

Beyond Petroleum: Strategic Workforce Planning and Climate Change Policies

by

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Bachelor of Education, University of British Columbia, 1979

Master of Arts, University of British Columbia, 2003

A Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree of

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Supervisory Committee

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Abstract

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Given the urgency of climate-change and the speed and scale of the structural transition to a low-carbon economy, there is a critical need for research that accelerates the diffusion of learning in the field of employment and workforce planning. While efforts to align workforce development and planning with the introduction of green policies are rapidly intensifying and maturing, there are gaps in coherence.

The transition to sustainable economies involves significant shifts in employment, including application and use of skills and workplace practices. New occupations are emerging and existing occupations are being greened at a rapid rate (Globe Foundation, 2010 a; ILO, 2011, pg. 4; 2012: OECD, 2013 pg. 47). Keeping equilibrium in employment while climate-change forecasts and technological innovations are rapidly evolving is a growing challenge for workforce planning and policy. This is also a ‘rate of change’ problem, and it needs to be better understood if governments are to provide leadership, adapt more quickly, and provide continuous high levels of services to citizens while maintaining strong economies.

Governments that understand this will be at the forefront of mitigation and adaptation efforts (OECD, 2012 a, b).

But how should that challenge be met? This study tackles that question, seeking to clarify how workforce development and planning can be directed toward improving employment prospects and reducing employment dislocations as the planet changes around us in the face of a changing climate. The implications of the findings are outlined and recommendations are then made as to how labour policies and workforce development and planning measures can best be targeted and integrated into the larger green policy framework to improve coherence of policies, institutional and organizational capacity and data capability.

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Acknowledgments

This dissertation is a story of three jurisdictions - British Columbia, California and New South Wales - as they strove to tackle climate change between 2000 and 2012, and the degree to which strategic workforce planning was included in each of their policy initiatives. This story reflects the culmination of academic, professional and personal growth, my own and that of the many researchers, policymakers and businesspeople whose work is described in the following pages.

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Dedication

For Ciaran

For he beholds the light, and from whence it flows, He sees it in his joy.

– William Wordsworth, 1884

Chapter 1

Introduction

Global Warming Challenge

The world is warming. Average surface-air temperatures have risen nearly one degree Celsius in the last 100 years (Intergovernmental Panel on Climate Change [IPCC], 2013; NASA, 2013), and science points to anthropogenic greenhouse gases (GHGs) like carbon dioxide, as the culprit. This warming will continue, and likely accelerate, if emissions are not drastically reduced on a global scale (IPCC, 2013). Warming, driven primarily by man-made emissions, is expected to increase by up to four degrees Celsius above pre-industrial levels by the end of this century. Historically, climate cools and warms in patterns. But the pace, or 'rate of change', is now significant (Pacific Institute for Climate Solutions [PICS], 2011). While the rate of warming over land has slowed recently, this is expected to be transient and is partly due to uptake of heat by the oceans; globally, warming is continuing (IPCC, 2013). Snow, ice and permafrost are in decline. Global average sea level has risen about 20 cm since 1900, due both to the addition of water to the ocean from melting ice on land, and the expansion of seawater as it warms. The changes that are underway have major environmental, social and economic consequences for all nations.

Science says that global warming needs to be limited to less than 2 degrees Celsius above pre-industrial temperatures to avoid dangerous climate change that would result in serious ecological disruption (IPCC, 2013). But we are already more than halfway towards that 2 degrees threshold (IPCC, 2013; 2011; WB, 2012).¹ Aggressive efforts to curb emissions would eventually reduce climate change, but cannot now prevent it entirely, because CO₂ has a long atmospheric lifetime. Even if emissions stop today, warming will continue for centuries as Earth adjusts to a new climatic equilibrium (IPCC, 2013). While no one can predict just how severe climate change impacts will be (IPCC, 2013; Stern, 2006) societies can both mitigate their contributions to this change and adapt to a new climate (IPCC, 2013; The World Bank [WB], 2012). Policy choices for mitigation and adaptation will vary for different regions, because warming will not be

globally uniform. Continental interiors experience more warming than coasts and polar areas are warming faster than regions closer to the equator (IPCC, 2013). Thus, there is a compelling case for all governments to transition to a low-carbon economy (see definitions, *Appendix A*). The transition is already happening, in some places, on a scale and at a speed ‘never seen before’ (OECD, 2011) with implications for employment, technology and innovation, and demand for ‘green’ products and services.

Adaptation and Mitigation: The Policy Response

Meeting these challenges simultaneously demands significant policy responses from governments, for it is they who identify priorities, provide market incentives, and drive changes in the green products and services sector, including stimulating innovation and adopting new technologies. This will require transformation in a transition to a world beyond petroleum that has at its core policies that promise to provide employment across a broad spectrum of societal needs for work in transition. Climate change mitigation and adaptation therefore requires that all governments change not only their internal business practices but the sectors they manage, such as agriculture, energy, fisheries, forestry, mining, tourism and transportation. It requires a conscious coupling of climate change and workforce planning policies. How these sectors are managed will vary depending on the regional climate differences. It will also depend on cultural differences, resources, and regional politics. The climate challenge is multifaceted, and no single policy will suffice.

The very complexity of the environmental challenges requires comprehensive policy interventions that are multi-faceted (Canadian Centre for Policy Alternatives (CCPA), 2010, pg. 11; Kok & de Coninck, 2007, pg. 587; Pielke & Sarewitz, 2005, pg. 267; Yencken, 2002). Natural systems do not conform to humanity’s boundaries. Therefore, solutions to these challenges require a coherent approach at all levels of governments and within societies. Meeting such challenges requires both public and private sector policy initiatives, particularly as they relate to energy and clean technology solutions. The public sector in particular faces unique challenges to innovate in the policy realm. One example is the question of whether its bureaucracy is ‘designed to innovate or to plan for

much of anything' (Desveaux, 1994, p. 31). Even with leadership and strategy, innovation is often constrained. Hence, the public sector often incents the private sector to action, particularly in clean technology development. Yet another challenge is that interventions also tend to 'evolve' and this evolution can also be constrained by the diverse array of rules developed in multi-lateral jurisdictions (sometimes referred to as a path-dependency evolution), which is the nature of environmental policy and governance in general, and climate change policy specifically (Howlett & Weaver, 2006).

To compound this environmental matters are often characterized by uncertain knowledge, competing values, political conflict and changing institutional arrangements (Head, 2010). What constitutes a successful policy initiative? There is a need to understand the governance, bureaucratic and organizational factors in policy innovation and focus less on policy and political errors in investigating why large-scale programs have failed or succeeded (Desveaux et al, 1994: 494; Head, 2010). But such factors are not the only deciding ones. Another variable is the selection of environmental policy instruments as well as governments' varying abilities to use such instruments (Eljadis, Hill & Howlett, 2005; Howlett & Ramesh, 1993). The ability to strategize about implementation of environmental policy affects the likelihood of success. Ultimately, it is important to understand the interplay of these variables not just to evaluate why previous policies have succeeded or failed, but to utilize 'knowledge and the capacity to generate and apply policy advice effectively in order to make policies "better" (Peters 1996:17). How knowledge is utilized within this increasing complex world of the policy process is "central to the capacity of government to govern effectively" (Peters 1996:17).

At the same time, government capacity is only half the story. The policy environment in which governments are functioning has grown increasingly uncertain (Klijn & Koopenjan 2004), which will influence workforce issues in any area. The framework for international action on climate change is evolving as are the policies at sub-government and regional levels. Cities face mounting pressure to act now to implement mitigation and adaptation efforts. But despite these pressures there is a gap between scientific research detailing the need for all governments to act, and the degree of action

undertaken. While there are numerous unknowns in this policy arena one goal of the comprehensive climate change intervention should be to minimize employment impacts and fluctuations as they take climate action, this points to a need for strategic workforce planning. Strategic workforce planning is critical to a society that looks to minimize employment impacts.

Managing the Transition: Strategic Workforce Planning

Two key assumptions elaborated in Chapter 4 animated this study: 1) government and society will be more adaptive and resilient to climate change long-term if environmental and economic policies, including strategic workforce development and planning, are aligned and reinforcing; and 2) that the transition to a low-carbon economy is necessary and in the best interests of society. Yet while workforce development and planning are key to comprehensive climate policy interventions (International Labour Organization [ILO], 2011; Organization for Economic Co-operation and Development [OCED], 2013), research is not keeping up. Indeed, in 2011, the ILO highlighted the “failure of environmental policy worldwide to consider employment” (*Skills for Green Jobs. A global view. Synthesis report based on 21 country studies*, pg. 10). While the ILO report (pg. 43) did find increasing links between environmental policy and skill policy in some governments, such efforts are not well aligned with climate change interventions.

Organizations such as the ILO and OECD have made significant efforts to conduct research on climate change policy and employment, particularly comparative country studies. Both organizations have mandates to advance understanding of the relationship between economic and environmental policies. Such research efforts linking climate change policy with skill policy are rapidly intensifying and maturing, but there are still gaps in application. This is somewhat to be expected; the challenge is very complex.

The transition to sustainable, low-carbon economies means whole new occupations are emerging. Jobs that already exist are ‘greening.’ This is also resulting in skill shortages (Globe Foundation, 2010 a; ILO, 2011, pg. 4; 2012). But while climate is a challenge for all nations, they are not making this ‘green’ transition equally due to varying capacities,

and this includes workforce development and planning (Climate Institute [CI], 2012). Green policies are expected to have a “neutral or slightly positive” effect on the workforce (ILO, 2009, p. 102), but estimates vary depending on modeling assumptions (such as timing or policy context) (Access Economics Pty Ltd., 2009). For example, the transition to a green economy will create jobs in expanding sectors (Australian Business Roundtable on Climate Change [ABRCC], 2006; OECD, 2011, 2012), and facilitate a significant transition, but jobs may be lost in carbon-intensive industries (CCPA, 2012).

Employment shifts due to green policies will be most significant, for example, where the most polluting industries comprise a greater part of the economy. According to the OECD (2012 a) almost 90 per cent of total CO₂ emissions come from just ten industries, which account for 16 percent of employment in OECD countries. These industries are: “agriculture, hunting and forestry; fishing; mining and quarrying; electricity and gas; inland transport; air transport; water transport; other supporting and auxiliary transport activities; activities of travel agencies; coke, refined petroleum and nuclear fuel; chemicals and chemical products; other non-metallic mineral; basic metals” (pg. 9). Most jobs in these sectors are in agriculture and transportation (OECD, 2012 a), but percentages vary within OECD countries. For example, 10 per cent of workers in Denmark are in these industries, but almost 30 per cent in Poland. Skill levels also vary across these sectors. The lowest-skilled workers are typically found in agriculture, and are likely to find the most displacement as climate-driven shifts take effect. The highest-skilled workers, conversely, are in the energy sector. While the technological innovations are advancing and new skills are required, these workers have the most potential for re-training after mitigation and adaptation initiatives (OECD, 2012 a). Conversely, in the renewable generation sector, sources such as wind, construction and general operational work will require a lower skill set for the most part, though there will be a management skill set needed. In general, it is “extremely difficult to forecast skills needs beyond general trends” (OECD, 2012 d).

Evidence suggests this transition will have a positive overall effect on the GDP of countries who undertake it (see *Appendix A*). But costs rise quickly with delay (WRC,

2008, pg. 6; Stern, 2006). Data suggest investing in renewables will be more profitable in the long run than fossil fuels, giving an economic advantage to those countries that adapt early (Work in a Warming World, 2011). Some leading research groups project that gross domestic product (GDP) will continue to grow as we transition to a low-carbon economy (see Allen Consulting Group, 2006 projected at 2.1 per cent per annum in Australia; CI, 2012; OECD, 2011). In 2011, the “annual value of the global environmental market was estimated to be \$866 billion, up 4 percent from 2010” (PICS, 2011). Clean energy investment topped US\$260 billion, “rising to 42 percent of total energy investment globally in 2010” (CI, 2012).

Keeping labour stable and economies strong while climate-change forecasts and technological innovations rapidly evolve is a challenge for policy makers and strategic workforce planners attempting to put sustainable green policies in place. To do this effectively, strategic workforce planners need to restructure and reallocate human capital, while minimizing the costs of complex factors like training systems, technology and public attitudes (ILO, 2011, pg. 15, OECD, 2013; OECD, 2011, pg.6). Governments that can do this will lead mitigation and adaptation efforts (OECD, 2012 a, b) and minimize labour impacts with good labour policies that harmonize with climate policy.

Government’s role is to “support workers and businesses to move to the green economy” (ILO, 2009, p. 102). Such policies aid in transitioning workers into the new economy (ILO, 2011; OECD, 2011; 2012) by minimizing labour disruption. This can be accomplished through strategic workforce planning which analyzes what skills workers currently have (skill supply) and projects skill demands in the future so that appropriate skills training programs can be developed. Countries with labour shortages, or skills ill-suited for a green economy, will see more impacts from climate and climate policy than those with plans.

Despite this, strategic workforce planning is still considered by some “a beginner’s game” (Conference Board of Canada [CBC], 2012). There is no “extensive academic or even applied literature” (Workforce Research Centre [WRC], 2010). Workforce

modeling still lacks precision, compared to other analytical areas of the climate-change milieu. Data are often not comparable between jurisdictions. Data can also be difficult to collect when skill sets and jobs are changing. Moreover, job forecasting tools are required for coherent workforce planning (Lipsig-Mumme et al., 2010). Addressing these issues with a conscious coupling of climate change policies and strategic workforce planning efforts will help reduce dislocations in the labour force.

Situating the Study: Academic Research on Climate Change and Employment

Academic research on climate change and employment impacts is a relatively new field that intends to assist workforce planners and policy makers as they attempt to transfer labour from decreasing areas of work to new areas of work. What follows distills several independent studies which illustrate how various climate change policies have impacted employment, using mathematical model projections that often do not fully factor the impacts of several competing policies, or are not sophisticated enough in their use of data codes to adequately account for labour transitions.

Recent literature reviews of the state of knowledge on work and climate include Wright's (2012) on Australia and Lipsig-Mumme's (2010) review of Canada's progress.

However, these reviews point more to a lack of academic attention. Although growing in sophistication, data analysis is often limited to specific sectoral studies (*see* Globe, 2012 for a study on employment impacts of the British Columbia Clean Tech industry and California research by the Clean Energy Research Centre 2012 as examples). Data capability, or integrity, to accurately project skill demand and supply is limited by coding and quantification. National and state/provincial data classifications are sometimes synchronized and sometimes not. At the regional scale, the value of workforce planning data is best realized when coupled with quantitative and qualitative information from businesses, but such information is sometimes not readily available. In general, established data categories often lag behind the current workforce skill profiles or are too broad to adequately capture the nuances needed for skill planning, particularly as they relate to green skills. This further constrains progress in workforce planning.

Improving workforce metric data collection and assessment will be key. Such efforts are rapidly intensifying and maturing, but there are gaps in application. In general, it is “extremely difficult to forecast skills needs beyond general trends” (OECD, 2012 d). Projections provide additional information and strategic guidance but should not “serve as a basis for detailed planning” (OECD, 2012 d). Strategic workforce development planning can close a gap by improving coordination across departments, agencies and between governments, identifies key transferable skills and can advance policy strategy. The more coordinated and cohesive the policy strategies, within and between different spheres of government, the more sustainable it will be (CCPA, 2010; WRC, 2011). However, the less tightly coupled the system, the greater its adaptability in unforeseen circumstances (Perrow, 1984).

Core to strategic workforce planning is data integrity especially in the context of climate policy. Sometimes, data are not reliable, relevant or even present. This can lead to inconsistent definitions (Centers of Excellence, 2009; City of Vancouver, 2012; Eco Canada 2012; UNEP, 2008), and difficulty in quantifying green jobs and the green economy (Globe, 2011; ILO, 2010; Parson & Associates, 2009; Pollin & Garrett-Peltier, 2009). These present barriers to understanding the skills needed to advance green policies and encourage greener production practices.

Skills present another challenge. The green economy, indeed any economy, relies on employee skills, in the public and private sectors. New jobs may require some new skills; others need up-skilling or training. The concept of sustainable skill ecosystems (SSES, Finegold, 2011) is promising where the “development and deployment of labour are in balance” (Government of South Australia, 2003). Yet, such concepts are not broadly evident in strategic workforce planning practice.

Learning from First and Second-Generation Adopters

There are lessons to be learned from nations who have adopted comprehensive climate change policies. In this study, these pioneers are called first and second-generation adopters. First-generation adopters introduced policy in the wake of the energy crisis of

October 1973, while second-generation adopters introduced policies in response to the Kyoto protocol (2005) and the Marrakesh Accord (2008 – 2012) implementation period. Each adopted different mixes of policies because of the state of knowledge and diversity of environmental conditions varied.

The First and Second Generation Adopters

The 1973 energy crisis galvanized efforts to reduce reliance on oil, particularly in European countries such as Denmark, Germany, Norway and the UK (identified as ‘first generation adopters’). The first Earth Day (April 22, 1970) catapulted a generation into greater environmental awareness and shifts in individual behaviors largely related to recycling. Early 1970s policies tried to reduce reliance on oil by encouraging adoption of alternate energy sources, improving efficiencies, and encouraging green economies. Reducing emissions was a by-product of these policies. It wasn’t until the IPCC (1988) released the first climate assessments (1990) and the Kyoto Protocol (1997-2005) set binding GHG emission reduction targets that there was a second wave of significant efforts.

The IPCC (1988) generated assessment reports at regular intervals on the state of the science from 1990 on, with the fourth assessment launched in 2007 (and the fifth in 2014). Evidence increased that anthropogenic behaviors and actions were having an impact on climate change. After the Kyoto Protocol, voluntary carbon markets gained momentum especially during the first implementation period from 2008 – 12, an interval known as the Marrakesh Accords. While nations signed on (or not), carbon pricing was first introduced at the sub-government level in several second-generation adopter nations starting in the mid-2000’s and several of these nations commenced more serious action on climate policy.²

This study first reviews approaches of first- and second-generation climate policy adopters, both in their comprehensive climate change interventions, and their workforce development and planning efforts in three case studies of New South Wales, Australia, British Columbia, Canada, and California, United States of America (USA), along with

experiences of other industrialized nations including Denmark, Germany, Norway and the United Kingdom (UK). It then compares and contrasts how governments of these nations, both first- and second-generation adopters of comprehensive climate-change interventions, have aligned their workforce planning and development with their green policies. Motivators and barriers will be identified, and recommendations for future research made.

Mobilizing Regional and Local Governments

Understanding first and second-generation interventions requires appreciating the role of regional collaborations and local governments. This level of government often implements national and provincial/state policies and plays a significant role in mitigating GHG emissions. For example, in British Columbia, an estimated 45 percent of greenhouse gas emissions fall within local government jurisdiction (Tyee Solutions Society, 2012). This constituency is therefore important. The literature shows that “excessively centralized and bureaucratized resource management science” at national levels often fails, and points to the successes of local governments and grassroots social-mobilization (Berkes and Folke, 2002: 121) for mobilizing policy action. Local governments often integrate and customize the broader climate change policies in suitable institutional arrangements to meet local needs. For this reason it is critical to study not only the details of local governments’ efforts at climate policy implementation, but also the organizational and institutional influences on them (Desveaux et al, 1994: 494; Head, 2010).

Research Focus: Case Studies and the Second Generation Adopters

Strategic workforce planning efforts at the sub-national and local government level are particularly explored in this study. The province of British Columbia (BC), Canada, and states of New South Wales (NSW), Australia and California, United States (US) led in climate change interventions in their respective nations and all led with the introduction of various carbon pricing schemes following several years of developing climate policy. British Columbia and California spearheaded the Western Climate Initiative (WCI) in 2008 with a goal to establish a regional cap-and-trade initiative. However, it was

California that eventually signed with Quebec while British Columbia watched in the wings. And, while the US and Canada have regional cap-and-trade markets, Australia is the only one of these nations that introduced a national carbon-pricing scheme in 2012 only to be repealed two years later. Australia made earlier progress at the state level in 2003 and by 2007 the New South Wales abatement scheme was the second largest in the world.³ In addition to considering or applying carbon pricing, each case study jurisdiction established policies, structures and training programs dedicated to climate action.

But a big part of these larger stories involves the actions of regional and local governments such as BC's Capital Regional District, the District of North Saanich, the City of Vancouver in British Columbia and the City of Sydney, New South Wales. Their efforts illustrate various strategies to align green policies with workforce development, and show the challenges inherent in such alignments, including lack of policy coherence, data or data capability limitations, and changes in labour demand or capacity. Jurisdictions differ in their characteristics, readiness, timing and approach to the climate challenge, so there can be no one 'magic bullet' approach. As we shall see, the degree to which these jurisdictions integrated strategic workforce planning⁴ with policy interventions had significant bearing on how efficiently new policies were implemented.

Research Questions and Objectives

What policies will reduce labour disruption in the transition to a low carbon economy? The early efforts of first-generation adopters met with fleeting success, initially introducing innovations that linked climate policies with workforce training to varying degrees. Automakers, for example, linked training programs with new technologies, and government strategic workforce planning identified green skills demand but a comprehensive approach across sectors was not embraced. The implication is that adapting employment needs to climate change must link labour and employment policies with strategic workforce planning processes.

With this in mind, three secondary research study questions guide this study. Each is discussed in turn.

Policy Coherence and the Broader Contextual Environment

The first question seeks to examine the tools and strategies second generation policy adopters used and how they differed from first generation policy adopters to understand policy coherence in a broader contextual environment.

1. What tools and strategies did the second-generation climate policy adopters British Columbia, California and New South Wales use, both within government and on a macroeconomic level to mitigate and adapt to climate change, and how coherent were they? Specifically a) what distinguished them from first-generation adopters? b) how did their arrangements evolve, or were they planned and c) what was the role of leadership?

This question seeks to understand how the climate change policy environment varies in each jurisdiction, whether carefully planned or organically evolved, as well as how important a role leadership (i.e. political and government executive) played in the evolution of these policies. This also includes understanding the degree of coherence of climate policies of selected nations and governments, including local governments, while accounting for unique characteristics. Coherence implies policy consistency. For example, tax incentives for carbon-intensive industries and fossil fuel development subsidies may contradict or counter mitigation efforts. Yet, economic subsidies and incentives can still play a role, in particular where they are coupled with broader societal objectives that will benefit future generations, such as reaching net zero emissions.

Institutional and Organizational Capacity in the Transactional Environment

The second question seeks to understand how well second generation adopters adapted institutionally and organizationally to the implementation of new policies.

Understanding the role of local governments, who play a large role implementing the policies of sub governments, and understanding whether their role in strategic workforce

planning and training was a critical variable is key to understanding the role of strategic workforce planning.

2. What policies, or aspects of policies, benefit or suffer from being run at a local or regional level? Did second-generation jurisdictions customize their climate change policies - and associated workforce training - for their specific policy settings, and if so, how was the customization institutionally supported?

Different countries have developed different institutional and organizational capacities to advance comprehensive climate change interventions and workforce planning. Dedicated agencies typically improve inter and intra-organizational communication, innovation and productivity. But to be optimally effective they ideally would be embedded close to key decision-making centres and be actively and sustainably supported by leadership. This study illustrates how effective institutional and organizational structures and sustained political support can strengthen climate change interventions while at the same time demonstrating that such outcomes are fragile: the demise of either structure or support can hobble effective policy intervention. This transactional environment between systems, including policies and labour, varies.

Levels of readiness and circumstances differ in countries developing comprehensive climate change policies and undertaking workforce planning. Climate, however, does not recognize political boundaries and is best broadly understood as a global system with regional variances. In this regard, climate change mitigation and adaptation efforts are best advanced via coherent macroeconomic approaches that aim to harmonize policies regionally, nationally and internationally. Carbon pricing and vehicle emission standards are two examples discussed that deal with higher-level policy with broad impact. Incentives for clean technology innovation and support for lifelong learning are also discussed and reflect more local consideration of socio-economic policy structures.

As societies adapt, they learn from their predecessors. But an institution's capacity to do so while implementing new climate policy, varies. Some thresholds exist past which

society can no longer make meaningful adaptations. As well, there are some thresholds beyond which adaptations become large-scale (Adger, Lorenzoni & O'Brien, 2009). Pahl-Wostl (2009) explores the idea of duetero-learning, which must happen in order for values and ideas to evolve as a regime transitions, opposed to single-loop learning, where effectiveness increases but organizations are not transformed.

However, bureaucratic and institutional factors can obstruct adaptation. Organizational structures of temporary adhococracy can allow administrative units to be structured and bureaucracies designed to support comprehensive policy innovation (Mintzberg, 1979). Child's (1972, 1997) "strategic choice" perspective suggests that actions by groups with the political power to influence organizational structures are key to adoption of climate policies and workforce organization. Desveaux (1994) draws our attention to the public sector's unique challenges in connecting structure and policy strategy.

Capability of the Workforce and Planning Systems

The third question seeks to understand how well strategic workforce planning institutionally supported the introduction of climate change policies and what learning strategies second generation adopters developed.

3. What workforce development and planning approaches, including learning strategies did second generation adopters develop?

This question seeks to compare and contrast the green skill workforce development and planning of selected nations and governments; and identify those that will most likely succeed across the public and private sectors. The third question seeks to understand the strengths and weaknesses of various strategic workforce planning approaches. Moreover, the research presented here shows that overlapping efforts can reduce efficiencies. Human resources are critical: effective and timely policy transitions require capable people to be at their core.

If policy interventions are to succeed, they need to be able to adapt to change. No single approach suffices (Cohen & Levinthal, 2010; Yencken, 2002). Different solutions may need different institutional supports, and organizations have widely varying institutional and organizational capacities. Resilience and vulnerability of individuals and organizations is critical to consider, as well as the limits to change (potential) and degree of internal control over variability (connectedness) (Holling and Gunderson, 2001). The adaptive cycle could be thought of as having two distinct stages: the first incremental phase of growth and the second of rapid growth or reorganization. When nations implement new climate change policies and establish new governance and institutions, they may have a slower start and then a faster advancement as initiatives evolve or reorganization creates renewal (Holling and Gunderson, 2002).

Along with institutional and organizational capacity for learning, adaptation requires good data. Countries differ in their capacity to provide data, including the capability to adequately capture environmental and economic measures. Global climate data are available through organizations such as the IPCC (2013), while national and regional data are available through their respective agencies. Workforce planning data are primarily collected statistically. Too often this is not a seamless undertaking.

A further critical variable that must be considered in a strategic workforce planning framework is skills. With respect to skills implementation transformative policy research says we should shift focus from nurturing specific skills to encouraging skills that allow people to respond and adapt to changing circumstances (WRC, 2012). The trend is to focus on finding a proportionate balance between generic skills (i.e. flexibility, adaptability, communications and social skills) that enable the workforce to respond in an uncertain environment, and job-specific skills (Keating & Smith, 2011). This is a critical challenge in workforce planning and a difficult requirement to establish. This balance becomes even more challenging when considering green policy, because there is a debate on what actually constitutes green skills or green jobs (CCPA, 2010; UNEP, 2008) Because of this, some scholars and practitioners are reluctant to define a given group of skills as green for strategic planning purposes (ILO, 2011 pg. 5).

Together, these research questions and objectives delineate the scope of the dissertation while identifying the gaps between policy coherence, institutional and organizational capacity and workforce capability. Ultimately, this work will lead to improved strategic workforce-planning best practices that will reduce turnover and expedite implementation of comprehensive climate change policies.

Overview of Empirical Approach

All governments grapple with workforce planning as a part of comprehensive climate change interventions. To provide a deeper theoretical and practical understanding of this process, a qualitative study that braided data, theory and field work was determined to be the best approach. This study is informed by a literature review on climate change policy, as well as on workforce planning that began to construct the framework that forms a backdrop to the study. This literature review spanned comprehensive climate change policy, comparative environmental policy, governance models, institutional and organizational factors, workforce development and planning, and employment impact modeling. Literature that describes the practical efforts of selected nations to introduce comprehensive climate change interventions was also reviewed.

Even though the focus of empirical research was on second-generation adopters, to locate these initiatives a backdrop of selected first-generation comprehensive climate change intervention adopters and their initiatives was undertaken in order to compare the efforts of first and second-generation adopters. Norway, Denmark, Germany and the UK were chosen as examples of first-generation adopters. Each nation advanced clean technology and renewable policies and related workforce-planning policies in the 1970s.

Three case studies of British Columbia, New South Wales and California were undertaken involving more than sixty semi-structured interviews, site visitations, seminar and conference participation, document analysis, and interviews with key informants such as climate change scientists, clean tech CEOs and senior strategic workforce planners over a period of four years. This involved learning first-hand from those who

developed and implemented regulations and policies, including workforce development and planning from three countries: in Australia (2012) while based at the University of Sydney's Workplace Research Centre in 2012; in British Columbia in 2010-12 conducting interviews; and telephone interviews with agencies in California in 2013. The questions arose as to the differences and similarities: Did they develop coherent policy and what was the broader contextual environment they worked within? What is their institutional and organizational capacity and how were policies developed and implemented (i.e. what was the transactional environment), and finally, what was the capability of the workforce and planning systems?

In addition to the empirical research the author also drew on infield working experiences undertaken in 2007 – 2010 in the BC Public Service Agency and as Associate Director, Workforce Planning and Leadership Secretariat. Work entailed identifying skill training for policy analysts, develop corporate workforce planning criteria and evaluation criteria working with a team of actuaries to inform deputies on trends and projections. This provided in-depth knowledge of the BC Government workforce planning system and foundational knowledge of metrics and data capability strengths and limitations that in turn guided the dissertation interviews and inquiries. Concurrently, the BC Public Service agency co-sponsored a MITACS research project on turnover within the BC Public Service, seeking to clarify 'optimal levels of turnover' in key areas of general and specific skills.

These cumulative work experiences and building empirical research led to further considerations as to how institutional strategy and structure fed into the capacity and capability of those government departments to carry out meaningful policy on an ongoing sustainable basis.

Organization of the Study: Three Parts and Eleven Chapters.

Chapter One describes a problem common to all governments, whether local or national, developed or developing; what is the best way to transition a workforce to a green economy while mitigating and adapting to climate change? It lays out the research

objectives and questions -- the first step to building a meaningful answer to this complex question.

Part One - Theoretical Perspectives, Analytical Framework and Methodology - has four chapters that provide an overview of the study and its theoretical underpinnings. A theoretical backdrop is outlined in the Chapter Two which surveys existing theory on policy responses to complex challenges like climate change. But what theories exist around workforce planning, the human side of that policy response? This is explored in Chapter Three. Chapter Four outlines the analytical framework. Chapter Five, which closes the first Part, lays out the methodology, ethics, and research approach. But theory alone is not sufficient. Therefore, in Part Two the dissertation examines real-world examples of international climate action.

Part Two - First and Second Generation Comprehensive Climate Change Interventions - has four chapters. In Chapter 5, comprehensive climate change intervention efforts of first-generation adopters at a macro level are examined and then more detailed accounts of three second generation adopters at the sub-government level including local government mini-studies in two of the sub-national governments, set the stage for the second generation of adopters, three of which are profiled in detail in Chapters 7 through 9. British Columbia, Canada; New South Wales, Australia; and California, USA are all sub-national jurisdictions that met the climate challenge within their own unique national context. These efforts show various degrees of success. Some had greater success than others. Did they learn from the first generation efforts and experiences, or were efforts thwarted politically, institutionally or organizationally? Were there capacity issues? What patterns can we see? This micro study approach magnifies the challenges that each jurisdiction faces, in particular, challenges of advancing policies developed at provincial or state levels that may not be coherent. Trying to advance policies that may have several competing authorities, and then trying to design adaptation or mitigation policies within the local government framework that is also limited in scope, is illustrated.

The third Part - Comprehensive Interventions: Reflections and Implications - considers degrees of integration of coherence, capacity and capability. In Chapter 10, which forms the first of two chapters of the third part of the dissertation, the findings are compared to each other in terms of policy coherence, capacity, and comprehensiveness. How do jurisdictions stack up, and what patterns emerge? Beyond theory, what can practice tell us? Overall the research findings were coherent with the theoretical literature review. Namely, that the preconditions for effective comprehensive climate change policy interventions are coherent policies, coordinated institutional and organizational mechanisms, sustained leadership, and political will, supported by strategic workforce planning that has strong data capability. Labour disruption and employment impacts are minimized when all conditions are met. Chapter 11 reflects on the framework and the findings for policymakers tackling this challenge in their constituencies. Practical implications and future research implications are outlined to help integrate workforce development and planning metrics into a comprehensive climate change policy framework.

PART ONE

**THEORETICAL PERSPECTIVES, ANALYTIC FRAMEWORK
AND METHODOLOGY**

Chapter 2

Comprehensive Interventions - Theoretical Perspectives

Introduction

Chapter 2 begins by introducing the concept of comprehensive interventions and explains why governments use them for complex policy issues and big challenges. The chapter begins by describing the nature of comprehensive interventions and explains why a multi-faceted approach works for complex policy challenges and why multiple tools and instruments are required. Comprehensive policy interventions are characterized by horizontal and vertical policy coordination between levels of government and sectors. Inter-jurisdictional collaboration is often required, and the larger the intervention, the more coordination is required. Above all, comprehensive interventions are initiated through political support at the elite level and without sustained support risk failure.

Chapter 2 is the first of two chapters that consider theoretical literature. It describes the comprehensive policy intervention approach, explains why a comprehensive intervention approach to climate change is needed, and examines the roles of multiple levels of government. The chapter highlights the roles of sub-government and local government levels of administration, which are also the focus of the case studies. While large international treaties can be galvanizing and often generate attention, sub-government and local government is where most concrete action occurs, and is therefore critical to understand. It also reviews literature of political agenda setting, role of elites, institutional design, and organizational factors. Other research from the field of organizational literatures is considered in Chapter 3 Strategic Workforce Planning.

Comprehensive Interventions and Complex Policy Issues

Complex challenges such as energy supply, pandemics, or environment require comprehensive interventions (Desveaux et al., 1994: 494) because of the many inter-related factors and effects they present (Canadian Centre for Policy Alternatives (CCPA), 2010, p. 11). But comprehensive interventions can be at risk of failure from many

variables at the institutional and organizational level. Environmental matters for example are often characterized by uncertain knowledge, competing values, political conflict and changing institutional arrangements (Head, 2010). Governance arrangements that consider all of these challenges are required.⁵ Such policy interventions often develop in an “evolutionary manner” because securing “political consensus” about how to address the problem can be difficult (Bodansky and Diringer, 2010, p. 9). This is the nature of environmental policy in general, and climate change policy specifically (Howlett & Weaver, 2006). With this in mind we review the political, institutional and organizational factors which influence the success of comprehensive interventions, beginning with the critical factor of agenda-setting, formally and informally.

Mobilizing Action. Convergence of Problems, Policies and Political Leadership

Political support at the elite level is critical to getting an issue on the policy agenda. This is a major message from Kingdon’s (1984) seminal study of the agenda-setting in health and transportation as case studies in the US. Kingdon draws on March & Olsen’s (1972) ‘garbage can’ model of decision making, wherein problems and solutions come down the chute at different times and decisions can be made based on causal or incidental relationships. Kingdon’s key arguments are that two categories affect agenda setting: active participants, or actors (inside and out), and processes. There are three types of processes (or streams): problems, policies and politics. Politics is the formal agenda while the policy stream is the alternative agenda. The convergence (or coupling) of these three streams is necessary, but not sufficient, for a subject to get on the agenda. There must also be a critical juncture, or focusing event – a policy window. There are in turn different types of windows: problems or issues that captures attention and political windows such as changes in administration or crises (Kingdon, 2003: 15).

A complementary perspective comes from Sabatier’s (1984) Advocacy Coalition Framework (ACF) which conceptualizes policy change as occurring in a policy subsystem consisting of actors with complimentary beliefs; a set of basic values, assumptions and perceptions. The belief systems of coalitions are organized hierarchically: deep core beliefs are fundamental norms and beliefs; policy core beliefs

are ‘fundamental policy positions and strategies for attaining core values across the policy subsystem’ and secondary aspects are “instrumental decisions and information searches necessary to implement policy core” (Parsons, 1997: 197). The deep core beliefs are the most resistant to change, i.e. one’s opinion on ‘freedom vs. social equality’, and require a significant focusing in order for change to occur. Sabatier also suggests this agenda-setting is “dominated by elite opinion” (Sabatier, 1991: 148). Therefore he believes that in order to change policy, policy subsystems should focus on elite opinion, and given that deep core beliefs are very difficult to change, that efforts should be aimed at changing secondary beliefs which are the easiest to change. The model predicts change at the deep core level only with a ground-shaking, focusing event. The model also predicts that there will not be significant change in policies as long as the subsystem advocacy coalition that instituted the program is in power – unless the change is imposed by a superior jurisdiction.

A key premise of the ACF is that understanding the process of policy change requires a time period of at least a decade. This is particularly relevant to environmental issues, such as climate change, which require long periods of time to identify the issue and problem, establish targets and goals for mitigation and then implement technologies to achieve the goals. The ACF suggests that issues can move up the agenda without requiring huge, unpredictable focusing events. It is consistent with Mintzberg’s (1987) observation that there can be deliberate versus emergent strategies, the latter building over time.

Child (1997) reminds us these choices of action, structure and organization need to be strategic. If this is the case, a temporary adhococracy structure can design administrative units and bureaucracies to better support new policy (Mintzberg, 1979). Child’s (1972; 1997) “strategic choice” perspective suggests that leading groups with political power over organizational structures are key to adoption of policies and workforce organization. This takes us into the realm of institutional design:⁶ how governments are restructured to fulfill its functions.

Implementation: Institutional Structures and Strategy

The institutional structures and systems vary by nation and political systems and the structures themselves influence policy capacity. One key factor in many nations today is federalism, a political system where responsibilities are divided between federal and provincial or states. One such example, is Canada's Westminster, federal system. Inherent in the Westminster model is 'parliamentary sovereignty; strong cabinet government; accountability through elections; majority party control of the executive (i.e. Prime Minister, cabinet and the civil service' (Rhodes, 2003: 5). The ultimate decision-making power is concentrated in the hands of a relatively small number of officials (Savoie (1999, 2003).

Federalism is cited as a major reason for weak policy capacity of governments in Canada and the US (Atkinson, W.D & Coleman, M.M., 1989). It has constrained the capacity to develop consistent and coherent sectoral policies. In such countries, national policies in most areas require agreement between the federal and provincial or state governments in complex, extensive and time-consuming negotiations with no guarantees (Howlett & Ramesh, 2003: 62). Where appropriate, in the case of federations, some policies need to be introduced with coordination at the national level (CCPA, 2010, p. 12), while others will be implemented at other levels of government, raising the potential for conflict and the need for bridging and coordination. Federal systems thus significantly affect the capacity of government officials to deal with pressing issues in a timely and consistent fashion because public policies are made and implemented by the 'national/central as well as state/provincial governments' (Howlett & Ramesh, 2003: 62). Bakvis & Skogstad (2002: 5) argue that executive federalism is a key to understanding the dynamic of Canadian federalism, which fosters an elite group that sets the political agenda. Yet there are other factors that impact how well strategies are executed, including uncertainty, the structure of bureaucracy and policy capacity.

Strategy Challenged by Uncertainty. Uncertainty challenges government structure and strategy implementation. Desveaux (1994) stresses the importance of structures that can innovate to implement strategies which, he argues, can be "analyzed in terms of two

categories of uncertainty: generalized and contingent” (p. 31). The challenge of coordinating climate-change policy has uncertainty on many levels requiring vertical and horizontal integration. Ongoing political support for these new integrated institutions is also critical. The comprehensive intervention risks failure if it is not well entrenched horizontally across government, which is why government structure is integral to agenda-setting and policy implementation. Another structural barrier is a lack of capacity, or gaps in the institutional structure itself, especially when it comes to new institutions created to address new policies. Any new institution needs ongoing attention because they may “gradually become rigid and myopic, economic sectors that become slavishly dependent, ecosystems that are more fragile and a public that loses trust in government” (Holling, Gunderson, and Ludwig, 2002 p. 9). All of these factors surrounding institutions and strategy will affect the design and performance of comprehensive interventions. Next, the role of the organization and the people who work in them, and their roles in advancing comprehensive policy interventions is discussed.

The Structure of Bureaucracy and Strategy. How the bureaucracy in particular is structured will affect the tools at government’s disposal to address broad challenges and this is particularly important for comprehensive interventions. Aucoin (1997) argues that the integrated delivery systems necessitated by comprehensive interventions still demand three factors: hierarchy, specialization and standardization (Aucoin, 1997: 298). Hierarchy, specialization and standardization are central to bureaucracy. Hierarchy is transparent in that it makes roles and responsibilities clear; specialization permits assignment of tasks to ensure competence and standardization promotes ‘equity, economy, efficiency and effectiveness’ (p.291). The inter-organizational structures demanded by the integrated delivery systems of comprehensive interventions which works across sectors requires a type of professional management not inherent in machine-style bureaucracies (Aucoin, 1997: 298). Aucoin (1997) argues that the challenge therefore is to design bureaucracy in ways that ‘best adapt the requirements of hierarchy, specialization and standardization to serve the ends of democratic direction, control and accountability, as well as the ends of effective public policy, productive public management and responsive public service’ (p.292).

Structure and Policy Capacity. Because the bureaucratic structure has the strongest effect on public policy processes, especially at the sectoral level, the impact on policy capacity has been enormous (Peters, 2006: 36). A government's strength can be measured by the bureaucracy's strength at the sectoral level (Atkinson & Coleman, 1989). Government is weakened in a given sector when authority is dispersed. The increasing 'politicization of governing and the declining real rewards' causes many senior civil servants to leave government (Peters, 2006: 36). Weaver & Rockman (1993:11 - 13) found that policymaking capabilities "differ substantially across policy areas within a single political system' due to 'different institutional arrangements in different policy areas or because similar institutions operate differently across these areas". In this way, the structure of bureaucracy and its tools is a critical institutional factor in determining policy capacity. Another barrier is "inadequate quantity or continuity of financial and human resources" (Ross & Dovers 2008: 255). These authors conclude that at the national and state level, analysis of environmental impacts of policies is weak, "resulting in a lack of evidence for presenting a business case for further action to support environmentally sustainable policies and programs" (Ross & Dovers 2008 p. 252). This has worsened due to policy capacity of governments in general has been eroded or 'hollowed out' in recent decades (Bakvis, 2000; Howlett, 2007, 2009; Pal, 2006; Peters, 1996; Weller, 1997).

Some argue that the capacity of governments may not have eroded; responsibility has been distributed (Dobuzinskis, Howlett & Laycock, 2007; Klijn & Koopenjan, 2004; Peters, 1996). Still others argue that the capacity 'varies widely' within a country such as Canada and depends on the size of government (i.e. smaller vs. larger provinces) (Howlett & Lindquist 2007: 102). Some see increased politicization in the provision of policy advice to ministers which contest the advice of public servants (Aucoin 1988; Peters 1996; Savoie 1994) and still others worry about the concentration of power in the hands of prime ministers particularly with respect to identifying policy priorities (Savoie 1999, 2003, 2008). Additionally, erosion of capacity in government has not been even (Peters, 1996: 24). Lindquist (2010) observes "gaps and limitations of comprehensive policy and administrative reform interventions," including the "inability of decision makers to anticipate all aspects of complex challenges when choosing strategies and

design” (p. 127). This gap emerges with respect to comprehensively linking new policies to workforce planning and climate change is no exception.

At the same time, the environment in which governments are functioning has grown increasingly uncertain (Klijn & Koopenjan, 2004). Globalization also has meant that governments will need to adopt instruments that permit greater ‘flexibility, speed and sensitivity in responding to external environmental factors’ (Peters, 1996: 5).

Jurisdictions will also need to work differently and collaborate. One of the by-products of this is the increase of cross-government policy issues and the need for governments to ‘manage policy horizontally’ (Peters, 1996: 5).

Desveaux et al (1994) draws attention to the public sector’s unique challenges in connecting structure and policy strategy, and questions whether the public bureaucracy is “designed to innovate or to plan for much of anything” (p. 31). These authors, as well as Lindblom (1959) and Wildavsky (1973) argue that bureaucratic ability to execute strategy is constrained by organizational design and access to and ability to process the necessary information. Mintzberg (1979) argued that some structures lend themselves to a more efficient adoption of policies than others. Desveaux (1995) argues that “public bureaucracies are ‘embedded’ in and accountable to a broader hierarchy of governmental and nongovernmental organizations” (p. 34).

Bureaucracy will be explored in greater depth with respect to workforce function in Chapter 3. This brings us back to institutional structure, and how it conditions the use of policy instruments and ultimately, their effectiveness. Let us briefly re-consider institutional structure, this time with an eye to its effect on policy instruments.

Strategy and Policy Instrument Selection. The selection of environmental policy instruments themselves (such as a carbon tax, cap-and-trade, fuel standards) and governments’ varying abilities to use them (such as what the carbon tax is applied to, the type of cap-and-trade system, fuel standards that are introduced over time) is crucial to the success of policy (Eljadis, Hill & Howlett, 2005; Howlett & Ramesh, 1993;

MacDonald, 2008). Thus, the institutional context, or the ability to strategize the implementation of environmental policy effectively, is a significant factor in the successful execution of policy. Carbon pricing, for example, is efficient because it doesn't require much ongoing control but simply mimics and deepens the market. Allocating input resources and output goods and services is one of the most complex human problems, to which the market is an elegant, bottom-up solution (albeit with the controls necessary to making it all work).

Policy instruments are not just tools. In simple models of policy-making (Pressman & Wildavsky, 1973), policy solutions are decided upon and then implemented, though things usually go awry at the implementation stage. The task of the analyst is to figure out which is the right or best tool to use, and then to fix mistakes when things don't go as planned (Mazmanian & Sabatier, 1980). Stone (2001) argues that each policy instrument is a kind of political arena, with its peculiar ground rules, within which political conflicts are continued. In a comparative investigation of differences between nations in the use of preferred policy instruments, Van Waarden argues that "the national differences in handling political and administrative issues [...] are related to the institutional environment, particularly the political, jurisdictional and public service institutions specific to each respective country." (Hill & Hupe, 2002: 165). In this way, institutional context informs policy selection, and vice versa.

Strategy and Bottom-up versus Top-Down Approach. Political theory has treated political institutions as determining, ordering or modifying individual motives and as acting autonomously in terms of institutional interest. More modern theoretical work in political science assumes that political phenomena are best understood as the aggregate consequences of individual or group behavior. There are two inherent assumptions in this approach: 1) that human behavior can be viewed as conscious or unconscious, but either way, preferences are exogenous to the polity and the timing of events is also exogenous depending flows of problems and solutions; and 2) that collective behavior stems from the interweaving of behavior at the lower level of aggregation (i.e. bottom-up versus top-down). The behavior of an organization is the consequence therefore of interlocking

choices by individuals and subunits. The behavior of the market is the consequence of interlocking choices by individuals and organizations, each in turn acting on aggregated preferences. Outcomes at the system level are determined by the interactions of individuals. This brings us to a critical difference between institutional structure and strategy factors in comprehensive policy: the ability to structure the implementation and train and motivate individuals and the ability to strategize effective implementation. Both are critical to successful policy execution (Head, 2010; Pahl-Wostl, 2009). Both provide insights on constraints to adaptation to new policies (Inderberg & Eikeland, 2009). How are these considered in a comprehensive climate change intervention? We turn to that now.

Comprehensive Policy Intervention: Climate Change Mitigation and Adaptation

Comprehensive interventions are critical to environment and climate change policy at all levels (Urwin & Jordan, 2008). Strengthening regional, national and international co-operation and managing public domain issues, such as climate, “hold the key to addressing co-ordination and incentive problems” (OECD, 2011: 13). Conversely, the “absence of coherent strategies to deal with these issues creates uncertainty, inhibits investment and innovation and can thus slow economic growth and development” (OECD, 2011: 17). Governments tackling climate change need institutional arrangements suitable to the problem (Howlett & Rayner, 2006; Wilkins, 2008) as well as the ability to adapt and learn (Cohen & Levinthal, 2010; Howlett & Ramesh, 1993; Yencken, 2002). Different policy solutions have different skill needs, and may need different institutional support. The ability to adapt may be the difference between success or failure.

Setting the Agenda for Climate Change: International Framework

International efforts through treaty and agreements with respect to climate change mitigation and adaptation have been ongoing since the United Nations Intergovernmental Panel on Climate Change (IPCC) was formed in 1988. Five assessments on the state of the climate have since been published, that synthesize scientific research on climate with the goal of informing governments and decision makers. The first assessment informed

the United Nations Framework Convention on Climate Change (1992) that set goals for global emission reductions with developed countries being given the leadership responsibility. It also transferred resources from developed to developing nations and it required that developed nations account for their emissions although targets were not set. Since 1995, the group of nations has met annually at the Conference of Parties but the group has been challenged to come to consensus on various items including how to divide the responsibilities and costs between developed and developing nations. Sharing responsibility has been difficult to quantify as developed countries account for the majority of anthropogenic greenhouse gases currently but developing nations are still acquiring clean technologies and do not wish to be held to the same standards as developed countries. Supporting developing countries to reduce their greenhouse gas emissions while gaining economic growth is a crucial challenge when developing international climate change interventions.

Key international progress includes the Kyoto Protocol (1997), the Copenhagen Accord Reduction Pledges (2010), the Durban Conference (2011) and the Doha Conference (2012). The Kyoto Protocol (effective 2005) had a consensus among developed countries (except for the USA and Australia) for the reduction of greenhouse gas emissions of 5 per cent below 1990 levels (by 2012). Some countries including Canada eventually pulled out of the protocol while others met the targets. Copenhagen set targets for greenhouse gas emission reductions by 2020. Countries such as Canada and the US agreed to similar reductions, relative to 2005, and Australia pledged 5-25 per cent reductions relative to 2000. Yet these pledges will not yield the necessary reductions to avoid temperature increases of more than 2 °C that the IPCC (2013) warns is the threshold for seriously adverse economic and environmental harm. Durban⁷ further sets binding emission targets for 2015 still in keeping with the 2020 targets from Copenhagen and also extends the Kyoto Protocol to 2013 (phase two) as well as a funding mechanism to support developing nations' transition to green technologies. Doha extended Kyoto to 2020 and also agreed on a process to reach a global agreement by 2015 but Canada opted out and the US did not ratify its participation. The new Kyoto targets now apply to the European Union and some other countries responsible for less than a quarter of the total greenhouse

gas emissions internationally. There are voluntary commitments by other nations but they are not sufficient to prevent the 2°C global temperature increase.

National Efforts: A Custom Approach with Harmonized Regulations

The challenge to meet international targets agreed to by nations with committee and voluntary participation rests at the national and sub government levels, each with different characteristics that govern instrument selection (OECD, 2011, p. 35) and different levels of readiness (OECD, 2013). Climate change policies generally aim to build on the energy advantages of their respective jurisdictions while advancing clean technology and developing market-friendly products. While country characteristics such as energy sources, geography, or climate are considered in the development of mitigation and adaptation policies, there is also an effort to harmonize regulations between nations and sub-government jurisdictions. Perhaps the most well-known are the harmonization of fuel efficiency standards between Canada and the US. Energy policies are a cornerstone policy of comprehensive climate change interventions.

Denmark, the United Kingdom (UK) and Australia are examples of national governments that introduced comprehensive climate change interventions including carbon pricing to stimulate technological innovation, regulations and support for green infrastructure. Denmark is generally regarded as leading mitigation efforts having reduced land emissions by close to 20 per cent to 1990 levels by 2010 and has set a 35 per cent renewable energy target, with 50 per cent wind energy, by 2020 and 100 per cent renewable energy by 2050. Australia's carbon tax introduced in 2012 by the Gillard government showed promise but was repealed in 2014 by the Abbott government. The United Kingdom has exceeded its Kyoto target of 12 per cent by double relative to 1990 by 2010. The UK's *Climate Change Act (2008)* (described in more detail in Chapter 5) aims for an 80 percent greenhouse gas emissions reduction by 2050. The UK has also established a comprehensive arrangement of policies and incentives to encourage green infrastructure development in the UK and reduce deforestation in developing countries. Such efforts to mitigate greenhouse gas emissions and adapt to climate change have been led by the Department of Energy and Climate Change (2008). The establishment of

dedicated central agencies (e.g. Denmark, Australia and the UK) often leads the development of innovative policies and measures. These institutional and organizational support mechanisms aided in multi-jurisdictional coordination and implementation.

A review of the efforts of first-generation adopters Denmark, Germany, Norway and the UK will be undertaken in Chapter 6 and an overview of Canada, Australia and the United States will be undertaken in Chapters 7, 8 and 9, British Columbia, New South Wales and California respectively.

The Role of Regional Collaborations

While mitigation of climate change impacts is a global challenge, leadership is required at all levels of governments to address the impacts and reduce emissions. Greenhouse gases know no borders and agreements to reduce emissions or harmonize regulations are needed at all levels. Regionalization, or joining-together of sub and local governments through amalgamation to increase efficiencies and economize service delivery, has shown the fiscal and jurisdictional advantages and limits to this delivery. Indeed it is through regional collaboration and local government levels where much policy must ultimately be enacted, but their capacity to respond to new policies varies greatly (Newman& Dale, 2005; Dale et al, 2009). Often the public sector is mobilizing the private sector and not for profits with financial incentives.

Local governments' capacity to deal with climate change varies due to financial, technical, or human resources constraints (Burch, 2010). Sometimes at this level of government the expertise and leadership needed aren't available (CURO, 2010) or else the institutional setup "severely inhibit(s) the evolution of responses to global issues such as climate change" (CURO, 2010). On the one hand, local governments have control over instruments that shape trajectories such as land use planning (e.g. zoning), and the generally smaller bureaucracy potentially fosters new innovations and a "close link between constituents and political leaders" (Picketts et al. 2009, p. 42). On the other hand, they operate under provincial or sub-government legislation and rely on high-level support for infrastructure costs (such as roads and water systems), often through special

grants for specific projects⁸. Moreover, bureaucratic greening efforts can be stymied politically.

In federal systems, responsibility for the environment is typically shared between the federal and provincial/state levels. The literature however shows the failure of such “excessively centralized and bureaucratized resource management science”, and points to the success of local governments and grass roots social-mobilization efforts (Berkes and Folke, 2002: 121). We can therefore learn from the experiences of local governments as they try to advance climate-change policies, because the capacity of communities to respond to new policies, such as climate-change policies, varies greatly with each requiring diverse types of expertise to lead such changes (Dale, 2008). Many regional and local governments have introduced comprehensive (if limited) approaches (e.g., the Columbia Basin Trust, 2012; the City of Vancouver, 2007; the City of Sydney, 2010). Regional agreements are one tool that can aid in this regard and limit carbon leakage.

Several factors determine which climate policy is likely to be implemented in which locality or region (e.g. the energy resources found within given jurisdictions). It is critical for climate policy and workforce planners to understand how these levels of government interact, and how regionalization or devolution in a given area affects policy decisions. Climate literacy is key for both constituencies. In addition, many sectors are regulated at different levels of government, further reinforcing the need to consider all levels.

What Does a Comprehensive Climate Change Intervention Look Like?

Governments have many policy tools to mitigate and adapt to climate change.

Comprehensive climate change interventions work across multiple jurisdictions, sectors and instruments.

Multiple Jurisdictions: Policy Harmonization Improves Coherence; Builds Capacity

In many nations there has been an ongoing debate with respect to who is responsible for what. In general, there has been a devolution of responsibility to local governments, and this has resulted in the regionalization of local governments while they acquire more fiscal responsibilities to provide services. Both subnational and local governments have acquired more responsibility in this way, but many argue that this increase in responsibility has not been followed by sufficient financial resources to adequately deliver services. This debate has focused more attention on the gap between levels of governments in the delivery of services, among them services and mechanisms implicated in the response to climate change. Some mechanisms such as carbon pricing, fuel standards and clean technology investments have occurred at the subnational level first, then harmonized (e.g. in the case of fuel standards) at the national level or between nations (e.g. Canada and the US). Local governments play a supportive role in this case. However, they also lead in other mechanisms and services, particularly in the areas of infrastructure (such as green buildings). These land developments occur within the sub government and national legislative framework (e.g. building codes). Notable exceptions exist in Canada (e.g. City of Vancouver “Charter”).

Regional Collaboration

One of the first regional agreements to reduce emissions, and the first in the United States (US), is the Regional Greenhouse Gas Initiative (RGGI). It began in 2009 as an eastern state collaborative to reduce power sector emissions. Its current goal is to reduce emissions by 45 percent by 2018 below 2005 levels. Two collaborative examples include both British Columbia and California; the Western Climate Initiative (WCI) and the Pacific Coast Collaborative (PCC). WCI (first established in 2007 and reformulated in 2013) is a collaboration of British Columbia, California and Quebec with a regional cap-and-trade system (currently, with the latter two participating only). Initially (2007) several western Canadian provinces and US states were involved. The California-Quebec cap-and-trade was launched in 2014 and the intention is that other provinces and states will join as success is illustrated. The PCC involves the western states of California, Washington and Oregon. British Columbia is the only province. The scope extends

beyond carbon pricing and includes cooperative agreements on clean energy and the green economy. It also includes labour considerations in that the supply-demand considerations are applied to energy and labour. This is an important consideration as increased (or decreased) demand for labour can ultimately cause labour dislocation (ILO, 2009, p. 102) (Wilkins, 1984). These dynamics will be discussed in Chapter 3. However, by using resources from carbon pricing schemes to develop the labour market, generating new employment and offsetting job losses, a “double dividend of both lower GHG emissions and higher employment” may be achieved (ILO, 2009, p. 102). Regional policy that accounts for these effects will smooth labour transitions.

The regional-level agreements mentioned above advance individual provincial and state climate change interventions begun much earlier, not just in terms of employment provisions. For example, in Quebec, a carbon levy was introduced in 2007 on coal, natural gas and petroleum and the revenues support climate change initiatives. This levy remains in addition to the cap-and-trade scheme underway between Quebec and California. British Columbia’s carbon tax is currently frozen at \$30/tonne/year and the revenue supports corporate and personal income tax reductions, so the tax is billed as revenue neutral. This has raised some controversy as the revenues are not directed back towards supporting other climate change initiatives.

Multiple Sectors and Instruments: Horizontal and Vertical Integration Improves Coherence

Comprehensive climate change interventions range from policies to regulations to incentives. They also range from sector to sector (e.g. Canada’s vehicle emissions standards in the transportation sector vs. national regulations on pollution reduction in the energy sector). As discussed, they transcend levels of government: national or sub government policies often consider a market mechanism to price carbon – to adjust for the market production of greenhouse gas emissions and their societal costs by taxing or regulating emissions, setting emission standards and investing in green infrastructure and clean technology. (It should be noted that such policies that support a carbon pricing

scheme are considered the most efficient (Wilkins, 2008), with effectiveness increased by supporting policies).

What follows reviews the three general approaches to mitigation and adaptation that are frequently used to tackle the multi-jurisdictional and multi-sector climate challenge, and introduce the concepts behind various policy tools used in each of the case studies in the dissertation.

Market Mechanisms. Economists and policy analysts agree that putting a price on carbon is one of the most cost-effective ways to reduce emissions (OECD, 2013). Carbon pricing sets a “clear signal” that there is a cost to CO₂. The price of carbon, it is recommended, if sustainable over time will facilitate innovation and individual action (PICS, 2012). More than 100 nations now have carbon pricing policies (Climate Institute, 2012, p. 15)⁹ to encourage individuals, businesses or government to make more efficient use of fossil fuels, develop better technologies, and switch to more efficient fuel (PICS, 2012). Carbon pricing policies range from multi-national such as the European Union cap-and-trade scheme to regional initiatives such as the Western Climate Initiative (WCI) to sub-government as in the example of the BC carbon tax.

Carbon taxes can make it economically viable for businesses or households to emit GHGs whether it is explicit in a tax or implicit through complementary policies such as clean air regulations. Revenues can “reduce other taxes or to fund projects that yield environmental benefits or provide other public goods like adaptation schemes in the face of climate change”(PICS, 2012). In cap-and-trade schemes, emitters hold a limited-supply (often auctioned) permit for each unit (often tonnes) of GHGs emitted. The total number of allowances available may be reduced over time to encourage reduction. Companies trade these allowances, establishing a market price for carbon. Cap-and-trade schemes can be regional or international. Each country distributes the revenues from such incentives differently. Some support “generating additional employment and offsetting the initial job destruction associated with sectoral adjustment” (ILO, 2009, pg. 102). Others fund citizen-learning programs or pensions. (See Norway, Chapter 5).

Effectiveness depends on how the resources are used, and which policies are chosen to complement the carbon-pricing scheme.

Carbon pricing success depends on which scheme is introduced and when. Some studies suggest “no loss of jobs or decline in output following the introduction of carbon taxes” (ILO, 2009, p. 102). One key consideration is whether the revenue is recycled back into the economy via tax reductions or higher spending (little job impacts) or used to pay down debt (negative job impacts). While an essential piece of the policy landscape, a carbon price cannot stand on its own. In addition to other climate policies it requires financial policy regulations and accounting policies, and immediately it needs workers in these areas. Once in place, it will impact regulations and products, which in turn means different skill sets in the workforce as a whole. Therefore, workforce planning in the climate policy arena is essential not only in spite of carbon pricing schemes but in step with them. This will be addressed in Chapter 3. Now the chapter returns to the supporting policies and regulations that together make a comprehensive intervention. In addition to a carbon pricing scheme, supporting policies are critical. First considered are regulations to reduce emissions.

Policies and Regulations. Regulations to reduce emissions are usually sector based. This is approached through a number of standards including fuel efficiency standards, low carbon fuels, and renewable portfolio standards. Fuel efficiency standards are often harmonized between countries. In the case of British Columbia, the carbon tax adds seven cents per litre to the cost of gasoline which is a consumer incentive to purchase more fuel efficient vehicles. All three case study nations have established fuel efficiency policies and low carbon fuels. In each nation, Australia, Canada and the USA, fuel efficiency standards were first introduced at the subnational level, in New South Wales, British Columbia and California. The quantification varies, but in Canada, standards apply to maximum average emissions for an entire fleet per year with a sliding scale to decrease emissions over a period of time. Renewable portfolio standards establish targets for how much electricity is generated from renewables such as wind, biomass or

geothermal production. Generally, standards are introduced gradually, and increase in strength over time allowing the market to adjust.

The most internationally accepted measure for management of greenhouse gas emissions is the *Greenhouse Gas Protocol* (GHG Protocol) co-developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). The GHG Protocol sets out the framework and approach for an organization to prepare a GHG inventory including identifying operational boundaries, reporting (e.g. scope 1, 2 and 3 emissions) and financial and operational control.

Financial Incentives. Governments are encouraging investment in clean technologies through financial incentives such as offsetting 100 per cent of emissions from electricity generated from natural gas (e.g. as in British Columbia) thereby incentivizing utilities to develop emissions reductions activities. Financial incentives are also made to consumers with discounts for fuel efficient cars, electric cars, or rebates for solar heating and panels. British Columbia's Clean Energy Fund was developed to incent innovation in the development of new clean technologies. At the local government level, there are incentives from national (federal) and provincial (state) levels of government to improve infrastructure and energy efficiencies, such as green buildings, waste management and sustainable transportation systems.

Carbon pricing, fuel standards and investing in clean technology and green infrastructure are three tools that governments which anchor comprehensive climate change intervention. Provincial and state and local governments play a key role in implementing and advancing these national policies and also developing their own policies.

Adaptation. Market mechanisms, policies and regulations and financial incentives are approaches to mitigate the impacts of climate change. Adaptation, in contrast, considers how communities are preparing for and adjusting to changing climate conditions, both in the present and the future. Adaptation considers planning by taking steps with respect to land use planning and infrastructure design. Risk management avoids costly remediation,

and works best when tailored to local circumstances since what works in one place won't necessarily work in another. Generally, four strategies are considered: protect, accommodate, retreat and avoid. Because climate change impacts and scale will vary by jurisdiction, most of this adaptation happens at the local government level but the costs are significant and financial incentives from national and provincial/state governments are often required. Adaptation plans in the case studies were not considered in depth due to the scope of the dissertation.

The climate change interventions are fluid and in all of these examples, the intention is to introduce them slowly and effectively and garner public support. The challenge is to develop policies which will be strong enough to be durable and effective but flexible enough to adapt to regional and local environments and minimize labour disruption. This is a benefit of regionalizing policies: through regional collaboration sub government and local governments learn from each other. But what are the conditions that allow for a jurisdiction to enact one or another policy: i.e. economic conditions, values, government structure?

Policy Transfer and Learning

In this study, the comparative case studies analysis seeks to understand in part whether jurisdictions draw lessons from each other. Governments learn from each other and often consider that for a given issue such as clean air, health care, or climate change, a given country may often offer a good example of success in that policy area. The result of this is referred to as lesson learning and diffusion. This happens when policy transfer occurs. Policy transfer has a 'multi-disciplinary character' (Evans & Davies 1999: 365). It is usually voluntary but can be coercive. Dolowitz & Marsh (2000) argue that policy transfer is how 'knowledge about policies, administrative arrangements, institutions and ideas in one political setting (past or present) is used in the development of policies, administrative arrangements, institutions and ideas in another setting' (pg. 5).

Rose argues that there must be dissatisfaction in order for there to be lesson drawing. Rose (1993: 22) identifies four ways of drawing a lesson including copying, emulation,

hybridization, and inspiration.¹⁰ Yet, in order to copy or emulate, there must be sufficient capacity to do so and copying may not be accurate or sufficient. While institutional theory and organizational theory focus our attention on structures and systems that advance policies and initiatives “they have not attended to the processes that control and maintain these institutions dynamically, the kind of dynamic causation that is present in economics and ecology” (Shon, 1971; Holling, Gunderson and Ludwig, 2002: 9); for this reason, concepts of adaptation, resilience, uncertainty, and vulnerability are also relevant. One barrier is a lack of capability, or inadequate skills and resources. Conversely, Meyer and Rowan (1977) argue that satisfaction is drawn from working and learning cooperatively.

Workforce Capacity and Learning: Thresholds

Ross and Dovers (2008, p. 245) suggest that the “most prominent success factors, barriers and gaps that affect environmental policy integration relate to leadership, long term embedding of environmental policy integration and implementation capacity” (p. 245). This means mapping existing skills and making sure they are used (i.e. skill utilization and development), and up-skilling (Skills Australia, 2011). Anderies, Janssen, and Ostrom (2004: 16) consider the institutional capacity to adapt the workforce to new climate policies. Adger et al (2009: 9) also identify other adaptive capacity thresholds, such as values and governance structures. They discuss the inherent assumptions of climate change policies that governments actually have the skills and knowledge to implement visions (Adger, Lorenzoni & O’Brien, 2009: 7). Pahl-Wostl (2009) explores triple-loop learning. Triple-loop learning is distinguished from deuteron-learning because deuteron learning is learning for increased effectiveness (Argyris & Shon, 1996) and triple loop learning results in a total transformation of the organization. Total organizational transformation usually means that the individuals have capacity to change and embrace some degree of resiliency.

Holling and Gunderson (2001) remind us that individuals and organizations have both resilience and vulnerability dimensions. Resilience as a concept “disentangles some of the inconsistencies that emerge when the adaptive cycle is applied to specific situations”

and the importance of adding vulnerability to change in addition to the other two properties of limits to change. They include the limits to change (potential) and degree of internal control over variability (connectedness). Vulnerability is then determined by the “resilience of the system” (2001: 41). Holling and Gunderson (2002: 47) conceive of the adaptive cycle of systems as having two distinct stages: the front loop or incremental phase of growth and the back loop of rapid growth or reorganization. This can be considered when nations implement new climate change policies and establish new governance and institutions, and plays a part in the slower start and then faster advancement as initiatives move forward or when reorganization creates renewal. It is useful to consider this capacity of systems to self-organize and respond when analyzing dynamics after a shift (see Norberg and Cumming, 2008). This can only be assessed after decades. One of the variables that expedites self-organizing is shared values of individuals and organizations.

Perry and Vandenabeele (2008) and Perry and Paarlberg (2006) identify institutional and individual-level factors that foster shared organizational values. Perry (2000; 2005; 2006; and 2008) argues that policies need motivated individuals to move them forward effectively. Holling, Gunderson, and Ludwig (2002: 10) argue in *Panarchy* that the “process of developing policies and investments for sustainability requires a worldview that integrates ecological with economic with institutional and evolutionary theory—that overcomes disconnects within each field” (p. 10). *Panarchy’s* foundational concepts such as three properties which shape the future responses of ecosystems, agencies, and people: (1) the potential available for change, (2) the degree of connectedness between internal variables and processes, and (3) the resilience of the systems, “a measure of their vulnerability to unexpected or unpredictable shocks” (Holling and Gunderson, 2002: 33) are core to the framework.

Summary

Comprehensive policy interventions have been the policy approach with respect to environmental challenges because of the multi-jurisdictional nature, and the need for effective supporting institutional structures (Ross and Dovers, 2008). Significant

international effort has gone into assessing the state of the climate (IPCC) and developing international agreements and protocols to reduce greenhouse gas emissions. Yet, international effort to reduce greenhouse gas emissions has fallen short of the required target to avoid a global surface air temperature increase of 2°C (IPCC). While national leadership and strategy can aid in setting regulations and standards within the broader policy matrix, it is not always obvious what other policies they will interact with, when they should be implemented and by whom, or the extent of impacts.

The governance arrangements in each nation influence the success or failure of policies and therefore institutional and organizational design are important considerations. How does a parliamentary government system impact these interventions? How well is a given state organized to address these challenges? What about the different capabilities of local, provincial/state and federal governments? Since most emissions originate at the local level, the initiatives and leadership at the regional and local levels is significant. By looking at the record of policy decisions and governance structure including institutional and organizational design, with a focal point being the crucial role of strategic workforce planning in advancing policy decision perhaps a response can be formulated.

Chapter 3 introduces strategic workforce planning and the current state of knowledge of how strategic workforce planning intersects with climate change policy responses, including employment modeling of skill supply and demand. The theoretical literature on strategic workforce planning is rooted in organizational development theory and empirical studies, but the research on the workforce and climate change is in its infancy. Chapter 4 connects the factors identified in the theoretical literature reviews of Chapter 2 and 3 in the Framework.

Chapter 3

Workforce Planning – Approach and Applications to Climate Change Interventions

Introduction

Chapter 2 examined the role of government in addressing large scale environmental matters and the tools that governments are introducing to reduce anthropogenic GHG emissions and the institutional and organizational design features which advance new regulations and incentives. Chapter 3 now turns to how governments are strategically linking these new policies with workforce planning and training through so-called strategic workforce planning. Two areas of the literature will be reviewed: strategic workforce planning and strategic workforce planning specifically for climate change mitigation and adaptation.

The chapter begins by situating strategic workforce planning in the broader organizational studies literature, including the literature on designing bureaucracy and various metrics used to plan and assess organizational effectiveness. Next the chapter turns to the role of strategic workforce planning in the comprehensive climate change policy interventions. Strategic workforce planning (SWP) in the age of climate change is a rate of change challenge. Climate change projections themselves are not currently included in SWP models. Nor is the rate of change of skill development that is needed. Metrics to evaluate and plan are changing rapidly as new innovations are introduced and new skill sets are required to produce, manage and evaluate new technologies.

Strategic Workforce Planning

Traditionally ‘workforce development’ is considered as professional development (Skills Australia, 2009), and ‘workforce planning’ is considered to be identifying skill sets (and hiring or retraining for specific needs) to make sure an organization achieves its mission (Colley & Price, 2010 p. 202; Conference Board of Canada (CBC), 2009). When workforce planning is included with business strategy, the strategy is more likely to

succeed (Conference Board of Canada, 2010; Keating & Smith, 2011). Strategic workforce planning uses quantitative and qualitative information to inform organizational strategy, forecast future scenarios and analyze gaps. Instead of focusing on one narrow sector or agency, it recommends actions that extend beyond the scope of one organization. Strategic workforce planning can reduce “locking in large complex organisations”; this is especially true in governmental policy, which traditionally resists “unorthodox ideas” (Marsh, 2009: 399). It can also enhance productivity in these organizations (Colley & Price, 2010), with employment and labour impacts that in turn affect GDP. Strategic workforce planning in the context of climate change interventions, this dissertation proposes, would also consider climate modelling scenarios and their various rate of change projections. Such hypothetical models would show that different skills and competencies will be needed at different times and in different places (e.g. dyke building, smart grid infrastructure).

Strategic workforce planning can address these challenges in a few ways. First, it provides a way to coordinate departments and agencies, and even different levels of government, which as we have seen is critical to enacting comprehensive policy. Second, it builds momentum by recruiting new people and training new skills. Third, it lays the groundwork for good skills-development strategies, frames HR policy, and informs development (Colley & Price, 2010). This ultimately makes government more likely to achieve policy goals - but only if the policies and plans are properly thought out and aligned.

Strategic workforce planning has wide practice and levels of sophistication (WRC, 2009) but is seen by some research bodies as ‘still being in its infancy’ (Conference Board of Canada, 2013). This dissertation argues that strategic workforce planning has had a long research tradition in organizational studies such as the studies of turnover, engagement, and performance measurement or the study of the bureaucracy or management in political science and public administration which are critical elements in advancing comprehensive climate change interventions.

Modelling Capabilities: Data Strengths and Limitations

To effectively design and implement a workforce strategy that optimizes productivity, one must understand its strengths and limitations. Strategic workforce planning considers a wide range of data on variables, some qualitative and some quantitative. These are often lacking; even countries with good systems for anticipating skill needs typically rely on ad-hoc initiatives at lower levels to secure reliable information (ILO, 2011). Modeling employment impacts, therefore, would benefit by considering qualitative and quantitative factors when forecasting work scenarios (Keating & Smith, 2011) and developing environmental-economic linkages models (Burniaux & Chateau, 2008).

The modeling of competency and skill needs and utilization, in conjunction with policy development, implementation and execution cycles, is complex. The main components include skill supply and demand. Supply could include low/unskilled and skilled workers, ageing and novice workers, and migration and retirement. Demand comprises things like the changing nature of work, globalization, turnover or climate change. Parameters such as unemployment rates, employment growth, productivity growth, net migration, population growth, and education qualifications vary by study. Data is “often reported in categories that are not necessary helpful for understanding skills, education and training issues. There are often no defined standards concerning what is valid data” (WRC, 2009). Such modeling often lacks data capability and consistency between different levels of government, making it challenging to model labour mobility.

Some systems have begun to address some of these shortcomings. The Australian Scenario Development Forum for Future Workforces 2011 identified ‘STEEP’ (society, technology, economy, environment and politics) as key modeling drivers, in addition to “labour force, industrial and workplace trends” (Keating & Smith, 2011). This qualitative and quantitative information, along with blue-sky research (which looks at future skill needs) is vital to workforce analytics. Important feedback loops in this process are engagement and exit surveys, and performance evaluations. These can help explain otherwise unanticipated observations because many of the relationships among elements are non-linear, so slight changes can cause large shifts and vice versa. Malcolm

Gladwell's (2000) *Law of the Few* suggests that about 80 percent of the strategic work will be done by 20 per cent of the highest performers. This is particularly relevant for those workers that are leading large scale public sector reforms such as comprehensive interventions as these leadership qualities (i.e. competencies) are instrumental in driving the implementation strategies. Modelling competency metrics are challenging. Turnover in these instances can delay implementation. Turnover in strategic workforce planning is a central consideration and the metrics are crucial for understanding it.

Turnover is a key variable, driving performance in all organizations and considerable attention focuses on this in the literature. There is no equation for optimal turnover. Rather, too much or too little is dysfunctional. Optimal turnover¹¹ could be understood as an 'acceptable rate of internal movement' plus 'acceptable rate of new hire turnover'. The concept of 'optimal turnover' is vital to workforce transition strategies. Employee-organization fit is critical to intrinsic motivation, high engagement¹² and low turnover (Breen, 2010). The relationship between job design and motivation in the public sector is another consideration (Perry & Vandenabeele, 2008). Perry and Paarlberg (2006) highlight the need for employee values to align with organization goals. When employees are hired because they have individual values corresponding to espoused organizational values which, they subsequently find, do not reflect the actual values of the organization, employees lose motivation and leave. Values differ in organizations and matter a lot when organizations are called on to take on new strategic directions and tasks. The fit of values was introduced in Chapter 2 and will be highlighted in the case studies of British Columbia and New South Wales in the examples of City of Vancouver and City of Sydney.

With so many variables and factors to consider, how does a strategic workforce planner collect appropriate data and model them along with the introduction of new policies to ensure the right skills are in the right division at the right time? It is a particularly challenging task in a policy environment such as climate change policy that is evolving constantly. A strategic workforce plan is nonetheless especially important for climate

change, where the very culture and incentives in the workforce may need to change if longer-term strategies are to succeed (CCPA, 2010; WRC, 2011).

Competencies and Skills

To effectively enact policy requires that governments assess whether the public service and larger workforce has appropriate skills (technical and social) as defined by a competency framework (behaviours and knowledge). Developing and implementing comprehensive policy takes expertise. Some jobs that will be affected by a new policy will be strategic and tactical, while others are technical or vocational and need complex planning. Identifying ways to train and up-skill the workforce in all these areas while retaining talent ensures stability, knowledge transfer and sharing.¹³ For example, those in senior positions need broad leadership competencies while others need specific technical skills. Sometimes, both skill sets are required. The trend in planning is to balance the need for specific skills (e.g. welding) with the need for competencies (i.e. flexibility, social skills) so the workforce can quickly respond to changes even if there is uncertainty (Keating & Smith, 2011). Some frameworks available for competency and skills are used in job design and descriptions, interview assessments and performance evaluation.

An emerging framework for skill strategies are sustainable skill ecosystems (SSES, Finegold, 2011). It considers the business setting, institutional and policy frameworks, type of labour, job structure and design and level and type of skills (Government of South Australia, 2003). In a healthy skill ecosystem, the development and deployment of labour are in balance (Government of South Australia, 2003), and supply and demand are relatively stable with a reasonable turnover (Skills Australia, 2011). A healthy skill ecosystem also requires understanding the capacity of individuals, organizations and broader networks to adapt (WRC, 2011).

An important distinction is whether skill shortages are quantitative (i.e. labour shortages) or qualitative (i.e. skill gaps). A skill shortage may also result from not training existing workers, or from a general lack of supply (i.e. underestimated growth rates). For example, the 'wind, wave and tidal power industry' in the UK has had shortages of

qualified engineers (Boettcher, Nielsen & Petrick, 2009). The USA has reported skill shortages in manufacturing and construction in the renewable energy sector (Apollo Alliance, 2008). In *Critical Issues Facing Australia to 2025* Keating & Smith (2011) note that the most common barrier for unemployed people looking for jobs is lack of training or experience (p. 2). Gap analysis in Australia identified the need for a “three per cent annual increase in enrolments in the tertiary sector to 2025 to deepen the skill levels of the workforce” (Keating & Smith, 2011: 2). The ability to work across disciplines was also noted as a strongly desirable future skill (Keating & Smith, 2011). Australia had several examples of public service strategic workforce planning at the national and state level in the 1980s and 1990s.

Finally, workforce planning is connected to changing organizational cultures. A study by the UK National Institute for Economic and Social Research (NIESR) showed that “for investment in skills to produce results, skills need to be contextualised within a broader organisational and management culture” (Skills Australia, p. 8). The Skills Australia (2011) report noted that “effective delivery of skills utilisation can only occur when the culture of an organisation consists of strong leadership, the commitment of staff and good communication” (p. 8). Developing an “understanding of how skills utilisation appears in practise in the workplace is critical to developing a framework upon which case study research can be based” (Skills Australia, 2011, p. 9).¹⁴

Strategic Workforce Planning in the Context of Climate Change Interventions

While academic research on climate and work is growing (Wright, 2012) much of the intellectual capacity remains outside academia, particularly in Canada (Lipsig-Mumme, 2010). International NGOs have done much comparative research on climate change and work (see ILO 2007; 2012; OECD 2012 a, b), and more recently, regional NGOs (see Canadian Centre for Policy Alternatives, 2012; 2013; Globe Foundation, 2010 b, c, d; EcoCanada, 2012). Research on strategic workforce planning, particularly linking planning to environmental and climate policies, has not received the same academic attention from organizational scholars. Nonetheless, studies of organizational design, bureaucracy, turnover and productivity have long research traditions and they are all

components of strategic workforce planning. Therefore lessons can be drawn from these established fields. Strategic workforce planning has generally lagged in connecting comprehensive policy interventions and workforce planning, creating a gap between considering the impact of several policies concurrently and their impact on workforce across organizations.

In the instance of climate change, the gap between policy development and workforce planning (both public and private sector) and development is particularly acute, in part because as technologies are advancing quickly the skill sets required to develop and administer these new technologies are lagging. Some skills are strategic and tactical, and others are technical and vocational. The transition to a low-carbon economy impacts skill needs in three ways (ILO, 2011 p. xviii): a) changes in skill demand; b) new jobs; and c) greening of existing jobs. This coupled with inconsistent data and metrics along with a lack of common shared definitions challenges the results and usefulness. It is worth a close look at the role of metrics in this challenge because of its centrality to data capability.

Some researchers think that skills should focus on “supporting ‘concentration of resources’ for scientific and technological research, training and investment” (WRC, 2007: 9). However, several hurdles must be overcome if this process is to be optimized through strategic planning. At the very start, the lack of clear definitions when dealing with skills is just one significant problem. For example, ‘green skills’ could be a key development metric, but the “nature of industries and occupations often change dramatically and in unanticipated ways and the settings within which work is performed are important elements in the development of the skill” (WRC, 2011). Therefore, it could be unclear if a given skill is in fact ‘green’. Ultimately, without a common set of definitions, large-scale plans for research and training may fall apart.

Metrics: Definitions and Frameworks

While the debate on what constitutes green skills or green jobs (CCPA, 2010; UNEP, 2008) continues in the search for metrics to quantify the green economy, there is a reluctance amongst some scholars and practitioners to define a groups of skills as ‘green’ (ILO, 2011: 5) and the trend is more focused on finding a balance between the need for generic skills (i.e. flexibility, adaptability, communications and social skills) to enable the workforce to respond in an uncertain environment, and the need for specific skills; and in what proportion (Keating & Smith, 2011). This is a difficult metric to establish but “required by individuals to respond to rapidly changing circumstances and in ways which skills can deepen over time” (WRC, 2012). But in general, concrete definitions that allow solid data have been a challenge in this field.

Several governments have wrestled with green skills and job planning frameworks, some more so than others (e.g. see Chapter on New South Wales and California workforce planning), particularly with respect to definitions. If, for example, ‘green skills’ is used as a key metric for development and planning, problems may arise because the “nature of industries and occupations often change dramatically and in unanticipated ways and the settings within which work is performed are important elements in the development of the skill” (WRC, 2011). Also, skills needed in senior positions in any comprehensive intervention are more broadly of the leadership and strategic variety – or competencies - versus specific technical skills. And even at the technical level, skills are not always essentially ‘green’ but may be a technical training such as engineering.

Definitions of green jobs and green skills vary across and even within countries, and occupation and industrial classifications are out of date as soon as they are published (Connection Research, 2009). The International Standard Classification of Occupations (ISO) and International Standard Industrial Classification of All Economic Activities (ISIC) do not “yet include officially defined green occupations and industries” (ILO, 2011: 147). While efforts are underway to “formulate agreed statistical definitions at national, regional, and international levels [...] the efforts are complicated by the dynamic nature of the green economy with evolving technology and thresholds for

environmental impacts” (ILO, 2012: 7). Some studies are not comparable because they are based on different assumptions (Bird & Lawton, 2009) and different definitions of the green economy (Muro, Rothwell & Saha, 2011). Therefore, despite growing sophistication of modeling the workforce impacts of climate policies (Access Economics Pty Limited, 2009; CCPA, 2010: 30; CCS, 2008: 5; Pollin & Garrett-Peltier, 2009), there are many data gaps.

The most rigorous data collection, the ILO argues, and analysis is conducted by the US for the O*NET database that monitors “evolutions of occupations regularly using standard procedures and presents occupational descriptions online for purposes of career guidance and career development” (ILO, 2011: 147). Yet, the US still does not have a “comprehensive national database on the spatial geography of the clean economy and its sub industries [...] and a proliferation of definitions and the absence of data for large numbers of regions has made it difficult to situate regional clean economies [...] in the absence of standard definitions and data [...] little is known about its nature, size and growth” (Muro, Rothwell, & Saha, 2011: 3).

In addition to these quantitative issues, strategic workforce planning also projects future scenarios or ‘blue sky’ research, which uses future scenarios to promote creative thought about future workforces (Keating & Smith, 2011; WRC, 2011). The US National Academy of Sciences (NAS) is a leader in this regard. They consider “possible futures for work, and more specifically the nature of occupations” (WRC, 2011, p. 5) to help policymakers plan for workforce development. One finding of the NAS research was that it was “possible that computer abilities could substitute for human abilities in occupations that currently employ 60 percent of the national workforce in 2030” (Elliott, in Hilton, 2008). How this factors into new green policies, many of which include technological advancements, is not completely understood nor modeled. It is the modeling of all of these factors, both the known or quantified and unknown that are considered in advanced strategic workforce planning.

Modeling Employment Impacts of Climate Policies

With respect to climate change itself, more precise forecasting of trends is needed (ILO, 2008; Lipsig-Mumme, 2012: 13) but there are data gaps (UNEP, 2008: 9). These gaps can hobble all facets of climate policy planning, including workforce planning. The IPCC scenarios show that the policies and technologies adopted today will impact the climate - and skill set required- we are adapting to as the projections consider different degrees of temperature increase. These projected scenarios which vary from 2 – 8 °C result in significant impacts for several sectors (e.g. agriculture) resulting in different required skill sets. Concurrently ongoing technological innovations affects skills and training needs. For example, while there will be job losses in fossil-fuel-dependent sectors, from restructurings, sell-offs and diminishing union influence (Masterman-Smith, 2010 pp. 323–325; Wright, 2012 p. 15), there will also be job gains in renewables (Access Economic Pty Limited, 2009: 1). Often, this analysis is policy-specific, and does not consider the impacts of a comprehensive suite of policies.

Skills upgrading will be a ‘significant part of restructuring’ (ILO, 2011) and many economies may realize ‘millions of jobs both directly, and indirectly through supply chains’ (ILO, 2011 p. xvii). In other words, projecting the impacts of a policy means comparing competing effects. A new green policy may decrease work in one area, but introduce work in another. The skills for the new work may be learned, or new workers may be hired. Consumers may spend more on a new product, but save money through efficiency. Macro-economic analysis of the effects of climate and energy policy options identifies potentially 25 million “net new jobs and \$159.6 billion in expansion in US GDP by 2020 if 23 major sectors based policies” are implemented (ICCEPO, 2010: 39). Further macro-economic analysis suggests that sector-based climate mitigation could “immediately expand employment, income and investment” by increasing energy efficiencies, freeing up capital, and investments in other economic activities (CCS, 2008: 2). Without examining the competing effects of various policies on employment, accurately projecting the impact on employment of a new policy thrown into the mix is difficult. (EPA, 2011). A simple example is going from the labour-intensive manufacturing of cars in the early Ford days to a more technological assembly line. Some

workers were lost, however the cars have become more fuel efficient. This has freed up capital for expenditures on other material goods, increasing employment in other sectors.

Other considerations are the timing and context of policy introduction. For example, the Grantham Research Institute on Climate Change and the Environment estimated that the greatest job creation would occur at the time of introduction of a new policy (Bird & Lawton, 2009). But these appear to be studies limited to policies requiring new infrastructure (i.e. wind). Other sectors may have long-term job expansion (i.e. building technologies and energy efficiency retrofitting). The ILO (2012) argues that impacts of green policies should be examined on a 'case-by-case-basis' (p. 14).

Migration is another employment impact of climate change that must be considered by any strategic workforce development policy as work location will shift as the climate changes. The Australian Scenario Development Forum identified their need to "increase supply of skilled people in the long term" through immigration. There would be increased competition for migration within the country. Some demographic, social and cultural drivers of willingness to migrate have more certainty (i.e. ageing populations) than others (i.e. degree of work- life balance). Climate change itself drives internal migration, affecting labour pools. More migration will "lead to economic growth, which in turn drives skill shortages" (Keating & Smith, 2011, p. 8). A comprehensive study on employment impacts of low-carbon industries was produced by Innovas in the UK, but the estimates were critiqued as "overly optimistic and do not tally with industry estimates" (Bird & Lawton, 2009: 15). Therefore migration is still difficult to predict.

Other studies nonetheless find that large numbers of jobs will be created, which will likely effect international and intra national migration (ILO, 2012, p. 178). Others find that (1) the clean energy industry created 2.7 million jobs "in recent years mostly among low and middle-skilled workers" (Muro et al., 2011; ILO, 2012); (2) a US \$100 billion investment in the green economy will create "four times more jobs than investment in petroleum, and will result in a 23 per cent decline in unemployment" (Polline et al., 2008; ILO, 2012); and (3) a US \$150 billion investment "would create 2.5 million jobs, in

contrast to 800,000 jobs lost from investment in fossil fuels” (Roland-Hoivost et al., 2009; ILO, 2012). Many of these modeling scenarios will be illustrated by a regulatory change that is due to be implemented soon. In 2017, the US EPA will introduce light vehicle efficiency regulations, the continuation of regulations introduced in 2010. This may shift consumer demand, but effects will depend on the economy at the time, including employment rates and fuel prices (EPA, 2011; BlueGreen Alliance, 2012).

The EPA (2011) states there are some inherent assumptions one of which is that the “official unemployment rate will have declined to 5.3 percent by the time the rules takes effect”. This is important because the unemployment rate when policy is introduced will determine how strong an effect is seen. When the “economy is at full employment, an environmental regulation is unlikely to have much impact on net overall U.S. employment; instead labour would mostly shift from one sector to another” (EPA, 2011, pp. 8-18). Conversely, a regulation introduced during high unemployment may affect overall employment (EPA, 2011).¹⁵ Long-term effects depend on how related industries respond. Regionally, differences are likely to be seen as well since not all jobs can be done in all locations. There would likely be positive employment in some regions, and negative in others.

Recent studies (BlueGreen Alliance, 2012) estimate that “proposed [fuel efficiency] standards will create an estimated 570,000 jobs (full-time equivalent) throughout the economy, including 50,000 in light-duty vehicle manufacturing (parts and vehicle assembly by the year 2030” (p. 3). And, if “light-duty vehicle sales were to increase by 4 percent in 2030, light-duty vehicle manufacturing employment would increase by 19,000 [...] if domestic content for these new components was to increase to 75 percent in 2030, then about 4,100 jobs would be added in light-duty vehicle manufacturing (including parts suppliers). The economic ripple effects create jobs in other sectors of the economy amounting to 9,000 jobs...” (BlueGreen Alliance, 2012, p. 3). The BlueGreen Alliance (2012, p. 7) report also cites employment impact projections of the new standards by other groups (i.e. the Union of Concerned Scientists, 2007; the Natural Resources Defense Council, the United Auto Workers, and the Center for American Progress,

2010). Both estimated employment increases. The former estimated between net 241,000 in 2020 and 370,300 by 2030, and the latter estimated 62,000 by 2014; but they were based on different assumptions.

The literature review of approaches to workforce planning in industrialized nations is therefore interpreted with the limits of this study and its methodology in mind. Many studies are not clear about underlying assumptions. Statistical labour market data also needs to be integrated with other information, and combined with “contextual analysis of generative forces shaping skill requirements” (WRC, 2009) such as new policies or varying climate change scenarios. Such is the complexity of the analysis for strategic workforce planning.

Organizational Design and Workforce Productivity

Organizational studies as introduced in Chapter 2 also have a long research tradition. Of relevance is the work of Mintzberg (1983), who looked at adhocracy structure of organizations and the impact they can have on productivity. So, as previously noted, while the field known as strategic workforce planning is relatively new, it combines several established fields of research. We will first explore perhaps one of the oldest research traditions - designing effective bureaucracy.

An effective bureaucracy may at first glance seem to be an oxymoron. But with good design bureaucracy can fulfill its functions, one of which is developing and implementing policies, some of which are contradictory (e.g. shale gas exploration policies and GHG reduction policies) and/or components of policies which are administered through different agencies (e.g. climate policies and industrial regulation). This can be a challenge, however, because organizational design is always evolving. The current trend toward integrated service delivery, horizontal integration and devolvement of management authority can at times ask government to move in contradictory directions from the traditional model. This can be a problem because it is the traditional model that research has focused on. For example, integrated service delivery and horizontal issues require designs that reduce specialization or differentiation, while devolution of

management authority requires an increase in specialization. If there is no correct way to deliver services, and different service delivery systems are being trialled, there may be conditions under which bureaucracy is an effective tool.

What might those conditions be? Primarily, bureaucracy can be an effective way to counter the negative effects of fragmentation in an organization. One condition is that where fragmentation reduces effectiveness, bureaucracy can centralize capability reducing confusion. Another condition is that where newly independent agencies have poor communications with the centre and a reluctance to follow central guidelines, unified bureaucracy reduces such problems through horizontal coordination. Finally, where fragmentation reduces accountability, a unified bureaucracy is a focal point for ministerial accountability to parliament (Rhodes, 2003:108-109). Rhodes also raises another key function of bureaucracies; that bureaucrats hold specialized knowledge and experience and are relied upon by changing governments to provide counsel. Indeed, bureaucrats can advocate for the public good and provide a counterweight to politicians, who may come and go more frequently. These competencies are some of the most valued in government and are acquired with long experience and personal qualities which the interviewees speak to in the case studies. Bureaucracy may indeed provide many different kinds of public benefits.

The challenge must be taken up, however, if the workforce planning is to be strategic. Aucoin (1997) argues that bureaucracy is essential to good management and governance – the organizational design “promotes democratic direction, control and accountability” (pg. 291). Hierarchy is transparent in that it makes roles and responsibilities clear; specialization permits assignment of tasks to ensure competence and standardization promotes “equity, economy, efficiency and effectiveness” (ibid, 291). Aucoin also argues that the challenge therefore is to design bureaucracy in ways that ‘best adapt the requirements of hierarchy, specialization and standardization to serve the ends of democratic direction, control and accountability, as well as the ends of effective public policy, productive public management and responsive public service” (ibid.

292). Aucoin (1997) further argues that red tape is not an inevitable consequence of standardization, but the “result of decisions to apply rules and regulations.”

Bureaucracy must therefore balance hierarchy, specialization and standardization on one hand with democratic control and accountability – this latter is perhaps the most important challenge in its design. Workforce planning is also a major consideration when designing bureaucracies that will deliver climate change policies; planners must understand the skills that will be needed by public servants, and what will be needed where, and these public servants must represent a delicate balance, neither pawns of political masters nor lacking in sensitivity or appreciation of political considerations. Ultimately, the legal structure surrounding the bureaucracy will determine its effectiveness as a service delivery tool as well as the allocation of responsibility within. As with everything else, balance is the key (Aucoin, 1997).

Summary

Chapter 3 has shown how the theoretical literature on strategic workforce planning is rooted in organizational development theory and empirical studies such as that surrounding organizational design, turnover and studies on the bureaucracy. We can see that while the term ‘strategic workforce planning’ is relatively new, its components are not. Nonetheless, the research on the interface between strategic workforce planning and climate change, the primary focus of this dissertation, is still in its infancy.

How will climate change impact how we work? What can workers do to mitigate and adapt to climate change? How do we plan for a workforce composition of skills and competencies when the technologies are advancing so rapidly that particular skill sets are not yet known? The location of workers for specific policy implementation may also vary as different climate scenarios manifest, depending on how civilizations mitigate and adapt. It must also include climate change projections, their associated policies, and a rate of change variable. Then, by looking at the record of policy decisions and governance structure in the context of institutional and organizational design, with a focal point being strategic workforce planning, perhaps a response to climate change that

meaningfully includes the workforce (both within the public and private sector) can be formulated.

The dissertation is organized around case studies at a high level (the first-generation) and at a more detailed level (the second-generation) at different times and in different phases of global comprehensive climate policy. The analytical framework forms a structure through which to help select, frame and analyze the case studies. The study moves to the delineation of the analytical framework next.

Chapter 4

Drawing it Together: Delineating the Analytical Framework

Introduction

The purpose of this chapter is to develop an analytic framework to guide the empirical research in this study. This framework situates the research question(s) and key variables, as informed by theoretical literature, against the backdrop of larger historical, governance and policy issues and trends. The variables are selected to assess the internal coherence of climate-change policy with workforce development and planning. They also consider the role of workforce planners to assess needs and set targets to help the labour force transition from decreasing areas of employment to new areas of employment that are developing as a result of climate change mitigation and adaptation policies. The empirical research for this dissertation explores how and when these variables presented themselves in the case examples of comprehensive policy interventions, and the degree of their alignment with strategic workforce planning. How these variables interact will vary depending on the current and projected regional climate change impacts and other environmental constraints of each situation or case. It also depends on cultural differences, resources, regional politics and economics.

The analytical framework has three dimensions that depict the dimensions of comprehensive climate policy along with workforce planning taking place. The first dimension is *situational*, and it qualitatively describes the characteristics of the organizations, policies and relationships. The major variables of this dimension are coherence, capacity and capability. The second dimension is *motive*, and it describes the forces that drive or hinder the evolution of policies in the governance context. Variables here inform the situational context and are in turn informed by them. They include institutional and organizational factors, vertical or horizontal integration, special interest groups, innovation and many other factors as identified in the theoretical literature. The third dimension is *temporal*, describing the stages that interventions move through as the

situational and motive variables interact. We will examine each of these dimensions, and their composite variables, in order below.

Situational Context

As explained in Chapter 2, three conditions are necessary to maximize favorable outcomes of comprehensive environmental policy interventions. These are:

1. coherence (among environment, economic and employment policies);
2. capacity (such as governance, institutional and organizational design best suited to implement policies); and
3. capability (at various organizational and institutional levels to implement policies and plan work).

The framework distills these variables and broadly refines them in two ways: i) the potential *capacity* and *capability* of organizations to adapt and change; and ii) the policy's *coherence* with workforce development and planning economy-wide, both within and between levels of government. The framework also situates the dissertation assumptions introduced in Chapter 1 which are that government and society will be more adaptive and resilient to climate change long-term if: i) environment and economic policies including workforce development and planning strategies are reasonably aligned and reinforcing (Gillenwater, 2011; Lipsig-Mumme, 2010; OECD, 2011); and, ii) new values, competencies, and behaviours are instilled into the repertoires of individuals and institutions, inside and outside government, to deal with change and take emerging opportunities (Perry and Paarlberg, 2006). These are important to achieve because the transition to a low-carbon economy is necessary based on our current knowledge of climate change, and is essential to the future best interests of governments and society (IPCC, 2013; OECD, 2011).

Drivers and Barriers to Comprehensive Climate Change Interventions

The drivers and barriers to developing a comprehensive climate change intervention were considered in Chapters 2 and 3. They included governance variables (or the contextual

environment), institutional and organizational variables (or the transactional environment), as well as strategic workforce planning variables. Governance variables include leadership, innovation, horizontal and vertical policy integration, political conflict and changing institutional arrangements. Institutional and organizational variables include organizing capacity (top down vs. bottom up), linking of organizations across levels, the role of bridging organizations, the capacity to actually implement policies and the selection of policy instruments. Another vital institutional variable is linkage between levels; that there must be balance between local and sectoral levels while still maintaining coherence at the national level. Strategic workforce planning variables also include organizational capacity and data capability. Each of these variables can be considered as drivers or inhibitors.

Strategic workforce planning, this dissertation argues, is a critical tool which helps ensure that skills are developed in a coordinated way across the workforce, and that they support the aims of comprehensive climate intervention. Given the amount of strategy required to achieve this, appropriate metrics and workforce data collection tools are required to adequately plan for different policy tool implementation and workforce scenarios. Organizational variables in this realm include the quality of data collection methods including classifications and standardized categories. A more detailed look at specific ‘driver’ or ‘barrier’ variables follows.

Drivers/Motivators

Major drivers in this dissertation include: leadership, international and public pressure, critical incidents which impact agenda setting and strategic workforce planning. As noted in Chapter 2, critical incidents provide opportunities to set agendas for comprehensive policy interventions, such as climate change. But without political leadership to sustain the momentum of international and public pressure that often accompanies such critical incidents, opportunity may be lost. However, if the opportunity is taken, then the momentum requires an ongoing appropriate selection of policy tools that are supported organizationally and institutionally. Different solutions may need different institutional supports, and organizations have widely varying capacities and capabilities, which in turn

rely on resilience and are compromised by degrees of vulnerability. Organizations with strong capacity and capability will be able to advance new interventions more rapidly and take advantage of this momentum.

When nations/jurisdictions implement new climate change policies and establish new governance and institutions, they may have a slower start and then a faster advancement as initiatives evolve or reorganization creates renewal (Holling and Gunderson, 2002). One big driver, sustained political support, can ensure the organization has time to advance the initiatives. In the early stages, ad hoc organizations are often created to support the intervention. This dissertation argues that such ad hoc organizations are another significant driver, often necessary in comprehensive interventions in order to ensure the right policy mix is implemented at the right time. They also advocate for new policies so that they will grow and be sustained. Later, the ad hoc organization can be assimilated into the broader government organizational framework.

An examination of institutional variables also tells us that environmental and labour policies must be coherent and mutually reinforcing. Regulatory approaches, for example training standards, must be consistent. Appropriate skills development may help here, but again the drivers must be present, and green policies require sustained political support and favourable economic conditions. Finally, intervention tools, including market mechanisms, regulations, and financial incentives for technological adoption and innovation, are also critical driver variables.

Barriers/Inhibitors

Key barriers as illustrated in this study may include: the changing political landscape, interest groups, limited resources, anti-tax sentiment, restrictions on available energy sources, bad policy choices and other governance challenges. Many of these however, such as the political landscape, are just the opposite of the drivers and are inhibitors depending on the circumstances. Hence the apparent redundancy but a key consideration. In each variable, timing and circumstances and policy selection turn it from motivator to barrier on the spectrum. Governance challenges include a lack of horizontal integration

between ministries and organizations, or a lack of vertical integration within organizations. Fostering integration is critical because a policy response to climate change requires both public and private sector initiatives, particularly around energy and clean technology solutions where public sector often incents the private sector. This could be through a small financial incentive from the public sector so that the private sector initiative can take hold. Sometimes, without it, the initiative is not sufficient for the private sector to advance. Government financial incentives are often a key variable in the advancement of comprehensive interventions in the private sector particularly as the risk initially can be significant in the technological realm.

Green technologies are advancing quickly and the requisite workforce skill sets are lagging, whether strategic or technical. This tension coupled with inconsistent data means that it is a constant challenge to effectively identify skills and skill needs, and to reflect that in workforce policy efforts. Therefore another critical inhibitor is a lack of data capability. It is worth a close look at the role of metrics in this challenge because of its centrality to data capability, one of the central components of the analytical framework. Key issues with respect to metrics include what constitutes a green skill, or whether labour classifications are consistent across relevant organizations. Also critical is identifying sector needs so strategic training can take place.

To ease the transition of the workforce under climate policy and minimize the impacts, the workforce requires appropriate training. It must be able to support emerging industries, and it must also be broad enough to fill competing needs between sectors, government levels, and general and specific skills. A challenge for government then is to implement policies across sectors while ensuring competency and skill training professionally and vocationally. Yet often there is a fragmented and decentralized labour market, with skills unsuited to the market's needs and muddled workforce development policies to match. Why does this pattern emerge? Often it is a failing of data collection, categories, and metrics that are useful for workforce development and planning. They may be in principle required, yet methods often vary across and between levels of government. The workforce development and planning system often lags behind green

policy implementation. None of this means that workforce planning is a poorly functioning system in itself; only that it may be poorly coordinated with other policy planning, particular with respect to the variable of timing (WRC, 2011: 48).

Comprehensive Climate Change Interventions: Environmental and Economic Variables
Drivers and barriers will delineate the evolution of comprehensive climate change interventions, but environmental and economic variables measure the outcomes of policy interventions. Environmental factors include greenhouse gas emissions measures; while economic factors may include GDP measures and knowledge indexes.¹⁶ These measures are not central to the dissertation's analytical framework, but are identified in Chapters 10 and 11 and we reflect briefly on these variables below.

Economic outcomes. These include labour statistics such as turnover, immigration/emigration and other OCED measures such as the Knowledge Index or the Innovation Index. These are not to be confused with data capability; they are outputs of that capability. Perhaps the most widely referenced economic measure is GDP. Carbon pricing mechanisms are generally considered the major climate policy option to influence economic variables, and such schemes usually rectify the market failure to apply a cost to pollution. Concerns that carbon pricing would lower the ever-critical GDP measurement have been central to debates around the economics of climate change policy.

Environmental outcomes and tipping points. The key environmental measure is GHG reduction. This must be done globally: individual jurisdictions that implement mitigation policies may help slow temperature increase, but can't achieve their ultimate objectives independent of global efforts. The right mitigation and adaptation choices, made early, may smooth the transition to higher temperatures while ensuring those temperatures and other climate change-related impacts don't exceed dangerous thresholds. In keeping with the IPCC (2013) emission scenario projections (SRES) [(now called Representative Concentration Pathways (RCPs) per IPCC's 5th assessment report], 2050 is identified as a 'tipping point', when the effects of our present policy choices will become evident. Various future scenarios have been generated by modeling different levels of cumulate

greenhouse gas emissions over this period, all resulting from different mitigation and adaptation policy choices made today. The nature of a ‘tipping point’ means that world governments will not get a second chance. Increasingly, as the world approaches these tipping points, there is mounting pressure for policies to be effective the first time, and that means coherence.

Overall, the framework incorporates barriers and drivers as variables - within two conceptual areas - the potential for change and the degree of connectedness – in which each consider the three necessary conditions for success (coherence, capacity, and capability). The drivers and barriers therefore set a framework to evaluate how coherent the comprehensive change interventions case studies were, with a focus on the role of strategic workforce planning in driving the degree of coherence. In what follows, all of these variables are assembled into a framework that unites these variables and depicts strategic workforce planning as the cohesive glue that unites policy, resources and objectives.

Phases of Comprehensive Interventions

The framework begins by identifying four phases through which comprehensive climate-change policy interventions proceed: *situation*, *initiative*, *implementation* and *impacts*. The first three encompass the interactions between organizational systems, institutional structures, and climate change and labour policy and strategies between the contextual and transactional environments. The concepts of coherence, capability and capacity are not sufficient to describe the dynamics of comprehensive climate interventions and strategic workforce planning. Again and again, the critical variable of timing and political leadership arises when we examine comprehensive policy interventions. Therefore, the framework contains an axis that deals with timing and begins by identifying the variables of the contextual environment, the situation. What follow are more detailed explanations of the three phases.

Situation. The second- generation adopters are identified in the current framework as governments that are addressing climate change in response to the Kyoto Protocol (1997)

and the IPCC assessment reports (1990, 1995, 2001, 2007, 2014) in the period from 2000 – 2012. Also during the latter part of this period, a new wave of adopters began to join in, also considered part of the second wave. The *situation* considers all of these nations' economic and environmental profiles, key policies of the different jurisdictions, and the governance and institutional settings. Initially, workforce planning is separate and not linked to comprehensive policy interventions in a strategic manner. Strategic workforce planning typologies emerge.

Initiatives. This considers the approaches of second-generation adopters, in terms of the first. In this period, adopters' policies, governance and organizational structures are refined. Strategic workforce planning still lags, but is increasingly more coherent with policy introduction. Urgency and the pace of action increases as there is growing awareness that we need to avoid catastrophic climate change (Pahl-Wostl, 2009: 355) (IPCC 2007, 2014) showing movement towards a climate 'tipping point'. The climate change challenge has uncertainty on many levels, because it is governed internationally, nationally, regionally and locally, but implementation rests predominately at the local level. It requires integration vertically and horizontally within organizations and institutions on many levels and within a broad range of actors (Pielke & Sarewitz, 2005: 258). During this phase integration becomes more cohesive.

Implementation. In this phase, strategic workforce planning is actively assessing supply/demand metrics and considering climate-change policies but still isn't fully integrated or considering all the impacts of the policy mix. There is a growing sense among policy makers that strategic workforce planning needs to be coherently involved and also that investment in green jobs and skills can yield economic benefits. Policy frameworks become more comprehensive. Competency and skill frameworks are reviewed, with the acknowledgement that they need refined metrics that assesses transferable broad competencies and key skills. Governance systems integrate more, with the understanding that the horizontal and vertical alignment will advance new policies more quickly. With new adopters the strategic advantage of this alignment is fully understood and there is greater attention to which structures best advance policies. The

learning has gone from single- to double-loop as described by Argyris (2006). Greenhouse gas (GHG) emissions begin to drop, though temperature will continue to rise as the world is committed to a certain amount of temperature rise already for the next several centuries (IPPC, 2013). Adaptation and mitigation strategies are refined as new technologies are introduced and advancements and increasing dependence on renewables improve GHG reduction targets. The diagram shows maturing capacities and capabilities of institutions and the workforce, as well as coherence between policy and practice. Strategic workforce planning as introduced in Chapter 3 appears prominently in the framework. Effective implementation is in evidence and while there are periods of erosion and rejuvenation, overall there are advancements in achieving targets (Mazmanian & Sabatier, 1988). Policy reforms have been sufficiently anchored and advancements are taking hold (Lindquist & Wanna, 2011).

Figure 4-1 illustrates the backdrop to the analytical framework.

Figure 4-1: Analytical Framework Backdrop

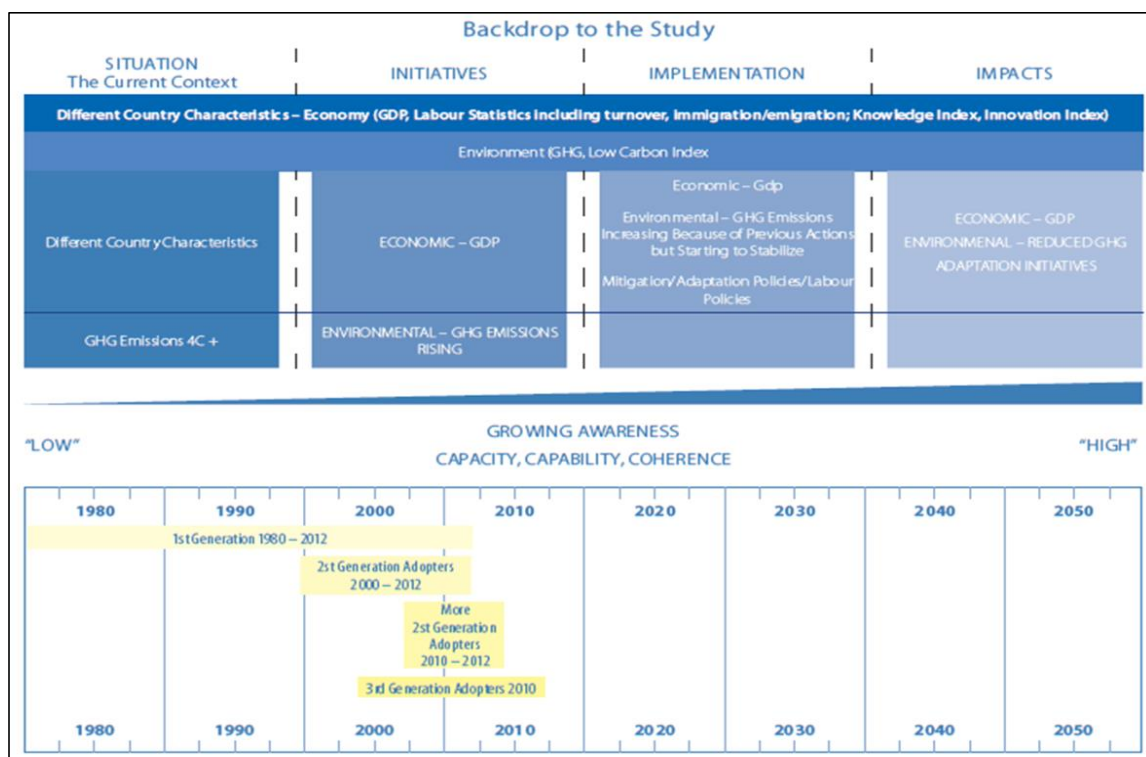
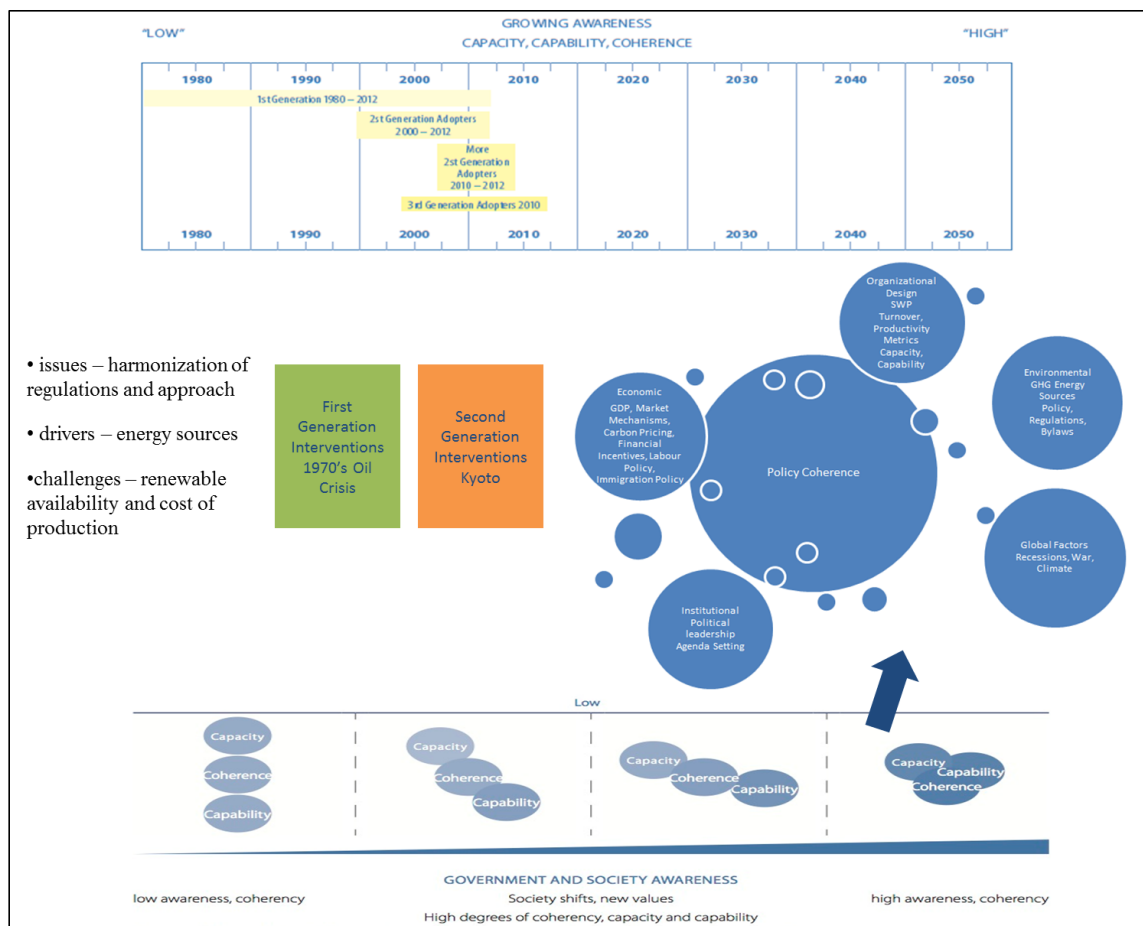


Figure 4-2 provides an overview of a framework to document and assess the initiatives and implementation efforts of the first and second generation adopters which includes the

degree of coherence of comprehensive climate change policy interventions, the institutional and organizational capacity and capability.

Figure 4-2: Analytical Framework



The fourth phase, *impacts*, deals with outcomes. Here there is even greater refinement of measuring and mitigating environmental and economic impacts of the policies including GHG emissions and labour turnover. The need to coordinate new capabilities (e.g. skills and competencies), as policies are refined or introduced quickly, is understood. The impacts from GHG emission reduction strategies in the 1970-2010 period are measured with greater accuracy, and increasingly clear data capability leads to clearer illustration of impacts. More nations thus adopt comprehensive interventions. Society's awareness continues to grow and new values become evident. New skills and competencies become intrinsic. Every level of jurisdiction is involved and the comprehensive climate change

interventions are aligned organizationally and institutionally. Economic indicators (GDP) are stable and strong, at least with respect to climate policy, and environmental indicators (e.g. GHGs, climate variables such as temperature and precipitation) illustrate that the policy choices and tools were effective or are becoming so. GHG emissions and ultimately the climate stabilize. While this phase is ultimately very important, and is acknowledged in the analytic framework in the interests of completeness and symmetry, an empirical assessment of impacts and outcomes of climate-change interventions would be a gargantuan task and does not fall in the scope of this dissertation.

Summary: Delineating the Analytical Framework

Overall, the framework considers the conditions under which organizations function best to advance comprehensive climate-change policy interventions in second generation adopters and the degree to which strategic workforce planning played a role in advancing these efforts and situates these adopters in a broader backdrop of the efforts of selected first generation adopters. The empirical research for this dissertation documents and analyzes the initiatives, and assesses their early implementation, including how workforce capability issues have been addressed. It also compares across jurisdictions (case studies) and identifies ‘best practices’ or approaches. The analytical framework gives a backdrop for the study of first and second generation comprehensive climate change intervention adopters (see respectively Chapters 6 and 7, 8 and 9).

Chapter 4 has introduced the analytic framework for the dissertation informed by the perspectives presented in Chapters 2 and 3. The framework considers three dimensions, the situation or the contextual environment and the motives, or forces that drive or hinder the evolution of policies and the stages of interventions over time and how these interact with each other. The analytic model provides an integration of these dimensions and considers strategic workforce planning as a critical supporting mechanism to aid in smoothing the labour transition in comprehensive climate change policy interventions. Strategic workforce planning remains in its infancy in this regard and the analytic framework in this study aims to reconstruct the typology so that a more sophisticated approach which considers: situation, motive and temporal aspects can emerge.

Chapter 5

Methodology

Introduction

This study seeks to understand tools and strategies of second-generation climate policy adopters at the sub-government levels, as profiled in the case studies; the role of local governments and the policies which benefit or suffer at the regional level; the workforce development and planning approaches of second generation adopters; the similarities and differences between second-generation interventions and earlier interventions; the learning strategies of sub governments; and how the second generation adopters customized and institutionally supported their climate change policies.

The study seeks to explore the coherence of climate policies in this broader contextual environment, the institutional and organizational capacity in a broader transactional environment and the capability of workers, including skill development and planning. The dissertation seeks to understand who uses workforce development data in each nation, how those data are used, and whether there are common methods and analysis that work well across different nations in order to tackle the study's central research question introduced in Chapter 1: "How can workforce development and planning be directed toward improving employment prospects and reducing employment dislocations as the planet changes around us in the face of a changing climate?"

Strategic workforce planning needs to be better understood if governments are to provide leadership, adapt more quickly, and provide continuous high levels of services to citizens while maintaining strong economies. Research to understand gaps between what we know and need to know to better align workforce development and planning with the introduction of green policies is needed. The research study is influenced by these research gaps on climate change and work notably methodology (e.g. mixed methods) and approach (consideration of multiple policies and labour impacts). The multi-variables outlined in the analytical framework, informed by the literature reviews are explored in the multi-faceted research approach. This study relied on a qualitative

methodology. It drew upon literature reviews and two sets of case studies, one of which draws on practical literature and the other on a combination of literature and interviews. What follows introduces the methodology for this study including various sources of field research.

Literature Reviews: Theoretical and Practical

Two literature reviews were conducted. The first review focused on academic and grey literature in two areas: comprehensive interventions and contributing variables such as governance, institutional and organizational factors, the degree of adaptation and resilience, and strategic workforce planning. Academic journals, government documents and non-profit and private sector publications were reviewed at an international, national, sub-government and local government level. The second review considered policy and workforce planning documents specific to the selected first generation nations and second generation jurisdictions and a review of the literature on turnover and its relationship to organizational performance and design.

Review of Theoretical Literature

The goal of the theoretical literature review was to identify variables that explained differences in how jurisdictions advanced comprehensive policy interventions, how they evolved at different stages, the situation as they introduced the green policies, the initiatives needed to get the policies in place, implementation including workforce development and training, and the impacts of all these factors on employment. The literatures selected for these reviews were multifaceted and interdisciplinary. Each was a different lens through which to view the framework and analysis/evaluation to follow.

The literature on comprehensive interventions identified variables contributing to their success or failure. Some studies considered broad, international comprehensive policy issues (e.g. AIDS, climate change) including policy tool selection and country differences. The institutional and organizational literatures were considered in order to understand the challenges of implementing new policies. They also helped understand how systems, structures and strategies adapt to political/leadership changes. The

literatures on workforce development and planning included analytics such as modeling and projections, and also identified key variables and barriers around implementation which were discussed in the previous chapter. The literature on adaptation and resilience considered the adaptive capacity of the individuals and organizations.

In general, while there is rich literature on climate policy and institutional and organization factors involved in its introduction, the literature is dispersed and few sources have conducted comparative, empirical studies specifically on employment in the transition to the low carbon economy as it relates to a comprehensive climate change policy intervention approach.

Review of the Practitioner Literature

The goal of the literature review of selected first generation nations and second generation jurisdiction policy and planning documents and reports was to understand the current context of climate change policy and workforce development and planning, and current efforts on implementation or modeling impacts of green policies on employment.

The scope included reports and documents from international, domestic and regional bodies some of which was conducted partially during a study abroad based at the University of Sydney Workforce Planning Centre. Documents from work experiences with the BC government in workforce planning and by request through key study participants were also reviewed. This review included literature on the case study second generation nations of Australia, Canada and the USA (to a lesser degree), with a focus on the sub governments of New South Wales, British Columbia and California, and a less in-depth focus, and higher level review on selected first generation adopter nations of Denmark, Germany, Norway and the UK (with specific examples of the experiences of Scotland and London). The literature reviews were supported through research grants with targeted research project outcomes which also informed the case studies.

Funding Sources for Theoretical and Practical Literature Reviews: Research Projects

The literature reviews were variously funded. What follows provides an overview of these projects:

- **Turnover and Workforce Planning.** The MITACS and BC Government supported research on turnover in the BC Government provided an in-depth study of the organizational structure of the BC government and strategic workforce planning tools.
- **International Case Studies.** The Environment Canada study provided an opportunity to identify the first generation adopters and then conduct research on key studies on climate change policies and impacts on employment in both first and second generation adopters. The Endeavour Fellowship (Commonwealth of Australia) provided an opportunity to study abroad at the University of Sydney's School of Business and Economics, Workplace Research Centre (WRC). The WRC conducts research on strategic workforce planning in Australia and internationally and the experience to learn from researchers who had conducted comparative research for the ILO and OECD was a valuable learning opportunity providing insights to comparative research and understanding the complexities and challenges of gaining insights into other countries strategic workforce planning efforts particularly those with language barriers.

The literature reviews, both theoretical and practical, were conducted specifically in the following five key focus areas: i) comprehensive policy interventions for complex policy areas; ii) comprehensive policy intervention approach for climate change; iii) the role of subnational and local governments; iv) strategic workforce planning; and v) strategic workforce planning in the context of climate change interventions. They informed the analytic framework in order to situate and assess the case studies. The specific funding projects and funding sources are summarized in Table 5.1 below and are connected to each of the research instruments.

Table 5-1: Research Instruments to Inform the Case Studies and Research Funding Support

Research Instruments	MITACS ¹⁷ and BC Public Service Agency	Environment Canada ¹⁸	Australian Endeavour Fellowship ¹⁹
Literature Reviews Theoretical	Study on Turnover and Workforce Metrics and Organizational Development	Comprehensive Interventions and Strategic workforce planning – employment impacts of climate change policy	
Literature Reviews Practical	Study on Turnover and Workforce Metrics BC Government	Case study comparative research ^{20, 21}	Case study comparative information ^{22, 23}
Interviews Turnover Study	Turnover Interviews with BC Government strategic workforce planners		
Interviews Second Generation Case Studies		BC, Canada (clean tech), California, New South Wales	New South Wales interviews
Field & Work Experiences	BC Government Workforce Planning	New South Wales field experiences	New South Wales field experiences and research at University of Sydney's School of Business

The Case Studies: First and Second Generation Adopters

Qualitative research is rooted in an understanding of complex social phenomena (Miles & Huberman, 1994) and seeks to understand from the perspective of human actors. A qualitative study was chosen to understand the social processes of actors and agents who are developing and implementing climate-change policies, with or without strategic workforce planning. A qualitative method allowed exploration of whether the existing theories of why and how comprehensive interventions succeed or fail with a particular focus on the variable of strategic workforce planning. By seeking the opinions of those who have lived the experience of advancing comprehensive climate change interventions,

either policy or strategic workforce planning a deeper understanding of the motivators and barriers is gained. Yin (2003) has defined that:

The essence of a case study, the central tendency among all types of case study, is that it tries to illuminate a decision or set of decisions: why they were taken, how they were implemented, and with what result.

Case studies are generally chosen as a research strategy when a researcher wishes to cover contextual conditions considered pertinent to the study enabling examination of complex situations; sometimes in multiple situations. Case study inquiry aims to identify a distinctive situation, relies on multiple sources of evidence and benefits from prior development of theoretical propositions to guide data collection and analysis. Case studies can explain presumed causal links in real-life interventions that are too complex for a survey. They can describe an intervention and the real-life context. They can be used to explore those situations in which interventions do not have not a clear set of outcomes.

In this study, case studies were chosen to illuminate linkages between different aspects of designing and integrating comprehensive interventions not amenable to quantitative analysis and also to show the extent to which second-generation and first-generation adopters aligned (or not) with strategic workforce planning. The period of first-generation adopters runs from the 1970s to current, and the second period begins in the early 2000s. The high-level first-generation adopter cases provide backdrops to the more detailed cases of second-generation comprehensive climate change interventions of British Columbia, New South Wales and California. The in-depth research primarily focuses on the second generation adopters. This was done to test the extent and nature of policy learning between jurisdictions over time, as the literature suggests this is a critical variable for comprehensive interventions that must involve multiple nations. From first-generation adopters, the case studies sought to understand at a high level what early strategies were used and to what effect. Second-generation adopters in-depth case studies

at the sub government and local government level allowed the researcher to dig deeper and explore the drivers and barriers and the interconnectivity between them.

Significance of the Selected Nations/States and Jurisdictions

The first-generation cases selected as representative of early adopters of climate change interventions were: Denmark, Germany, Norway and the United Kingdom (UK). Each advanced energy policies to reduce reliance on fossil fuels in the 1970s and each advanced worker transition training either through the private or public sector during this period. Following the actions of these nations, a second-generation of climate policy adopters emerged in the 1990s.

Three subnational governments were selected as representative of these second-generation adopters of climate change interventions. They are British Columbia (BC), Canada; New South Wales, Australia; and a mini case study of California, United States (US). They were selected because they were leaders in advancing comprehensive climate change policies at the sub government level in their respective nations. BC became the first carbon neutral government in North America and the latter two were the first to introduce carbon pricing in their nations.

What do all these nations and sub-governments, first- and second-generation, have in common, and what environmental and economic factors do they share? All are advancing comprehensive climate change interventions, including carbon pricing schemes and the development of renewables with emission reduction targets. Some, such as Scotland (APS Group Scotland, 2011; The Scottish Government, 2011) in the UK has declared that 100 per cent of all of its electricity must come from renewables by 2020 (The Scottish Government, 2011, p. 2). Denmark's Energy Strategy aims for the country to be fully dependent on renewables by 2050. Denmark (ILO, 2011) has also led in technological advances (e.g. wind power). Canada is 'leading the world in carbon capture and storage (CCS) technology' (CI, 2012). In 2011, Canada issued 'draft federal regulations that will, for the first time, set CO₂ emission limits on coal plants' (p. 12). By 2016, almost half of 'USA energy consumers will have a smart meter' financed by

federal stimulus funding and driven through state legislation (CI, 2012, p. 12). In President Obama's 2013 Inauguration Address he called upon Americans to rise to the climate change challenge.²⁴ In 2011, the US led the world in total clean energy investment (CI, 2012) despite uncertain economic conditions. There are other notable mitigation achievements in these and other adopters such as Germany and Norway but among them were their achievements to foster economic growth in clean technology and renewables while tackling climate change. New sectoral growth meant new jobs and skills.

These first and second-generation adopters were also chosen because they maintained and in some instances improved socioeconomic indicators²⁵ while advancing comprehensive climate change interventions illustrating that climate change interventions, contrary to some advocates, can mitigate environmental impacts while improving economic conditions. All are ranked in the top thirty for GDP per capita (World Bank 2011) leading with Norway (4th), Australia (9th), Denmark (10th), Canada (12th), US (16th), Germany (24th) and the UK (26th). Several ranked in the top ten for low-carbon competitiveness (CI, 2012). Each nation leads in some facet, for example: According to the Climate Institute (2012), the United Kingdom (UK) and Germany are the 'best prepared to be competitive in the low-carbon economy' (p. 8). Both have overcome political challenges by coordinated planning and developing green policies that met the needs of many constituents (see Energy Bulletin, 2011 for more about early initiatives in Germany; Theil, 2008). All rank at or near the top of the list as innovation leaders (*see* European and Global Innovation Scoreboard, ProInno, 2011).

Finally, all first generation adopters identified for this study had advanced training initiatives in conjunction with energy policies some were centralized and others were decentralized. Scotland, for example, has a comprehensive skills investment plan with centralized training for the energy sector (see Skills Development Scotland, 2011). Others, such as the UK (ILO, 2011) pioneered green skills taxonomies with decentralized training. However, among all generations, coherence between green policies and skill and training policies vary from comprehensive (Scotland) to fragmented (Canada, US).

The selected nations taken together illustrate how different countries and sub governments, at different times have implemented varying policy approaches to reduce GHG emissions and achieved varying results in both the environmental and economic realms. This dissertation investigates the factors that have led to these results.

Each jurisdiction has lessons that if examined may assist other jurisdictions avoid some trial and error. Denmark, Germany, Norway and the UK each led in the introduction of renewable energy sources such as wind and wave technologies, as well as carbon pricing policies. By exploring climate policy's global pioneers, the efforts of second generation adopters such as New South Wales, Australia and British Columbia, Canada and the mini-case of California, USA can be situated and assessed. These high level cases presented in Chapter 6 provide a link to the more in depth cases reviewed in chapters 7, 8 and 9. What follows provides an overview of the more detailed case studies.

Second Generation Cases: British Columbia, Canada, New South Wales, Australia, and California, US

The dissertation focuses on the in-depth case studies of the initiatives and approaches of the provincial government of British Columbia in Canada and the state governments of New South Wales in Australia and California in the USA as three second-generation adopters who were leaders in the introduction of comprehensive climate change interventions from 2000–2012, including carbon-pricing schemes in their respective countries. Each jurisdiction introduced various workforce development and training schemes, including green skill frameworks in either the public or private sector to complement these interventions. The political leaders in each jurisdiction (e.g. Premier Gordon Campbell of British Columbia, Premier Bob Carr of New South Wales and Governor Arnold Schwarzenegger of California) shared deep core beliefs that advancing the climate change policy agenda was good both environmentally and economically. By choosing countries with similar institutional structures (i.e. parliamentary federations) it is possible to see similar institutional structures and conditions giving rise to similar kinds of policies (Schwartz, 1996). Differences in agenda-setting (on similar issues) are

attributed to differences in political structures or institutions (i.e. bureaucrats) or the influences of advocacy coalitions changing beliefs.

The case study areas are comparative for other reasons than those already noted. British Columbia, New South Wales and California are a similar geographic size. The first two have similar populations (4 and 7 million respectively); California's population is 38 million. Australia and Canada share common political structures and systems of governance. Many of Canada's regulations are harmonized with the US and they are Canada's primary trade partner. All three have declared carbon neutrality targets, though the scope varies within each.

Figure 5-1: Map of 2nd Generation Adopters (British Columbia, Canada, California, USA, and New South Wales, Australia)



The case selection framework below in Figure 5-2 situates the first and second generation adopters as all having a high degree of comprehensiveness of climate change policies and a high degree of compliance with policies as well as a high degree of coherent labour policies and workforce planning as compared to developing nations. All are OECD nations and enjoy a high standard of living as evidenced in strong socio-economic indicators; they have a high degree of comprehensiveness with climate change polices vs. the degree of compliance and a high degree of coherent labour policies and workforce

planning compared to developing nations and nations such as China and India who have a low degree of comprehensiveness of climate change policies vs. degree of comprehensiveness and a moderate degree of workforce planning.

Figure 5-2: Case Selection Framework

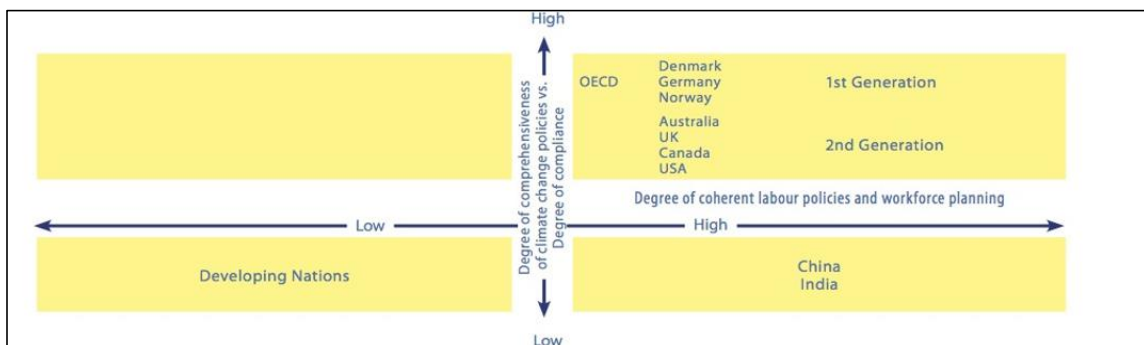


Figure 5-3 is arranged broadly according to two dimensions: the driver and barrier variables outlined in the analytical framework in Chapter 4 and the degree of alignment between policies and skill development and training.

Figure 5-3: Framework to Evaluate the Case Studies

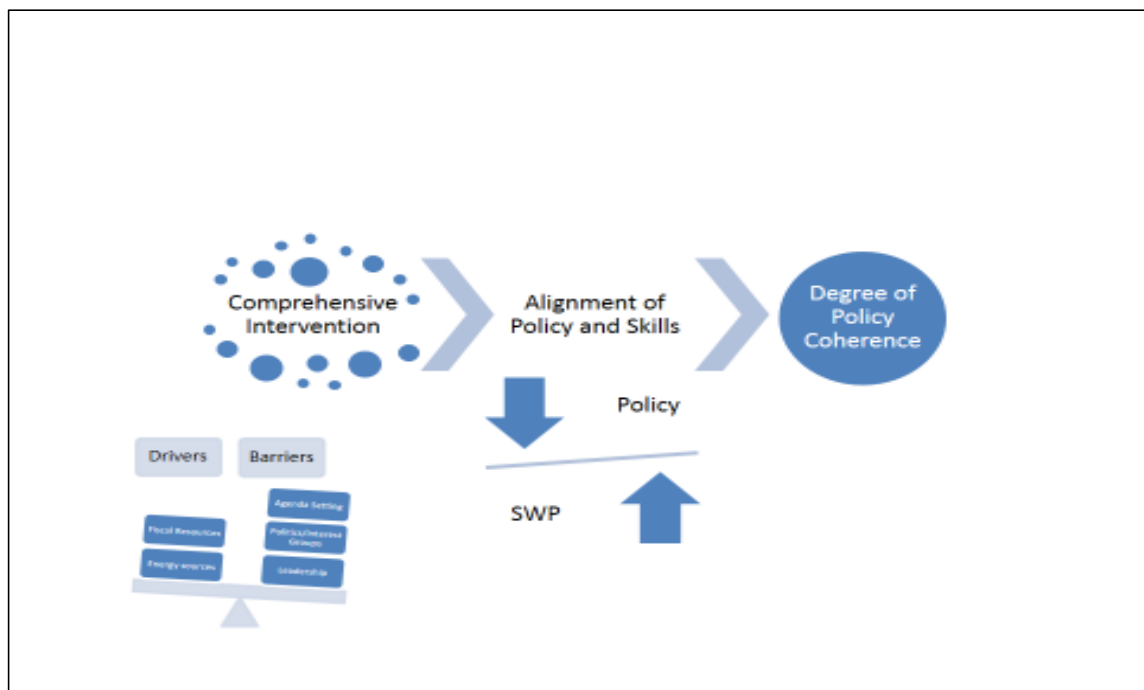


Table 5-2 comprises first and second-generation policy regimes and the degree of connectedness of policies and the degree of alignment of climate change policies with strategic workforce planning over time in relation to the research questions.

Table 5-2: Degrees of Coherence, Capacity and Capability Integration over Time

Research Questions	Degree of Integration/ Time (Coherence, Capacity, Capability) Potential for Change and the Degree of Connectedness Low- Medium-High
Policy Coherence and Broader Contextual Environment	
What tools and strategies did the second-generation climate policy adopters British Columbia, California and New South Wales use, both within government and on a macroeconomic level to mitigate and adapt to climate change, and how coherent were they? Specifically a) what distinguished them from first-generation adopters? b) how did their arrangements evolve, or were they planned and c) what was the role of leadership?	Low-Medium-High
Institutional and Organizational Capacity in the Transactional Environment	
What policies, or aspects of policies, benefit or suffer from being run at a local or regional level? Did second-generation countries, particularly local governments, customize their climate change policies - and associated workforce training - for their specific policy settings, and if so, how was the customization institutionally supported? What can we learn from regional and local government in these jurisdictions?	Low-Medium-High
Capability of the Workforce	
What workforce development and planning approaches, including learning strategies did second generation adopters develop? Were there similarities or differences in this respect between first and second generation climate policy adopters??	Low-Medium-High

Case Studies: Interviews and Literature Reviews

Key data were collected via in-depth semi-structured interviews²⁶ conducted with executives, policy analysts and workforce planning experts in the second generation case study jurisdictions.²⁷ All interviews were conducted in person in British Columbia. In New South Wales, 80 per cent of interviews were conducted in person, and all California interviews were conducted via telephone. Interviews were asked open-ended questions to

offer their personal narrative and experiences with comprehensive climate change interventions and/or related strategic workforce planning. The interviews were designed to inform the research objectives, outlined in the questionnaire:

1. To understand and categorize various comprehensive policy strategies on climate change and to evaluate their internal consistency.
2. To understand how much of these strategies dealt with workforce education and adaptation, and whether these components are adequately aligned with the rest of the interventions.
3. To develop a framework in which climate change policies that include workforce-development initiatives can be examined within broader theoretical models.

The questions were provided in six areas which are linked to the framework and are listed below in Table 5-3 Interview Questions, Variables and Framework.

Table 5-3: Interview Questions, Variables and Framework

Interview Questions	Variables	Analytical Framework Phase	Literature (Theoretical/Practical)
Current Role & Professional Background	Leadership, political (un) certainty; critical incidents	Implementation, Impacts	Governance, Strategic Workforce Planning, Bureaucracy
Organizational Mission & Vision	Political certainty; agenda setting Top-down/vertical-horizontal integration	Situation, Context	Governance, Institutional
Climate Policy & Workforce Planning Knowledge	Talent capacity; policy cohesiveness; institutional & organizational capacity; criteria for evaluation; agenda setting; political (un)certainty	Context, Initiatives, Implementation How well have initiatives have been converted into solutions	Comprehensive Interventions, Policy cycle, Policy window Organizational, Strategic Workforce Planning, Modelling, Metrics, Turnover
Workforce Planning Systems	Top-down/vertical-horizontal; data capability; resources; policy alignment; training	Initiatives, Implementation, Impacts;	Strategic Workforce Planning, Modelling
Organizational Structures	Top-down/vertical-horizontal	Context, Initiatives, Implementation	Organizational, Institutional, Governance, Bureaucracy, Local Government
Innovation and Learning Strategies	Top-down/vertical-horizontal; resources; policy alignment	Initiatives, Implementation	Organizational, Strategic Workforce Planning

Research Participants

The interview methodology involved interviewing a representative group of public servants employed at the executive, management, and middle-management levels. Private sector CEO's were also interviewed. Executives are responsible for designing the policy interventions and handling strategic workforce planning, and middle management often executes senior management's policies. In many instances, the interviewees were familiar with the interviewer. Agency documents were requested and provided in advance in several instances. Sixty-three interviews with executives, senior analysts and workforce planners in the public and private sectors in climate change, green policy development and implementation, and/or workforce development areas were conducted. Interviewees were identified through:

1. British Columbia: a) working relationships with senior BC government officials, and contacts with senior executives in sustainability and green workforce development in local governments (i.e., the City of Vancouver's Economic Development Commission and the Capital Regional District's Sustainability Department); b) contacts with environmental NGOs such as the Globe Foundation and Eco Canada; c) personal network of climate-change experts and practitioners and several clean tech CEO's through my responsibilities at the Pacific Institute for Climate Solutions (PICS);
2. New South Wales: a) new contacts in Queensland and New South Wales and in the University of Sydney's Workforce Planning Department through the study abroad experience connections and b) through support of Professor Catherine Althaus-Kaefer, formerly based at Griffith University and Australian National University; and
3. California: contacts from network of climate-change experts and practitioners.

Almost seventy percent (43/63) were from Canada, twenty (14/63) from Australia, and ten percent (6/63) from California. There was one interview conducted with representatives of the ILO in Bangkok, Thailand which was included in the Australia group. Interviews in British Columbia and New South Wales were at the local, regional,

sub-government and national government level. In California, all interviews were at the state level. Interviews were conducted in person when possible, by telephone otherwise.

Procedure and Analysis

A letter of introduction was sent to targeted employees via email, explaining the study and asking agreement to participate. It was expected that this process recruited sufficient persons for saturation. After interviewing, follow-up calls/emails were made to thank participants, ask for additional information, and check emerging processes. The goal to conduct each interview at the interviewee's office was primarily accomplished with the exception of the California and ILO interviews. Each interview was approximately one hour. Most were taped and transcribed. Participants uncomfortable with taping were asked if written notes would be permitted. All said yes. Additional thoughts of the researcher were noted immediately following the talk.

Interview subjects were told participation could result in a second interview; but it was not anticipated this would be a frequent occurrence. Approximately seventy-five percent (49/63) agreed to be identified. One agreed to be interviewed on condition that their organization not be referenced in the dissertation

Data collection took place in Victoria and Vancouver, British Columbia, and New South Wales, Australia. The interviews began in the fall of 2011/2012 in British Columbia, continued in the winter of 2012 in Australia. Final interviews with Canadian clean tech CEOs and California climate change policy and workforce planning experts were conducted in the spring of 2013 in Victoria (by phone). Interviews with BC government strategic workforce planners for the MITACS turnover study were conducted in 2009, and are also considered in this study as part of the implications and recommendations including the strategic workforce planning typology. In this dissertation when discussing interview results less than 3 is considered *few* and 4 – 10 would be considered *several*. More than 10 would be *many*.

The case study interviews focused on the following matters:

1. Understanding comprehensive policy strategies on climate change and to evaluate their internal consistency.
2. To identify strategic workforce planning mechanisms and whether these components are adequately aligned with the rest of the interventions.
3. To develop a framework in which climate change policies that include workforce-development initiatives can be examined within broader theoretical models.

Table 5-4, located on the following page, provides a summary of the research questions, data sources and analysis.

Stepping Back: Strengths and Limitations of the Methodology

The research conducted was multi-faceted and considered a number of jurisdictions and two types of case studies and also benefited from personal work experiences in the BC Government and at the Pacific Institute for Climate Solutions in corporate workforce planning and in the development of climate change learning courses respectively. The strengths are:

1. The study is multi-faceted with two levels of case studies, a multi-disciplinary literature review, with three in-depth case studies.
2. The research is exploratory, the multi-faceted approach provides a broad survey to give the overall scope of which future research can focus on gaps and areas of promise.

This comparative case study was constrained by time and financial resources. The results may have been more comprehensive as a mixed methodology, benefiting from quantitative analysis of employment impacts of comprehensive green policies by an economist.

Table 5-4: Overview of Research Questions, Data Sources and Analysis

Research Question	Interview Question	Research Instrument	Analysis
Policy Coherence & the Broader Contextual Environment			
<i>What tools and strategies did the second-generation climate policy adopters British Columbia, California and New South Wales use, both within government and on a macroeconomic level to mitigate and adapt to climate change and how coherent were they? Specifically a) what distinguished them from first-generation adopters b) how did their arrangements evolve, or were they planned and c) what was the role of leadership?</i>	Organizational Mission & Vision Climate Policy & Workforce Planning Knowledge	Government Records +100 documents Literature Review Theoretical & Practical Interviews (63) Field and Work Experiences	Comparative Interpretive
Institutional and Organizational Capacity in the Transactional Environment			
<i>What policies or aspects of policies, benefit or suffer from being run at a local or regional level? Did second-generation countries, particularly local governments, customize their climate change policies – and associated workforce training – for their specific policy settings, and if so, how was the customization institutionally supported? What can we learn from regional and local governments in these jurisdictions?</i>	Climate Policy & Workforce Planning Knowledge	Government Records Interviews Work Experiences	Comparative Interpretive
Capability of the Workforce and Planning Systems			
<i>What workforce development and planning approaches, including learning strategies did second generation adopters use? What were the similarities or differences in this respect between first and second generation adopters?</i>	Workforce Planning Systems Innovation & Learning Strategies	Government Records Literature Review Practical Interviews Work Experiences	Comparative Interpretive

The limitations are:

1. There was limited time to explore the cases of Denmark, Germany, Norway, the UK and to some extent the broader USA beyond California. Language barriers meant limited exposure to key documents in the first three countries. Language barriers also prevented review of government websites and documents, and limited financial resources were a barrier.
2. Time and financial support to study other leading first generation adopters (e.g. Finland and France) or second generation adopters within the same jurisdiction (another province or state) may have provided more case examples of interest.
3. Only OECD nations were selected. Findings may have varied with non OECD nations such as Poland or Spain but are members of the EU Emissions Trading Scheme.
4. The focus of the study was primarily the public sector, with some attention to the clean tech sector and ngo studies. A study that included the private sector and ngo's would provide additional scope.

Additionally, case studies are often criticized for a lack of generalizability but these case studies are exploratory. Case studies are only generalizable to theoretical propositions not populations because the case study, unlike the experiment, does not represent a sample. The generalizability of case studies is more of an analytic generalization. Yin (2003) cautions that the bias of case study researchers enters into experiments more readily than other research strategies and more frequently. In this comparative case study the researcher is biased towards the assumption that a transition to a low carbon economy is necessary and that strategic workforce planning can play a key role. The researcher's involvement in government corporate workforce planning in BC benefited the insights for the BC case. The lack of involvement with corporate workforce planning in NSW

and California detracted from an in depth understanding of the differences between the jurisdictions in government corporate workforce planning.

Summary

This chapter outlined the research design, data collection methods, research procedures and analysis and study strengths and limitations. The methodology sought to explore the institutional context of climate-change strategies, particularly how the capabilities of governments and other social actors are transformed, whether by design or through self-organizing components, by strategic workforce policies. Literature reviews, seminars, site visits, fieldwork and interviews provided an array of data to respond to the research questions. The case studies of first generation adopters at a high level helped situate the second generation case studies in a broader framework. It draws attention to the research gaps in the field of strategic workforce planning and comprehensive climate change interventions and the need for accelerated scholarly attention.

In summary, the research encompasses four key areas of study and data collection including literature reviews of pertinent academic and grey literature including documents of relevant strategic workforce planning documents; interviews with key informants; seminars and conferences and work and study abroad experiences providing deeper insights. There were several strengths to the study including a significant contribution to the literature on the state of research of climate change interventions and strategic workforce planning. The methodological limitations noted included time and financial constraints and the benefit that could be gained from consideration of other jurisdictions, particularly those that did not succeed with comprehensive climate change policy interventions and the role of strategic workforce planning in the process.

PART TWO

**FIRST AND SECOND GENERATION
COMPREHENSIVE CLIMATE CHANGE INTERVENTIONS**

Chapter 6

First Generation Comprehensive Interventions: Denmark, Germany, Norway and the United Kingdom

Introduction

Although today it is greenhouse gases and their effects on climate that drive efforts to reduce fossil fuel use, it was the global energy crisis of October 1973 that first catalyzed efforts to reduce reliance on oil. Such efforts were particularly notable in the European countries of Denmark, Germany, Norway and the UK. Early 1970s policies in these jurisdictions aimed to reduce reliance on oil by using alternate energy sources, improving efficiencies, and encouraging green economies. A grassroots movement toward environmentally conscious living was growing and a green culture emerged among some citizenry, at least in the developed world, symbolized with the noted publication of *Silent Spring* (Carson, 1962) and the first US Earth Day (April 22, 1970). This environmental sensibility soon led to policy interventions, particularly in the northern European countries.

This chapter provides a high level review of the climate interventions of four ‘first-generation’ climate policy adopter nations selected because each advanced climate policies alongside workforce planning and training, often with specific green skills training. Each first generation adopter linked climate change policy with training, but in different ways. In Denmark, renewable policies included training components; in Germany, initiatives were introduced regionally and then in a broader capacity; in Norway a comprehensive oil arrangement includes tax revenues that support pension and learning funds, and Norwegian Centres of Expertise regionally conduct qualitative labour forecasting; and the UK established green-economy growth policies and became a leader in data collection. Yet, each also had gaps between comprehensive climate change policies and employment skill needs and requirements.

The chapter reviews each nation's key climate policies and workforce planning and explores the gap between policies and labour needs. While an examination of economic and environmental indicators or outcomes is not within the scope of this dissertation each of the four nations has achieved significant GHG reductions while maintaining a high GDP. Appendix B provides a profile of economic and environmental indicators²⁸ which illustrate that the adoption of comprehensive climate change policies does not preclude a high standard of living for those in the present or future generations.

Denmark: A Leader in Renewable Energy and Linking Policy with Training

Denmark is one of the world's top climate change performers (Germanwatch, 2013). It consistently ranks as one of the most energy efficient countries.²⁹ It has declared goals to reduce energy consumption by 12 per cent by 2020 compared to 2006, and to have 100 per cent renewable consumption by 2050 (The Danish Ministry of Climate, Energy and Building, 2012). The country was on the ground floor of green policy. Particularly hard hit in the 1973 oil crisis with more than 90 per cent of its energy source derived from imported oil Denmark vowed never to repeat the oliekrise ("the oil crisis"). This drove the quest to wean itself off of oil dependency sparking much innovation. It is the birthplace of modern turbines: The "modern wind industry began in 1979, with the production of relatively small wind turbines by Danish manufacturers" (PICS, 2013). Twenty-two per cent of Denmark's energy requirements now come from renewable sources, primarily biomass and wind, and wind currently provides "28 per cent of national electricity needs" (PICS, 2012 a, p. 1).

Denmark has a national carbon tax, investment grants for energy savings initiatives, and tax refunds for industries that reduce energy use (ILO, 2012, p. 192). Over 36,000 people are employed in the Danish renewable energy sector, including 23,500 direct and indirect jobs in the wind industry (p. 104) "reflecting its status as Europe's original wind pioneer" (ILO, 2012 p. 104). Denmark is home to turbine manufacturer Vestas, one of ten companies accounting for "approximately 80 per cent of the global wind market at the end of 2010" (ILO, 2012, p.104). While Denmark has room for improvement in data capture and analysis of employment needs at the national level, efforts to integrate

employment policy with climate policy have helped create jobs and transition the workforce.

In 2010, the Danish Energy Agency (established in 1975, transferred to the Danish Ministry of Climate Energy and Building in 2007) reported that green production accounted for more than 250 DKK and while green exports to emerging markets increased it was below the European 15 average (Danish Energy Agency/Ministry of Climate Energy and Building, 2012). All of Denmark's green policies are accompanied with employment plans. For example, the DK Energy agreement outlines a plan to create employment.³⁰ However, the green skills strategy connected to these initiatives was fragmented and instead, the most fruitful efforts in workforce planning have come from the education sector. Vocational training now includes green tech skills in energy, waste management, construction, transportation and agriculture (ILO, 2011, p. 264), and new qualifications have been developed. The vocational, education and technical (VET) systems can develop green courses adapted to their local needs. The Danish VET system's governance structure and use of statistics to ensure adequate competency and skills training meeting projected needs makes it adaptive and responsive (ILO, 2011).

While the renewable energy sector has created tens of thousands of jobs, other sectors have weathered economic downturn with the help of green job creation. While Denmark's construction industry has lost approximately 30,000 jobs since 2008 due to the economic downturn, the Danish Construction Association has seen about 5,000 new jobs created thanks to energy efficient restoration. In 2009, the Danish Government set up a committee to figure out how to develop construction industry skills for energy efficient buildings, because "Identification of skill needs and the provision of retraining and skills upgrading right through the value chain are a crucial element of restructuring" (ILO, 2011). The strategy seems to have worked: according to a 2012 Pacific Institute for Climate Solutions Summer 2012 newsletter, "last January, the Danish Energy Agency released statistics that show that from 1990 (the Kyoto Protocol base year) to the end of 2011, Denmark's GDP rose 38 per cent, total national energy consumption fell 1 per cent, coal consumption fell 50 per cent and CO₂ emissions fell 25 per cent." So, while some

sectors, such as construction lost more jobs than other sectors gained, in general Denmark's economy has continued to grow, though 2014 figures show a slight contraction and slowing.

There are many examples of Denmark's success with skill transfer³¹ and efforts to retrain workers, but there are also "concerns that workers laid off, particularly the low qualified, could end up in structural unemployment" (ILO, 2011). In addition to job creation there are examples of how the Danish government has worked with industry to transfer skills and reduce employment impacts of economic transition. In 2009, the shipping company Moller-Maersk Group closed the Lindoe Shipyard in Southern Denmark. The Danish government worked with the company to create new jobs for the Lindoe workforce by identifying transferable skills. The facilities were ideal for producing offshore renewable equipment, thereby reducing employment impacts.

In 2008, the Danish Growth Council called for training to "exploit green technologies further" (ILO, 2011, p. 265). A committee of government, industry and social representatives is responsible for identifying skill needs, drawing on industry and labour market information. While education gaps (such as building and construction advisors) have been identified, no major initiatives have analyzed the labour market or its retraining needs in Denmark in the wake of a greening economy (ILO, 2011) until the recent naming of Copenhagen as the trial city for the new OECD Green Growth Indicator framework. Copenhagen has advanced climate change adaption plans that are progressive including climate neighbourhoods which are planned for sea level rise. According to the OECD, Copenhagen has made "considerable progress towards a low carbon future" (OECD, 2012 d, p. 11), but "comparative data sources at the national and international level" are limited, making progress "difficult to contextualize" (OECD, 2012 d, p. 11). Instead, most information on the impact of policy on green jobs comparatively at a national level comes from the ILO (2011, 2012).

Germany: Energy Transformation and Training Leadership

Germany has advanced green policies for more than forty years (Buehler et al., 2011). These are national policies coordinated with state (or “lander”) labour training programs that have withstood the test of political changes. Its green economy comes from “several decades of targeted policy design and implementation” (Buehler et al., 2011). Germany also participates in the European Emissions Trading System (as does Denmark, Norway and the UK). Germany taxes gas, heavy fuel oil, light heating fuels and electricity and, like Denmark, has revenue-neutral tax provisions for some industries (i.e. agriculture) to reduce employers’ and employees’ social security contributions (ILO, 2012, p. 192)³². Germany has a feed-in-tariff, which “stipulates a (usually) higher than market price and guaranteed access to the grid for different forms of renewable generation” (PICS, 2013). Fossil fuel consumption has declined steadily since these reforms, which were incrementally introduced.

Energy pricing is a big part of German energy policy. Gasoline prices were more than double those in the US in 2011 thanks to comparatively heavier tax on polluting industries. While such tax reforms may not be possible in other countries, Germany has shown that behaviour changes at price points. Perhaps as a result of higher energy costs, energy-efficient technologies are the “fastest-growing German export product” (Buehler et al., 2011). Reducing energy use has helped Germany weather global oil and gas price fluctuations (Buehler et al., 2011). However, the *Energiewende*, or Energy Concept, the 2010 strategy that set national energy policy to 2050, has faced significant issues.

By 2010 Germany’s renewable energy sector employed approximately 340,000 people, primarily in biomass, wind and solar energy (Buehler et al., 2011). This was mostly because of the *Renewable Energy Sources Act* of 2000 (Buehler et al., 2011), which included a cap-and-trade system as well as energy reform. As of 2010, the federal government’s new Energy Concept set Germany’s energy policy until 2050, aiming to make it the “most energy efficient and greenest economy in the world” (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, 2011). Emissions will be cut 40 per cent by 2020 and at least 80 per cent by 2050 (Buehler et al., 2011). The

Energy Concept's guiding principle is "modes of financing that ensure fairness between generations" and the objectives of "energy, climate change and financial policies must be harmonized" (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, 2011). The Energy Concept aims to create an efficient energy grid, develop codes for energy efficient new buildings and redevelopment of existing buildings and transition to six million electric cars by 2030.

Recent critics of *Energiewende* or the energy transformation plan (see Boisvert, 2013, 2014) state while Germany closed almost half of its nuclear plants in favour of building renewable energy capacity from wind and solar, the electricity input to the grid from these new sources was unreliable and poorly performing. This undermined the stability of the broader European grid to such an extent that Germany has had to remedy the problem with new coal and gas fired plants. Biofuel policies, as well, have not yielded anticipated mitigation results. More than half of Germany's "timber harvest is now burned for fuel" (Boisvert, 2014). Biofuel as a policy to meet renewable objectives is growing in Europe but encountering increasing criticism around sustainability and lifecycle emissions. Such concerns have led to policy adjustments that center on retreating to coal.

Buehler (2011) states that the German approach is to start small and implement policies in digestible stages. There has been a track record of successful implementation of green policies across all levels of government, and meet the needs of many constituents because of this approach (Buehler et al., 2011). Training was considered early on in the implementation stages and supported by a rigorous vocational-technical institutional system. The greening of skills in Germany happens through three channels: initial vocational, ongoing vocational and university. Companies inform training at each level. The education system retrains workers for green restructuring, with the exception of renewable energy, where organizations prefer to recruit already-trained workers. Because of "high growth rates" (ILO, 2011), there are apprenticeship programs. Where there aren't enough skilled workers, Germany established formal training centres. Some green jobs and apprenticeship pilot projects are not integrated into overall skills development (ILO, 2011). Examples of German training includes Siemens SE, a training centre for

wind power turbines and plants in Bremen, and the Germany Federal Association of Wind Energy in conjunction with employment agency and local manufacturers.

Germany provides vocational training that offers specific qualifications: e.g. Specialist in Solar Thermal Energy, Specialist in Environmentally Compatible Energy Techniques and Building Energy Consultant.

German skills development through the German Alliance for Work and Environment is highly regulated and coordinated through vocational and university education that is informed by industry and trains apprentices for flexible employment. In a recent ILO (2011) study on employment impacts of green policies, the German Republic self-reported that it was “difficult to find any incidence of occupations or occupational profiles completely disappearing as a result of ‘greening’ of the economy” (ILO, 2011, p. 313). This was again attributed to the education system, which trains apprentices for “flexible employment” with a “dual vocational training system focusing on the transfer of basic knowledge rather than workplace-specific competencies” (ILO, 2011, p. 313). The number of low-skilled workers is highest in recycling, and the number of university graduates highest in air pollution control (ILO, 2011, p. 100). The ILO observes that German “educational policy has underestimated the environmental sector’s high growth and hence skills and labour needs, which has led to skill shortages” (ILO, 2011). Germany’s national support for training and education that transitions workers to a greener economy also allows for regional variances. Starting small and expanding geographically ensured small successes were built upon. Green skills were measured early when introducing new technologies and green policies, in addition to research on skill needs, assisted in anchoring long term success.

German green policy, which began with the goal of relieving Germany of dependence on fossil fuels, has had sustained political support and that has enabled prolonged development of environmental policies. Germany’s Energy Concept 2050 aims to make it one of the most energy efficient and greenest economies in the world. The country has a strong GDP (ranked 12th in OECD nations, 2014) that illustrates that strong climate policies can produce a strong economy. Thanks to the Concept and other green policies,

energy efficient technologies are the fastest growing German export and support a thriving industry. However, challenges in transitioning to new energy sources have slowed momentum somewhat, and illustrate the need for strategic planning at all levels using a multi-faceted approach that optimally both conserves energy and improves energy efficiency in tandem.

Norway: An Exemplar in Comprehensive Oil Arrangements

Norway has one of the highest standards of living, the lowest unemployment and highest spending on education in the world (OECD, 2011).³³ Norwegians “work amongst the shortest hours in the world – approximately 500 hours/year less than the average Australian” (WRC, 2011). The population - 5 million - is approximately that of British Columbia or New South Wales. Norway also has advanced green policies and aims to be carbon neutral by 2050 (WRC, 2011). Yet the country is a major producer of fossil fuels. How has Norway’s enviable situation been achieved? Norway exports oil and agriculture products, showing that a resource-based economy with strong learning programs can plan coherently (WRC, 2011).

Norway’s strategy has been to direct revenue from its resource-based economy into education. The country has a climate and energy fund, funded by a carbon tax on offshore industry and a tax on transportation improvements. Employers, unions and governments are provided with advanced lifelong learning, both general and technical, leading to “superior workforce planning” and an “oil sector flourishes without destabilizing other parts of the labour market” (WRC, 2011). This unique trajectory began in 1962, when the Government increased social services, employment expenditures and industry subsidies in response to the discovery of oil in the North Sea. “Comprehensive oil arrangements” were negotiated between oil companies and the public sector (WRC, 2011). A petroleum fund was established to reserve wealth for the next century, and a large portion of the growth dividend was directed to lifelong learning, providing economic stability.³⁴ Norway is generally recognized as an exemplar in workforce development because of the lifelong learning scheme and coordinated efforts with

education and recruitment. However, greater effort to ensure that learning is more focused on identified employment needs rather than the individual's interest is required.

Norway's experience illustrates the potential power of workforce data capability. Norwegian Centres of Expertise support more than 20 regional arrangements on "qualitative forecasting and analysis of both output and labour demand" at the university level. Data from Statistics Norway are supplemented by biannual surveys of skill and workplace learning needs. Data are shared with Training Agencies and Training Circles. However, despite this, documentation on Norway's workforce planning is limited (WRC, 2011). Statistics Norway conducts "detailed statistical modeling" and Norwegians are encouraged to study in areas of projected skill shortages. Another workplace research centre, the Work Research Institute, analyzes Norway's workforce development programs. These have resulted in large-scale institutional reforms since the 1990s to vocational and university programs, informed by qualitative and quantitative data.

The WRC (2011) study of Norway's workforce planning data revealed that "demand for unskilled labour grew from three to eighteen per cent in a very short time period" (p. 19). However, the limited capacity of models to capture how work is evolving means that future research needs a stronger qualitative component. Good data collection does not mean excellent workforce planning. Data must be subject to "robust analysis, interpretation, dialogue and dissemination to promote 'adaptive capacity'" (WRC, 2011, p. 8). Norwegian employers are surveyed every six months about what skills they need and whether apprentices are available. These data are used by vocational training boards to advise schools. The government coordinates general and apprenticeship education systems, meant to create an adaptable and highly educated workforce. Norwegian Centres of Expertise (industry clusters identified for highest potential of future growth) provided training for specialized sustainability-related skills in twelve strategic clusters.

Many initiatives, for example to advance literacy with mature workers, have had good results (OECD, 2014). However, others have faced challenges. Youth apprenticeship programs have had difficulty achieving a supply/demand balance. There are

employee/employer tensions because of few apprenticeship placements and a debate over whether employees have the right to placements once they complete training. Part of this issue stems from a policy weakness: An employment policy encouraging student choice leaves a gap between supply and demand, since students can't be forced to take what doesn't interest them. The results are mixed and reportedly frustrate "employers interested in workers with a broader range of skills" (WRC, 2011) (i.e. construction workers trained to learn 'a little about a lot' did not have specific crafts).

Workforce planning is accompanied by a robust climate policy. Many examples exist. Within the building sector, there are household grants to replace oil-fired boilers by 2020, increasing demand for workers in this arena. Norway has also led with carbon capture and storage technology at Sleipner Vest, where more than eight million tonnes of CO₂ have been stored. Again, demand for workers was stimulated.³⁵ In 2013, the top selling cars in Norway were electric. This is a noteworthy achievement accompanied by demand for new skill sets among the automobile servicing workforce. Norway is also reaching out, and has pledged US\$2.5 billion for United Nations programs in developing countries to "ensure a just transition of the workforce that creates decent work and quality jobs...directing investments towards labor-intensive value-added activities, such as ecosystem restoration" and generating employment (ILO, 2012, p. 64).

The Norwegian example illustrates how a relatively coherent policy approach, one that aligns fossil fuel and renewable development with lifelong learning programs, can be a success. A key strength of the approach is the identification of skill needs and shortages, determined in part through bi-annual employers' surveys coordinated with local level tripartite boards. Yet while strategic workforce planning data identify skill needs, the demand for unskilled labour has grown. That consequence illustrates a need for a qualitative component that more clearly identifies where workers intend to labour.

The United Kingdom: Climate Change Act and the Economy

Despite the 2008 recession, the UK's green economy has grown continuously and is valued at 122 billion pounds (PICS, 2012). The UK's "green goods and services market

expanded by 4.7 per cent over the past year” and employs one million people (PICS, 2012). At the same time, the UK is sixth in the world in the clean tech industry with the highest percentage investment in alternative fuels, building technologies and wind (PICS, 2012).³⁶ This was supported financially through revenues from climate change policies.

In 2001, the UK introduced a climate change tax on carbon, using revenues gained for energy efficiency improvements and renewable energy support. The UK also introduced a carbon price floor in 2011 (CI, 2012, p. 15). In 2006, the UK released the Stern Review which set out the parameters that linked climate change and the world’s economy. The UK’s main environmental policy, the 2008 *Climate Change Act*, tackled rising unemployment linking climate policy and labour (ILO, 2011). Another piece of legislation, the Low Carbon Industrial Strategy (LCIS) (Bird & Lawton, 2009) lays out the strategy to achieve the targets outlined in the *Climate Change Act*. It also acknowledged skill gaps and shortages as threats to the green economy in eleven industrial sectors and services including wind, wave and tidal power, nuclear power, carbon capture, low-carbon vehicles and buildings, construction, biotechnology and business and financial services (ILO, 2011). Yet the UK was challenged to meet targets set out in the Climate Change Act of eighty percent reduction of GHG emissions by 2050 from 1990 levels. The Act was criticized for focusing on these targets primarily without sufficient attention to social consequences. If meeting the targets is the prime objective, by products such as cut social services may result.

This leadership is not surprising as the UK has had a quarter century of championing green energy initiatives and skill planning, giving it considerable skill analysis and workforce transitioning experience (ILO, 2011). But while the national UK Office for National Statistics (ONS) collects labour data, it does not conduct labour projections (WRC, 2011). It can produce “specific labour market data, disaggregated by region” (WRC, 2011). In the past few years it has deepened its data analysis and coordination (WRC, 2011) and government has focused on strengthening synergies between labour data collection and training needs. The UK Skills for Growth (2009) initiative outlines strategies to develop the existing and future workforce, and established the UK

Commission for Employment and Skills (UKCES). The latter identified data collection issues in the UK surrounding workforce planning (WRC, 2011). These included a need to map and coordinate core data collection resources and survey sources and a need to improve skill utilization by understanding workplace conditions. The Commission found that workforce development policy requires a cohesive approach and proper analysis (WRC, 2011). This was the policy backdrop for workers, including those in green or transitioning industries.

The UK has a green skills checklist (see ILO, 2011) and comprehensive green skills training in many sectors. But it has a significant data gap that hobbles its effectiveness. It “uses qualification as a proxy for skills” which “offers limited scope to understand the remaining potential within the existing and future workforce” (WRC, 2011). This raises the issues of ‘training quality’ and ‘training relevance’. Workforce development training programs need to accurately identify skills gaps and shortages in order to be effective. One response included the 2009 *Higher Ambitions Strategy* to fund growing industries. This included degree courses to support new technologies and regional agencies to identify skill needs in green sectors (ILO, 2011). While the UK has lost jobs in the manufacturing and utilities sectors, and losses are projected in the coal, shipbuilding and automotive sectors, impacts vary regionally. A non-centralized response to reskill workers negatively impacts employment. It also leaves employers and regional development agencies to handle reskilling and training. However the UK has led in some specific comprehensive training, for example emissions traders can be trained in-house or through “industry-led continuing training programmes” (ILO, 2011, p. 123) led by the European Climate Exchange.

The UK government has also “prompted skills development by establishing a prototype emissions trading scheme to prepare firms for the European trading scheme” (ILO, 2011, p. 123). Some of the initiatives for the national governments to advance climate change policy was born from other members of the UK nationally (e.g. Scotland) and local governments such as London. London’s initiative to tackle climate change led to broader action by the UK government. The London Plan (the strategic plan for London) included

a statutory duty for the London Mayor to tackle climate change. This became a foundation for the UK Climate Change Act. The action supports starting small and expanding what works makes it more likely for governments to tackle climate change.

Another reason the UK has been able to advance climate policies was the reduction of the regulatory environment. High-level changes were introduced by then-Prime Minister Tony Blair who described the energy department as rigidly maintaining status quo due to corporate government wherein no one director can create change, forcing him or her to take executive action (Dissertation interviewee, Sydney, New South Wales). Prime Minister Blair commissioned an independent study that showed the high operating costs of the power grid and the need to move away from ‘information’ to ‘market intelligence’. This illustrates that both regulation through climate change policy coupled with deregulation when appropriate so that implementation of new policy is not stymied by bureaucratic processing is a key balance to strike. Too much regulation can be a barrier to climate change policy adoption. Another barrier is lack of business certainty. Developing plans with stated goals helps create such business certainty.

The Case of Scotland: Renewable Targets and Green Skills Training

Scotland (APS 2010, 2011) in particular has massive green energy potential in tidal and offshore wind (almost 40 per cent of the total UK resource) and the Scottish Government has stated that 100 per cent of its electricity must come from renewables by 2020. By the end of 2011, wind and hydro “reached 36 per cent of Scotland’s electricity consumption (BBC, December 20, 2012) and from January to September of 2012 Scotland saw 15 per cent growth in the “output of wind, hydro and other renewables” (BBC, December 20, 2012). Scotland was motivated to attract businesses who could invest heavily in infrastructure in the development of renewables, particularly off shore wind infrastructure. The Routemap for Renewable Energy in Scotland (2011) estimates 28,000 direct jobs and 20,000 indirect with impact of 7 billion pounds by 2020 (APS, 2011). It sets out several action plans and strategies (i.e. *Roadmap for Scotland’s Marine Renewables Industry, 2009; Marine (Scotland) Act 2010; Low Carbon Economic Strategy, 2010; Blue Seas-Green Energy A Sectoral Marine Plan for Offshore Wind*

Energy in Scottish Territorial Waters); financial support (i.e. the 13-million-pound WATERS fund, 70 million pounds from the National Renewables Infrastructure Fund); and skills investment plans (i.e. Skills for Scotland: Accelerating the Recovery and Increasing Sustainable Economic Growth and the Skills Investment Plan for the Energy Sector). A Skills Utilisation Leadership Group was established comprised of leaders from business, government and stakeholder groups.

Doosan Power Systems (March 2011) announced 170 million pound investment in Scottish wind power in the next 10 years (APS, 2011) and Mitsubishi Power Systems Europe Ltd (December 2010) announced it would to invest in offshore wind turbines creating up to 200 jobs over 5 years and leveraging up to 100 million pounds in the local economy. This initiative was scrapped in 2012 and dealt a serious blow to Scotland's job creation plans. The Scottish Government is still developing offshore wind, but continues to build the infrastructure and skill capacity which has attracted leading turbine manufacturers (APS, 2010, 2011).

The Scottish Government has centralized green skills training, focusing on the energy sector (APS Scotland, 2010, 2011; Scottish Government, 2010). The government outlined specific skills needs such as types of "engineers, leadership and management, project managers, welders, turbine technicians and divers" (APS, 2011). Most jobs will be at the technician level. It also identifies uncertainties that impact planning, such as the newness of technologies, financing, international energy governance and impacts on national economics (APS, 2011). The Scottish Government also has initiatives to promote green jobs to youth (i.e. Junior Green Energy Awards, national support for careers in renewables) and financial incentives for innovation and research.

Sector Skills Councils

Wales presents another example which second generation adopters copied, the sector skills councils that identify skill gaps and improve skill supplies, which will give Welsh industries, a "strategic comparative advantage (i.e. technological or innovation)" (ILO, 2011, p. 131). Several sector skills councils in the UK have coordinated a "Renewable

Energy Skills Strategy”. Innovas estimates 400,000 new jobs in the UK by 2015 as a result of the LCES plan (Bird & Lawton, 2009). But sector-specific studies produced “significantly lower numbers” (Bird & Lawton, 2009, p. 6). These estimates suggest that projections are uncertain and depend on “assumptions about the extent of government interventions” (Bird & Lawton, 2009, p. 6).

Some effects were not considered, such as impacts of renewable energy policies on prices, which impacts consumer spending. Some scholars argued (in 2009) that there was no analysis on areas at risk from a low-carbon economy (Bird & Lawton, 2009) or the impact on employment of those who lose their jobs but become employed in other sectors (Bird & Lawton, 2009). Bird & Lawton (2009) identified some things government could do to reduce employment impacts, including more detailed analysis of the sectors at risk, strategies to protect vulnerable jobs, and creating employment and skill training for “those that need it most” (p. 6).

Comprehensive Intervention Approach First Generation Adopters Summary Tables

The above overview and key findings from each of the high level case studies of Denmark, Germany, Norway and the UK are summarized in tables available from the author.³⁷ Each of the three research areas, policy coherence, institutional and organizational capacity and capability of the workforce are rated between Low-Medium-High. There are many variables to be considered within each question, so while the outcome may be a similar rating for all four nations, some may rank higher on some variables than others within the matrix of each question with a similar overall result. Table 6-1 First Generation Adopters: Degrees of Coherence, Integration and Connectedness Overview follows.

Table 6-1: First Generation Adopters: Degrees of Coherence, Integration and Connectedness Overview

Research Questions & Key Variables	Denmark 100% Renewable Targets	Germany Energy Transformation & Training	Norway Comprehensive Oil Arrangements	UK Climate Change Act and the Economy
<i>Policy Coherence and Broader Contextual Environment</i> Degree of Integration	High	High	High	Medium - High
<i>Institutional and Organizational Capacity in the Transactional Environment</i> Degree of Connectedness	Medium-High	High	Medium-High	Medium-High
<i>Capability of the Workforce</i> Potential for Change	High	High	High	Medium-High

Summary

The selected first generation adopters reviewed in this chapter, Denmark, Germany, Norway and the UK highlight the early efforts and approaches for mitigation through renewable energy efficiency which evolved into comprehensive climate change interventions.³⁸ The approaches varied by country but all were initiated during the early 1970s. Policies were introduced at different times in different ways, depending on levels of readiness and differing circumstances: Norway developed its policies in response to oil finds in the 1960s, while much recent activity in Scotland is the result of a recently growing wind industry.

Each country had its own approach. Some, such as Germany, implemented at a regional level first, working out new program nuances, while Norway approached the development of oil from a national level with a sophisticated multi-faceted investment of long term savings. Denmark and the UK invested in technological advances such as the wind turbines and advanced climate change policies with various workforce training

schemes. Different countries have developed different institutional and organizational capacity to advance comprehensive climate change interventions and workforce planning.

In general, the UK, Scotland and Wales have broad knowledge on labour market and green skills with coordination with green policies, and deepening analysis is underway in the UK in an effort to be more proactive as opposed to reactive. The UK responds more sectorally vs. holistically – but there is increasing data coordination.

Another factor warrants consideration. WRC (2011) makes the key point that skill shortages can sometimes be the result of jobs people “won’t or don’t want to do” (WRC, 2011). This was identified as a serious issue for Norway (WRC, 2011). While organizational structures can also be created that allow administrative units to be structured and bureaucracies designed to support comprehensive policy innovation as in Norway’s Centres of Expertise, the establishment of such units and development of needed skill sets doesn’t equate to job vacancies being filled.

The exploration of the efforts of these four first generation adopter nations allows reflection for the efforts of second generation adopter governments which follow: British Columbia, Canada, New South Wales, Australia and the reconnaissance case of California, United States. This provides a baseline of comparison while delving much more deeply into the comprehensive climate change intervention efforts of these second generation adopters: the policies, the changing political landscape and the efforts to build institutional and organizational capacity and capability.

Chapter 7

British Columbia, Canada

Introduction

In the mid 2000's the Province of British Columbia witnessed firsthand the impacts of a changing climate including a significant increase in forest fires and a rapidly spreading and devastating infestation of the Mountain Pine Bark Beetle, attributed to warming winters that failed to keep beetle populations in check. Such phenomena offered a strong motivation for the government to take action on climate-change mitigation, and in 2007 and 2008 the Province announced several initiatives designed to reduce GHG emissions by 2020 and beyond. Premier Gordon Campbell captured the mood of the government in late 2007:

...we saw really firsthand in British Columbia the effects of climate change that had been predicted: extreme variations of weather in a very short period of time, literally going from record rainfall days in the southern part of British Columbia to record low stream flows and all the way back again where we had extreme storms and mountain snow packs...British Columbia is highly sensitive to climate change (21 Nov 2007, Hansard, pp. 9369).

In 2008, the Premier set out an ambitious comprehensive climate change intervention in phase one of the British Columbia Climate Action Plan. It comprised a multi-sector (transportation, buildings, waste, agriculture, industry, energy and forestry) and multi-faceted policy approach to foster mitigation while adapting to climate change, and it set goals that would see BC establish the first carbon neutral government in North America. The Plan included legislated, substantial greenhouse gas reduction targets: 33% below 2007 levels by 2020 and 80% by 2050. A legislated requirement for local governments to report on GHG emission reductions sparked local government to work in parallel with the Province to mitigate and adapt.

This chapter will describe the steps taken by British Columbia's comprehensive climate change interventions, from their introduction in the mid 2000's through to 2012, and evaluate them with a view to their coherence and whether strategic workforce strategies were introduced or emerged as part of those comprehensive policy interventions. Key policies and supporting structures will be discussed, including the formation of the Climate Action Secretariat and the role strategic workforce planning played in supporting the climate mitigation and adaptation efforts. Observations derived from analysis of 43 interviews³⁹ conducted mostly in person with senior scientists, policymakers and strategic workforce planners in provincial, regional and local governments in British Columbia and leading Canadian scientists are presented. All interviewees played instrumental roles in shaping and implementing the climate change policies. CEOs and senior workforce planners of leading Canadian clean tech companies were also interviewed and twenty additional interviews were conducted with strategic workforce planners in ministries and organizations involved with workforce planning and a study of turnover in the BC civil service. Insights gained from these interviews are also described in this chapter, and examples of comprehensive intervention initiatives in BC are included in the appendices.

In order to locate the BC government's scope of authorities in the Canadian federation, this chapter begins by providing an overview of the national government's approach to climate change as well as the agencies responsible for climate change and their competing and complementary policies. This overview shapes the context necessary to understand the response of British Columbia—within Canada— in helping to address the climate-change challenge and the responsibility to reduce GHG emissions. Two sections follow. The first provides an overview of British Columbia's climate change intervention and the Climate Action Plan (2008) and the second evaluates the Climate Action Plan from a strategic workforce planning perspective. The conclusion summarizes the findings and presents a high level analysis of the degree of policy coherence and institutional and organizational capacity and capabilities.

Climate Change and the Distribution of Relevant Authorities in Canada

Canada's abundant energy resources (e.g. coal, oil and natural gas, and renewables such as biomass) make it "a leader by necessity" in climate and energy policy (Woynillowicz, Comette & Whittingham, 2012, p. vi) but its leadership efforts have fallen short of the mark. While the federal government has taken several steps to tackle climate change in the last decade—among them the Kyoto Protocol (ratified in 2002; withdrew in 2011), the *Turning the Corner* climate change action plan (2007) and the Copenhagen Accord of 2010 which stated that Canada would reduce emissions to 17 per cent below 2005 levels by 2020—it still does not have a comprehensive climate-action approach. Following the election of Prime Minister Stephen Harper in 2006, Canada announced it would not meet its Kyoto commitments. By default, the responsibility to reduce GHG emissions was laid primarily at the doorstep of the provinces.

Canada is one of the "only major oil-producing nations to have established an economy-side GHG reduction target" (Government of Canada, 2012) which is based on a sector by sector regulatory approach. Between 2005 and 2011, GHG emissions "decreased by 4.8%, while the economy grew by 8.4%" (Environment Canada, 2013), but such apparent gains are primarily the result of provincial initiatives like the phasing out of coal power plants in Ontario, rather than a result of concerted federal action. Canada has received some positive attention with respect to taking action on climate change. The International Energy Agency⁴⁰ (2010) report (see Canada – 2009 review) on Canada's progress on GHG emissions recognized Canada's leadership in carbon capture and storage, energy efficiency and efforts to streamline environmental policies such as harmonization of the light and heavy duty vehicle regulations with US policies.

Relevant Authorities for Climate Change and Environment

Two main agencies are responsible for natural resource and environmental issues in Canada. Natural Resources Canada (NRCAN) oversees energy and environment (including provision of climate change data and publications) and Environment Canada (EC) is responsible for protecting the environment, providing information on weather and protection of Canada's natural heritage (Environment Canada, 2014). Canada's 'energy

policy' is guided by principles of market orientation and "respect for jurisdictional authority and the role of the provinces" (NRCAN, 2013) and specifies that where necessary, Canada will intervene with targeted regulations to achieve policy goals (NRCAN, 2013). NRCAN develops policy for energy sources stewardship and exploitation, efficiency and non-fossil-fuel resources.⁴¹

NRCAN and EC have some overlapping areas of responsibility, one of which is climate change research and data collection, although EC is considered the lead agency in the climate change research domain. Indeed, the flagship institute for climate modeling in the country, the Canadian Centre for Climate Modelling and Analysis (CCCma), is a division of the Climate Research Branch of Environment Canada and is based at the University of Victoria. A third body, the Canadian Foundation for Climate and Atmospheric Sciences (CFCAS), was the main climate change research-funding agency for Canada from 2000 – 2012 but closed its doors after the federal government in 2012 did not renew support for the foundation's research-oriented work.⁴²

Canada's self-proclaimed approach for GHG emission reduction is based on several key 'principles' (NRCAN, 2013) that target a sector-by-sector regulatory approach. The Office of the Auditor General of Canada (OAGC, 2012) in review of Canada's sector by sector approach asserted that this approach would require a high degree of policy coherence since the greenhouse gas emissions involve all major sectors. Transportation and the electricity sectors are two of the largest sources of GHG emissions, and they have been targeted first and are now described. Three principles follow.

Targeted Regulations. Improving fuel efficiency is a key strategy in GHG reduction, and Canada has made this approach a priority with a goal to harmonize with US regulations. The policy harmonization with the US developed over the mid 2000 – 11 period. The federal government has direct responsibility for new vehicle standards, air quality and labour issues. One target for lower emissions that falls within the government's mandate is heavy and light-duty vehicle emissions which in 2008 comprised 27 per cent of Canada's GHG output (Environment Canada, 2012).⁴³ Reductions in this sector have

been realized through regulations that set progressively tougher fuel efficiency regulations for vehicles across the light and heavy duty spectrum. The electricity sector has also been singled out. Coal fired electricity is responsible for 11 per cent of Canada's emissions and new regulations were developed over the mid 2000 period and released for review in 2011.

Market Orientation. While Canada has supported its clean tech industry through federal tax credits and funding (KPMG, 2011; National Round Table on the Environment and the Economic NRTEE, 2012) and Canada's green economy is ranked 13th worldwide, valued currently at about 98 billion Canadian dollars (PICS, 2012), federal financial support for the sector has not been consistent. For example, Canada has recently terminated its Clean Energy Fund, which funded clean energy research and demonstration projects between 2009 and 2012 (David Suzuki Foundation, 2012). Initially the fund was established at \$1 billion but was reduced over subsequent years with funds reallocated to an ecoENERGY Retrofit-Homes project. The fund did support initiatives which supported large scale carbon capture and storage initiatives and renewable and clean energy technologies. A few clean tech CEO's interviewed lamented the ending of support in 2012.

Respect for Shared Jurisdiction with the Provinces. Canada shares jurisdiction of environmental matters with the provinces under the Canadian Constitution. As the nation initially explored various policies to reduce GHG emissions during the 1990s and early 2000s,⁴⁴ including ratification of the Kyoto Protocol in 2002, a joint approach was sought with the provinces (National Round Table, 2012). Realization of such an approach remains elusive. "Widely divergent natural resource endowments" (National Round Table, 2012, section 2.1) yield different total and per capita GHG emissions regionally within the country. In turn, those lead to differing economic interests with respect to climate policy. The national emissions-reduction target mandated by the Kyoto Protocol and the manner in which it was decided, together with the ensuing U.S. withdrawal, also proved divisive. Several provinces opposed ratification and once the federal government made the decision to ratify the Protocol, attempts to construct "joint

federal/provincial action on climate change dissipated” (National Round Table, 2012, section 2.1).

Since the Kyoto Protocol ratification, Canada’s provinces and territories have implemented more ambitious climate change policies than the national government, but a lack of coordination among the sub-national jurisdictions has limited their collective effectiveness (David Suzuki Foundation, 2012). Climate change policy across the nation has been fragmented and is now characterized by two main features: a) each province has its own policies to reduce GHG emissions tailored to meet GHG performance standards set nationally (IISD, 2013); and b) provinces develop their own policies or “cherry-pick from proposed federal policies to negotiate locally tailored sector-by-sector equivalency agreements” (IISD, 2013 pg. 4). But there are other reasons why progress has been slow in Canada during the 2000 – 2012 period.

Progress on Climate Change 2000 – 12

Progress has been slow due to the complexity of policies and the fact that comprehensive regulations develop over multiple years before coming fully into force (Office of the Auditor General of Canada, OAGC, 2012). Policies such as harmonization of light and heavy-duty vehicle regulations were in development for several years during the mid 2000’s onwards and were released for review in 2012. In addition, stimulus packages in the US and other countries in response to the 2008–10 recession have been a recent focus for new green investments, and in general Canada has fared poorly compared to other countries on the share of stimulus dollars going to green investments, and green investments per capita” (CCPA, 2010, pg. 30).

The nationally fragmented policy approach is another reason progress has been halting. The NRTEE was “directed by the Minister of Environment to conduct a comprehensive review of provincial and territorial climate change plans and assess their likely contribution to Canada’s 2020 greenhouse gas emission-reduction target of 17% below 2005 levels” (NRTEE, 2012). The Roundtable found that those policies would not meet federal goals. More recently, the UNFCCC (2013) found Canada’s emissions were flat

relative to 2007 but will fall short of the 2020 GHG reduction goals. Environment Canada (2014) reported that Canada had made no progress in 2013 towards its pledge to reduce GHG emissions by 17 per cent from 2005 by 2020 and without new policies Canada would not meet the 2020 goal. However, some progress has been made at the sub-national scale. For example, emissions in BC are down 5.4 per cent relative to 2007 although there has been an increase in population in the province of almost 200,000 since that time. But emissions in other provinces such as Alberta continue to rise. Such contrasts across the nation are shaped by competing policies on oil, natural gas and coal production. Building institutional capacity to harmonize and align policy within Canada through a coordinated policy strategy with equal incentives would perhaps help in meeting national policy goals.

There is yet another reason why progress has been constrained. Alignment of climate-action policies with labour market development and employment policies has also met with challenges. Harmonizing skill training across provinces, ensuring labor mobility agreements are in place and aligning climate policies with skill development policies would increase the rate of policy implementation. We turn now to Canada's institutional structure and strategy on human resources.

Relevant Authorities for Human Resources and Skills Development

Human Resources and Skills Development Canada (HRSDC) delivers and manages social programs for Canada including labour market development. The approach of HRSDC is to ensure a “highly-skilled, adaptable and inclusive labour force and an efficient labour market to meet a variety of economic challenges” (HRSDC, 2013, a). While HRSDC has a green skills development strategy it is not broadly communicated and still not fully developed.⁴⁵ *Work in a Warming World* (2013, 2010) and the CCPA (2012) have called on Canada to develop a comprehensive national green strategy including green jobs in construction, transportation, manufacturing, waste management and adaptation planning.

HRSDC does have specific activities targeted to support the development of skills associated with advancing the green economy (HRSDC, 2013 a). These include aboriginal labour market programming, support for labour market integration, labour market and development agreements which provide funding for provincial and territorial labour market programs as well as services often for low-skilled workers who are employed in green industries. Furthermore, an enabling fund for official language minority communities has been established, with a mandate to expand the green-employment sector.

HRSDC relies on Canada's sector councils for workforce information and data collection. In 1992, the Government of Canada established such councils to research human resource challenges and specific skill needs facing the Canadian economy. (In contrast to Australia, Canada's sector councils do not report to an overarching authority.) Eco Canada (2012, 2011, 2010 a, b, c, d) was the sector council established for the environment, but as of April 1, 2013, core operational funding was no longer provided to that and all other sector councils in Canada. Instead, a different approach is now in play: a Sectoral Initiatives Program (SIP) which funds projects of national scope that support the "development of labour market information (LMI), national occupational standards (NOS) and certification to address skills shortages" (HRSDC, 2013, a) particularly those for the green economy.

For the environmental sector, Eco Canada now updates national occupational classifications (i.e. Canada's National Occupation Classification (NOC)) and harmonizes them with the US (the North American Industry Classification System system). This approach provides information on new green jobs, the size and composition of Canada's green economy, and future needs (Eco Canada, 2010; ILO, 2012, p. 111) but because these are changing rapidly the NOC systems lags behind current practices.

The national labour data collection agency, Statistics Canada, which collects Canadian workforce and employment data, does not collect data on green skills specifically (telephone conversation, September 20, 2012). While employment in the green economy

is expected to grow in Canada, how it grows and to what degree depends on future climate change policy and strategic workforce planning support in this transition will play a key supporting role to ensure appropriate training and skill sets are available to support these changes. Ensuring a targeted, harmonized climate change policy and coordinated human resources policy between Canada and the Provinces would minimize labour impacts.

Accurate labour market information is needed to minimize labour transition stress, and this is as true at the international level as it is nationally. Canada participates in several international economic and environmental collaboratives in this regard, such as OECD and various roundtables to harmonize regulations and data/metrics on economics and labour. A trilateral US-Canada-European roundtable recently found that green jobs needed “accurate labor market information and vigilant planning [...] to minimize bottlenecks that prevent industry from hiring needed skilled workers” (U.S. Canada-European Commission Trilateral Roundtable, 2011).

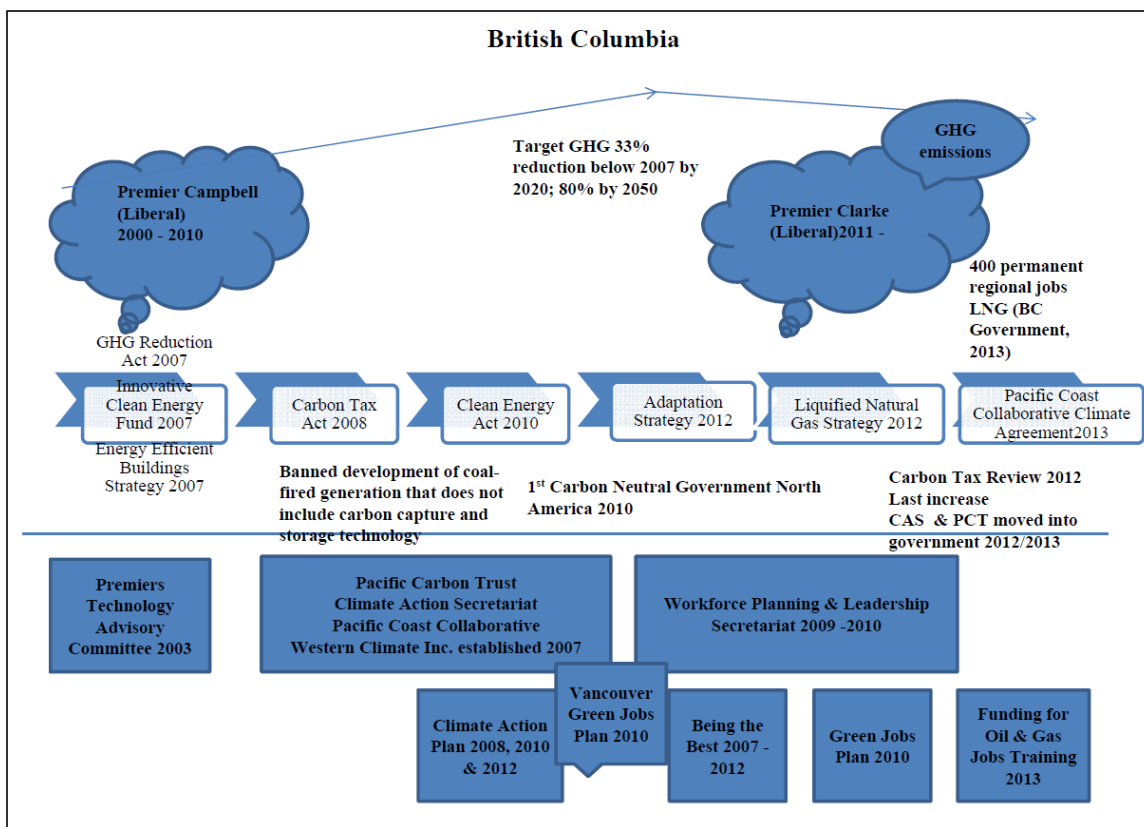
The relative lack of coordination at various scales has not constrained all progress. While British Columbia was not the only province to take action (both Alberta and Quebec introduced carbon pricing schemes prior to BC and Ontario introduced substantive green skills training initiatives) none were as substantial and comprehensive as British Columbia. Initiatives taken in British Columbia offer one good example of a subnational government, and the most exemplary of the Canadian provinces, that introduced a comprehensive climate change intervention with workforce planning lagging. While this planning effort was not fully integrated, it does provide an instructive case.

British Columbia: Mobilizing to Address Climate Change

The Climate Action Plan (2008) outlined how the BC government would build on the policy framework set out in 2007. The Plan offered a multi-year, multi-sector approach that laid out how the government would reduce GHG emissions by 33 per cent by 2020 from 2007 levels. To locate the BC government’s comprehensive climate change intervention, this section begins by providing an overview of British Columbia’s

organization on climate change and its related environmental initiatives prior to the Climate Action Plan announcement. This overview shapes the context necessary to understand the scope and magnitude of British Columbia in helping to address the climate-change challenge and the responsibility to reduce GHG emissions. Multiple policies comprised the Climate Action Plan, as described in the following section and summarized in Figure 7-1.

Figure 7-1: British Columbia Approach



Organization of BC Government and Previous Environmental Initiatives

The BC Government did not pay much attention to climate change prior to the mid 2000's. As one interviewee for this study noted: "Climate change was kind of in the bowels of the Ministry of Environment and the Ministry of Energy but not enough weight to ever have any substantive actions." Prior to the establishment of the Climate Action Secretariat in 2007, climate change was a developing policy initiative in the Ministry of

Energy and the Ministry of Environment for approximately ten years. During 1995 – 2005 there was increasing information about the topic, public awareness grew, and resources such as contingency funds to increase public awareness of climate change were progressively made available. Climate change indicators were developed for BC under the New Democratic Party (NDP) government, released in 2002 in the early years of the BC Liberal government (Ministry of Environment, 2002). A former senior governmental executive explained the Ministry of Environment relied on this “peer-reviewed” work heavily explaining: “the indicators looked at climatic change drivers and ecosystem and community over very long time periods – decades and some indicators had 100 years of data.” He explained the approach to climate change mitigation in 2002. Environmental issues were not terribly important and were indeed considered “retrograde in terms of emission actions until 2007”. Premier Gordon Campbell did strike the Premier’s Technology Council in 2001 to provide advice on technology related issues which made recommendations on strategies for alternative energy adoption. The resulting 2007, 2008 and 2010 reports offered specific recommendations on clean technology.

2007 and 2008 were banner years for climate action in BC. Several pieces of legislation to mitigate GHG were introduced and adopted as law including the *Greenhouse Gas Reduction Targets Act* (2007), the *Greenhouse Gas Reduction (Cap-and-trade) Act* (2007), the *Greenhouse Gas Reduction (Vehicle Emissions Standards) Act* (2007) which enabled adoption of vehicle emissions standards, the *Greenhouse Gas Reduction (Emissions Standards) Statutes Act* which regulated landfill gas emissions, the *2008 Utilities Commission Amendment Act*, which encouraged low-carbon energy generation projects, the *Greenhouse Gas Reduction (Renewable and Low Carbon Fuel Requirements) Act* which encouraged renewable energy and reduction of carbon content in fuels, the *Local Government (Green Communities Statutes Amendment Act, 2008)* which encouraged development of sustainable communities and the *Carbon Tax Act* (2008) which taxed emissions from fossil fuels purchased and combusted in BC and used the revenue to reduce personal and corporate income taxes, making the tax revenue neutral by law (Climate Action Plan, 2008). Various funding initiatives were taken, such

as the Innovative Clean Energy (ICE) Fund established in 2007 which provided support for clean technology development.

However, the approach to adaptation was somewhat different. There was more latitude to deal with this aspect of climate change strategy in government, and in 2002 Minister Joyce Murray made a million dollars available for climate change research (per interview 2012). Those funds were used to engage consultants to assist with ongoing discussions with the federal government and to seek financial support to assist with climate change mitigation and adaptation. Most of the funding was directed to adaptation (Interviewee, 2012). One interviewee stated that during the years preceding the establishment of the Climate Action Secretariat the work on climate helped the British Columbia government stand up for provincial rights when it looked like the federal climate change plan would have a limited impact:

BC acted independently of the federal government and we accomplished a lot during the 2000 – 2006 period. BC did not really support the federal government [...] it was very skeptical and it was standing up for provincial rights and asserting certain kinds of actions when it seemed to be our economic benefit.

The interviewee stated, that in many ways this assertion led to the innovation and initiatives that formed the foundation of British Columbia's comprehensive climate change intervention.

The Climate Action Plan: Announcement and High Level Design

The 2007 throne speech announcement by Premier Campbell surprised many.⁴⁶ Campbell, was inspired to act following growing devastation of BC's interior forests by the mountain pine bark beetle, increasing frequencies of forest fires and floods, as well as via exchanges with California Governor Arnold Schwarzenegger, also a conservative, who was advancing a tough climate change intervention in California. Campbell and Schwarzenegger shared a similar political outlook and understood that initiatives to support clean technology and reduce GHG emissions were good for the environment and

the economy.⁴⁷ Memoranda of agreement were signed in 2007 formalizing BC and California's commitment to address climate change impacts on the oceans, and both BC and California joined the Western Climate Initiative in 2007.⁴⁸ Campbell had the long-term vision and political clout to initiate and advance a comprehensive intervention. He set in motion many policies and initiatives designed to reach the 2050 targets, but these were not sufficient to realize his vision. A senior BC executive shared an expression they had in government: "... we'll probably work with eight different premiers to hit the 2050 target."

The Climate Action Plan (2008) set out targets for GHG reductions to 2020 and 2050 and introduced baseline measurements of GHG reductions in 2007. Reports on GHG reductions were first released in 2008 and issued bi-annually since. The Climate Action Plan (2008) had ambitious goals, but the steps taken were gradual and included the incremental carbon tax, negotiations with other provinces and states to introduce a cap-and-trade system, and the establishment of the Pacific Carbon Trust that would sell and administer carbon offsets. Other steps included a requirement for BC to have the first carbon neutral public sector, and the establishment of green purchasing policies as well as targets for emission reductions in specific sectors such as transportation. The scope and depth of these policies for energy efficiency, decarbonisation and GHG emission reductions comprised a comprehensive climate change intervention.

In addition to these multi-sector targets and policies the Climate Action Plan recognized that communities had to be brought along incrementally and not become discouraged if they weren't changing their behaviours fast enough and so an incremental approach was taken. One of the informants stated: "If you get it wrong, people feel like you're vilifying them for the fact that they drive a minivan." This involved programs for residents was a key strategy for energy efficiency particularly. Incentives for families through LiveSmart BC to reduce consumption of energy and water were made available, incentives for electric vehicle purchases and tax reductions for fuel efficient vehicles are some examples. LiveSmart BC also included an education and training component to ensure climate change education in the schools and green education campaigns in the workplace.

It also involved regional and local government planning that will be discussed later in the chapter. These included establishing new flood plan guidelines, infrastructure grants that recognize climate change, and green community development strategies through the Green Communities initiatives.

Policies and Instruments

The Climate Action Plan (2008) formally set out the legislation introduced in 2007 and 2008. This included the *Greenhouse Gas Reduction Targets Act* set out legislated policies to reduce GHG emissions, the Carbon Tax Act (2008) which introduced legislation for an incremental carbon tax on gasoline over five years which was revenue neutral; and the Greenhouse Gas Reduction (Vehicle Emissions Standards) Act (2008) harmonized BC's standards with California's (2004) to reduce vehicle emissions.

Transportation policies to expand transit and increase transit ridership were introduced as well as support to increase cycling infrastructure. Various policies to support energy efficiency were developed including energy efficient buildings with amendments to the building code (developed over several years but coming into effect December, 2014). Local governments were legislated to include GHG reduction targets through official community plans by the *Local Government (Green Communities) Statutes Amendment Act* (2008). New acts, regulations and policies followed.

The *Clean Energy Act* (2010) outlined many of BC's energy goals, including goals for BC to generate at least 93 per cent of its electricity from renewables and reduce its expected increase in energy by 66 per cent and to encourage communities to reduce energy consumption. In 2007, the government set a goal of 100 % carbon neutrality by 2010 for all governments in British Columbia. In 2012 the Province returned almost \$2.8 million carbon tax (collected through Carbon Tax Act 2008) to local governments committed to carbon neutrality by 2010. The revenue neutral tax supported reducing personal income taxes for incomes under \$119,000 in Canada, and one of the lowest corporate tax rates in the G8 countries (British Columbia Ministry of Finance, 2012). An interviewee commented that, despite the progress on the Climate Action Plan, there were several policies CAS staff had worked on over time that hadn't "...seen the light of day."

New Institutions, Committees, Capabilities

During the 2007 – 2010 period, the BC government established several institutions and committees to support the targets and goals set out in the various acts and policies.

Climate Action Secretariat. The Climate Action Secretariat (CAS) was established (2007) as an independent body and as the only government organization with a direct reporting relationship to Cabinet. All other organizations and ministries had to report through Cabinet Operations (Cab Ops) to Cabinet. This direct reporting relationship gave a clear signal about the importance of climate change on the government's agenda, particularly the Office of the Premier. One interviewee stated:

So there's no point in having an organization that is designed to hit the targets if you don't have a premier that's going to be focused on the issues to do it, right? When you're in the premier's office you are working for all ministries. No one asks you whether you're on an environmental file or an economic file. You also have very clear authority over all ministries. You can see it on an org chart.

The mission of CAS was broadly to reduce greenhouse gas emissions and advance an adaptation strategy. Both required drafting legislation, the original cabinet submissions and writing complementary legislation CAS was not directly responsible for. The political power that accompanies a Secretariat with a direct reporting relationship to Cabinet is significant. In addition to establishing CAS, the Premier created a cabinet committee for climate action and for climate action clean energy. The Premier also had the foresight to establish a foundation at the University of Victoria to ensure long term funding for climate change research.

Committees. As noted above, CAS staff could write directly to cabinet. Cabinet committees are indicators of government priorities and they can also ensure quick decisions can be made and most importantly an avenue to build support, provide a forum of debate for issues and educate ministers to understand the issues -- all of this allows the

Premier and Ministers to champion a cause internally and to the public. Elevating climate change in the provincial government with supporting committees and institutions ensures policy is not traded off against energy or economic development. An interviewee explained that developing the right supporting organizations and committees to match changing political leadership and goals is tough.

In the later days of the Campbell administration (2009), on the heels of the recession, CAS was ‘demoted’ from a direct reporting relationship to Cabinet to a division within the Ministry of Environment. This signaled the reduced priority of the ‘climate file’ within the government and diluted the power of the CAS workers. During this time, its focus also shifted from policy development to implementation.

Capabilities. An interviewee suggested the most important consideration was keeping the mitigation and adaptation work together, rather than separating them. Mitigation responds to reducing GHG emissions; adaptation tackles the impacts of climate change; each require different capabilities. On the other hand, it is good to connect these distinct capabilities collaboratively since reducing GHG emissions with the adaptation people who then use the results as the basis of their work is very worthwhile and there’s various carry over actions where there are co-benefits. Reducing greenhouse gases benefits adaptation and vice versa. An interviewee emphasized that the biggest difference between mitigation and adaptation when working in government is that the two concerns involve working with different stakeholder groups and different ministries on distinct sets of problems.

Recognizing the need to build capacity in the government and the fragility of CAS, the Campbell government provided funding to the Pacific Institute for Climate Solutions (PICS) to develop climate change solutions and education for government and the general public (see www.pics.uvic.ca/education) and ongoing support for the Pacific Climate Impacts Consortium to continue regional climate modelling. The \$90 m endowment established for PICS assured longevity for climate change research and involved the

major universities in British Columbia. The headquarters were located at the University of Victoria.

Working Across Ministries

The Climate Action Plan (2008) identified several initiatives that required working across several ministries. These included a BC Bioenergy Strategy, The Agriculture Plan: Growing a Healthy Future for BC Farmers, The Mountain Pine Beetle Action Plan, The BC Air Action Plan, The BC Transit Plan, The Energy Efficient Building Strategy, the BC Green Building Code, the foundation grant to the University of Victoria for the Pacific Institute for Climate Solutions, and Living Water Smart previously mentioned. These were all orchestrated by the Climate Action Secretariat that oversaw the Climate Action Teams established in 2008.

Several interviewees acknowledged that the Climate Action Plan presents challenges working horizontally and vertically across the public service and with outside groups. And these challenges became more pronounced when CAS lost its direct reporting relationship to cabinet. CAS had to deal with legislation beyond its control and coordinate different objectives between mitigation and adaptation – challenges within the organization and across organizations. When that happened, a senior executive reported that it was difficult for public servants used to reporting to their boss to then start thinking about influences from another group. The establishment of Climate Action Teams within each ministry in 2007 to help coordinate and communicate the internal workings of government helped in this regard. One interviewee stated that the Climate Action Teams worked in ministries mobilizing climate action that varied dramatically from each other as each had different initiatives involving one or more organizations. An interviewee explained:

We are a small group that provides a ‘whole of government’ approach to the Climate Action Plan. That means that every ministry has to contribute to implementation of the plan. We innovate for the next big thing. We monitor the progress against the targets and what our provincial emissions look like every year. Our job really is to make sure that the

relationships work within government –and with our key stakeholders. The Climate Action Teams play a key role as well as they bring new ideas to the workers within each ministry to green government operations. These ideas vary depending on the organization.

Many of CAS policy goals were achieved through participation with other ministries programs without requiring a climate change lenses. The Ministry of Energy may advance energy efficiency to improve conservation but for CAS this was a climate change mitigation strategy. An official role for CAS was to work with the Ministry of Finance as one interviewee explained:

There were five kinds of basic policy perimeters that were put in place for the carbon tax very early on, very basic ones. The Ministry of Finance people know how to apply taxes. This was just a new one and there were practical considerations to go along with that but they knew exactly what to do. Whether it was a tax on the carbon content of fuel or energy content it didn't make any difference to them.

Regional and local governments implement provincial climate change policies. They have “on the ground level” responsibility for implementation of provincial climate change policies. What follows reviews the authorities first given to local and regional governments.

Working Through Other Levels of Government

The Climate Action Charter (2007) announced a partnership between the BC government, the Union of BC Municipalities and local governments. Local BC governments (182 out of 189 in 2012) now voluntarily commit to reaching carbon neutrality, measuring public sector GHG emissions and planning for compact and energy efficient communities. The BC government enacted the *Local Government (Green Communities) Statutes Amendment Act* (Bill 27), 2008 mandating that official community plans (OCPs) and regional growth strategies (RGS) considered GHG reduction targets

(by 2010) and energy and water conservation. Local governments voluntarily committed to achieving carbon neutral operations by 2012, and to measure and report on community GHG emissions in the Local Government and Community Energy and Emissions Inventory which reports annually on local governments progress and work towards creating more energy-efficient communities. While the momentum has diminished in some local governments since 2011, British Columbia has several good examples of regional and local initiatives and traction including the regional Columbia Basin Trust, Metro Vancouver, the Capital Regional District and locally, the District of Elkford, Township of Ladysmith and the City of Vancouver (see *Greenest City 2020, Action Plan*, City of Vancouver, 2012).

Regional districts in British Columbia have responsibility for coordinating regional planning mechanisms such as transportation and setting regional climate change goals. Here we consider two examples to show how climate change has been addressed. The Capital Regional District was chosen because it is where the author lives and works; the author has familiarity with the broader policy framework and has firsthand experience implementing regional sustainability and climate change policies at the local government level. The City of Vancouver was chosen because it has several green initiatives and advanced them when preparing to co-host the 2010 Winter Olympic games with Whistler, which was touted as the ‘greenest Olympic games.’ Vancouver’s Mayor and Deputy City Manager have been strong advocates and supporters of green planning initiatives.

Capital Regional District: Regional Sustainability Strategy. The District’s Strategic Plan (2009-2011) sets out its commitment to action on climate change and achieving carbon neutrality by 2012 and sets out a corporate sustainability strategy. Climate actions include reducing emissions by 33 per cent by 2020 based on 2007 emissions, carbon neutrality, assisting municipalities to reduce emissions and educating the community on climate change matters. In 2012 the Capital Regional District began the process of transitioning from its 2003 Regional Growth Strategy to a Regional Sustainability

Strategy (RSS) with climate change as its driving goal and five supporting policy themes to reach it. The completion date is scheduled for mid-late 2015.

In 2011 the only person formally working on climate change in the CRD was a climate change coordinator. In 2013-14, a few senior planners were working on the RSS file. The climate change coordinator facilitated community workshops and processes to advance the knowledge. She lamented the challenges of being a lone champion. While this changed with the advancement of the RSS strategy, the CRD approach differs significantly from the City of Vancouver where strong green leadership is evident in the Mayor and Deputy City Manager and a Sustainability Group was established (of more than 20) in 2010-11. The CRD developed the RSS over several years and public consultation began in 2015. Also in contrast to the City of Vancouver the CRD's green job and economy planning is lacking. The Capital Regional District's *Workforce Planning: A Workbook for CRD Managers* (Summer 2009) set out a framework without specific focus on training initiatives for environmental related initiatives. CRD interviewee acknowledged training is for core programs similar to Vancouver, but without a key greening element.

The District of North Saanich which resides in the CRD, recent public consultation resulting in alignment of its regional context statement with the CRD RGS (a public consultation process on housing began in 2007 culminating in 2014) was politically contested. The politically polarized challenges were framed in inconsistent data in CRD documents (e.g. metrics in some included First Nations and not in others) and an incoherent policy approach lacking alignment with federal growth projections and their own sea level rise mapping identifying nearby Sidney as vulnerable to sea level rise yet identifying it also as a centre of growth. District Councillors grappled with understanding the disjointed broader policy matrix context and inconsistent use of metrics in plans. The community became increasingly positional.

Two sustainability goals –albeit ill-defined -- were competing: work-live and affordable housing advocates were thrust against rural farming preservationists. A broken Mayor

bravely bore a public hearing of more than 500 the majority of which spoke in support of the increased density. However, the Mayor was re-elected months later on a platform promising to repeal the decision known as Bylaw 1352. This illustrates how inconsistent metrics and competing policies can further divide a polarized community and result in decisions that perplexed all political persuasions. The muddling through process continues in DNS as Council has yet to determine next steps (April, 2015). Strong leadership matters and inter jurisdictional harmonization of policies is key to advancing sustainability and climate change policy agendas. Coherent policies between all levels of government are important. Ensuring workers can live near their work is a key GHG reduction strategy. Saving precious agricultural land is also a key sustainability policy. We turn now to the story of a neighbouring green mayor who has met with more success.

City of Vancouver: 2020 Action Plan and Adaptation Strategy. Vancouver has the “smallest per capita carbon footprint of any city in North America” (City of Vancouver, 2012). Though its main energy source is hydro, making it easier to reduce reliance on fossil fuel energy sources, Vancouver has led with several green policy initiatives under the leadership of green Mayor Gregor Robinson. The Mayor appointed a Greenest City Climate Action Team to lead community wide consultations during 2008 – 09 culminating in release of the Greenest City 2020 Action Plan. The Plan’s ten goals set out actions to reduce emissions below 1990 levels, develop renewable energy sources and design compact neighbourhoods shifting financial resources to walking and cycling. The Greenest City 2020 Action Plan included goals to: a) double green jobs by 2020 over 2010 levels and b) double the companies greening their operations in addition to GHG reduction and energy efficiency goals. The implementation plan is updated annually with reports on progress to meeting target. The Plan meets or exceeds provincial policy targets. The policy implementation and development is overseen by the Sustainability Group established within the City.

The Sustainability Group works closely with CAS to advance mitigation and adaptation policies and strategies. An interviewee explained three main mitigation strategies. The first is alternative fuels for city vehicles. The second area is climate planning and carbon

accounting and fulfillment of the climate leadership role outlined in the Greenest City Action Plan. The third area is air quality planning and working closely with Metro Vancouver who has jurisdictional control over air quality to ensure policy that meets goal nine of the Greenest City Action Plan.⁴⁹ With respect to adaptation, the City of Vancouver was the first Canadian local government to adopt a “comprehensive adaptation strategy” in July 2012 (PICS, 2013, July 9).

City of Vancouver: Green Skills Planning and Recruitment. The City of Vancouver’s strategic workforce planning has had some progressive examples but they are linked to strategic partnerships rather than notable internal training initiatives. An interviewee explained that the extensive internal training program which has historically been put together to fulfill core city needs to deliver services to the public has remained relatively the same with no specific green skills training identified:

At the City of Vancouver there is no specific internal training currently around sustainability. We have a green operation plan that the city’s putting together to green its own internal operation with things such as green procurement but no specific training.

However, working with the University of British Columbia the City of Vancouver offers a unique and innovative work-study program. An interviewee explained that the city and UBC signed an MOU in which the City would provide biomass to UBC and in exchange UBC would provide the city with a number of graduate students to help support the City of Vancouver’s work around the Greenest City Action Plan. Eventually, this internship of this interviewee culminated in a permanent senior position and many other such placements followed showing the strength of the program. Despite some learning curves for both parties, the benefits have been mutual, providing the ‘horsepower’ of pure research that many cities do not have. The UBC biomass project⁵⁰, a \$27 million investment and partnership with Nexterra systems, is regarded as a pioneer in alternative energy systems. This project provides twenty-five percent of the University’s heating

needs and set new global standards for emission reductions. It has lowered UBC's GHG emissions and fossil fuel consumption.

In terms of general climate literacy for the City employees, an interviewee explained that during 2009 – 11, the City tried to spread knowledge across the organization, but there were challenges. Both the senior management in sustainability and workforce planning acknowledge that the isolation of the sustainability group while perhaps necessary initially also while signalling its importance also implicitly gives it a regal status in the eyes of the general workforce. It is a challenge of how to disseminate and devolve that responsibility down into the organization stated one interviewee: "If you take on the whole organization from the outset you're not going to make any progress." On the other hand, adding a singular climate change advocate in the middle management level without a senior portfolio championing as was the case with the Capital Regional District, can slow progress.

There are other partnerships at a regional level and beyond that BC has been involved with which have demonstrated leadership. We turn to that next.

Regional Partnerships: Western Climate Initiative and Pacific Coast Collaborative

British Columbia collaborates in regional climate change partnerships involving energy efficiency, decarbonisation and regional cap-and-trade carbon pricing schemes. These include the Western Climate Initiative which was established in 2007 (now WCI, Inc.) and the Pacific Coast Collaborative in 2008. The former was established to develop a cap-and-trade system in the western states and provinces and the latter was established to harmonize climate change policies and regulations, create jobs and increase clean tech investment in British Columbia, Washington State, Oregon and California. British Columbia and California are key stakeholders in both initiatives and developed strong working relationships between public and private sectors. These partnerships harmonized various codes, regulations and policies and aim to create more stable regional markets to encourage broader private sector investment.

An interviewee explained how the work at CAS on harmonized codes for vehicle emissions as part of the WCI provided the foundation for the Canadian and US light and heavy-duty vehicle emission reduction regulations:

We spent a lot of time developing a regulation for managing tailpipe emissions for vehicles that was then taken over by the federal government. We regard that as a victory. We carried it all of the way through to a regulation which was promulgated. We are proud that the work that the Canadian federal government and US government is doing now on vehicle emissions was because of the work that BC and California initiated.

These partnerships begun in 2007 are still ongoing today. They cultivated different policies at different phases of the Climate Action Plan and were the main action for advancing climate policies regionally after the announcement of the Plan.

Phases of Implementing the Climate Action Plan

The Climate Action Plan (2008) set the course for British Columbia's action on climate change mitigation. Several acts were legislated in 2007 followed by the Clean Energy Act in 2010. An interviewee explained: "We actually haven't had any major policy changes on the climate file since 2007." The focus, he noted, was on implementing what they could and working on cap-and-trade through WCI but the financial support was diminishing. The WCI partnership from 2007 to 2012 faced many challenges and when the cap-and-trade partnership was finally announced, only Quebec and California participated. Other challenges followed. Notably, the carbon tax met a policy stalemate in 2012.

The carbon tax started with a low tariff rate (\$10 per tonne of CO₂ emitted) with scheduled increases of \$5/tonne/year for four additional years because, as an interviewee explained "... it was what corporations advised they could live with." Yet, while there have not been major policy changes since, there remain many gaps in policies as the same interviewee explained:

There's a huge gap right now in that we don't have process emissions covered by the carbon tax and we don't know when cap-and-trade is going to come into play – which would cover process emissions. We are left hanging mid-stream not doing anything until political decisions are made.

Another interviewee explained that having the carbon tax stop increasing in 2012 impacted the capacity to properly scope emission reductions and the momentum of the Climate Action Plan describing the effect as a “failed experiment.” The interviewee explained that CAS does not know what will happen past 2012. The focus now is implementation of existing regulations which takes up all of staff time and it has had impacts:

For those of us working directly on cap-and-trade on developing the next set of regulations around allocations we were relieved at a relaxation in time lines even although the relaxation in timelines is not good for emissions but in terms of just stress reduction on people that has been very large because we were pushed hard to put in the parameters to join the cap-and-trade scheme and then suddenly with the election of a new Premier it was put on hold. Til when, we do not know.

Despite BC's status being the first (large) carbon neutral government in North America and having the “lowest personal income tax in Canada for net incomes up to \$119,000 per year and one of the lowest rates of corporate income tax among the G8 countries” (British Columbia Ministry of Finance, 2012), the progress has been slowed due to competing policies (i.e. carbon tax vs. shale gas exploration and development and the new liquefied gas strategy). While BC's consumption of fossil fuels has fallen since 2007 (even though fossil fuel use in Canada has increased overall between 2010 and 2011), it is not clear whether this reflects increased efficiencies and switching to alternative fuels. This indicates the policies from the Climate Action Plan were effective in reducing GHG emissions in British Columbia.

BC's comprehensive climate change interventions strengths include a full climate change action plan, adaptation strategy, 2008 vehicle fuel-efficiency act which matches California's standards, and legislation which ensures municipalities set targets and develop GHG reduction plans (rescinded with the Clark government in 2013). But overall, BC's policies are not coherent because other less climate change friendly priorities emerged and political support waned diluting the effectiveness of the comprehensive intervention. Government subsidies to the oil and gas sector and the continued development of shale gas and liquefied natural gas (LNG), the potential of a third dam on the Peace River without full evaluation of impacts or comparative alternatives (i.e. wind, expansion of the grid west – east which the newly formed 2060 organization supported by PICS is exploring) erodes the impact of climate policies.

A 2012 report on the Climate Action Plan suggested the carbon tax impact would be greater if it was increased. Since only emissions from combustion of fossil fuels during the mining and transport of coal are covered by the carbon tax in BC—and not the emissions when the coal is burned in other jurisdictions—some analysts have called for an increase in the carbon tax rate and to apply it more broadly, acknowledging that “such policy changes will be easier to implement when more jurisdictions join the Province in pricing carbon” (CCPA, 2012). The BC Government's 2012 report on its climate action plan states “complementary policies continue to be essential to target activities that are less responsive to a carbon price or whether other forces (e.g. high growth) mean that the current carbon price is not a strong enough incentive” (PICS, 2012, pg. 22). The David Suzuki Foundation (2012) ranked British Columbia's progress on the Climate Action Plan “very high” (David Suzuki Foundation, 2012). This study ranks the policy coherence during the 2000-12 period as High to Medium declining in the latter years with diminishing support from Premier Clark. This is reflected in Table 7.2 following and in more detail in *Appendix G*.

Table 7-1: British Columbia: Research Implications Policy Coherence and Implementation Phases

Research Questions & Key Variables	1980 – 2000 Pre Dissertation Study Period Cumulative Incrementalism	2000 – 2012 Period of Dissertation Study Effective Implementation	2012+ Post Dissertation Study Period Gradual Erosion
<i>Policy Coherence and Broader Contextual Environment</i> Degree of Integration	Low-Medium	High – Medium (end of 2011) GHG Emissions Reductions Target Act (2007) – 33% reduction target by 2020 and 80 % by 2050; carbon neutral government legislated Call for proposals Innovative Clean Energy Fund (2007) Carbon Tax, vehicle emissions standards, renewable and low carbon fuel requirements, green community development (2008) Climate Action Plan released (2008) Clean Energy Act (2010) BC Joins Western Climate Initiative (2007) Beginning of public consultations on cap-and-trade (2010) BC becomes first carbon neutral public sector (2011)	Medium-Low

Was BC's Climate Action Plan Integrated and Coherent?

BC's Climate Action Plan set out GHG reduction targets to 2020 and 2050. Significant progress was made up until 2011 when Premier Clark directed the attention of CAS to LNG development and did not continue carbon tax pricing annual increases. BC's progress diminished. While British Columbia led Canada on carbon pricing it abstained from progressing with California and Quebec in the cap-and-trade scheme announced in 2013 after seven years of participating in the negotiations. Premier Clark announced BC's position on carbon pricing as wanting the rest of the country to "catch up". While the carbon tax was a big deal in BC, it is one part of a broad comprehensive intervention that includes not only sector GHG reduction targets and actions such as vehicle regulations but also public outreach and behaviour change. Several interviewees emphasized that the carbon tax, while most publicly recognized as the climate change policy of the BC government, is only a small piece of the picture. BC did introduce

energy efficiency amendments to the building code (though not official until December, 2014) and several other policies at the local government level that mobilized action on energy efficiency, de-carbonization and GHG reduction. Reporting mechanisms were developed and supported by training.

In May 2013 Premier Christy Clark informed British Columbians that she was going to stick with the Climate Action Plan. A few interviewees remarked they were hopeful that there was continuity and reflected at least initially upon Clark's election: "...so, you know, six more premiers to go." However BC did not continue to make the same progress and lost momentum and did not continue with carbon tax increases after 2012 and "stalled on implementing measures to ensure it meets its 2020 reduction target with the threat of shale gas and the potential development of the LNG terminals" (David Suzuki Foundation, 2012, pg. 13). In 2013, the BC government announced there would be no further carbon tax increases for five years after a one year review of the tax. The freeze was positioned by the Clark government as a 'pause' to let other provinces 'catch up'. Some viewed the tax as putting BC at a competitive disadvantage; others viewed the freeze as a lack of leadership to continue advancing the progress BC had made on climate change.

While Campbell's leadership was instrumental in initiating the climate change policies and the carbon tax was a key policy, the road to transition beyond petroleum is long:

You might think that the carbon tax can be done because you get a premier who found religion and decided to be tough one day and did it. And that's part of the story. There's a million different personal decisions in BC that influence whether that thing gets axed or not, and that I think is the biggest constraint.

The Climate Action Plan: A Strategic Workforce Planning Perspective

The Climate Action Plan (2008) set out an action plan to achieve energy efficiency and GHG reduction goals and overall ranked as having high coherence but its alignment both stated and through other workforce planning documents did not fare well. A low degree

of coherence from a strategic workforce planning perspective was given by the author. This was assessed through a review of the plan itself and the degree to which green policies and their related skill needs were considered by workforce planners in the BC government. Jobs was mentioned four times but without specific targets for British Columbia or links to the sectors that would increase employment or decrease as a result of the policies. There was very little expressed alignment with workforce planning and this was assessed through the author's own experience as the principal senior government person evaluating the strategic workforce plans of each ministry over the period 2007-10.

A British Columbia Jobs Plan (2011) was announced later followed by a BC Skills and Training Plan (2012) and a BC's Skills for Jobs Blueprint: Reengineering Education and Training (2012) outlining the plan for skill development for LNG. The Climate Action Plan (2014) update reflected on BC's achievement meeting 2012 GHG emission targets but referred to the Growing Green Jobs: BC's Green Economy Update 2014 for information on green jobs and the green economy. The Growing Green Jobs: BC's Green Economy (2012, 2013) identifies the green economy in several sectors including renewable energy, green buildings, clean transportation, water, waste and land management with British Columbia regarded as a leader in driving clean technology innovations and growing green jobs. It sets out the estimates of jobs in each sector and the actions including financial support to advance growth of green jobs.

British Columbia participates in the Knowledge Infrastructure Program a joint federal-provincial initiative that supports research and job expansion in local communities and the Pacific Institute for Climate Solutions to increase research support for industrial efficiency and competitiveness. The workforce focus in the BC government in 2008 was on the Workforce Planning and Leadership Secretariat, newly established, with no links initially to CAS and a limited integration of green teams with ministries. BC government ministries and organizations workforce planning followed a template with few identifying green actions. So, the role in 2008 to drive mobilization of the green workforce agenda to all of government fell to CAS.

Climate Action Secretariat Workforce

The main government body addressing climate change, the Climate Action Secretariat began with less than ten people. The skill sets needed in the early stages of start-up were different than the ones required for implementation. Different skills needed at different stages of organizational evolution is not a new concept but one that is often overlooked. Sometimes the stages of evolution retrace themselves in periods of rejuvenation, and skill set requirements continuously change from innovators to technocrats through different stages of implementation. Seasoned strategic workforce planners and workers can manage this delicate dance of skills. An interviewee stated:

When CAS started we had highly talented people, some of whom were brilliant on climate issues, but half of them had never worked on climate before [...] The real tough part is you never know what mode you're going to be in next political season.

So, turnover, is relative to skill needs and planning for a turnover needs to consider each evolutionary stage of the organization. While there is a perception that CAS has a high turnover, it is partially supported by the reality of a need for different skill sets at different organizational periods and these changes happened rapidly. Turnover in such situations is a good thing since ad hoc organizations take on new tasks depending on the stage of policy-making (design, engagement, implementation, etc.). Budget cuts also meant that a lot of people were let go, mostly people in auxiliary positions, so knowledge and capabilities were lost. Whereas an area like cap-and-trade, or for carbon neutral government CAS was hiring permanent positions.

To a large extent, the climate change policy group responsible for developing legislation and greenhouse gas reporting were also responsible for implementing at the industry level which requires a different skill mix. So what are the competencies and skills of those early CAS workers? An interviewee explained that, although he had no formal training in climate policy, after two and a half years working on climate policy he had the equivalent of a master's degree. Another interviewee explained that many CAS workers

have training in economics. Several senior executives at CAS commented on the hiring competencies for policy analysts and one summarized that: “When we hire policy analysts, which is very general work we look for the ability to use economic tools, economic thinking.” Another interviewee commented on the challenges of hiring for different period of organizational evolution:

You can’t just fire all of your innovative people and have a bunch of cabinet trained technical guys because you might actually be in a position, like this fall [2011] where you’re saying I want the next Climate Action Plan and who’s going to do it.

While several interviewees explained that CAS would engage stakeholders and develop relationships with academics, advocates and industry sectors, one sector not actively engaged were the workforce planners to assist CAS with these transitions. An interviewee explained that most hires were direct rather than supported through ministry or BC Public Service agency workforce planners.

Concurrently to establishing CAS, the Workforce Planning and Leadership Secretariat (WPLS) was formed, which also reported to the Office of the Premier. Despite their physical location almost across the street from each other, very little coordination of green policies or integration of Climate Action Teams occurred as part of the corporate workforce planning process led by WPLS.

The Broader Context for BC Government Strategic Workforce Planning

Provincial workforce planning was two-fold during the 2008-10 period: the Public Service Agency with 450 employees and the Workforce Planning and Leadership Secretariat (WPLS) ⁵¹ with fifty employees planned corporately for workforce planning frameworks for each ministry and organization, corporate learning, and employee evaluation or performance reviews along with handling employee disability matters. Prior to 2008 the Public Service Agency was the principal corporate workforce planning agency. The WPLS handled matters of a confidential nature and reported directly to the

deputy's on matters of short and long range workforce projections. Second, the Advanced Education and Labour Market Development (AELMD) assessed longer term provincial needs in the broader public and private sector, and coordinated information with training institutes, colleges, universities and immigration.⁵² The interface between WPLS and AELMD was nominal but there was a relationship at the Executive Director levels. Planning involved labour mobility issues such as transfer of federal to provincial employees and less on projected future skill needs.

As discussed earlier in the chapter, the public sector often incents private sector industry. One example are policies that support clean technology innovation. The province has stimulated investment in the private sector with respect to clean technology development with financial support and then also must ensure appropriate training for individuals to work in this growing field and the policies and systems which support labour mobility. While the government is critical for policy, policy signaling and coordination, there is a role for industry to play as well in training and adapting initiatives that have worked elsewhere, to address the problems they are facing. When policies are introduced without sufficiently skilled workers, it can spark private sector critiques to draw attention to labour analysis gaps. Indeed, such was the case noted by clean tech CEO's interviewed.

Linking Green Policies with Strategic Workforce Planning

Initially, when the Climate Action Secretariat and Workforce Planning Secretariat were established in the 2007-09 period, the government did not have a corporate workforce plan that considered the Climate Action Plan goals and the Climate Action Secretariat did not have a workforce plan to take it from a whole-of-government approach to a line ministry implementation. The corporate workforce plan 2007 – 12 *Being the Best* was championed by the Deputy to the Premier, Jessica McDonald, and early on focused on changing organizational culture and engagement. The focus on this shifted abruptly with the economic downturn in 2009 and the departure of the deputy champion that elevated workforce planning corporately. While the elevation of workforce planning was critically needed to strategically plan for the future, what was missing were clear links between the two Secretariats on the climate file.

Although there was some evidence of green thinking in ministry work plans (one job detail for myself was reviewing each one of these plans for the years 2008-10) such as carbon neutral measurements it wasn't until 2011 - 12 that there was a corporate green jobs plan and a more concerted focus for ministries to include green evaluation metrics relative to green skills and job design. It was a good start but one that lagged far behind the climate policy development during 2003 – 10. The Canadian Centre for Policy Alternatives (CCPA) suggested in a 2010 report that leadership was needed to “implement a more coherent and integrated climate, industrial and labour market policy” (pg. 6) such as just transition plans, including green job strategy beginning with a building retrofit scheme accompanied by an appropriate skills training program and the development of a local food system where as much of the community food would be grown within the region. CCPA (2010) suggests that “in the vast majority of cases, skills will be readily transitioned to other needed work that will be created in green industries” (pg. 8) but does not site any sources.

In 2011 with the election of Premier Clark, the focus from the premier's office shifted from climate to jobs, and it was packaged as a green jobs plan. *BC's Green Economy* (BC Government, 2012) was released in conjunction with the 2012 GLOBE conference linking the green economy with the *BC Jobs Plan*. *BC's Green Economy: Growing Green Jobs* was released in 2013 (BC Government, 2013). It was launched with a large showcase extravaganza at Globe (which the researcher attended). The glossy document was a high level overview of the green economy. While *Being the Best 4.0* (2009 – 2012) identified teams and initiatives within government as doing green work, actual workforce planning for green skills was not prioritized, and the February 2013 throne speech was silent on climate change and green jobs. The 2012 report on BC's Climate Action Plan progress called for “a more coherent and integrated climate, industrial and labour market policy” (CCPA, 2010, p. 6) including indicators to track progress.

In BC, the economic multiplier model is tailored to the “specifics of the provincial economy” so the job creation numbers “tend to be smaller because, as a small, open

economy BC experiences greater leakage of investment dollars out of province to suppliers from other parts of Canada or other countries, or leakages of profits to shareholders who live outside of the province... Additionally, the industry categories in the model do not neatly align with the priority areas for green jobs” (CCPA, 2010, pg. 30). “The total amount of investment (public and private) matters, and further research would be required to define detailed plans and green investments for specific sectors in BC. Stimulus packages in the US and other countries in response to the 2008–10 recession have been a recent focus for new green investments, and in general Canada has fared poorly compared to other countries on the share of stimulus dollars going to green investments, and green investments per capita” (CCPA, 2010, pg. 30). The BC government has produced some employment analysis on the green economy (BC Statistics) but much of the research has been driven by the not-for-profit and private sector through organizations such as the Globe Foundation and KPMG. Key to the development of a more labour market policy is the quality of the data, or data capability. If it is not measurable, it is not verifiable nor reportable.

Linking Green Policies with Employment Analysis: Not-for Profit and Private Sector

The not-for-profit and private sector began to research employment impacts of BC’s green policies in 2005 - 08, with the first GLOBE Foundation and KPMG reports. These reports focused attention on quantifying the impacts of the Campbell government climate change policies. The very definition of a 'sector' varies as noted in the example of clean technology above, different data sets are used and interpreted, or the data itself lacks the capability to be comprehensively analyzed. Forecasting skill and job needs for the private sector has been advanced by the not for profit and private sector analysis conducted in several reports. The GLOBE Advisors market report *British Columbia’s Clean Energy Supply & Storage Sector. Industry Insights on Job Creation and Investment Promotion in BC’s Clean Economy* (GLOBE Advisors, 2012, p. 1) stated that in 2011 the clean energy supply and storage sector in BC was “estimated to have generated some \$4.9 billion in gross domestic product (\$3.9 billion direct and \$1.0 billion indirect) and 25,100 full-time equivalent jobs (13,000 direct and 12,100 indirect).

The job opportunities in the GLOBE Advisors report on clean technology employment needs and impacts were “quantified using updated and proven methodologies that allow for the identification of industries and occupations that are part of this (clean technology) sector in BC” (GLOBE Advisors, 2012). The report emphasized a further limitation of the research: it is one matter to quantify available skill sets from graduating classes, and another to assess the value of experience and higher level thinking and innovation, particularly desired in the clean tech industry. Clean tech businesses rely on the latter. While there is no shortage of new graduates with the “theoretical skills, the lack of hands-on experience with specific advanced clean energy technologies is preventing many academically-qualified individuals from finding employment in this sector” (Globe 2012, p. 1).

Clean tech is the second-fastest private sector job creator in the province, third-largest contributor to GDP with a growth rate 20 per cent higher than Canada’s overall (Government of BC 2012). In 2011, BC’s clean tech sector employed 8,400 workers, and had the highest number of clean tech companies in Canada, generating “more than \$2.5 billion in revenue” (KPMG, 2012). The growth and success of clean tech in BC has been attributed by those who lead it as having the right business environment – supported by financial incentives from both the Provincial and Federal governments. Both have waned in recent years. A 2005 Report to the Premier’s Technology Council (Umedaly, 2005, p. 8) in BC estimated industry potential of direct employment in the “tens of thousands over the next decades” in emerging technology subsectors (e.g. clean production, fuel cells, ocean energy and smart grid). The total benefits (including indirect jobs impacts) have been calculated by as much as a “factor of 5 jobs per million dollars in revenue (in the renewables sectors), but others as 36 jobs per million dollars in revenue (in the energy efficiency sector)” (Umedaly, 2005, p. 8). While estimates of the employment impacts of the clean tech industry in British Columbia vary,⁵³ there is agreement that the impacts are large.⁵⁴

Interviews with some leading Canadian clean tech company CEO’s provided insight into recruitment challenges and desired competencies and skills as well as understanding

employment impacts of the rapidly growing industry. The numbers of employees in their firms ranged from 150 – 500/company with revenues ranging up to more than \$500 million. All CEO's stated that "education or training was a given" at all levels of jobs. All CEO's were seeking people with passion and an entrepreneurial spirit, who were tenacious and perseverant particularly at the start up phases. Despite the projected growth interviews with clean tech CEOs revealed that all experienced recruitment challenges and getting people with the skill competencies they desire. They emphasized that after the 'basic technical qualifications', more importantly for success, two key personal traits -- passion and perseverance – were what they sought and: "Complete resolution that you can't fail and the tenacity to succeed and see the end game and all steps clearly."

Those interviewed agreed on several barriers to working in Victoria or Vancouver. Both have high costs of living, and lower salaries than the US. Canada's immigration policy is a hindrance to attracting talent. The search for software developers was particularly competitive. Several CEO's noted that the cost of living in Vancouver is high compared to the US or California with housing prices two or three times higher and salaries lower and these are barriers to hiring stating that they only are able to recruit from the states if they were planning on coming to Vancouver anyway. Clean tech CEO's unanimously agreed that to improve recruitment and retention required creating education programs for software developers, incentives to work in the clean tech industry (vs. clean tech finance where compensation was often higher), and relaxed immigration policy so workers (e.g. from California) could come quickly to Canada would be helpful. This illustrates the need for private sector industry to be able to become part of the official policy discussion on immigration as well as skill training and the gap between public sector financial incentives for private sector development and corresponding labour alignment policies. Strategic workforce planners and policy analysts in different ministries with different policy areas such as immigration, advanced education and climate change need a vehicle for planning and integration to limit these bottlenecks.

A summary of the policies and workforce planning are featured in *Appendix G*, Table 7-2 Comprehensive Climate Change Intervention Coherence, Capacity and Capability and Table 7-3 BC Degrees of Coherence and Phases of Development.

Summary

The Climate Action Plan (2008) set British Columbia's climate change intervention course. The Adaptation Strategy followed in 2012. BC's progress on climate change mitigation and adaption has varied much of it related to leadership changes. BC's leadership changes meant a policy shift in 2011 towards more competing policies with the advancement of LNG. The progressive and incremental carbon tax has no planned increases for five years (2012 beyond) despite evidence that it has encouraged a reduction in fuel use and GHG emissions continue to decline (until 2012). The impact of the new LNG strategy is not fully understood. British Columbia's competing policies on shale gas fracking diminishes progress to achieve goals on GHG reduction. The future is uncertain.

However, the contributions of local governments are significant considering the large carbon footprint of cities particularly buildings and transportation, so all is not lost. Momentum achieved by some regional districts such as the Capital Regional District and local governments such as the City of Vancouver continue and they illustrate the critical role of local governments implementing policies and embedding new green values culturally both corporately and in the community. Local governments have also pioneered some innovative workforce development programs such as the City of Vancouver's agreement with UBC for biomass exchange for new talent.

Broadly, progress on strategic workforce planning has lagged behind provincial and local government climate policy efforts. The economic downturn of 2008-09 abruptly shifted a promising BC corporate workforce planning strategy to modernize the public service to restructuring efforts. A window of opportunity was lost. Despite Green Jobs Plan announcements in 2012, the Premier's (2011) focus on skills and training and funding support is predominately directed towards LNG infrastructure development rather than on

some of the largest emitting sectors such as buildings and construction despite not being able to quantify whether LNG exports will replace coal consumption in consuming destinations. And, there are policy gaps between immigration policy and the private sector.

Canada is not the only country without a national comprehensive climate change policy. We turn now to the case of New South Wales, Australia to explore another example of a sub-government taking the climate reins in absence of a federal comprehensive climate change policy.

Chapter 8

New South Wales, Australia

Introduction

Both land and coastal sea-surface temperatures have risen in New South Wales since collection of temperature data began in 1910 (Australian Government, 2014), and temperatures well above average have been recorded since 2010. The frequency of very warm months has increased and the frequency of very cool months has decreased over the past 15 years, along with increases in the number and intensity of heatwaves, fires and a lengthening fire season (Australian Government, 2014). Droughts followed by flood events are becoming more widespread across the state.

Given these evolving climatic landscapes, efforts to conserve energy and shift to renewable sources have been at the forefront of New South Wales climate change action which began in earnest under Labor Premier Bob Carr (1995 – 2005). Carr was a long time conservationist, known for climate change activism. Three Labor premiers followed Carr from 2005 – 2011, and all continued to build climate-action momentum. In 2005, the New South Wales Greenhouse Plan (NSWGP) was announced, setting out an agenda for GHG emission reductions by 60 percent by 2050 and cutting GHG emissions by 2025 to 2000 levels. This comprehensive intervention identified how NSW would meet these targets through community awareness, adaptation, and energy efficiency and mitigation policies to meet emission targets.

The steps taken by NSW are notable since the mandatory greenhouse emissions trading scheme—entitled, the *Greenhouse Gas Reduction Scheme* (GGRS) (2003)—was the world's first undertaking to limit carbon emissions from electricity suppliers. Initially introduced as a voluntary scheme in 1998, the world's first carbon rights legislation, had notable success meeting dropping benchmark targets. Liberal Barry O-Farrell repealed the State emissions trading scheme in 2012 and it was replaced by the national carbon tax.

This chapter will describe the steps taken by New South Wales's comprehensive climate change intervention, from its introduction in the early 2000's through to 2012 and evaluate them with a view to their coherence and whether strategic workforce strategies were introduced or emerged as part of those comprehensive policy interventions. Key policies and supporting structures including the formation and closing of the Greenhouse Office, and the role strategic workforce planning played in supporting the climate mitigation and adaptation efforts are described. Observations derived from analysis of fourteen interviews conducted mostly in person with scientists, senior policy makers and workforce planners in the state of New South Wales (NSW) and leading Australian scientists are presented. This chapter reviews examples of initiatives at the national, state, regional and local government levels.

In order to locate the NSW government's scope of authorities in the Australian federation, this chapter begins by providing an overview of the Commonwealth government's approach to climate change as well as the agencies responsible for climate change and their competing and complementary policies. This overview shapes the context necessary to understand the response of New South Wales—within Australia—to address the climate-change challenge and the responsibility to reduce GHG emissions. Two sections follow. The first provides an overview of New South Wales's climate change intervention and the Greenhouse Gas Plan (2005) and the second evaluates the Greenhouse Gas Plan from a strategic workforce planning perspective. The conclusion summarizes the findings and presents a high level analysis of the degree of policy coherence and institutional and organizational capacity and capabilities.

Climate Change and the Distribution of Relevant Authorities in Australia

Impacted by record high temperatures Australia's efforts on climate change over the past twenty years have been highly politicized. Prime Minister John Howard (1996-2007) refused to ratify Kyoto but did plan to meet the targets and committed \$1.8 billion towards climate change and \$700 million towards clean technologies (IEA, 2005). The Howard government supported a national emissions trading scheme (NETS) initiated in

New South Wales (2003) as an interstate trading scheme and while other states took steps to join, New South Wales was the only one to advance the carbon trading scheme and mandated GHG emissions. In 2007, Howard's successor Prime Minister Rudd (Labor) ratified Kyoto and in 2009 Rudd delayed the carbon trading scheme. In 2008 the Commonwealth and states and territories commissioned *2008 Climate Change Review* (Garneau, 2008) on the economic impacts of climate change was released (updated 2011) with a key recommendation of a Carbon Pollution Reduction Scheme (Garneau, 2008) and carbon capture and storage and clean coal technologies. Garneau was chief advisor on climate change to the Commonwealth until 2011.

In July 2011 Prime Minister Julia Gillard (succeeded Prime Minister Rudd who resigned in 2010), announced its Clean Energy Future Plan (flowing from the Clean Energy Legislative Package, 2011; amended 2012). The CEFP introduced a national carbon price commencing on July 1, 2012 to be transitioned to a cap-and-trade scheme by 2014-15,⁵⁵ as well as other policies for reducing GHG emissions.⁵⁶ It aimed to cut 159 million tonnes of carbon between 2012 and 2020 (Australian Government Department of Climate Change and Energy Efficiency (AGDCCEE), 2011) and generate 20 per cent of it electricity from renewable sources by 2020 (CI, 2011). The renewable energy target of 20 per cent is "expected to drive investments of around AUD \$19 billion by 2030" (CI, 2011, p. 1) and "close to 34,000 new jobs" with "strong and decisive" climate policies resulting from the Clean Energy Act (CI, 2011, p. 1). States and regions with the "best clean energy sources and strongest policy settings will attract the lions share" (CI, 2011 p. 1). The Australian Renewable Energy Agency (ARENA) and the Clean Energy Finance Corporation (CEFC) were established in 2012 as independent authorities to support innovations in renewables. The CEFP included the Green Car Innovation Fund for low-emission vehicles.⁵⁷ Australia is in process of introducing new standards for light duty vehicles (effective 2013-18) to meet the US standard to 2025.

Australia is the world's eighth largest energy producer, and exports two-thirds of energy production (ILO, 2011, p.203).⁵⁸ Australia has one of the highest emission rates per capita ranked 18th highest (see United Nations Statistics Division, 2012) attributed to

energy-intensive agriculture and coal use in the grid. Australia is the world's fifth largest producer of coal and the third largest producer of brown coal, exporting about half of all coal (Baer, 2014).

Relevant Authorities for Climate Change and the Environment

The Australian constitution does not specifically give the Commonwealth authority on matters of the environment and until the 1970s the states and territories were responsible for the environment. The *Environmental Protection Act* (1974) increased federal involvement and in the 1980's the foundations for the Commonwealth's role in matters of the environment were expanded. The Australian Bureau of Statistics and Environment Australia reports annually on Australia's overall progress towards sustainability (since 2002).

The Australian government Department of Climate Change and Energy Efficiency (DCCEE) was the lead agency for climate change policy including mitigation of GHG emissions and reporting and adaptation strategy and the coordination of climate change science.⁵⁹ The DCCEE was established in 2008 and responsible for three acts: The *National Greenhouse and Energy Reporting Act* (2007), the *Renewable Energy (Electricity) Act* 2000 and the *Renewable Energy (Electricity) (Charge) Act* 2000. The Department of the Environment, Water, Heritage and the Arts (DEWHA) is responsible for all matters on the environment, air quality and fuel quality standards. The DOE is responsible for national policy on the environment and heritage. The Climate Change Authority (CCA) established in 2012 serving as an independent body established by the *Climate Change Authority Act* 2011. The Climate Change Authority establishes GHG emissions targets and monitors progress through the National Greenhouse and Energy Reporting System. States and territories regulate heavy vehicles, and the federal government regulates trade and commerce. Local government regulates infrastructure, such as roads similar to Canada and the US.

Progress on Climate Change 2000 – 12

Australia's effort and progress on climate change has ebbed and flowed. Australia has one of the highest per capita GHG emissions in the world. Australia ratified Kyoto (2007) and agreed to reducing its emissions by between 5 and 15 or 25 per cent below 2000 levels by 2020. In 2012 Kyoto was amended and Australia submitted a second target from 2013 – 2020 to reduce emission by 5 per cent below 2000 levels by 2020 and the option to increase the target up to twenty five percent. Australia's net GHG emissions increased by 9 percent between 1990 – 2007 and then experienced minor increases up to 2012. In 2012 the GHG emissions were reported as being "broadly the same as in 1990 notwithstanding a doubling in the size of the economy" (Climate Change Authority, 2012). The Climate Change Authority (2012) attributed this to economic variables and climate change policy. Despite this 'progress' the Climate Change Authority recommends the Commonwealth increase its target from five to 15 to 19 percent reduction by 2020 relative to 1990 in order to meet the IPCC (2013) recommended ceiling of 2° C maximum temperature increase. One recommendation from the CCA was sustained coordinated emissions reduction policies. While not specifically stated, one such policy that was not sustained that was helping Australia potentially meet this recommended increase target was the carbon tax. We turn to that now.

The Labor Gillard government launched the carbon tax (2012) after unsuccessful attempts by the Liberal Howard (2006) and Labour Rudd (2007) governments, launching the tax at \$23 AUD/tonne based on the Garneau (2008) report recommendation. The carbon tax had a short but successful life. It was introduced at \$23 AUD/tonne transferring to a EU cap-and-trade scheme in 2015. Emissions were reported 1% less in applicable sectors. As a cornerstone policy of the Gillard government it was accompanied by a suite of supporting policies and institutions but the cap-and-trade scheme was never realized. The tax was repealed by the Liberal Abbott government in 2014 (after the Senate rejected the repeal twice). In March 2014, the Commonwealth reported a decline in emissions in the electricity sector and a slight increase in national

emissions. The Commonwealth undertook a review of its climate policies (Climate Change Authority, 2014).

Australia's climate policy and its relationship with labour and employment also had its ups and downs. The Gillard government institutionally aligned the Australia Productivity and Workforce Agency announcement with the onset of the carbon tax and the Jobs and Competitiveness Program for non-electricity sector targets at emissions intensive trade exposed initiatives. While both shared a similar fate to the carbon tax the ingenuity of the Gillard government to initiate these concurrently with the carbon tax sets them apart from other second generation adopters. Aligning climate-action policies with labour market development to ensure an efficient labour supply and targeting skills development to advance such policies requires leadership and foresight. Australia was on a trajectory from 2007 onwards of efforts to align emissions reductions policies with human resources and skills development nationally and coherently with the states. However, there was insufficient traction on climate change policies to survive the 2013-14 policy demise. Green skills, though, retained some momentum. We now review the Australian government's institutional structure for human resources and skill development.

Relevant Authorities for Human Resources and Skills Development

The *Clean Energy Act* included the Clean Sustainable Skills Package (CSSP) (first announced July 30, 2009), worth US \$94 million to be administered by the newly created Australia's Workforce and Productivity Agency (AWPA) officially opened on July 1, 2012, formerly Skills Australia (formed 2008). That the inception of the AWPA coincides with the launch of the carbon tax sent a clear signal to the public and private sector of the need to coordinate climate change policies and workforce planning and to ensure productivity increased. The AWPA administers workforce planning and the workforce training needs of Australia's federal climate policy. Australia is one of the few countries to fund human resources and skill identification for climate policy (ILO, 2011, p. 49). The AWPA is closely aligned with State training agencies: it will fund Australia's future workforce by more than \$3.02 billion over six years and provide more than \$2 billion to the university sector over the next four. It will "develop and monitor sectoral

skills and workforce development plans in conjunction with Industry Skills Councils and Industry” (Skills Australia, 2012) and to provide independent advice (Skills Australia, 2012). While governance and institutional mechanisms are ‘in place’ to advance the Clean Energy Plan (2011)⁶⁰ and the AWPA initiatives, they are both in ‘early stages’.⁶¹

The WRC argued that green workforce development, which “until recently, lacked coherence and has been characterized by fragmented state and national initiatives... and as a result, both the demand for and supply of ‘green skills’ in the Australian economy has been inadequately analyzed and coordinated” (WRC, 2009, p. 12). While Skills Australia brought some policy coherence the labour demand changes rapidly and the identification of green skills and green jobs was a moving target. The CSSP expanded Skills Australian and other Commonwealth green skills training initiatives such as the National Energy Skills Initiative (NEES) launched as part of the National Strategy for Energy Efficiency in 2008 to ensure skills development in the energy sector was interdisciplinary. The Department of Education, Employment and Workplace Relations (DEEWR) deals with matters of education and vocational policy and programs including training.

Sector Skill Councils

Eleven national industry skill councils (ISC) advise the AWPA and DEEWR on vocational education and training needs in their respective areas. Skills Australia (now AWPA) produce “environmental scans” to help position ISCs more effectively (Buchanan & Evesson, 2009) and respond to the skilling needs in their industries (see ILO, 2012, p. 137 for Australia’s Green Plumber program).⁶² Environmental scan documents identify new skills and knowledge that needs to be incorporated into existing qualifications, and what new courses are needed (Buchanan & Evesson, 2009). The *Green Plumber* initiative is just one example of green skills training.⁶³

There was ongoing consultation between the Commonwealth and the States to ensure training is meeting industry needs. In 2009, the National Green Skills Agreement (NGSA) was renegotiated with the states and territories.⁶⁴ The NGSA, in conjunction

with the National VET Sector Sustainability Action Plan (NVSSAP) 2009–12, coordinated green workforce development initiatives between state, industry, education, skills councils and other agencies (WRC, 2011, p. 14). The Commonwealth recognized that regional communities are diverse with unique challenges and opportunities (Australian Government, 2011). In the 2011 budget the Commonwealth invested \$674 million targeted to regional participation and productivity (Australian Government, 2011) supporting regional education, skills and jobs plans providing more than \$19.1 million over 3 years to support 34 coordinators across the country to improve participation, skills and education outcomes. In Australia, state governments use similar data sources to each other but often emphasize different, local elements (WRC, 2009). Data capability remains an ongoing issue (WRC, 2009).

The government classifies green occupations based on existing government, (ANZSCO) industry (ANZSIC) and skill (VET certificate to university) classifications. This taxonomy distinguishes between ‘green’ and ‘sustainable’ functions (ILO, 2011, p. 99). It also has an agreement with all states and territories to build capacity in the vocational education and training (VET) sector to deliver green skills (see Australian Government *Green Skills Agreement*, 2008⁸). A challenge in workforce planning for green skills are data challenges. An interviewee explained:

Among green skills linked to ANZSCO, there are sixteen job families and job roles split across them. Anyone developing climate change policy is usually listed as ‘generic’ because “really it’s a skill, policy writing and analysis, and then you plug in the context.

This tangled terminology is just one hurdle the government faces. In terms of the workforce planning framework the interviewee explained that in the last ten years, workforce planning in Australian Public Service has not progressed well. In 2009/10, 21 per cent of government agencies had a workforce plan. Last financial year, only 26 per cent of agencies had a workforce plan, but in saying that, there was no consistent

methodology (NSW interviewee, 2012). So while Australia has directed funding green skills development, the workforce planning is lacking.

The goal of the Clean Sustainable Skills Package (CSSP) was to create 50,000 new employment opportunities and improve coordination of training. These include green skill apprenticeships that integrate green ‘trade skills’ into ‘existing vocational education and training courses’; the National Green Jobs Corp, which provides six months of training and experience for 10,000 ‘long-term unemployed 17 to 24 year olds to work in green industries; and the Local Green Jobs Initiative that places ‘6,000 workers from disadvantaged communities into green industries’ and ‘new training places for 4,000 workers as insulation installers in support of the Home Insulation Program for a total of \$94 million investment (Wright, 2012). The CSSP draws upon the taxonomy of green skills developed by the Commonwealth.

With the Clean Energy Future Plan supporting green skills planning and development, and the Australian Workforce and Productivity Agency supporting workforce planning and training, the governance and institutional mechanisms were in place to advance the transformation and coordination required between national and state training. However, both the CEFPP and the AWPA were in their infancy and the degree of coordination and alignment then cannot yet be challenged. The new policy and plans and supporting institutional structures nevertheless recognize and support the need for a coordinated coherent effort between policy and skill development.

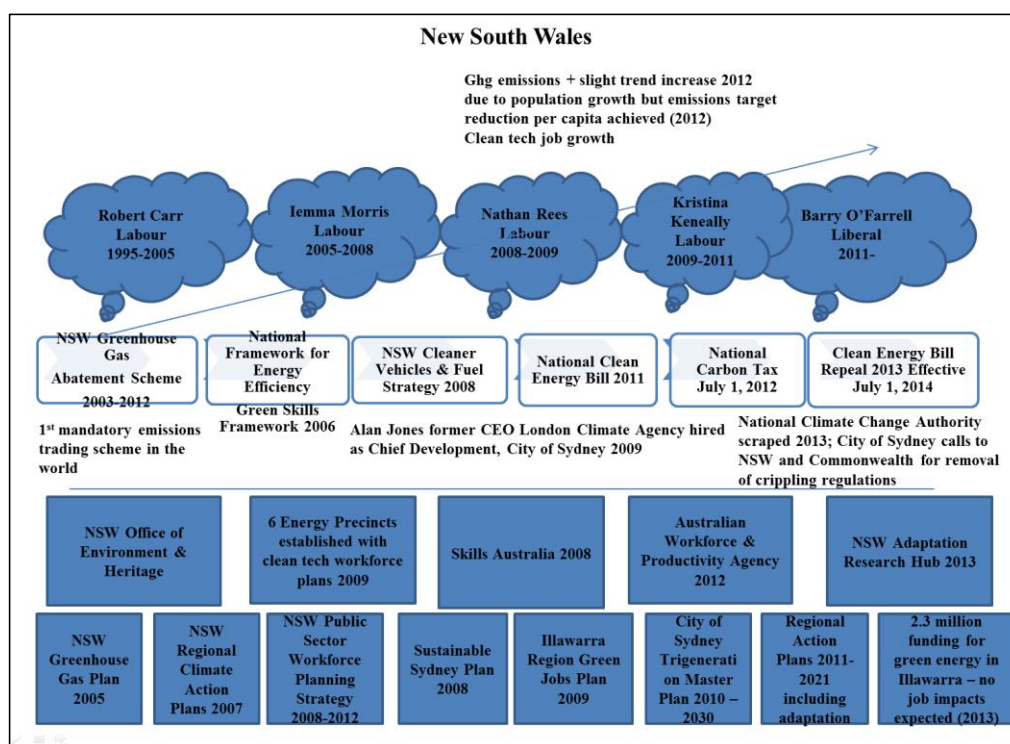
While New South Wales was not the only Australian state to take action (Queensland introduced green skills and training and climate change policies in the mid 2000’s), none were as substantial and comprehensive as New South Wales. The initiatives taken in New South Wales offer a good example of a subnational government that introduced a climate change intervention concurrently with workforce planning. While this planning effort was not fully integrated, it provides another instructive case.

New South Wales: Mobilizing to Address Climate Change

The New South Wales Greenhouse Plan (2005) outlined how the state government would build on the 1995-05 policy framework. The Plan offered a multi-year, multi-sector approach to reduce GHG emissions by 60 per cent emission cuts by 2050 (see Australian Business Roundtable on Climate Change 2006: 15). With twenty percent reduction energy targets to be derived from increasing renewables by 2020 the state sought to invest significantly in clean technology.⁶⁵

To locate the New South Wales' comprehensive climate change intervention, this section begins by providing an overview of New South Wales' organization on climate change and its related environmental initiatives prior to the Greenhouse Gas Plan announcement. This overview provides the context necessary to understand the scope and magnitude of New South Wales comprehensive climate change plan. The following section provides more detail on the multiple policies comprised in the NSW Greenhouse Gas Plan and how it addressed the climate-change and the responsibility to reduce GHG emissions. Figure 8-1 provides a summary.

Figure 8-1: New South Wales Approach



Organization of New South Wales and Previous Environmental Initiatives

During the 1980's and 1990's there was increasing resources directed to climate change such as funds for regional climate change projections (conducted by CSIRO which is federally funded) aiding state planning efforts. In 1995, Bob Carr was elected Premier and a 10 year tenure began. An interviewee explained Carr's aggressive mobilization on climate change:

Carr's interest was driven by his intellectual position on climate change. Carr had, and has, a deep passion for the environment. And when it came to reducing the risks of climate change he saw his job as raising awareness of the problem and developing policies that went beyond the standard, regulatory policy suite and affected electricity production and use.

During the early Carr years many policies were testing new ground. Carr recognized that for climate change policy there was the need to measure, verify and report and the institutional supporting mechanisms to do so but these mechanisms, or standardization of them weren't available when Carr took office. At that time climate change climate change was the responsibility of a smaller office within the NSW Environment and Heritage Office which had the main responsibility for the environment with some senior policy advisors residing in the Premier's office beginning in 1995. Cabinet proposals with a significant impact on activities related to both mitigation and adaptation were brought forward by a number of Ministers and portfolios (i.e. Coastal Policy by the Department of Local Government and the Department of Planning; the Building Sustainability Index by the Department of Planning and the Greenhouse Gas Abatement Scheme by Treasury and the Department of Energy). Consumer awareness programs such as Live Energy Smart, Green Power and It's a Living Thing were conducted over several years beginning in the late 1990s and early 2000's.

Carbon Rights Legislation, the world's first, was introduced in 1998 supporting carbon sequestration as a *voluntary* initiative. Fleet emission targets of 20% reduction by 2008 were achieved through new vehicles and the introduction of hybrids. The Sydney Ferries

trialed biodiesel. The Greenhouse Gas Office was established in 2005 concurrently with the launch of the Greenhouse Gas Plan, the year Carr resigned as Premier.

The New South Wales Greenhouse Gas Plan (2005): Announcement and High Level Design

In 2005, NSW introduced a comprehensive climate change intervention a Greenhouse Plan (NSWGP, 2005). The NSW Greenhouse Gas Plan (2005) introduced a comprehensive intervention which had carbon and energy efficiency policies, financial incentives, land use and transportation objectives, a building index, and public education campaign objectives. Biodiversity, adaptation and sustainability strategies were also laid out. Many of these were initiative in the years prior to 2005.

Carbon Policies. In 2003, NSW introduced the world's first *mandatory* emissions trading scheme (discontinued July 1, 2012), the *NSW Greenhouse Gas Abatement Scheme*, a mandatory target for electricity retailers followed several years as a voluntary initiative. The NSWGP stated goal was to work with other states and territories to advance the carbon trading scheme more broadly in absence of national leadership was a cornerstone policy.

Energy Efficiency. In 2003 the NSW government concurrently introduced the *Building Sustainability Index (BASX)* requiring energy and water conservation measures of up to 40 percent and 25 per cent in GHG emission reductions in all new residential dwellings and buildings by July 2004. New light Emitting Diode (LED) traffic lights were mandatory and one third of existing lights would be replaced by LED over 3 years. Steps to strengthen the NSW Energy Management Policy to reduce energy use in government operations were undertaken.

Financial Incentives. An energy savings fund was established providing incentives for residents and businesses of up to \$200 million over 5 years, the Energy Savings Fund, and 2.5 million/year to support clean tech and the adoption of emission reduction project (NSWGP, 2005). Forest NSW carbon plantation contracts were established and the

investors retained benefits. The NSWGP included a plan to lobby the Commonwealth to provide financial incentives for energy efficiency improvements for buildings.

Land Use and Transportation. NSW government implemented a \$1 billion Rail Clearways Programs to improve Sydney's rail network and an improved city bus network. New measures to green the Building Code of Australia to improve efficiency of commercial and residential buildings was a mandatory part of the plan which increased over time. Over time, planning at state and local government's levels to reduce car dependency were achieved.

Building. The Building Sustainability Index (BASIX) was introduced in 2004 to residential buildings and was expanded to multi-unit residential buildings in 2005. The Energy Savings Funds provided incentives for residents and businesses for conservation measures. The *NSW Metropolitan Strategy* provides strategies to the Greater Metropolitan Region of Sydney on growth management and energy conservation. The *Native Vegetation Act* rewards farmers for managing indigenous species.

Solar Energy. New South Wales has been active in solar energy research. The University of New South Wales was the first in the world to offer undergraduate training in photovoltaics and solar energy. The University now supports postgraduate and research training in the field. The Faculty of Engineering led in the development of high performance silicon solar cells. New South Wales cut the level of voluntary feed-in-tariffs for rooftop solar while raising the price of gas of up to 20 per cent (April, 2014). A Solar Bonus Scheme (the Scheme) was introduced in later years (2009-10 which provided the feed-in-tariff for customers with small wind and solar generators and is scheduled to end on December 31, 2016 as set out in the Electricity Supply Act (1995).

Since 2007, NSW has advanced its clean tech industry and has expanded the grid. The NSW government has explored the large potential for renewable energy developed from waves but the production costs remain high and the grid has not been extended to include wave energy. A Climate Change Fund (2007) was established under the Energy and

Utilities Administration Act (1987) to support energy and water conservation and was discontinued (as of 2013). The pioneering emissions trading scheme was replaced by the Commonwealth carbon tax July 1, 2012.

The *2021 Climate Action Plan* followed the NSWGP in 2011 and outlines 8 regional action plans which are linked to clean tech plans for each region including workforce projections and skill needs and training. NSW has not budgeted for mitigation within government nor specified offset purchases but local governments can apply to the Climate Change Fund, or the Treasury Loan Fund (PICS, 2011, p. 11) for funding support. The NSW government provides financial assistance to the Energy Action Plan and supports the Regional Clean Energy Precincts Program.

New institutions, Committees, Capabilities

New institutions and committees which supported the NSWGP included the NSW Greenhouse Office (2003 – 2007) and an office to support the 2021 Climate Action Plan was established later. Several committees also supported these plans that worked across sectors.

New Institutions. The NSW Greenhouse Office, was established in and resided within the NSW Cabinet Office (established 2003). Its main mandate was to develop climate change policy and to co-ordinate a joined up response to reduce GHG emissions and adapt to climate change. The Cabinet Office provided advice to the Premier and coordinated policy across departments. It ceased operations in 2007. The Independent Pricing and Regulatory Tribunal of NSW (IPART) was established to act as both administrator and compliance regulator for the NSWGHGRS monitoring compliance by both parties and certificate issuers and reporting annually to the Minister (NSWEHO).

Committees. A National Action Plan (2004) established a national/government industry group to develop options to reduce coal fired power generation GHG. Partnerships with the Commonwealth and private sector to improve public transportation was undertaken.

NSW also established a group to work with other states and the Commonwealth for new light and heavy duty vehicle standards to harmonize with leading nations.

Capabilities. Various new capabilities were required to manage carbon trading and GHG reporting. A Catchment Management Authority developed a methodology for accrediting carbon sequestration managers at Abatement Certificate Providers.

Impacts of new energy policies in NSW are estimated at over 6,900 new jobs in the electricity sector by 2030, including 1300 permanent jobs, 4,500 construction and 1200 manufacturing (CI, 2011 a). Detailed regional employment modeling was also conducted by the CI (2011) for each regional energy precinct in NSW including Illawarra, where the state's most competitive wind resources are located. The energy precinct planning was highly detailed planning for green jobs.

Working Across Organizations and Other Levels of Government

New South Wales has a whole-of-government approach to several policies. The main office leading the strategic whole-of government approach up until 2007 was the NSW Greenhouse Office. Streamlined reporting on water, waste, energy, greenhouse gases and the fleets was introduced in the NSWGP requiring agencies to report on energy and water use, GHG emissions, waste generation and steps to green the fleet. All cabinet minutes were required to detail environmental action impacts.

The NSWGP policies mobilized local governments to take action and build capacity. This study focused on the City of Sydney as NSW largest metropolitan area and it was where the author was situated in NSW. The Region of Illawarra was selected because it was an at risk area with projected high employment turnover on the horizon due to economic transition from natural resources to renewables (e.g. wind). The author travelled to a wind farm in the region and attended public consultation sessions with planners, politicians and the community during the study abroad period regarding this transition and visioning how the community would change. We now turn to the example of the City of Sydney.

Local Governments. There are 152 local governments in the state of New South Wales. The region of Illawarra and the City of Sydney were chosen as case study areas within the state of New South Wales because both the region and the City were leading in climate change planning, the first with a coordinated green job plan, including a targeted training program and the second because of progressive green initiatives. When the NSW government implemented a \$1 billion Rail Clearways Programs to improve Sydney's rail network and an improved city bus network to improve public transportation reducing GHG emissions and improving efficiencies.

New measures to green the Building Code of Australia to improve efficiency of commercial and residential buildings was a mandatory part of the plan which increased over time. Over time, planning at state and local government's levels to reduce car dependency were achieved. The Building Sustainability Index (BASIX) was introduced in 2004 to residential buildings and was expended to multi-unit residential buildings in 2005. The Energy Savings Funds provided incentives for residents and businesses for conservation measures. The *NSW Metropolitan Strategy* provides strategies to the Greater Metropolitan Region of Sydney on growth management and energy conservation which coordinates regional growth.

In addition to support for regional green job development, both the Commonwealth and the NSW state governments financially supported local government efforts through the Regional Clean Energy Program, and initiatives such as City of Sydney's Sydney 2030 plan and the NSW 2021 Regional Action Plans. Climate Action 2021 Plan sets out the Towards a Resilient Sydney project to improve information of climate change risks and identify actions to improve resilience, reduce impacts and adapt.

City of Sydney: Sydney 2030 Plan. The City of Sydney was the first city in NSW to become carbon neutral (2008) with the City declaring direct emissions (9 per cent), electricity indirect emissions (71 per cent) and other indirect emissions (20 per cent).

The Sydney 2030 Plan (2007) sets out a plan to achieve 100 per cent local generation and fill 30 per cent of its requirements by renewable energy by 2030.

A distinguishing feature of the Sydney 2030 Plan is a tri-generation strategy to produce electricity, heating and cooling all in one process. The plan aims to replace electricity from coal fired power stations with low carbon tri-generation systems. It is led by the Chief Development Officer of Energy, who also developed the London and Woking Plan. City of Sydney officials explained that Sydney is 25 per cent of NSW's GDP – 8 per cent of Australia's. Its energy bills are high, and much of that is because of electric air conditioning (AC). Reducing energy costs, increases GDP. Some AC users don't pay the full cost; and everyone pays to reinforce the network to supply them so one of the goals an interviewee explained was to reduce the size of the networks because "the networks have to be three or four times the size that they need to be just to cope with electric air conditioning." With tri-generation, the goal was to reduce that significantly. The interviewee explained that by supplying cooling using waste heat a huge reduction on people's energy bills would occur.

The NSW government has been supportive the interviewee continued because there is much public opposition to these high network charges that manifest as higher energy bills. A report was commissioned on the costs of centralized energy. And by talking about the hidden costs of centralized energy, the public is beginning to be aware of the benefits of such a move. The interviewee explained that: "We've already been successful with getting the Australian Energy Market Operators to change the rules on generation." However, the interviewee explained that the grid was not designed for decentralized power, so the proposition was to reduce rules and charge one fee for service. Instead, decentralized energy operators would aggregate their plants into a single registration, and pay only about \$5100 when it would previously have been hundreds of thousands of dollars. For the first time the proportion for electricity bills from network charges was established at approximately 40%. One interviewee stated: "...it was quite shocking, people were very surprised."

Two additional strategies of the Sydney 2030 Plan are noteworthy. The City provides incentives to the private sector with five per cent capital to bring in new energy and water conservation projects. Another was leading by example. For example, the City retrofitted the Town Hall with a solar panel roof and other small-scale solar projects on the city properties; building energy efficiency retrofits, LED (light emitting diode) lighting, and tri-generation projects in the City's own buildings and operations. Sydney's Town Hall became one of the most energy efficient buildings in the city.

The Sydney 2030 Plan illustrated how a combination of leadership, strategic direction and high level advocacy helped promote changes supporting green development. Hiring senior people with knowledge and experience in order to set the direction and stay the course was, in the opinion of one interviewee, a key initial strategy to ensure success. Starting with concrete evidence is important to set policy direction and build support politically and with citizens.

The initiatives have not been without opposition. As one of the interviewees stated, basic utilities are State jurisdiction and the Labor Party policy was against privatization even though several successive Labor Governments wanted to privatize electricity. The interviewee expressed that in their opinion:

That's one of the contributing issues to Labor losing power. One of the key issues was electricity because successive premiers, under a Labor Government, wanted to privatize and Labor Party policy was against privatization.

The interviewee also quickly pointed out that the options to privatize are favored because of the costs of upgrading. The interviewee explained that the real challenge is getting the public and workers to understand what it means to privatize.

City of Sydney Workforce Planning

Formal learning and development programs for the City of Sydney's 1750 full-time equivalent staff across are conducted in-house. A tailored program is required because

the work is very specific to the City services explained a City of Sydney interviewee. The role of workforce planning at the City of Sydney is to support all of those areas and to ensure that capacity and skills development of the workforce here is exemplary. The City of Sydney has high goals for the workforce the interviewee explained: “They want to punch above its weight. The service aspect is critical. Reputation is everything.” When it comes to skills and capabilities, like any city, the workforce varied widely in competencies and skills explained an interviewee:

There’s the highly operational – the on the street and cleaning the street, the front line library and community centre workers and customer service, and then there’s the highly strategic areas. The competency and skill sets vary broadly.

The interviewee states that the City’s workplace culture curtailed the adoption of green policies because the culture was entrenched. However, changing the culture of workers to embrace a green attitude is instrumental in moving the Sydney 2030 Plan was the objective of the workforce planning unit in 2012. Ensuring that management are fully onboard and live the values themselves is key to advance the Sydney 2030 goals the interviewee states: “Every hire matters.” Linking green policies and jobs and skills was more formally linked at the regional level in the nearby region of Illawarra. The discussion now turns to this.

Regional Partnerships: The Innovation of the Rural Region of Illawarra. This NSW region of Australia is the world’s largest producer of coking coal (53 per cent of the export market) (Illawarra, 2009) and “all of the renewable energy technologies that will power the future rely on steel.” In 2007, Australia exported 132 million tonnes (mt) of coking coal (Illawarra, 2009). Illawarra’s southern coalfield is the “only source of premium quality hard coking coal” in NSW and home to the largest steelmaking plan in the country (Illawarra, 2009). The regional economy depends on steel, coal and heavy manufacturing, and is home to some of the most competitive wind resources in NSW. Not surprisingly, there was strong interest from the Commonwealth and NSW governments to transform its steel manufacturing base to renewable energy

manufacturing to position the region as a continued economic stronghold for the state and nation.

In 2009, Illawarra received seed funding from the Commonwealth and the state of NSW to develop the first regional green jobs plan in Australia (Illawarra, 2009). Although Australia was not as hard hit by the economic downturn as North America is was not incubated from its effects. Plans for diversity included a cogeneration plan (Port Kembla Steelworks) that would be the largest carbon abatement project in the nation. Other industries will service and repair wind farms and other renewable energy initiatives such as Oceanlinx (a wave power technology) which never got off the ground due to the high cost of development. With respect to the plans to use the region for making wind turbines and leveraging the steel expertise there, the interviewee notes that the federal Labor government refused funding for this, but received NSW government support. Moreover, the Commonwealth's carbon tax was seen as shifting responsibility to the market.

The Commonwealth's financial support to Illawarra to develop the regional green jobs plan was supported also by Skills Australia. The intention was to support the transition of workers from coal and steel to new renewables. An interviewee stated that the single most important ingredient for success in the regional plan was consistent high level political support at the regional but it was consistently challenged. An interviewee explained why:

I come from Wollongong, which is a steel town and really got hit by this. [...] There's a downturn anyway and many of us feel that the carbon tax will make matters worse. And the problem they've got with the high Australian dollar, plus the carbon tax - they've lost all their overseas markets now. Australian steel is just too expensive. So they're only producing for the domestic use which is extraordinary. We have not been in that situation since the 1940s.

This small case example illustrates the significant of political support for action and funding.

Phases of Implementing the NSW Greenhouse Gas Plan

The NSW Greenhouse Gas Plan (2005) set the course for New South Wales' action on climate change mitigation. Great strides were made with the first mandatory abatement scheme which was compromised due to national climate change policies challenges “characterized by a lack of a coherent and nationally coordinated climate change policy agenda” (WRC, 2009, p. 8) and up to 2011 a time of “botched reforms” (*see* Kelly in Lindquist, Vincent & Wanna, 2011, pg. 43 - 51). The sustainability agenda was going through transition, but not a full policy transformation at the national level – instead it was vigorously contested. The state of NSW was motivated to take action due to the Carr personal commitment to environmental matters and the understanding that the state needed to step up in the absence of Commonwealth leading on GHG reduction. There were particular policy challenges in water management policies including infrastructure that were contentious with respect to “who pays.” One interviewee observed that:

The Commonwealth is examining water restriction policies it's quite a contentious issue. The decisions being made after the last drought were not just about water restrictions but about broader water infrastructure at the time as well. And who was going to pay for what. It bottlenecked policy progress.

Another NSW interviewee explained that the policy instrument selection was very much connected to addressing climate matters. During the previous drought the NSW government looked a lot at desalination plants and other mechanisms but panic unfortunately overcame planning analysis:

There were strategy documents and plans that might have been developed but when the drought hit, there were decisions made on top of those. There was supporting analysis and informing the populous about the decisions that were made around big infrastructure because there's a gap in the knowledge or analysis

that is provided to engage the broader public in these big decisions which affect both sustainability outcomes and hip pocket outcomes and energy use for years and for decades to come ‘cause they’re very large investments and it was just sort of made in this panic – in that sort of space. Planning is the key issue, challenge in the space of uncertainty.

An interviewee explained that this uncertainty of not knowing what those changes might be makes planning and achieving policy coherence challenging:

In Australia it’s part of our national psyche to have flood and drought ...however, in the last few years it’s stretched beyond previous memory – the memory of the current generation and now we aren’t so certain.

The interviewee explained that this degree of uncertainty challenges public support for policy selection and retention. In 2011, newly elected Liberal Premier O’Farrell repealed the Solar Rebate Scheme that paid tariffs to eligible households was repealed because the costs exceeded budget closing it to new customers. The O’Farrell government announced *NSW A Plan to Make NSW Number One (2021)* 2011 (including a goal to strengthen the NSW skills base). A series of plans accompanied the NSW 2021 plan which had a target of 20 percent renewable energy by 2021 and was supported by a Renewable Energy Action Plan and NSW Energy Efficiency Action Plan and a Metropolitan Strategy for Sydney. The NSW government announced the Towards a Resilient Sydney a plan for adaptation intended as a model for NSW regional adaptation planning in 2012. NSW progress on climate change continued on mitigation but the policy mix changed and there was a shift to renewable energy and adaptation. While the Greenhouse Gas Plan was now obsolete and the Greenhouse Gas Office was closed, there was momentum at the national level with the Gillard government carbon tax and Carr’s vision of a national carbon pricing scheme was realized.

As outlined in table 8.1 below the policy coherence between climate action policies during the 2000 – 12 period is ranked as High with a high degree of initial momentum

begun in 1995 with the Carr government. Premier O’Farrell’s election signaled less momentum, introducing a new climate action plan which was less robust, but this was at the tail end of the 2011-12 period.

Table 8-1: New South Wales Research Implications Policy Coherence

Research Questions & Key Variables	1980 – 2000 Pre Dissertation Study Period Cumulative Incrementalism	2000 – 2012 Period of Dissertation Study Effective Implementation	2012+ Post Dissertation Study Period Effective Implementation Graduated Erosion
<i>Policy Coherence and Broader Contextual Environment</i> Degree of Integration	Low-Medium	High Greenhouse Gas Plan (2005) NSW 2021 (2011) Towards a Resilient Sydney (2012) 1 st world’s mandatory carbon trading (2003)	Medium Lost momentum with carbon tax axing by Abbott in 2013 begun by Gillard (2012) impacted states as states discontinued carbon pricing with advancement of national scheme

Was New South Wales Greenhouse Gas Plan Integrated and Coherent?

New South Wales, under the leadership of Bob Carr, initiated several climate change policies beginning in the mid 1990’s which gained traction from his sustained leadership to the mid 2000s. The world’s first mandatory abatement scheme was a pioneer and its significant contribution was to illustrate that “market-based mechanisms could achieve environmental objectives” (IPART, 2013). Yet the plan was criticized by some who “favoured an approach that involved measuring the absolute reductions in emissions reductions achieved rather than the hypothecation approach used by GGAS, particularly it was criticised for its treatment of financial additionality” (IPART, 2013 pg. 2). The Greenhouse Gas Plan did not require that projects demonstrate that they would have occurred anyways and critics suggested that viable projects should have to demonstrate that they environmentally or legislatively exceed existing requirements. Nevertheless, the pioneering efforts to introduce a mandatory greenhouse gas emissions reduction scheme and supporting policies and plans, ranked high because recognized the need and acted on it. It may have had growing pains and critics but it first introduced a plan that was measurable, verifiable and reportable.

The early momentum beginning in 1995 was sustained during Carr's tenure until his resignation in 2005. His efforts were sustained by subsequent Labour premiers and then a Labour Prime Minister built on this momentum, institutional structures and long-time strategy links with other states. However, the Gillard carbon tax and government was short lived and Gillard's successor dismantled many of the bodies and policies developed by her government from 2010 – 12 as well as the aligned carbon pricing and clean energy policy direction between national and state governments was fractured. But not completely. Much action on green skills training through coordinated training between the national and state bodies continued but climate change policies were diluted or eliminated.

The NSW Greenhouse Gas Plan: Strategic Workforce Planning Perspective

The NSW Greenhouse Gas Plan to achieve energy efficiency and GHG reduction had reasonably high coherence and while it did not explicitly link with strategic workforce planning, several parallel initiatives that were developing green skills legislation, strategy and training that accompanied the plan. The *NSW Green Skills Strategy* (NSWGSS) (2008, c) began with registering training organizations help businesses green their workforce (ILO, 2011, p. 153). It funded institutions to increase green training, including new courses. The *NSW Green Skills Strategy Implementation Plan* (NSW GSSIP) identified jobs that require new training, and then report to the appropriate skill council who then coordinates it at a national level. The *Agreement* and the *Plan* were developed alongside the National Framework for Energy Efficiency.

Linking National and State Workforce Planning

Supporting the plans, data models for strategic workforce planning were developing in sophistication, but challenges existed with capability of the data explained one interviewee. Targeted markets were also changing with new climate policy. The interviewee notes that previously: “In days gone by, there was a very strong connection in terms of apprenticeships and training and now we're not identifying positions as such.” The skill needs are changing as policy shift:

The challenges in training – moving from policy shift to policy shift – from large centralized systems to more decentralized water for example recycling does generate workforce and skill needs and also where workers live and they are not coordinated between the federal and state governments the way they should be.

In 2009, WRC (2009) argued that “The lack of coordination at the federal level has underpinned years of often innovated but poorly integrated State and private sector initiatives, a system that has resulted in overlapping programs, fragmented objectives, and unclear signals for students, consumers, business and industries considering the green skills imperative.” Such policy gaps were further exacerbated by an impasse between the Commonwealth and the states on climate policy during 2000 - 2010, such as carbon pricing which affected NSW skill development policy (WRC, 2011) because although the Commonwealth supported training development funds were not always directed to training needed for climate related policy needs. Despite this impasse there were notable efforts and achievements of NSW efforts to link policy and training. NSW green skills training and implementation strategy are also examples of pioneering efforts at the sub government level though first generation adopters had clearly grappled with these issues (e.g. UK Green Skills Checklist).

Broader context in New South Wales Government Concerning Strategic Workforce Planning

State workforce planning is structured and regulated. In addition to NSW central agency for human resources Department of Education and Communities, each office and agency have their own human resources departments. Vocational training is administered by the New south Wales State Training Services and the Australian Public Service provides workforce planning support services for NSW agencies. The following provides an overview of the two agencies.

New South Wales Vocational Training. The NSW Training Services administers its vocational system and funding. Funding decisions are considered within a broader

national framework established by the Council of Australian Government (COAG), of which all states and territories are members. Skills are targeted for training by COAG, and members must agree to targets. The two main goals of the State Training framework are to double the number of people with higher qualifications, and half the number who don't have a "certificate three" and above (Interview). State Training officials are also responsive to regional and local needs. The Strategic Skills Program gives guidance on the qualifications or units of competency to be purchased. Every course is formally evaluated, including the Office for Environment and Heritage's program (responsible for green jobs). As the interviewee explained, the most important question is whether people are actually using the new skills they learned. Regional centres do the purchasing and that's in response to local demand for training, and they work together with employers and what are known as Registered Training Organizations that deliver the training. The public provider is New South Wales which is responsive to local demand.

Australian Public Service and It's Relationship to NSW. The Australian Public Service (APS) has offices in each state and in New South Wales there is an office in Sydney and the main office is located in Canberra. A Workforce Information and Planning Department (WIPD) of the APS coordinates with NSW ministries and agencies. The APS also administers the green skills data model for the Commonwealth which is linked to ANZCO and NSW green skills model.

Linking Green Policies and Green Skills

The Commonwealth and the state of NSW also recognizes the need for training to be tailored at the regional and local level and has supported the pilot program in the Illawarra Region in NSW and various initiatives at the City of Sydney.

Overall, the link from the NSW Greenhouse Gas Plan and strategic workforce planning from 2000 – 2012 was medium. New South Wales led in renewable energy development and skills policy at the state level in Australia and has conducted detailed workforce development and planning exercises and employment impact analysis (CI, 2011 a). How NSW efforts will advance within the 2014 Commonwealth energy reforms which ended

mandatory renewable energy targets is yet to be realized. In the absence of a carbon price, renewable energy targets and supporting institutions to assist and build capacity, the future for Australian comprehensive climate change interventions is uncertain. Efforts to build workforce capacity including training and skills development scheme are continuing but the public sector support for this is also uncertain with the closing of the AWWPA. Without a long-term, central policy framework and a high degree of uncertainty, mitigation and adaptation efforts are compromised.

A summary of the policies and workforce planning are featured in *Appendix H* Table 8-2 NSW Comprehensive Climate Change Intervention Coherence, Capacity and Capability and Table 8-3 NSW Degrees of Coherence and Phases of Development.

Summary

The NSW Greenhouse Plan (2005) set the course for NSW climate change intervention though many policies were introduced in the early 2000 period. In 2003, New South Wales launched the world's first mandatory emissions trading scheme. In 2011, a Liberal Premier set out NSW 2021 (2011) a ten year plan to reduce GHG emissions and included goals for training and apprenticeships yet it was a departure from the aggressive targets set out in the NSW Greenhouse Plan setting targets for 20% renewable energy by 2020. Liberal Barry O-Farrell repealed the State emissions trading scheme in 2012 concurrent with the advancement of the National carbon tax (July 1, 2012) (now repealed).

The role of local governments in meeting New South Wales targets has been a key strategy of the NSW Greenhouse Gas Plan. Momentum achieved by the City of Sydney, particularly its tri-generation initiative is noteworthy because of its leadership.

NSW government during the 2000 – 2011 period established energy precincts which had specific clean technology plan and workforce development plans were formed in 2009 - 2011. New South Wales workforce planning linked to national skills planning and the Commonwealth supported training. Standardization of sector and job categories throughout the state was developed in order to efficiently transfer skills. While still requiring ongoing refinement, Australia and NSW in general has advanced development

of green skills and workforce planning both institutionally through the establishment of national, regional training schemes, supporting legislation and agencies such as the Australian Workforce Productivity Agency.

The case study illustrates that political leadership is a significant motivator of comprehensive intervention effective implementation at all levels of government. It also illustrates that without sustained political leadership and policy focus an abrupt change of policy direction can occur. The Commonwealth policy reversals in 2012 – 14 have left states such as New South Wales, who stopped progress on cap-and-trade banding together with neighbouring states calling for action on climate change from the Commonwealth in the wake of record high temperatures. Reportedly, the NSW Liberal Premier has not been keen to publicly criticize it's national Liberal Prime Minister but the need for action for New South Wales led to NSW joining the coalition. The rate of progress states can make without a national supporting policy framework is stymied. While carbon pricing efforts both nationally and at the state level were short lived, the skills development framework that was coordinated between national and state agencies has continued despite the demise of a national carbon policy.

Chapter 9

California, USA

Introduction

California's climate varies widely from coastal communities to the Mojave desert and from the northern redwoods to the mid-central Mediterranean-like climate. The state of California has suffered many severe droughts most recently in the mid- 1980's, 1990s and 2000's with the current considered the worst drought in the past 500 years. Droughts and a declining Sierra snowpack -- a key water source for state's growing population -- mobilized water conservation and energy efficiency measures for several decades. This was prior to the introduction of *California Global Warming Solutions Act 2006 (AB 32)* that launched a comprehensive climate change intervention led by Governor Schwarzenegger. In a 2007 address to the United Nations (September 24, 2007), Schwarzenegger announced California's mobilization on climate change:

California, because of its unique position, is on the cutting edge of what is to come....Last year in California, we enacted greenhouse gas emission standards that were beyond anyone else's dreams. We enacted the world's first low carbon fuel standards.

The framework outlined in the *Climate Change Scoping Plan (2008)* included ongoing climate research and aggressive action on clean technology innovation supported by the national government. The Governor went on to observe that:

Right now, in California, the brightest scientists from around the world and the smartest venture capitalists are racing to find new energy technologies and the solution to global warming. It is a race that is fueled by billions and billions of dollars. Last year alone, California received more than 1.1 billion dollars in clean tech investment.

The United Nations announcement shone the global climate spot light on California and its climate change plans to cut 30 per cent of its emissions, or approximately 15 percent from its current levels (California, 2008). Soon California began to reach the goals set out in the 2008 Scoping Plan, establishing it as an international leader. This culminated in a 2013 California Air Resources Board announcement that California's emissions declined for the third year in a row (2011 figures), attributed to the policies on energy efficiency (e.g. solar production), de-carbonization and GHG reduction. Also in 2013, California announced the cap-and-trade initiative with Quebec developed through the Western Climate Initiative over 7 years. In 2014 the Georgetown Climate Center announced California as a climate change leader in the US completing the highest number of goals in its Climate Change Scoping Plan.

This reconnaissance chapter will describe the steps taken by California's comprehensive climate change interventions, from their introduction in the mid 2000's through to 2012 and assess them with a view to their coherence and whether strategic workforce strategies were introduced or emerged as part of those comprehensive policy interventions. Key policies and supporting structures will be discussed, including the formation of the climate change office within CalEPA and the role of strategic workforce planning played in supporting climate mitigation and adaptation efforts. Observations derived from the analysis of five phone interviews conducted in Spring 2013 with senior climate change policy and workforce planning advisors at the state level are presented.⁶⁶ All interviewees played instrumental roles in shaping and implementing the climate change policies. Insights from these interviews are described in this chapter and examples of initiatives in California are included in *Appendix I*.

To locate the California government's scope of authorities in the United States federation and why California felt compelled to act, this chapter begins by providing an overview of the national government's approach to climate change as well as the agencies responsible for climate change and their competing and complementary policies. Two sections follow. The first provides an overview of California's climate change intervention and the Climate Change Scoping Plan (2008) and the second evaluates the Climate Change

Scoping Plan from a strategic workforce planning perspective. The conclusion summarizes the findings and presents a high level analysis of the degree of policy coherence and institutional and organizational capacity and capabilities.

Climate Change and the Distribution of Relevant Authorities in the United States

In 2008, the Obama administration established the White House Office of Energy and Climate Change Policy and the Inter-agency Climate Change Adaptation Task Force with a mission to identify policies for the US to adapt to climate change. The President vowed to accelerate the transition to a low-carbon economy and a goal to reduce GHG emissions 17 percent below 2005 levels by 2020. The Obama administration hosted the first Major Economies Forum on Energy and Climate (2009) to inform and complement the Copenhagen talks (United Nations, 2010). Climate change was front-and-centre in the 2013 inauguration address (US Government, 2013). The Climate Action Plan and Climate Change Adaptation Plan were unveiled in 2013 with goals to cut carbon pollution, prepare the country for climate change and lead efforts to mitigate and adapt to climate change including increased funding to clean technology innovation. Obama's efforts in both terms were thwarted by Republican opposition and conflicting policies and measures. A decision on the Keystone XL pipeline resides with Obama (vetoed February, 2015 and Senate vote March 4, 2015 did not override veto). The Obama administration has made progress on the climate file however with a targeted sector by sector approach.

US environmental policy is energy-focused. Targeted regulations include reduction of vehicle emissions, electricity regulation, waste management and advancement of clean energy (ILO, 2011, p. 431; The Carbon War Room Research & Intelligence Group, 2012). For vehicle emissions the US announced new fuel efficiency standards, requiring vehicles and light trucks to get an average of 35.5 miles per gallon – a 25 per cent improvement --by model years 2017 through 2025 (EPA, 2011). In 2011, the US announced new fuel efficiency standards for heavy duty vehicles for model years 2014 – 2018. Heavy duty vehicles are the second largest source of GHG emissions in the transportation sector. Other green changes in the automotive sector include new electric

hybrid vehicles and alternative fuel technologies. Transportation accounts for about 72 per cent of the US's domestic oil consumption (EPA, 2011). The Renewable Fuels Standard invests in research on biofuels.

For electricity generations, the US EPA introduced new regulations for coal and natural gas power plants (Government of United States, 2013). During President Obama's first term (2008 – 2012) the United States doubled the generation of electricity from renewables (US Government, 2013). The US green economy is valued at 644 billion pounds – over a trillion USD in today's currency - leading the world's clean tech industry (PICS, 2012).¹ In 2012, the US emissions fell to the lowest in twenty years.

Relevant Authorities for Climate Change and the Environment

Several federal agencies work to achieve GHG reduction goals. The Environmental Protection Agency (US- EPA) and the Department of Interior are responsible for environmental regulations. The EPA sets emission and waste disposal standards and regulates electricity generation. The Department of Interior is responsible for natural resources and heritage and coordinates eight regional climate science centres climate-change-impact data and management strategies. A Climate Change Response Council coordinates initiatives among bureaus. The Department of Energy is responsible for energy, environmental and nuclear science and works to find cost-competitive biofuels (in partnership with the Department of Agriculture). The Department of Agriculture focuses on food security and coordinates regional hubs assist farmers to adapt. The Natural Resources Conservation Service and the Department of Interior's Bureau of Reclamation provide grants to farmers for water conservation measures. The Department of Agriculture works with the Department of Interior to support wildfire risk. Department of Energy informs states and residents about operating costs for electric cars in respective

¹ The United States of America is ranked 16th on GDP (WB, 2011) and emits 18.27% of global GHG emissions (WB, 2011). It ranks 43rd on the Climate Change Performance Index (German Watch, 2012), 8th on the Low Carbon Competitiveness Index (CE, 2012), 12th on the Knowledge Economy Index (WB, 2012) and is ranked as an Innovation Leader on the Innovation Scoreboard (ProInno, 2012).

states and provides incentives for avoidance, reduction or sequestration of GHG emissions (see US federal agency websites such as <http://www.doi.gov/index.cfm>). The Department of Transportation seeks strategies for alternative fuels and works with the EPA to improve transportation options. The Department of Housing and Urban Development developing energy efficiency standards supporting research to improve energy efficiency in homes. The Department also assists businesses to meet the President's Better Building Challenge to reduce energy consumption by 20 per cent by 2020. The Department of Health and Human Services seeks to improve hospital resilience to climate change and train medical professionals to prepare communities for climate change impacts.

Federal – State Policy Coordination and Policy Harmonization. Like Australia and Canada, while some policies are within a state's jurisdiction, some are best coordinated at a national level. This has led to fluctuation in policies and actions. The lack of consistent federal attention in the US to green policies, along with overlapping incentives, has created a fragmented response. Policies often begin at the state level, and a federal response follows years later. While the EPA (2011) is introducing heavy-duty and light-duty vehicle regulations, states have taken earlier green initiatives (California, 2007). The *Clean Air Act* (1963, 1970, 1977, and 1990) is one example. In 1970 the Act was amended to include both federal and state regulations for reductions of stationary and mobile pollution sources.

Local Governments. As part of the President's 2013 Climate Action Plan, a task force was established to help state, local governments and tribal officials to advise the Government on actions needed for climate change. The Climate Action Plan also committed to continue to help state agencies prepare for climate change such as identifying transportation infrastructure vulnerabilities and improve safety standards for buildings. Prior to the 1970s the states and local governments oversaw all environmental matters within their jurisdiction and the federal government had jurisdiction on environmental matters federally only. This changed during the 1970s and now the states implement federal environmental laws as well as develop state environmental laws.

Many states have introduced green policies and climate change plans (see California Air Resources Board, 2008; Florida Governor's Action Team on Energy and Climate Change, 2008; North Carolina Climate Action Plan Advisory Group, 2008). As of 2014, 14 states finalized climate change adaptation plans and an additional 9 states are undergoing adaptation planning.

Progress on Climate Change 2000 – 2012

Progress on climate change in the United States has been moderate. Climate change is politically polarized. Republican President George W. Bush (2000 – 08) followed by Democrat President Barak Obama (2008 – 16) had different policy approaches yet progress has been made under both administrations to reduce greenhouse gas emissions. Bush announced in the Climate Change Plan (2002) voluntary greenhouse gas emissions intensity with a target of eighteen per cent reduction by 2012 which actually would have increased emissions by twelve percent had the policies continued (Centre for Climate and Energy Solutions, 2002). Conversely, Obama announced the National Energy Plan for America during his presidential campaign (2007) with climate change action initiatives to increase renewable energy and reduce greenhouse gas emissions. Despite the Bush administration's national approach progress was made notably from the states' efforts (e.g. California). Since 2005, emissions were reduced by 6.5 percent to 2012 (US Department of State, 2014) and the 2009 – 11 period reported the lowest levels for any three year period since 1994-1996 though much of this was attributed to the economic downturn. Yet, this progress is not sufficient to meet Obama's pledge to reduce greenhouse gas emissions 17 percent below 2005 levels by 2020 (Copenhagen Accord, 2009).

Despite U.S. economists advising that carbon pricing is the most efficient way to reduce greenhouse gas emissions, attempts to introduce carbon pricing have been unsuccessful. The Senate (2010) voted against a cap-and-trade (both Republicans and Democrats voting against). The President's Climate Action Plan (2013) set out a comprehensive action plan to meet the Copenhagen pledges with a multi-sector and multi-jurisdictional approach. The Plan continued subsidies to the states for programs such as the Better

Buildings Challenge (2011) with a goal to increase multi-family buildings energy efficiency by 20 per cent, toughening fuel efficiency standards and adaptation strategies and sector targets such as the carbon pollution standards for existing power plants (formerly announced by the EPA, June, 2014). While the partisan gap on climate change between Republicans and Democrats continues to challenge the Obama administration's effort to enact carbon pricing, Obama's sector by sector approach and financial incentives to the states moves the administration's agenda forward.

There is another policy area where the Obama administration has positively supported with climate change: labour, employment and training. However, the focus has connected the economic downturn recovery with employment unemployed and lower skills and the progress did not fully meet employment objectives of the 'green deal' to 'energize the economy' with economic stimulus for clean energy technology and job creation (see *Recovery Act*, 2009). The report stated that the green jobs were 'slow to sprout' with measurements being challenged by definitions of what constitutes a green job.⁶⁷ These growing pains to align climate change and employment policies illustrate the challenges of aligning policies when the policy mix is constantly changing as a result of political uncertainty and economic downturns.

Relevant Regulatory Authorities for Human Resources and Skills Development

The USA has good data for workforce planning [US Bureau of Labour Statistics (BLS)], but with a population of more than 300 million, it has a 'fragmented and decentralized labour market' and can't always use the information consistently (WRC, 2011). An OECD report noted (2011) that economic development policy in the USA is shared amongst more than ten federal agencies, two dozen sub-agency units and 70 programs. While the BLS conducts "considerable research into an array of labour market trends and movements" (WRC, 2011) the US' complex structure makes robust data sharing challenging. The ILO (2011) reports that the North Carolina Employment Security Commission's O*NET database does the most rigorous and systematic workforce research in the US. A recent report using O*NET data found that in 2006, demand had increased for 64 'green' occupations, a further 60 were considered 'green enhanced skills

occupations’, and 46 were ‘new and emerging’ green occupations. But this doesn’t measure specific policies, skill use, and reskilling/up-skilling. It also does not capture the breadth and scope of green skill and employment changes. For example, vehicle emissions and clean tech are big components of green policy. Work in a Warming World notes that “there are few recent studies of changing patterns of employment and skill requirements in the North American automotive industry” (W3, 2010). Federal data bases are reliant upon information collected at the state level which has been difficult to obtain because of costs and data bases are not harmonized.

Quantifying the US green economy is challenging in part because the cost of obtaining “accurate data at the state level is prohibitive” (Headwaters Economics, 2012, pg. 2 – 8). Different data sets have different definitions, and projections of job growth are unreliable (Headwaters Economics, 2012, pp. 2 – 8). One study identified potentially 25 million “net new jobs and a \$159.6 billion in expansion in US GDP by 2020 if 23 major sectors-based policies” are implemented (ICCEPO, 2010: 39). The ARRA is estimated to create 2.5 million green jobs. This becomes a net 1.7 million due to job loss due to fossil fuel industry (ILO, 2011, p. 433)). This estimate, (ILO, 2011), while not comprehensive, is much less than the US Department of Labour estimate. An OECD report stresses that labour projections are “highly sensitive to changes in underlying assumptions” (1994, p. 8). The US Bureau of Labor Statistics has scenarios that “differ by a margin of 9 million people” (p.8).

Two U.S. organizations lead in identifying future skill needs. The U.S. Department of Labour has identified twelve sectors that will have higher demand from green growth. These are: renewable energy, transportation, energy efficiency, green construction, energy trading, energy and carbon capture, research, design and consulting, environmental protection, agriculture, manufacturing, waste management and government and regulatory administration. Within these sectors, three categories were identified: “green increased demand occupations (64), green enhanced skill occupations (60) and green new and emerging occupations (91)” (ILO, 2011, p. 435). More than 60 were jobs that would “take on new green tasks and require new green skills” (ILO, 2011,

p. 435). The National Academy of Sciences (NAS) is considered leading-edge in identifying workforce futures (Hilton, 2008), projecting that computers will replace more than 60 per cent of the national workforce (Elliott, 2007) by 2030. NAS also projects much more fluidity in who performs particular jobs, as employers use a wider variety of workers and skills.

A Green Jobs Framework for Action has been developed.² An important aspect of the US green growth strategy is characterizing green jobs as quality jobs. The U.S. country report to the ILO stressed that quality is a characteristic of a US green job that it is “attempting to promote” (ILO, 2011, p. 431). Another policy objective is to promote rapid job growth, improve job quality to modest and well-educated workers and increase employment access (ILO, 2011).

In 2011, the Obama administration created the Energy Regional Innovation Cluster (E-RIC), led by seven federal agencies, including the Departments of Labour and Education. E-RIC had US\$129.7 million in funding (ILO, 2011, p. 136). Other initiatives include the Clean Energy Workforce Training Program (ILO, 2012, p. 197). Most funding for green jobs comes from the American Recovery and Reinvestment ACT (ARRA) and the Department of Energy. It allocates \$US 600 m to the US Department of Labour to expand and develop green skills. The money is distributed to training providers in many organizations after a competitive grant process. Altogether, about \$US 100 billion will be spent through the ARRA initiative on the green economy. In 2007, the US Government enacted *The Green Jobs Act (2007)* to fund ARRA, including state energy sector partnership and training grants (\$US 190 m), green capacity building grants (\$US 5.8 million) and state labour market information improvement (\$US 48.8 million).

The United States has taken action of green jobs and green skills training linking some financial support in this regard as part of recession recovery, labour market data

² The Green Jobs Framework for Action outlines framework for regional forums on green jobs and steps to develop action plan. Retrieved from http://www.doleta.gov/pdf/No_Workers_Frame_0306.pdf (July 15, 2012).

collection and clean technology training. While California was not the only state to take action (several states adopted climate change plans and a regional cap-and-trade program RGGI was initiated by nine Eastern States) none were as substantial and comprehensive as California. Initiatives taken in California offer another good example of a subnational government that introduced a comprehensive climate change intervention concurrently with workforce planning. While this planning effort was not fully integrated, it does provide another instructive case.

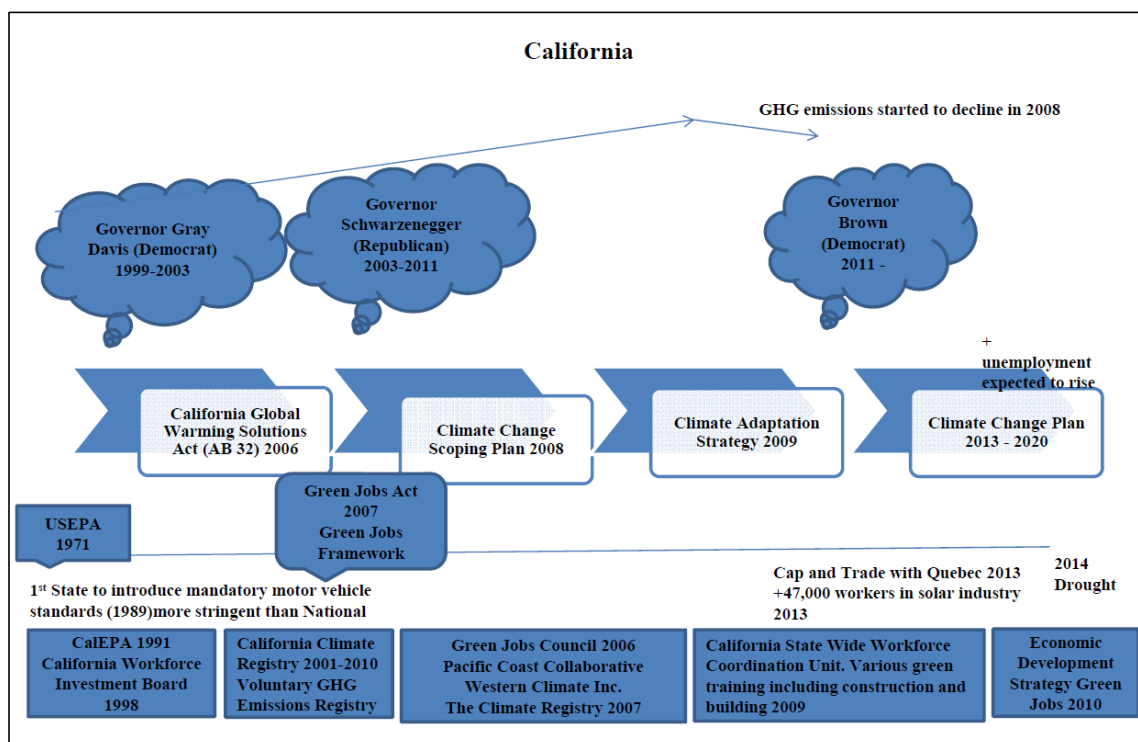
California: Mobilizing to Address Climate Change

California has led in climate change policies and actions for several decades in the US and several of its responses to environmental challenges were following with national expansion. For example, California led the development of North America's first utility-scale wind energy projects in the 1970s (PICS, 2013). The US is now second to China in most installed wind capacity (PICS, 2013) and California has been the foremost developer. California's long history of climate change policy development can be attributed to consistent political support over the past forty years, regardless of political affiliation. The current governor democrat Edmond ("Jerry") G. Brown (2011 - present) was Governor from 1975 – 83. George Deukmejian was Governor from 1981 – 91 and Pete Wilson 1991 -99. Brown succeeded republican Arnold Schwarzenegger (2003 – 2011) and democrat Gray Davis (1999 – 2003). All were active on climate change mitigation and adaption. Schwarzenegger led California during a time of a significant climate change policy time in which clean air and renewable energy policies introduced during the mid-2000's were expanded upon and the climate change intervention capitalized on the momentum of work over several decades prior. Its approach to climate change includes "preserving California's lifestyle, fostering economic growth, strengthening the natural environment, improving public health" (Climate Change Scoping Plan 2008, pg. 35).

To locate California's comprehensive climate change intervention, this section begins by providing an overview of California's organization on climate change and environmental initiatives prior to the Climate Change Scoping Plan announcement. This overview

shapes the context necessary to understand the scope and magnitude of California in helping to address the climate-change challenge and the responsibility to reduce GHG emissions. Multiple policies comprised the Climate Change Scoping Plan, as described in the following section and summarized in Figure 9-1.

Figure 9-1: California's Approach



Organization of California and Previous Environmental Initiatives

While California introduced regulations to incite the automotive industry to produce more efficient vehicles before the *Federal Clean Air Act* of 1970 (W3, 2010) it was in 1988, under Governor Deukmejian when the California Energy Commission (CEC) was named the lead agency for climate change and the climate change file gained traction. That is when the state legislature asked the CEC to study climate change in California with the passage of AB 4420. The California Energy Commission held hearings and produced a report recommending actions and some legislators recommended then that a law be passed to reduce emissions stated one interviewee. The CEC was statutorily responsible to create an inventory of the state's GHG emissions. An interviewee

explained that some companies knew change was coming; they started reducing emissions and wanted to protect themselves before it happened.

In 2001, Senate Bill 1771 created the California Climate Action Registry (CCAR) to establish GHG emission baselines and a voluntary registry where companies could register reductions and would receive credits and voluntarily record their GHG emissions. The interviewee explained that companies were motivated to do so because they wanted favorable treatment in the future with AB 32 because some of the emission reductions are being converted to allowances. Also in 2001, Senate Bill 527 requires that the CEC provide guidance to the CCAR on the development of emissions protocols and the certification programs. AB 1493 (2002) was passed the subsequent year requiring the ARB to develop regulations to reduce emissions from vehicles and light duty trucks.

In 2005, Schwarzenegger signed an Executive Order #S-3-05 setting a target to reduce GHG emissions by 80 per cent by 2050 below 1990 levels, by 2020 to reduce GHG emissions to 1990 levels and by 2010 to reduce GHG emissions to 2000 levels. To meet the 2005 targets two pieces of legislation were passed. First AB32, the *California Global Warming Solutions Act* (2006) mandated California reduce GHG emissions to 1990 levels by 2020 with goals to introduce a low carbon fuel standard, clean car standards and a cap-and-trade scheme. Meeting the goals required a comprehensive multi-sector approach including natural gas, transportation and electricity. The second piece of legislation was the Senate Bill 1368 (2006) which required the Public Utilities Commission and Energy Commission to develop an emissions performance standard to electricity providers.

The California Environmental Protection Agency (Cal- EPA) is the main regulatory agency for the environment. Cal-EPA is an umbrella agency and has six boards including air resources, water, recycle and the department of pesticide. The biggest department is the California Air Resources Board (ARB) who has statutory responsibility to write the Climate Change Scoping Plan (2008) and implementation of AB 32. The Natural Resources Agency is responsible for adaptation planning.

The Climate Change Scoping Plan: Announcement and High Level Design

The Climate Change Scoping Plan (2008) put in place the measures to be developed over the subsequent two years to be in motion by 2012. It was developed by the Air Resources Board (ARB) and the Climate Action Team (CAT). It set out recommended actions for the state and local governments and specific emission reduction measures including, but not limited to light-duty vehicle GHG standards, energy efficiency and renewables portfolio standards, regional transportation-related GHG targets, vehicle efficiency measures, solar roof initiatives, green building strategies, and goals for recycling and waste, water and agriculture. There were also incentives for voluntary early actions and reductions and the use of allowances and revenues. Amongst specific targets to reach the 2020 goals, included a renewable energy mix of 33 percent, targets for transportation-related GHG regions throughout the state including incentives to reach the targets and the development of a cap-and-trade program linking with WCE partners (which potentially included British Columbia) to create a regional market for carbon. Another key partnership was California's participation in the West Coast Regional Carbon Sequestration Partnership (WESTCARB) to advance sequestration technology to meet goals of job growth, improving public health, reducing energy consumption, improving savings for residents and businesses. Regional and local government targets were also set out.

Policies and Instruments

To achieve the Climate Change Scoping Plan (2008) goals policies were enacted in key sectors including transportation, energy and electricity, buildings, waste management and land sectors such as forestry and agriculture. Some of these are highlighted below beginning with transportation, the largest source of GHG emissions in the state.

Transportation. Passenger vehicles account for 30 per cent of California's GHG emissions (CCSP, 2008). To achieve GHG emission reductions, three strategies were employed. The first was the adoption of Light-Duty and Heavy-Duty Vehicle Greenhouse Gas Standards. As of 2008, 14 states had adopted or were in process of

adopting California's standards. British Columbia and Quebec enacted similar legislation in the same years. The second was the introduction of the Low Carbon Fuel Standard (LCFS) a flexible performance standard to advance low carbon fuel availability which became "the precursors to the US national standards and by extension North American standards" (W3, 2010, p. 138). Through regulation California had the 'cleanest burning gasoline and diesel fuels sold in the world' in 2007 (California Air Resources Board³, 2007, p. 26). The third was to reduce miles vehicles travel through more efficient transportation systems.

While California has made improvement in air quality, even with increases of population and vehicle miles driven [California's population has increased by 22 percent and vehicle miles by 45 percent in the past 20 years (California Air Pollution Control Officers' Association, 2014)] due to state and federal vehicle emissions regulations and other regulations, the effects of climate change globally challenge this progress and diminish the impacts. California's standards were introduced for medium and heavy duty vehicle hybridization with the Zero Emission Vehicle (ZEV) program. California mandated that by 2025, 15 per cent of all cars sold must be electric. The Obama administration supported the mandate but not national targets.

Energy and Electricity. Second to transportation, the energy and electricity sector have the next highest GHG emissions, with a quarter of California electricity being imported. The goal in this sector was to expand and build upon energy efficiency programs. New standards for energy-efficient appliances have worked because of the size of California's market: manufacturers want to be able to sell their products there. Energy efficiency targets for Zero Net Energy (ZNE), improved building codes and various water and energy conservation programs and incentives for residents, businesses and the agricultural sector. These were enacted by several pieces of legislation such as the *Solar*

³ In 2014, the ARB announced that it was on track to meet its goal of an 80 percent reduction in emissions from 1990 by 2020 but wanted all sectors to pay larger roles in meeting these targets.

Hot Water and Efficiency Act (SHWEA), 2007 and supported by the California Long Term Energy Efficiency Strategic Plan (CLTEES, 2008).

The Renewable Portfolio Standard (RPS) has objectives to diversify electricity supply. Senate Bill 107 (2006) mandates that investor owned utilities (IOU) to increase renewables by 20 per cent by 2010. Publicly owned utilities (POU) are encouraged to meet the same targets. The Million Solar Roofs Initiative (MSRI) offers financial incentives to convert roofs to solar.

Commercial and Residential. Commercial and Residential buildings account for 22 per cent of GHG emissions (CCSP, 2008), the second largest contributor in the state. The Green Building Initiative (Executive Order S-20-04) proves a comprehensive approach to reducing emissions through green building design, construction and renovations including energy efficiency and conservation during all phases of construction, selection of materials, siting of houses on lots and close to public transportation. A new building code, the Green Building Standards Code (GBSC) was adopted in 2008.

These complementary measures make up the California comprehensive climate change intervention. The cap-and-trade program and complementary policies cover approximately 85 per cent of California's GHG emissions. The cap-and-trade program is discussed below in the section on regional initiatives. The policies and regulations are enacted through various agencies, institutions and committees.

New Institutions, Committees, Capabilities

Several institutions and committees supported the implementation of the Climate Change Scoping Plan (2008) and several new capabilities were required to support the implementation.

CalEPA. A CalEPA Climate Change Advisor describes the organization as a small organization, 70 – 75 people in total, with only 15 policy staff– almost entirely appointees of the Governor, including one technical unit which is mostly scientific of

which many are deputy's appointees and one civil service staff. The function of the Climate Change unit is to coordinate roles of all agencies and boards and coordinate climate change policy across all agencies in the state. Coordination is a big part of the function in addition to providing policy analysis and advice to the Secretary.

Committees. Several committees were established to advance the CCSP (2008). The Economic and Technology Advancement Advisory Committee (ETAAC) which was formed under the *California Global Warming Solutions Act* (2006) encouraged benefits of cap-and-trade policy in combination with other initiatives. The Global Warming Environmental Justice Advisory Committee (EJAC) was also established under the CGWS (2006) and supports the ETAAC objectives but the focus is on carbon pricing rather than cap-and-trade. Both committees recognize the role of complementary policies such as support for financial incentives and policies and regulations.

Capabilities. Few new jobs are projected in the utility sector (CCSP, 2008, pg. 95). Green jobs are focused in manufacturing and professional, scientific and technical services (CCSP, 2008, pg. 101). Investments in green technology are projected to produce jobs at a faster rate than other investments (CCSP, 2008).

Working Across Organizations. To meet the 2005 targets Governor Schwarzenegger directed the California Environmental Protection Agency to coordinate with the Secretary of the Business, Transportation and Housing Agency, Secretary of the Department of Food and Agriculture, Secretary of the Resources Agency, Chairperson of the Air Resources Board, Chairperson of the Energy Commission and President of the Public Utilities Commission. A key coordinating role is played by the Climate Action Team (CAT) and the CAT Land Use and Local Government (LUSCAT) sector group and various subgroups. The Climate Action Teams were established for each state agency in 2005 releasing a report in 2006 with recommendations. These were considered a key coordinating role for climate policy.

Other Levels of Government and Partnerships

California is participating in several regional initiatives such as the Pacific Coast Collaborative and WCI, Inc. California is a charter member of the International Carbon Action Partnership (ICAP) an organization of countries and regions that are pursuing cap-and-trade implementation.

Western Climate Initiative. The Western Climate Initiative (WCI) was established in 2007 and included five states adding four Canadian provinces (including British Columbia) in 2008. The objective was to set regional multi-sector program to trade carbon. By 2011, only California and Quebec adopted standards established by the WCI. The California-Quebec cap-and-trade scheme was officially launched in 2014. The cap-and-trade caps emissions from sectors with highest emissions and permits businesses to trade unused emissions incentivizing energy efficiency and eventually reducing the need to offset allowances. Individual projects which reduce emissions not registered in the cap produce offsets which can be transferred.

Pacific Coast Collaborative. The Pacific Coast Collaborative (PCC) was established in 2008 with four Western states and British Columbia with a focus on regional sustainability economic initiatives, including but not limited to jobs, clean energy including energy efficiency, green ports and green highways. California, British Columbia, Oregon and Washington agreed to harmonize greenhouse gas policies as much as possible, such as the mandating of the use of green fuels.

Role of Local Governments. By 2008, more than 120 California local governments (and more than 500 in the US) had signed the U.S. Conference of Mayors Climate Protection Agreement pledging to meet Kyoto targets and several had established climate change offices and were in process of developing a comprehensive climate change intervention (State of California, 2008, pg. ES-13). Local governments took actions through land use planning including zoning, smart growth, transportation, building compact communities. Green Cities California, an organization with a mandate to assist local governments achieve targets was formed during this time. A Local Government Operations Protocol

(LGOP) was established to help local governments track progress on GHG emission reductions. In 2008, SB 375 was passed establishing a process for local governments and key stakeholders to plan for GHG emission reductions and establish regional GHG emission reduction targets. In 2010 a new Green Building code was introduced.

Several local governments in California stand out for green initiatives. San Francisco was named greenest city in North America ranking highest in environmental performance and commitments out of 27 major metro areas in the U.S. and Canada (Greenest City Index, 2011). San Francisco's notable achievements include reusing eighty per cent of its waste and have set solar energy goals. In 2009 California initiated the green jobs training program, the Clean Energy Workforce Training Program training workers for solar installation and green building design.

The Climate Change Scoping Plan called for local governments to reduce GHG by 15 percent by 2020. Local governments took actions through land use planning including zoning, smart growth, transportation, building compact communities. A Local Government Operations Protocol (LGOP) was established to help local governments track progress on GHG emission reductions. In 2008, SB 375 was passed establishing a process for local governments and key stakeholders to plan for GHG emission reductions and establish regional GHG emission reduction targets. SB 375 requires local governments to develop sustainable communities' strategies of how they will meet the GHG reduction targets. Several regions had already begun such blueprint planning at the time of release of the CCSP (2008), with public transit planning being a key strategy to reach targets and reducing vehicle reliance.

Phases of Implementation

An interviewee explained that the first five years of the CCSP were very busy and that the ARB recently reflected on the last 5 years (2008 -2013) which he described as having been crowded in the policy arena on climate change. The focus now is to make sure they are successfully implemented and communicated. He explained that at the annual conference of CEC (2012) cap-and-trade passed and six months after that, ARB

announced it would delay the program for a year – it came into effect January 1, 2013 – to make sure everything was in place. The interviewee explained the current status of the Climate Change Scoping Plan: “A lot of the conversation now is what happens in 2020.” The interviewee explained that the real issue is about what role the government has in encouraging the development and adoption of new technologies:

In policy, there is always the question about the role of government. We ask ourselves what should we be doing and why and are we the best ones to do it? In the case of climate change policy one of the questions we ask is to what degree should we incent industry to develop new technologies.

The interviewee explained that the objectives from 2012-13 onwards are to develop policies to extend beyond 2020 and incent investment and on smooth implementation of policies underway, navigating the California carbon world, develop policies for 2030 – 2050:

We need to focus on policy levers with biggest impacts, removing barriers for multiple funding streams to work together. Right now we are in a phase I which we refer to as an organizing campaign. Sometimes I want to say, ‘enough on legislative front.’ We need time to focus our energies on making work what is already in place from the 2008 plan rather than begin new work.

Making sure that the structures are in place and have the capacity to meet their goal, even if the money is not yet there, is important. Also being entertained is how to advance workforce training beyond what the Climate Change Scoping Plan set out. An interviewee explained that the policy folks are considering linking cap-and-trade auction and revenue with training:

We consider with the cap-and-trade auction and revenue projection and wonder how do we invest some of those dollars into workforce training?

The interviewee explained that the effort is to establish principles so: “When we get to the point where we have money, we will know what to do.”

Was California’s Climate Change Scoping Plan Integrated and Coherent?

California introduced a series of legislations, policies and strategies between 2006 – 2012 and was instrumental in several regional collaborations including WCI and the PCI, one establishing a cap-and-trade market trading scheme and the other on harmonizing economic and environmental policies. The trajectory towards reducing GHG emissions has not been without challenges and setbacks but reports on progress between 2008-12 are positive. SB 85 requires all state agencies to report on progress submitting it to CalEPA. The first update on the CCSP (2008) was released in 2013 and found that California had made great strides in reaching its goals. In 2013, about 23 per cent of electricity came from renewable resources, green building standards are in effect for residential and businesses, energy efficiency appliances have been introduced, the Low Carbon Fuel Standard has facilitated the introduction of cleaner fuels equal to removing half a million vehicles from the road (CCPA, 2013). More ZEV’s are on the road and more energy efficient vehicles are on the road. Reduction of the number of miles vehicles are driven has substantially increased. The cap-and-trade program, after years of deliberation, was announced and California is now in the process of looking at 2020 and beyond.

As outlined in Table 9-1 following, the policy coherence between climate action policies during the 2000 – 2012 period is ranked as High –as while the initial momentum was strong and the plan comprehensive, the 2011 period realized continued support from Governor Brown and cumulative progress was made.

Table 9-1: Research Implications California Policy Coherence

Research Questions & Key Variables	1980 – 2000 Pre Dissertation Study Period Cumulative Incrementalism	2000 – 2012 Period of Dissertation Study Effective Implementation	2012+ Post Dissertation Study Period Cumulative Incrementalism Effective Implementation
<i>Policy Coherence and Broader Contextual Environment</i> Degree of Integration	Medium	High	High

The Climate Change Scoping Plan: A Strategic Workforce Planning Perspective

The Climate Change Scoping Plan (2008) set out an action plan to achieve energy efficiency and GHG reduction and overall ranked as having high coherence and medium alignment with strategic workforce planning. Overall, the link from the Climate Change Scoping Plan (2008) and strategic workforce planning from 2000 – 12 was medium-high.

The Climate Change Scoping Plan (2008) identified job creation and good jobs were an integral component of the plan although most of the planning was in separate documents, the CCSP did integrate economics and jobs into the Plan. The Climate Change Scoping Plan specifically included a focus on labor including workforce development and skills training and specifically identifies initiatives to green the workforce through technological innovations to transition to a cleaner energy. The economic analysis for the plan included a projection that 100,000 new jobs would be created as a result of the policies. These would be derived from investments in green technology and renewables such as wind, and biomass.⁴ The plan also identified areas of jobs losses, such as the snow sector losing potentially 14,500 jobs by 2050 and retail gasoline sales. The CCSP (2008) estimated an overall increase in California of 2 million jobs to 2050.

⁴ “National Venture Capital Association estimates that each \$100 million in venture capital funding helps create 2,700 jobs, \$500 million in annual revenues for two decades and many indirect jobs” (Climate Change Scoping Plan, 2008, pg. 16)

Key Agencies

California's agencies responsible for workforce development and planning in California are the California Labor and Workforce Development Agency (CLWDA) and the newly created Green Collar Jobs Council (AB 3018, Chapter 312, Statutes of 2008). Another key state agency is the Employment Development Department. California has advanced training and skills in the green economy, particularly under the California Workforce Investment Board (CWIB) Under the CLWDA. The CWIB was established in 1998 to assist the Governor in the development, oversight, and continuous improvement of investments in California's workforce. The current (2013) 56 members are appointed by a Board and create policy on behalf of the Governor. An interviewee explains they create mostly administration policy, and occasionally seed ideas for legislation, as in the creation of the California Green Jobs Council. The Green Jobs Council was established in recognition of the employment impacts of AB 32 an interviewee explained: "When AB 32 passed – there was a recognition that we are doing this to mitigate climate change and that will mean new jobs and job losses." However, the interviewee says the emphasis was diminished with the economic downturn of 2008. When the Obama administration invested in recovery, the Green Jobs Council had an increase in funds, but subsequently, not much focus.

Broader Context in California Government

Communication is an ongoing process between agencies working on climate change and those working to apply these policies to the workforce. An interviewee explained that one of the communication messages in the process of advancing AB 32 was to help environmental groups understand is that a green job isn't always a good job – it can be short termed, dead ended – it might be better to give broader training. The demand for a specific green skill can go away: "You can become someone who is a plumber or electrician vs. someone who bolts down a solar panel – the transferability of skills is key." This raised a further issue around skills and funding: "The climate change organizations [...] wanted to fund specific skills rather than broader skills. We need both."

The CWIB is currently working with climate change agencies in Sacramento, linking them with universities and colleges to develop consistent programs that will make sure graduates have these broad skills that will, ultimately, better implement green policies. Partnerships that have arisen in manufacturing sectors between manufacturers and colleges and schools so that workers can transition from one skillset to another without costly turnover. One interviewee pointed out the training lag between policy development and implementation partially due to employers not being at the table:

Green jobs were a major selling point for a period of time in our country [...] problem was, not tens of thousands of jobs materialized overnight partially because employers were not consulted when the plans and targets were set and so the targets were unrealistic. And, there was backlash.

However, state funding for job training has helped bridge the gap between employers' needs and training, with training programs offered by community colleges and vocational schools. Additionally, there is real growth in people coming out of graduate school. One interviewee stressed that despite this progress, workforce planning doesn't make the grade so far:

In terms of reducing carbon – California is doing pretty well compared to other states. But on the workforce side in terms of making sure skills are relevant and meeting the lofty goals we are still a C – moved from a D.

Communication efforts from the CWIB is working to narrow the gap the interviewee continued, recognizing there remains much work to do to coordinate agencies and educational institutions and industry competency and skill needs.

In general, all those interviewed emphasized that while there are specific technical training programs needed for new clean technologies, when it comes to policy makers, an education in specific skills needs to be coupled with experience in policy making,

government and personal qualities. One interviewee commented that in order to have a high position in government working on any policy issue – but particularly climate policy:

... it's important to have experience in policy and government matters of a broad nature [...] because developing climate policy means understanding a number of competing priorities.

Policy capacity is a critical skill to ensure policy coherence.

The Climate Change Scoping Plan (2008) included economic forecasts and while mentioning jobs did not comprehensively link climate change policies with job training needs; the training followed through the California Workforce Investment Board later. With energy efficiency a key policy as part of the plan, training needs for solar production and installation and building efficiencies were required but lagged. California's solar energy training is now regarded as one of the best in the US. Training was also required to advance cap-and-trade and measuring GHG emissions and it also lagged behind policy introduction. This is not a new phenomenon for training to lag behind policies but it provides another instructive case. The overall impact on labour, along with distributional effects, is not clear as California recovers from the 2008 recession.

A summary of the policies and workforce planning are featured in *Appendix I*, Table 9-2 California Comprehensive Climate Change Intervention Coherence, Capacity and Capability and Table 9-3 California Degrees of Coherence and Phases of Development.

Summary

The Climate Change Scoping Plan (2008) set out the framework for California's climate change intervention. In 2009, the California Climate Change Adaptation Strategy followed. In 2006 California introduced AB32, the *California Global Warming Solutions Act* (2006) mandating California reduce GHG emissions to 1990 levels by 2020. A low

carbon fuel standard -- the first in the world -- was enacted in 2007, followed by clean car standards in 2007 and the cap-and-trade scheme was launched in 2014 (though developed through the WCI from 2007 – 2014). The Climate Change Scoping Plan included employment impact projections. Several regional and local government climate change plans were released in the 2009 – 2010 period as local government grappled with efforts to mitigate and adapt to climate change.

In 2014, California released the Climate Change Research Plan. Former Governor Schwarzenegger (2003 – 11) recognized California's leading role in climate change at the World Summit for Regions on Climate (October, 2014):

We are big believers in the regional approach, in the subnational approach. That while, maybe, the U.N. will come to an agreement right away - and hopefully when they have the negotiations in Paris, they will come to an agreement - but to utilize also the subnational governments. Because we in California have been very successful without the help of the national government.

The case study illustrates that sub-governments can make significant progress in the absence of a national comprehensive climate change intervention. Also recognizing the significant roles of sub governments on climate change, the Obama administration established the 2013 Climate Action Plan a task force to help state, local governments and tribal officials to advise the Government on actions needed for climate change.

PART THREE

**COMPREHENSIVE INTERVENTIONS:
REFLECTIONS AND IMPLICATIONS**

Chapter 10

Findings in Perspective

Introduction

This chapter reviews the findings from the empirical research conducted for this dissertation. It begins by considering the varying degrees of integration in the broader contextual and transactional environments between first- and second-generation adopters who have introduced comprehensive climate change interventions and their similarities and differences. It then considers the varying degrees of alignments between climate change interventions and strategic workforce planning. It concludes that indeed workforce development and planning can be directed toward improving employment prospects and reducing employment dislocations as the planet changes. Moreover, the research presented here shows that overlapping efforts can reduce efficiencies, and it reveals five cross-cutting themes that are critical in encouraging progress: sustained leadership is essential for successful comprehensive climate change interventions; a multi-sector and multi-jurisdictional approach results in a high degree of policy coherency; alignment of institutional strategy and structure effect coherency; a planned and evolving approach strengthens capacity and strategic workforce planning alignment improves coherency.

Review of Findings

The empirical research conducted for this dissertation has shown that climate change mitigation and adaptation efforts, via the introduction of low carbon policies, need coherent macroeconomic approaches that include labour policies and strategic workforce planning to ensure adequate skill training and supply. Human resources are critical: effective and timely policy transitions require capable people to be at their core and strategic workforce planning efforts to minimize employment impacts. A key driver is sustained political leadership. When political support exists simultaneously between multiple jurisdictions and there are shared objectives and policy harmonization, the rate

at which targets are met will increase. But, these may also be compromised if strategic workforce planning is not aligned with policies.

A combination of coherent market mechanisms, policies and regulations and financial incentives with a conscious coupling of workforce development that meets skill needs is required for the greatest rate of change. As the case studies demonstrated, first- and second-generation adopters varied in the degrees of coherence they showed, both in strategizing how to implement environmental policy effectively, and how to align strategic workforce planning with climate change policy interventions, particularly in training and motivating individuals to support and implement such initiatives. All are critical to successful policy execution.

The following section discusses the degree to which the intervention was coherent and integrated with workforce planning and the distinguishing features of each of the first-generation adopters: whether the comprehensive climate-change intervention and strategic workforce planning is responsive, adaptive, proactive or reactive.

First Generation Adopters Case Findings

The 1973 energy crisis galvanized efforts to reduce reliance on oil, particularly in the European countries such as Denmark, Germany, Norway and the UK (identified as ‘first-generation adopters’ in this dissertation). Since that time, these countries introduced tough renewable and GHG reduction targets and innovations in electricity generation from wind, solar, and biomass sources as well as in the practice of carbon capture and storage. Fiscal policies included financial incentives for clean technology advancement, prudent investments, and linking revenues with provision of energy efficient savings to change behaviors, and generate savings for future generations. Policies were introduced at different times in different ways, depending on levels of readiness and differing circumstances but each country embarked upon notable and lasting comprehensive climate change interventions: Denmark’s *Energy Agreement*, Germany’s *Energy Concept*, Norway’s *Climate and Energy Fund* and the UK’s *Climate Change Act* are the cumulative expression of decades of work. These initiatives have been described in

Chapter 6.⁶⁸ The degrees of policy coherence of first generation adopters are summarized in Table 10-1 a -- and are described in the section following.

Table 10-1a: Degrees of Policy Coherence and Workforce Planning and Local Government Integration (2000 – 2012) First Generation Adopters

	Denmark	Germany	Norway	UK
<i>Degree of Policy Coherence</i>	H Renewable Energy	H Energy Transformation	H Oil Arrangements	H Climate Change Act & Economy
<i>Workforce Planning Integration</i>	H Linking Training & Legislation	H Training Leadership	M Gaps between Learning & Skill Demands	M Fragmented
<i>Regional/Local Government Policy Integration</i>	√	√	√	√
High= High degrees of policy coherence; Medium = Medium degree of policy coherence; Low = Low degree of policy coherence.				

Denmark: High Policy Coherence and Workforce Planning Integration.

Denmark vowed never to be reliant again after the 70's oil crisis ('oliekrisen') when oil accounted for more than ninety percent of its imported energy. Denmark intends to produce 100 percent of its power needs from renewables by 2050. The Danish Growth Council, a committee of government, industry and social representatives, is responsible for meeting the demands imposed by this target identifying skill needs, and drawing on industry and labour market information of green growth. All of Denmark's green policies are accompanied by employment plans. For example, the DK Energy Agreement⁶⁹ outlines a plan to create jobs. Vocational training now includes green tech skills in energy, waste management, construction, transportation and agriculture (ILO, 2011, p. 264), and new qualifications have been developed. The vocational, education and technical (VET) systems are free to develop green courses adapted to their local needs. The Danish VET system's governance, structure and use of statistics to ensure adequate competency and skills training meeting projected needs makes it adaptive and responsive

(ILO, 2011). Overall, the degree of integration with climate change policy is high. The Danish training model is responsive and adaptive.

Germany: High Policy Coherence and Workforce Planning Integration.

The guiding principle of Germany's Energy Concept is applying fairness and harmonization of climate change and fiscal policies in consideration of future generations. Germany taxes gas, heavy fuel oil, light heating fuels and electricity and, like Denmark, has revenue-neutral tax provisions for some industries (e.g. agriculture). These reduce employer and employee social security contributions and provide tax refunds for industries that reduce energy use (ILO, 2012, p. 192).⁷⁰ The German Alliance for Work and Environment regulates and coordinates vocational and university education that is informed by industry and trains apprentices for flexible employment. Training is considered early on as policy is developed, embedded concurrently with implementation stages and supported by a rigorous vocational-technical institutional system. The greening of skills in Germany happens through three channels – initial vocational, ongoing vocational and university. The education system retrains workers for green restructuring, with the exception of renewable energy, where organizations prefer to recruit already-trained workers. Because of “high growth rates” (ILO, 2011), apprenticeship programs are common and robust. Where there weren't enough skilled workers, Germany established formal training centres to meet needs. The German model is proactive and institutionalized and, like Denmark, the degree of integration with climate change policy is high.

Norway: High Policy Coherence; Some Workforce Planning Integration.

The Climate and Energy Fund directs revenue from Norway's resource-based economy into education and pensions. The Fund is supported by a carbon tax on offshore industry and a tax on transportation improvements. Climate policy in Norway is accompanied by workforce planning. At the university level, Norwegian Centres of Expertise support more than 20 regional arrangements that are based on both qualitative forecasting and quantitative analysis of skill supply and demand. Such analyses are facilitated by biannual surveys of skill and workplace learning needs, using data collected by Statistics

Norway. Many examples of policy-training alignment exist. Within the building sector, for example, a policy to provide household grants to replace oil-fired boilers increased demand for workers in this arena and training programs were provided accordingly. The alignment is not perfect however. The provision of life-long learning funds in Norway enables skill development in areas that are not required while leaving shortages in others. Moreover, Norway's vocational training is increasingly being absorbed into the university level which decouples supply of vocationally-trained workers from workforce demand. That leaves imbalances in skill supply. Overall, the Norwegian model is progressive and institutionalized but it falls short on meeting skill demand. The degree of integration with climate change policy is medium.

UK: Medium Policy Coherence; Medium Workforce Planning Alignment.

The *Climate Change Act* had an ambitious plan to reduce GHG emissions by 80 percent by 2050 relative to 1990 but has fallen short of meeting its goals. There was an accompanying supporting strategy that identified skill gaps, but not a coherent plan to shrink them. Despite advancing a more coordinated planning, skill analysis and blue sky research effort to centralize its response to reskilling needs, key regional skills bodies close to the workforce were abolished, with the exception of Wales which retained skill sector groups (WRC, 2011). Regional bodies, like those that were eliminated, can be a key factor in successful policy implementation. The tide is changing in the UK, however. In the past few years data analysis and coordination have been improved (WRC, 2011) and government has focused on strengthening synergies between labour data collection and training needs. The UK is regarded for the development of green skill checklists but it has fallen short in ensuring that all sectors are adequately guided in the advancement of new policies. In the non-union construction sector, for example, lack of training and skill gaps result in new construction not meeting energy efficiency requirements (interviewee, 2013). This reflects fragmentation of the institutional system, which is also seen across the members of the UK. Scotland, for example, has moved to a centralized training system whereas Wales relies on sector councils to inform its skill development. Overall, neither coordination between these neighbouring nations nor a blanket green growth strategy are in place. The UK model overall is reactive, institutionalized and fragmented,

while the Scottish model is in process of becoming proactive, thanks to the centralization of training, and the Welsh model is proactive and centralized with its sector skills councils. The degree of integration in climate change policies and workforce planning across the UK is medium.

First Generation Adopters High Degrees of Policy Coherence; Rate of Change Challenges

First generation adopters Denmark, Germany, Norway and the UK demonstrated great leadership but they are not without their challenges. While the climate change interventions had medium to high degrees of policy coherence, all were challenged with pioneering efforts that had repercussions due to the rate of change. Institutional strategies and structure did not have sufficient capacity to fully integrate new policies to maximum effectiveness, and the pace of progress slowed. In Germany, for example, critics of *Energiewende* or the energy transformation plan (see Boisvert, 2013, 2014) noted problems after the country closed almost half of its nuclear plants in favour of building renewable energy capacity. Input to the grid of electricity produced by new solar and wind-power installations was unreliable and poorly performing. This undermined the stability of the broader European grid to such an extent that Germany has since had to remedy the problem by adding new coal and gas fired plants. German biofuel policies, as well, have not yielded anticipated mitigation results. Concerns have been expressed elsewhere: in the UK, the *Climate Change Act* has been criticized for setting targets at the expense of cuts to social programs, while in Norway, the national pension fund has been sharply criticized for investments in coal. Denmark alone, with a high degree of political consensus has a different challenge: maintaining momentum.

Second Generation Adopters Case Findings

British Columbia, New South Wales and California introduced comprehensive climate change interventions in the early to mid-2000 period. BC's Climate Action Plan (2008), New South Wales' Greenhouse Plan (2005) and California's Climate Change Scoping Plan (2008) set out the enabling legislation, policies, plans and targets to mitigate and adapt to climate change. These initiatives are described in Chapters 7, 8 and 9.⁷¹ British

Columbia introduced North America's first carbon tax, California led in the first state-provincial cap-and-trade scheme (with British Columbia abstaining) and New South Wales led with the introduction of the world's first mandatory carbon pricing on electricity in 2003. All three jurisdictions were first to declare carbon neutral governments in their respective nations.⁵ Each are distinguished within their respective nations as leading at the sub government level introducing plans with targets that were measurable, verifiable and reportable and achievable. All reported on their progress and each achieved a high degree of policy coherence and varying degrees of alignment with workforce planning. What follows provides a summary of this assessment of the degree of integration of coherence, capacity and capability in the broader contextual environment and the potential for change and degree of connectedness for each of the jurisdictions. Table 10 – 1 b below provides an overview of the degrees of policy coherence of second generation adopters. The sections following summarize the findings.

Table 10-1b: Degrees of Policy Coherence and Workforce Planning and Local Government Integration (2000 – 2012) First Generation Adopters

	BC	NSW	California
<i>Degree of Policy Coherence</i>	H 1 st Carbon Tax N.A.	H 1 st Mandatory Abatement Scheme	H Cap-and-trade
<i>Workforce Planning Integration</i>	L	M	M
<i>Regional/Local Government Policy Integration</i>	√	√	√
High= High degrees of policy coherence; Medium = Medium degree of policy coherence; Low = Low degree of policy coherence.			

⁵ British Columbia included Scope 1 and 2 emissions in the measurement for carbon neutral government. NSW included other indirect emissions so includes a wider scope as does California (wider scope). Scope 1 and 2 emissions are easier to measure and less controversial since they can be directly linked to energy consumption While scope 3 are harder to measure and contributes a small amount of GHG emissions, involving the broader PSO chain would result in a more effective reduction.

British Columbia: High Policy Coherence, Little Workforce Planning Alignment.

BC's Climate Action Plan (2008) set targets in the *Greenhouse Gas Reduction Target Act* of 33% reduction by 2020 and by 80% by 2050 to 2007 levels. British Columbia achieved its first interim target of a 6% emissions reduction below 2007 levels by 2012. During the 2000-12 interval, BC's climate change intervention evolved from cumulative incrementalism to five years of effective implementation (2007-12), with gradual erosion on mitigation beginning in 2011. Momentum on adaptation including sea level rise have continued. The *Carbon Tax Act*, the first in North America, resulted in lower fuel consumption by British Columbia residents after five years of successive modest increases. The Climate Action Plan included legislated requirements for local governments to set targets in their official community plans for GHG reduction and report on progress to the community emissions inventory reporting mechanisms. The Plan incited innovation in clean technology but failed to align with workforce planning. The first Green Jobs Plan was high level and subsequent refinements focused on LNG development. In terms of overall assessment, the degree of integration in the broader contextual environment was ranked as high to medium, with a medium to high potential for change and degree of connectedness. The degree of integration in the transactional environment was ranked as high to medium, with a medium to high potential for change and degree of connectedness. The degree of integration with strategic workforce planning was ranked as low – medium, with a medium to high potential for change and degree of connectedness. The British Columbia model is adaptive and responsive.

California: High Policy Integration; Some Workforce Planning Alignment.

California's Climate Change Scoping Plan (2008) set targets to reduce GHG levels to 1990 levels by 2020 and by 80 per cent below 1990 levels by 2050. California is on target to meet 2020 goals. During the 2000-12 interval, California's comprehensive climate change plan evolved from cumulative incrementalism to effective implementation. The Scoping Plan included several progressive policies such as the world's first low carbon fuel standard. The plan also aligned climate change policy with the green economy and job growth. In 2008, California introduced AB-1315 *California Green Collar Jobs Act* of 2008 and in 2012 the Green Collar Jobs Council was established and administered by

the California Workforce Investment Board with a mandate to develop strategic plans that outline the training and development of a skilled workforce to meet the California's green economy needs. The Climate Change Scoping Plan has a high degree of integration in the broader contextual environment and enjoys a high potential for change and a high degree of connectedness. Several local governments have developed climate change plans within the state. The degree of integration in the transactional environment was ranked as medium to high, with a high potential for change and degree of connectedness. The degree of integration with strategic workforce planning was ranked as high, with a high potential for change and degree of connectedness. The Scoping Plan projected some employment impacts from AB32 (both gains and losses). Overall, the California model is determined to be proactive and responsive.

New South Wales: High Policy Coherence; Medium Workforce Planning Integration.

The NSW Greenhouse Gas Plan (2005) set targets of a 60% reduction in GHG emissions by 2050 and a return to 2000 levels by 2015. While NSW's GHG emissions increased by 2012, they decreased on a per capita basis. During the 2000 – 2012 period, New South Wales' comprehensive climate change plan evolved from effective implementation to being gradually eroded. The world's first mandatory abatement scheme was announced (2003). The momentum achieved under the Carr government held until the 2011 – 2013 period. By 2012, NSW was left without a state-level carbon scheme. A Skills Board was established, replacing the Board of Vocational Education and Training, with a mandate to fund training organizations to run courses for priority skill needs through the NSW Green Skills and Energy Efficiency Strategy. The Greenhouse Gas Plan had a degree of integration in the broader contextual environment that was ranked as being high to medium, with a medium to high potential for change and degree of connectedness. The degree of integration in the transactional environment was ranked as being high to medium with a medium to high potential for change and degree of connectedness. The degree of integration with strategic workforce planning was ranked as being medium to high with a medium to high potential for change and degree of connectedness given the recent changes to climate change policy at the national level. The NSWGGP did not

mention jobs nor employment but there were parallel green skill development and training plans. Overall, the New South Wales model is progressive.

First and Second Generation Adopters Compared

The second-generation adopters clearly demonstrated leadership at the sub government level and mobilized local government action, but like their first generation counterparts, they also had their challenges. Driven by political leadership they put climate change at the centre of the policy agenda even in the absence of a coherent national climate-change policy intervention, and they established momentum at the local government level by mandating GHG reduction targets. That progress was challenged politically however. In British Columbia momentum was eroded with a change of Premier in 2011, even though the same political party remained in power. New South Wales' momentum was challenged with the election of a Liberal Premier in 2011 who adopted a 'softer' approach and it was further eroded when a Liberal Prime Minister repealed a national carbon tax. That tax had replaced the NSW mandatory emissions trading scheme that left the state without a carbon pricing scheme under its own control. In contrast, California's momentum has continued despite changing state political leadership but it has been challenged at the same time by national political fractures that hamper the multi-jurisdictional policy alignments for which the first generation adopters are known.

The first and second generation adopters took action for different reasons: the 1970's oil crisis drove national-scale responses in the former, while second generation adopters worked at the sub government level three decades later and announced comprehensive climate change interventions that stemmed from cumulative work that linked to the Kyoto Protocol. The two approaches were distinguished from each other by macroeconomic policies: First-generation adopters directed taxes and revenues from renewables and fossil fuel extraction towards savings, pensions and learning and training funds while second-generations directed taxes from carbon pricing and fossil fuel extraction towards income tax reductions and general revenues. Both met with varying degrees of success in aligning skills training with policies, although first-generations had the highest degree of integration. Their energy plans were aligned with skill training

needs (e.g. Denmark, Germany and Scotland aligned policies with both decentralized and centralized approaches). In contrast, plans in British Columbia and New South Wales were nearly silent on the economic links to employment and labour, whereas California's plan clearly identified the macroeconomic links. California's training efforts on solar panel installation and New South Wales energy precinct plans that were aligned with skills training are notable. British Columbia lagged in this regard.

The first and second-generation pioneers showcase key drivers, motivators and barriers that led to both success and failure in comprehensive climate change interventions. These include changing political landscapes, policy choices, inter jurisdictional cooperation, multi sector cohesiveness and skill training that meets demand. Such influences will now be more fully explored in five thematic areas.

Discussion: Themes and Explanations

Five key themes emerged from the literature search in the context of first and second-generation adopters: the role of leadership, the need for a multi-sector and multi-jurisdictional approach, institutional strategy and structure alignment, a planned and evolving approach and strategic workforce planning alignment. Each theme shall be considered in turn.

Theme 1: Sustained Leadership Is Essential for Successful Comprehensive Interventions

Comprehensive climate change interventions were sparked by critical incidents, but it was leadership and public pressure that put climate change action foremost on the public policy agenda. This finding is supported by the literature. Public and political support was high and key to garnering traction on new policies. First-generation interventions were supported by sustained public support over several decades while second-generation adopters intervened with political support for action at the sub government level. New South Wales Premier Bob Carr's long tenure and personal commitment to climate change policy was instrumental in NSW introducing the world's first mandatory emissions trading scheme. California governors Brown and Schwarzenegger advanced AB32 with public support, motivated by the occurrence of several droughts. British Columbia's

Premier Campbell turned on the switch with public support when the province was undergoing environmental impacts from climate change. Whatever the motivation, at the helm were the singular visions of Carr, Brown/Schwarzenegger and Campbell. They mobilized action in their own jurisdictions in the absence of national mobilization on energy transformation and climate change policy. When momentum stuttered or eroded it reflected shifting political agendas. In British Columbia, a new Premier in 2011 meant less emphasis on climate change and more on job creation and natural resource development linked to LNG development. Conversely, in California, despite a change of governors and political parties, the emphasis on climate change policy has remained relatively constant. In New South Wales, progress was stymied by a newly elected Liberal Premier (2011) at the state level and Prime Minister (2013) at the federal level, which weakened support for climate change policies and led to repeal of the national carbon tax. Clearly, the role of leadership was key in putting climate change at the top of the state or provincial policy agenda and keeping it there.

Leadership at the local government level was also critically important, where experienced executives were key drivers of climate-action policies. Alan Jones (formerly head of City of London's climate change) appointed to the helm in Sydney, and Sadhu Johnson (formerly with City of Chicago) in Vancouver, for example, brought knowledge, vision and passion to the advancement of climate change action in their respective jurisdictions. The cross pollination of ideas and innovations they brought from their previous positions advanced the climate change agendas in both local governments. Both reported in interviews that their role in initial development of policy was key in showing the critical value of leadership in ensuring that interventions got a secure toehold. Indeed, actions by local governments played a key role in helping to achieve GHG reduction targets. But such outcomes are fragile: leaders matter and should leadership weaken, policy interventions can be quickly hobbled.

Theme 2: A Multi-Sector and Multi-Jurisdictional Approach Leads to More Coherence

The literature clearly shows that optimal policy coherence is achieved through multi-sectoral and jurisdictional integration (*see* Lindquist and Wanna, 2015, pg. 11). First

generation adopters beneficially sought alignment with other nations and regions, while second-generation adopters sought alignment regionally. All first and second-generation adopters worked inter-jurisdictionally with other provinces and states on regional efforts to advance carbon pricing policies and more specific initiatives, such as light and heavy duty vehicle regulations. First-generation adopters joined the European Union Emissions Trading Scheme (2005) while BC and California were both members in regional collaborations such as Western Climate Initiative (WCI) and then later in the Pacific Coast Collaborative (PCC), the intent of both being to foster policy learning and harmonization. New South Wales established the greenhouse gas abatement scheme in 2003 and worked for years with other states collaboratively to expand the network. Interestingly, all three second-generation adopters introduced low carbon fuel regulations prior to national adoption, while first generation adopters led in alternative transportation policies (i.e. policies which fostered increased electric vehicle adoption, for example). But there is another regional collaboration that helped meet mitigation and adaptation goals: local governments.

Cities in particular are facing mounting pressure to act now to implement climate change mitigation and adaptation measures regardless of national and provincial/state climate change policies. They are motivated to reduce infrastructure costs and to conserve energy and water. Many cities are located on coastlines and are in the front lines in dealing with the challenge of rising seas. For such reasons, cities have often stepped up when national or sub government efforts were stagnating or floundering. For example, Copenhagen, Denmark has a goal to be carbon neutral by 2025. Vancouver produced the first climate adaptation plan in British Columbia and Sydney introduced Australia's first tri generation initiative (i.e. the process of simultaneous production of heat and cooling from solar or heat combustion - combined cooling, heating and power systems) while London gave the mayor statutory obligations to tackle climate change (e.g. The London Plan). Local governments in BC were legislated to become carbon neutral by 2012, report on their progress and to reduce GHG emissions by one-third by 2020. All of these demonstrate how urban centres can implement plans on a local scale to serve as testing grounds for new larger policies. Local government contributions include waste management, sewer

upgrades, building codes that exceed national or provincial standards (e.g. City of Vancouver), energy efficiencies, reduced transportation emissions, reduced corporate emissions through fleet efficiencies, green procurement practices and in some instances, electric vehicle charging stations, and solar hot water incentives. Some cities have generated climate action funds through property tax increases (e.g. District of North Cowichan).

While local, regional and sub governments often are at the forefront of driving public-private sector initiatives and are capable of great impacts and action, they can be at the mercy of policy decisions made higher up the chain. Climate change is no exception. In Australia, Canada and the U.S., political challenges in setting national energy policies have led to fragmented policy approaches with provinces and states. In the case of Australia, state governments had to deal with a policy impasse on carbon pricing, and efforts to coordinate a state cap-and-trade system and green skills policy struggled (WRC, 2008, p.10–13). The demise of the short-lived national carbon price created climate policy uncertainty that eroded momentum and negatively impacted all jurisdictions.

In summary, both multi-jurisdictional and multi-sector approaches improve policy coherence at all levels of government, but that is challenged by changes on the political landscape. Somewhat ironically, local governments, whose actions were ignited by national and sub-governmental policies, have usually maintained the highest degree of momentum despite political uncertainties at higher levels. That observation highlights the importance of institutional support, as explored in the next theme.

Theme 3: Institutional Strategy and Structure Alignment

First and second generation adopters varied in their approaches to setting institutional strategies and establishing supporting structures to advance comprehensive multi-sector and jurisdictional interventions. The institutional context, or the ability to strategize the implementation of environmental policy effectively, is a significant factor in the successful execution of policy.

Development of sound strategy is complicated. The example of carbon pricing, a keystone policy of both first and second generation adopters, illustrates this complexity. Since its inception, the European Union Emissions Trading Scheme (2005) has evolved through three different iterations with the last one initiated in 2013. The Scheme intended to add nations outside of Europe including Australia in 2014, but that attempt collapsed with the termination of Australia's carbon price in 2013/2014. Such initiatives were planned over several years and illustrate how fragile they can be despite years of institutional planning. In the wake of the repeal of Australia's carbon tax the EU was left to restructure its trading scheme. Similar complications have arisen elsewhere. Both British Columbia and California participated in the Western Climate Initiative for more than seven years, including designing a Western Canada/US cap-and-trade scheme. Yet in the end, only Quebec, joined with California to establish the now-existing bi-jurisdictional the cap-and-trade program, which took effect in 2013 illustrating the challenges of aligning strategy and structure across jurisdictions. Such cap-and-trade schemes are in general still in their infancy and their designs differ everywhere making it difficult to collaborate easily, particularly across national borders.

In each adopter, a dedicated agency for climate change policy was established. In second generation adopter case studies, secretariats or office were established within the Premier's or Governor's office: British Columbia's Climate Action Secretariat, the California EPA, and the NSW Greenhouse Gas Office. Each was involved in regional collaborations and were also the main link with national offices. Each drove both public and private partnership collaborations (e.g. clean technology innovation support). In larger local governments, sustainability or climate change offices were established to customize provincial and state climate change policies reflecting regional variations in energy and economies and liaise with sub governments and drove private sector initiatives. In each jurisdiction institutional strategies and structures that aligned sectors improved the degree of policy coherence.

The literature and the first and second-generation examples showed that shaping of institutional context takes time and there is no one best way to implement (*see* Lindquist and Wanna, 2015). Comprehensive interventions can falter if they are introduced too quickly without institutional support. Therefore the rate of change is a key variable. Both a planned and evolving approach can accommodate a pace in which interventions are implemented and aligned sectorally and inter jurisdictionally. Sometimes this is accomplished strategically so there is a planned institutional alignment but not always. There are challenges when the type of approach is not strategically enacted.

Theme 4: Planned versus Evolved Approach

First and second generation adopters varied in their approaches to advance comprehensive climate change interventions. The type of approach, planned or phased or evolved is another significant factor in policy enactment and execution (*see* Patashnik in Lindquist and Wanna, 2011). All adopters had both planned and evolved phases which were often politically driven. Sometimes climate action plans were introduced with goals and supporting plans that were not fully realized due to a political change in direction (see the case of British Columbia). Periods of evolution were generally welcomed by climate change policy makers as relief from the high energy policy innovation and initial implementation phases but they were often not planned. In the instances of all second-generation adopters the climate action plans followed the introduction of key pieces of legislation. The types of policies varied as well and different approaches were required. Whether it's a carbon tax policy that is incrementally increased over several years, or the introduction of solar panels both require public education and workforce training to ensure success. These require a planned approach. Sometimes, however, successful policy initiatives such as carbon taxes and cap-and-trade programs may stutter with decreased political support while public support has not faltered (e.g. BC's carbon tax). Other times, there is political and public support for new energy efficiency initiatives such as solar panels but inadequate trained workforces has left a dissatisfied public and occasionally bankrupt companies (e.g. NSW, Australia). These policies evolve over time and when finally adopted move to a planned approach.

Strategic workforce planning alignment is a key support in both approaches. Without planning to align policies with training and sufficient time to do so policy implementation falters. Scientific and technical knowledge alone is not enough to design and implement new policies. Policies must be strategically aligned with the institutional structures to support implementation at the pace that can be institutionally supported, including workforce skill alignment. Overly technical approaches may overlook social aspects or educational training appropriately which takes time.

On a broader jurisdictional level, first-generation adopters were victims of their own initiative and some policies faltered because other jurisdictions lagged. Second generation adopter's interventions built upon evolving policy initiatives and went through phases of planned versus evolving policy. The literature shows this is the nature of environmental policy in general, and climate change policy specifically (Howlett & Weaver, 2006). For example, BC's Climate Action Plan (2008) built on foundational work which began incrementally from the 1980's with a few workers in the Ministry of Environment. The climate policies within the Climate Action Plan (2008) set out an action plan to reach targets but there were many more that were incrementally developed by organizations over time. Due to the complexity and interdisciplinary nature of climate change, climate change interventions are best developed over time several interviewees stated. Taking the time to draw the community into the discussion and process is integral to community buy in and behavioural change making the case for an evolving process, an interviewee stated:

If you do everything on the first day -- it just sets you up for a type of backlash...if you get it wrong, people feel like you're vilifying them for the fact that they drive a minivan.

Finding the balance between advancing green policies so there is progress towards targets and goals when world governments aren't taking strong action on climate change and not demonstrating a commitment to climate change slows down overall progress. Yet, evolving processes allow businesses and communities to adopt and adapt to new policies

and behaviours over time with a greater chance of long lasting embedment. The role of leadership is significant not only in enshrining climate change as a top priority policy item, but in setting the pace and parameters. It is the top –down, bottom-up approach that mobilizes climate change policy action (*see* Lindquist and Wanna, 2015) and this requires both a planned and evolving approach. Aligning skill sets with policy in a comprehensive intervention in which policy initiatives and pace of implementation are constantly shifting is a challenge for strategic workforce planning, the final of the five themes to be explored.

Theme 5: Alignment with Strategic Workforce Planning Improves Coherence

Aligning strategic workforce planning with comprehensive climate change interventions is the fifth theme to be explored. It is a significant supporting contributor to the success of comprehensive climate change interventions and a key driver to the rate of change. Policy implementation can stumble without sufficiently trained workers (e.g. new building codes with insufficiently trained construction workers). First and second-generation adopters varied broadly in their approaches to align comprehensive climate change interventions with strategic workforce planning (e.g. top-down, bottom-up, multi-sector, multi-jurisdictional, planned vs. evolved). Leadership was a key driver in the type of approach and the impetus to connect sectors and jurisdictions. Some jurisdictions had climate action plans which had little or no mention of jobs, but nevertheless had coherent climate change interventions (e.g. BC and NSW) and other climate action plans had employment targets and were also coherent climate change interventions (e.g. California). Other jurisdictions aligned legislation with training (e.g. Denmark and Germany. BC and NSW introduced green job plans and NSW introduce green skills legislation after the climate action plans were announced. California had parallel green skills training initiatives.

When the workforce development and planning system lags behind green policy implementation that doesn't mean it's a poorly functioning system in itself. Conversely, highly developed workforce planning systems can “co-exist with poorly coordinated policy planning processes” (WRC, 2011, p. 48). The experiences of Norway and the

United States provide useful examples of two ways this can happen. Both collect useful information, but both have struggled with alignment with environmental policy workforce needs. Norway's vocational training is increasingly absorbed into the university level, and the fact that students have vocation choice separate from workforce needs leaves imbalances in skill supply. This makes for a continuous learning culture that nonetheless falls short of workforce needs. In the US, conversely, there is a highly fragmented polity which creates a gap between superb data collection at the national level and its use at the state and regional levels. Both nations have excellent data collection that co-exists with planning processes, which could be better coordinated both workforce and policy.

At the national and sub government level there were efforts to draw on sector skills councils to fine tune workforce planning (see examples in Australia, Canada, Norway, Wales, New South Wales and California) but skill gap identification did not always correlate to ensuring adequate skill supply. Perhaps the example which most stands out in this regard is Norway whose approach to an adaptable and well-educated workforce is through general skills training produces workers who do not have specific skills or requisite skills. There is the tension of whether government should get involved in training and invest money until there is a better understanding of what the world is going to be and a perspective that the more stability and continuity in approaches to reduce emissions to scale that perhaps this will take care of itself. This leads to a broader consideration of the role of the public and private sector in training. Should government lead in workforce planning and training when climate change policies remain in their infancy and leave training to the private sector and stay focused on supporting universities and training institutes more broadly. Such implications will be explored in the next chapter.

Table 10 – 2 which follows ranks each adopter and the degree to which the interventions were driven by leadership, integrated multi-sectors and jurisdictions, institutional strategy and structure, whether the approach was planned or evolved and the degree of strategic

workforce alignment. They are ranked from High to Low and Planned and/or Evolved are the ranking is intended to reflect broadly the findings. It is not a detailed assessment.

Table 10-2: First and Second Generation Adopters Thematic Findings

	Denmark	Germany	Norway	UK	BC	NSW	California
<i>Leadership</i>	High	H	H	H	H	H	H
<i>Multi-Sector Multi-Jurisdictional</i>	H	H	Medium	M	M	M	M
<i>Institutional Strategy and Structure</i>	H	H	M	M	M	M	M
<i>Evolved vs. Planned Approach</i>	E/P	E/P	E/P	E/P	E/P	E/P	E/P
<i>Strategic Workforce Planning Alignment</i>	H	H	M	M	Low	M	M-H

Note that second generation adopters were constrained by the actions (or not) of their respective nations and the ranking is relative to their efforts and achievements in spite of such constraints.

Comparing Comprehensive Interventions and Progress

First and second generation adopters of comprehensive climate change interventions had varying degrees of policy coherence and strategic workforce planning alignment. The role of leadership was instrumental in putting climate change policy in the policy driver's seat and the pace at which it evolves in both first and second-generation adopters. If the leadership is joined up through national, sub government and local governments the rate of progress improves. The second generation adopters illustrate that a multi-jurisdictional approach is not a necessary condition. If multi-sectors are aligned including public and private and the not for profit sectors the rate of change can increase

and the degree of cohesion improves. If the institutional strategies and structures are aligned further cohesion occurs. Strategic workforce planning alignment is also not a necessary condition but it does improve the degrees of coherence, capacity and capability.

The findings indicated suggest that the overall degree of integration of policies with second generation adopters as high, recognizing the decline of British Columbia from 2011 and New South Wales from 2012. The overall degree of integration with strategic workforce planning ranged from low (British Columbia) to medium – high for New South Wales and California, with California making the most significant strides in the 2011 period beyond. Each second generation adopter had exemplar local governments, though only British Columbia’s City of Vancouver and New South Wales’ City of Sydney were considered in depth. The local government of these exemplars degree of policy integration is high and the degree of connectedness with labour is medium.

The results are summarized in Table 10-1 a, b below which provides an overview of the first generation adopters degrees of policy coherence and integration of climate change policy with workforce planning and local governments and are ranked from High to Low.

Table 10-1a, b: Degrees of Policy Coherence and Workforce Planning and Local Government Integration (2000 – 2012)

	Denmark	Germany	Norway	UK	BC	NSW	California
<i>Degree of Policy Coherence</i>	H	H	H	H	H	H	H
<i>Workforce Planning Integration</i>	H	H	M	M	L	M	M
<i>Regional/Local Government Policy Integration</i>	√	√	√	√	√	√	√

First generation adopters receive high grades for their pioneering efforts and vision to align climate change policies macro economically nationally. Second generation

adopters receive a high grade for their pioneering efforts at the sub government level in the absence of national energy policies and the vision to integrate local governments. Similar to Table 10 – 2 these ranking reflect considerations of second generation adopters degrees of non-integration with a national climate change intervention but are also weighed with the very positive contributions of the mobilization of local governments.

Conclusion

Five themes arose from the findings with links to the literature which are drivers and barriers to the adoption of comprehensive climate change policy interventions: sustained political leadership; a multi-sector and multi-jurisdictional approach, aligned institutional strategy and structure, a planned and evolved approach and strategic workforce planning alignment. For each first and second generation adopter a key focusing event (1970's energy crisis, Kyoto, drought, mountain pine beetle, floods) supported politically (Sabatier, 1991) got climate change on the agenda. Though greening efforts were underway amongst citizenry and within the public and private sectors political leadership put climate change on the top of the policy agendas. Ongoing political support is also critical or the interventions risk erosion or demise.

Comprehensive climate change interventions need coherent macroeconomic approaches that connects institutional strategy and structure. A combination of coherent market mechanisms, policies and regulations and financial incentives with workforce development strategies is required for the greatest rate of change. First and second-generation adopters varied in the degrees of coherence to strategize environmental policy and the ability to structure the implementation, and to align strategic workforce planning with climate change policy interventions. All are critical to successful policy execution.

Chapter 11

Reflections: Implications for Theory and Practice

Introduction

Climate is best broadly understood as a system with a global reach that varies regionally and does not recognize political boundaries. And it is changing. The climate challenge therefore is multifaceted, and no single policy response will suffice. Environmental challenges at the global scale that climate change presents require comprehensive policy interventions driven by governments for it is they who identify priorities, provide market incentives and drive policy innovations. Governments are critical in shaping macroeconomic and technological relationships and they drive the rates at which adaptation and mitigation can occur, with the ultimate target being a transition to a sustainable global economy. But getting there will require fostering major shifts in employment that must include applying skills and adjusting workplace practices. In response to the challenge, new occupations are emerging and existing occupations are being greened at a rapid rate. Maintaining equilibrium in employment while the climate changes and technological innovations rapidly evolve is a growing challenge for workforce planning and policy. This is in part a ‘rate of change’ problem, and that aspect needs to be better understood if governments are to provide leadership, adapt more quickly, and provide continuous high levels of services to citizens while maintaining strong economies. Governments that get this will be at the forefront of mitigation and adaptation efforts (OECD, 2012 a, b).

While climate change is a challenge for all nations, the ‘green transition’ is not being made equally due to varying national capacities, and this includes workforce development and planning. Green policies are projected to have a “neutral or slightly” positive effect on national workforces (ILO, 2009) but estimates of impact vary. Employment impacts may be greatest when polluting industries comprise a greater part of the economy and effort is required to retrain workers in such industries to reduce the displacement as climate-driven shifts take effect. Yet comprehensive interventions

evolve and forecasting is challenging. A government's success in guiding the strategic transition of a workforce through significant policy changes will have great bearing on public wellbeing, and it will demand a solid foundation of research to guide implementation.

Strategic workforce planning, however, is still regarded by some as being in its infancy and research, both academic and applied, has been insufficient to align climate change policies adequately with competency and skill needs. Amongst the significant unknowns in this arena are metrics related to strategic workforce planning. This central factor is critical to any society that looks to minimize employment impacts and fluctuations. In that context, a key focus of this dissertation research has been to clarify how workforce development and planning can be directed toward improving employment prospects and reducing employment dislocations as the planet changes around us. That focus has guided the research reported in this dissertation.

What This Study Set Out to Do

The study set out to understand how workforce development and planning be directed toward improving employment prospects and reducing employment dislocations as the planet changes around us in the face of a changing climate? In order to respond climate change interventions and workforce planning were reviewed for four 'first-generation' climate policy adopter nations , selected because each advance climate policies alongside workforce planning and training in different ways and three 'second-generation' climate policy adopter sub governments: British Columbia, New South Wales and California.

Reflections on the Framework and Findings

In this study five influences were identified as being key to delivering durable policy reforms and making them stick: sustained leadership, a multi-sector and multi-jurisdictional approach, institutional strategy and structure alignment, a combination of a planned and evolved approach, and strategic workforce planning alignment. Each will be discussed in turn.

Political Leadership is a Key Driver. Comprehensive climate change interventions are the most successful if they have : a) strong political leadership at the implementation level; and b) continued political engagement in the interventions. Without either, comprehensive green policy initiatives don't take hold or lose momentum (e.g. the changing political leadership in British Columbia from Premier Campbell to Premier Clark). The case studies indicated that in countries with a long history of sustained political engagement (e.g. Denmark, Germany, Norway and to a lesser degree the UK), the green culture of the citizenry seems to transcend political affiliation. Initiatives started under one administration are carried through regardless of political change. However, at the sub government level, changing political engagement can reduce momentum established by comprehensive interventions, although if local governments have established their own policies, momentum can continue.

Multi-Sector and Multi-Jurisdictional Integration. Comprehensive climate change interventions are most successful when they are supported structurally at all levels of government, and when they incorporate one or more of the following characteristics: a) employ both top-down overarching frameworks and bottom-up self-organizing capacity; and b) include horizontal and vertical integration across sector and jurisdictions. Governments and institutions, including the bureaucracy (Desveaux, 1995) play the key roles in developing (Inderberg & Eikeland, 2009) and subsequently advancing interventions sectorally and inter- jurisdictionally. At the same time, government capacity is only part of the story. Climate change policies will survive political changes if: a) capacity building begins early in tandem with the introduction of the policies (Lipsig-Mumme, 2010); b) networks are mobilized, formally or informally, that can sustain themselves regardless of political and government changes; and c) planning frameworks are integrated early in the process. The case studies illustrated that observed high degrees of policy coherence could have been further harmonized with jurisdictional policies; this would have reinforced durability and persistence in the political policy domain.

Institutional Strategy and Structure. Second generation adopters institutionally supported embedding climate change policies broadly through establishment of climate action teams, committees and cross-cutting inter organizational bodies. Moreover, aligning strategies with structures encourages more rapid policy adoption (Canadian Centre for Policy Alternatives, 2010; Howlett & Rayner, 2006; Ross & Dovers, 2008; Wilkins, 2008; Young, King and Schroder, 2008;). When promoters of strategic workforce development and planning work closely with policy makers, planners have a clearer understanding of required competencies and policies can be advanced more quickly. Capacity and capability to work across government and across other sectors is critical for success. The ability to strategically coordinate centrally are key factors for success (e.g. the establishment of the Climate Action Secretariat, Greenhouse Gas Office and CalEPA).

Planned versus Evolved Approach. Comprehensive interventions tend to 'evolve'. This evolution can be constrained by the diverse array of rules developed in multi-lateral jurisdictions which is the nature of environmental policy in general (Howlett & Weaver, 2006) which creates uncertainty. The environment in which governments are functioning has grown increasingly uncertain (Klijn & Koopenjan 2004) which will influence the type of policy implementation approach. This study illustrated that different approaches were used in different phases and indeed evolutionary phases, while providing relief, loses momentum. First-generation adopters were ignited to commence comprehensive climate change interventions in the oil crisis period and then a phase of effective and incremental implemental followed. Some of their efforts evolved too quickly and were retracted until businesses caught up. In Norway, comprehensive oil arrangements were negotiated between oil companies and the public sector and institutionalized and the effects will last for several generations. In second-generation adopters, the announcements in the early to mid-2000's followed years of gradual incremental policy development and establishment of systems and structures to prepare for the larger announcement. Whatever the phase, Lindquist & Wanna (2011) remind us that policy reform is a 'creative and emergent process in all phases' and assessments should be relative to both the enactment and implementation efforts (Patashnik, 2011).

Strategic Workforce Planning Alignment. Strategic workforce development and planning strategies are more likely to be found in organizations with one or more of the following characteristics: a) they set out performance targets and systematically measure progress (OECD, 2011); b) there is continued political engagement in the interventions and there is consistent political leadership that makes strategic choices (Child, 1997); and c) they employ both top-down design and bottom-up self-organizing capacity (Berkes & Folke, 2002, City of Vancouver, 2007; City of Sydney, 2010). These characteristics were particularly seen in the strong alignment between climate change policy and labour policies in Denmark and Germany; both were strongly influenced by unions (top-down and bottom-up). In New South Wales, the NSW Energy Precincts and Green Skills implemented green policies and greener production practices along with strong workforce development and planning, and these benefitted from political support that resided within the national framework.

Implications of the Study Findings

Climate-policy interventions can be framed in terms of such institutional variables that include the significance of setting the agenda, political leadership and enactment, institutional context and government structure, the role of the bureaucracy, policy instrument selection, policy transfer and learning, organizational and workforce capacity and learning, and the role of local governments. But research on strategic workforce planning that buttresses such interventions is scant. The literature reviews suggest that the framing influences and workforce planning are two spheres of knowledge have been considered in isolation from each other, that is until now.

This dissertation has focused on the interface between strategic workforce planning and climate change, and although research on that interface is still in its infancy, it is now clear that there is growing research attention. One such field that overlaps organizational studies and comprehensive interventions literatures is the research on the public sector's unique challenges in connecting institutional structure and strategy (Desveaux (1994); Lindquist and Wanna's (2015). This literature also reminds us that policy interventions often develop in an "evolutionary manner" because securing "political consensus" about

how to address the problem can be difficult (Bodansky & Diringer, 2010) and nations choose preferred policy instruments to implement policy challenges. This is the nature of environmental policy in general and climate change policy specifically (Howlett & Weaver, 2006).

Chapter 2 highlighted Van Waarden's (*see* Hill & Hupe, 2002) comparative investigation of differences between nations in the use of preferred policy instruments. He argued that 'the national differences in handling political and administrative issues [...] are related to the institutional environment, particularly the political, juridical and public service institutions specific to each respective country.' (Hill & Hupe, 2002: 165) The study showed that each nation and sub government handled political and administrative issues differently and had different results. Each learned from each other to varying degrees.

Gaps remain, however. That between policy development and workforce planning and development is particularly acute in part because as technologies are advancing quickly competency and skill sets required to develop and administer these new technologies lag. Another gap is the deficiencies in data to effectively model needs at the local level. One of most difficult "problem facing all workforce planning systems in all the countries studied (in a 2011 study of four nations) was getting an effective balance between sensitivity to requirements at local and sectoral levels while maintaining coherence and effective labour market outcomes at the national level" (WRC, 2011 p. 34). Without a set of common definitions between jurisdictions large-scale plans for policy implementation and research are compromised. While academic research on climate and work is growing (Wright, 2012) much of the intellectual capacity remains outside academia, particularly in Canada (Lipsig-Mumme (2010). International NGO's have conducted comparative research on climate change and work (see ILO, 2012, 2011; OECD, 2012 a, b) and regional NGO's such as the Canadian Centre for Policy Alternatives, and Globe Foundation have conducted sector specific analysis.

Practical Implications of the Findings

In general, the research found that the more policies were comprehensive, coherent and mutually reinforcing with workforce development and planning, the less negative employment impacts (e.g. Denmark). As data capability improves over time, the degree of employment impacts should decline but this is not always the case (e.g. Norway, UK). A jurisdiction could have good workforce data capabilities but if the institutional systems and strategies are not aligned to ensure that skill training meets demand there may be a gap. Norway had excellent data collection but also had employment gaps. If green policies are reasonably aligned and reinforcing, they will advance more quickly. Five key practical implications arose from the findings that relate to the need for comprehensive climate change interventions and strategic workforce planning alignment: political support for enactment and effective implementation, the need for a top-down and bottom-up approach, institutional strategy and structure alignment, how to improve data capability and harmonization and the need for ongoing climate literacy and education to ensure shared values and knowledge.

Political Support Necessary for Enactment and Effective Implementation

One of the most prominent success factors or barriers that “affect environmental policy integration relate to leadership” (Ross & Dovers, 2008). Political support at the elite level is critical to getting an issue on the policy agenda but also keeping it there. First there must be a focusing event (e.g. the oil crisis, drought, flooding, Kyoto) and then the political will to enact policy. The nature of comprehensive climate change interventions is that they evolve, so after enactment the need for a long period to effectively implement policy innovations is required. If there isn’t sufficient time for the workforce to be mobilized and new values embedded, risk of failure increases. Therefore sustained political support is required for effective implementation.

Top-down; Bottom-up Approach Necessary for Integration

Climate change’s complexity and the required policy require a comprehensive policy framework that coordinate levels of governments and actors in other sectors. Creating needed workforce strategies that allow for emergent learning cannot always be known or

designed in advance. An institutional approach that is adaptable and resident providing room for both a top-down and the bottom-up that is mutually reinforcing is the best way to advance green policies coordinated with workforce development planning. While many policy options are developed at the local level, green policies require coordinated national training and skill development. Nations with coherent national training schemes, in the context of workforce development and planning needs that are top down (national) and bottom up (local) coordinated, transition more rapidly to green economies. Research to support how strategic workforce planning can improve this alignment is required.

Institutional Strategy and Structure Alignment Not So Easy

Institutional design and strategy are always evolving making implementing policies, some of which are contradictory or components of policies administered by different agencies, a challenging exercise. The current trend towards integrated service delivery, horizontal integration and devolvement of management authority can also ask government to move in contradictory directions from the traditional hierarchical model. The key to success is the “assumption of shared responsibility on the part of governments” at all levels, unions and employers (ILO, 2011, p. 93). This assumes the institutional structures and organizational mechanisms are in place to support the necessary ongoing organizing dialogue and modeling. In practical terms, this is a challenging task. Strategic workforce planning alignment in this dynamic environment to reduce fragmentation and improve efficiencies through horizontal coordination is a key role and research to support how strategic workforce planning can improve horizontal integration and alignment is required. The literature points to the success of local governments as they try to advance climate-change policies but the capacity varies greatly.

Data Harmonization Challenges Strategic Workforce Planning Alignment

There is an ongoing debate on what constitutes green skills or green jobs and the metrics to quantify the green economy. There is reluctance amongst some scholars and practitioners to define a group of skills as ‘green’ and the trend is more focused on defining the competencies (e.g. leadership, communications) and skills (e.g. wind farm

operator) needed particularly the competencies to respond in an uncertain environment. These are difficult metrics to establish but required is the changing environment of climate change policy. Several interviewees stated that while training knowledge is foundational and core, it is the personal attributes of adaptation, flexibility, integrity and passion that are the most desirable. These skills cannot be trained, they are ‘found’. Another pressing challenge is that labour market availability and education opportunities “need to be supportive of emergent industries and structural change” (OECD, 2011) but must also be tailored to reflect the uniqueness of each nation’s economy. Each nation has unique structural characteristics politically, economically and geographically, which drive the direction of new policies. Strategic workforce planning research can balance the competencies and skills needed to advance green policies but research is required to understand what the balance between competencies and skills for different policies to refine projections.

A particular knot that must be worked out involves the collection and use of data on climate policy and green skills and the varying degrees of harmonization between national and sub government data collection and coordination of metrics. To get a comprehensive picture, several data sets must be synthesized. Workforce planning data are primarily collected statistically. This is not a seamless undertaking. What skills should we be examining? A basic question – until we dig deeper into the nature of work surrounding green policy. Research tells us that transformative policy demands that we shift focus from nurturing specific skills to instead encourage skills that allow people to adapt to changing circumstances (WRC, 2012). What does this look like? In the ILO (2011) analysis of more than 60 nations, most countries agreed that “intensive vocational training courses” are the most specific way to retrain and build workforce capacity, with the least employment impacts. Interviewees stressed the need for both competencies and skills training.

Even for countries with good data collection (i.e. Australia, UK, USA) and analysis, there could be better information quality (WRC, 2011) through refining more relevant categories, ensuring the data collected is relevant at different levels of workforce

development (i.e. local, sub-government, national), system capacity to use the information, and agreeing on how ‘evidence’ will be used in overall planning is a challenge (WRC, 2011). How data is disseminated and collected is critical. For example, the UK has national skills strategy “Skills for Growth 2009”, but no centralized national response, such as reskilling, to address green restructuring. Individual employers are retraining workers (i.e. Belfast shipbuilder’s example) through their own training plans. But green training doesn’t mean skill use. Employer-identified skill shortages may or not mean there aren’t sufficiently trained workers: it may just be a job people don’t want to do. In order for strategic workforce planning to be aligned with climate change policy the data must be measurable, verifiable and reportable. Research which identifies gaps in metrics and data harmonization and makes recommendations for alignment is another gap which would aid strategic workforce planners.

Climate Change Literacy and Engagement

Developing and implementing comprehensive policy takes expertise. Politicians, public sector managers, policy analysts and strategic workforce planners require ongoing climate education and engagement to effectively implement climate change policy. They also require general knowledge of climate change science and the local, regional and national planning framework. Ross and Dovers (2008) argue that one of the most important success factors that affect policy integration relate to implementation capacity and Anderies, Janssen, and Ostrom (2004) remind us that the institutional capacity to adapt the workforce is critical for the adoption of new climate policies. Adger et al (2009) identify other adaptive capacity thresholds such as values and governance structures and the inherent assumptions of climate change policies that governments actually have the skills and knowledge to implement visions. Holling and Gunderson (2002) argue the importance of considering the potential to change and the degree of internal control over variability (connectedness) when planning for change.

When nations or sub governments consider new climate change policies and establish new governance and institutions it is useful to consider the capacity of systems to self-organize and respond in different phases. Ongoing education and engagement with all

workers and politicians is necessary to ensure shared values and knowledge. Perry (2008) argues that policies need motivated individuals to move them forward effectively. The potential for change, the degrees of connectedness between internal variables and the processes and the resilience of systems are core to the degree of adaptability of institutions (Holling & Gunderson, 2002). Human resources are critical components to ensure effective and timely policy transitions require capable people at their core. Therefore climate literacy knowledge and effective training mechanism is required. Harmonized climate change education builds solid knowledge foundations less challengeable from special interest groups.

Implications for Future Research

Academic research on climate change and strategic workforce planning is a relatively new field and there is a strong need for expanded research on employment and workforce planning and its connection to climate change. Five major gaps in the literature and in practice emerged and are discussed below which link the theoretical and practical: the need for labour and employment policy to be considered concurrently with climate change policy negotiations, institutional strategy and structure alignment with strategic workforce planning, harmonization of data metrics, centralization and decentralization of training and climate change policy and literacy.

Labour and Employment Policy integrated with International, National and Regional Climate Change Negotiations and Collaborations

International efforts through treaty and agreements with respect to climate change mitigation and adaptation have been ongoing since the formation of the IPCC (1988). Leadership is key to the successful integration and embedding of climate change policy. Negotiations now are ongoing at the international (e.g. UNFCCC) national (e.g. OECD) and regional levels. Work and workers are considered at the international levels but groups such as trade unions do not participate in negotiations. At regional collaborations (e.g. Pacific Coast Collaborative) economic considerations such as job creation are part of the deliberations but harmonization of employment and labour policies and the role of strategic workforce planning are often not considered. Labour and employment policy

needs to be considered concurrently with climate change policies to ensure workers are fully integrated in the transition. Research is required to recommend steps to narrow these gaps and develop policies which will be strong enough to be durable and effective but flexible enough to adapt to regional and local environments and minimize labour disruption particularly since many sectors are regulated at different levels of government, further reinforcing the need to consider all levels concurrently. Some of these include identifying the economic conditions, values and government structures which are optimal.

Institutional Strategy and Structure Alignment with Strategic Workforce Planning

Specific research areas to optimally align institutional strategy and structure with strategic workforce planning is another gap. Overlapping efforts or redundancies can reduce policy efficiency. Therefore strengthening institutional mandates, improving horizontal coordination between agencies, and ensuring that implementation capacity is relevant are key recommendations. Some areas of research include institutional designs which best links science innovations, policy and skill needs and development and are resilient enough to adapt to changing policy environments. There are policy gaps between nationals, sub-governments which impact local governments planning capacity which need to be addressed (e.g. the District of North Saanich where federal policy permits airport expansion which regional policy does not consider federal land activities allowing employment expansion without regional policies to support worker housing and policies to ensure its affordable enough and targeted to support these workers. The location of workers are related infrastructure are another consideration for local governments and strategic workforce planners).

Harmonization of Data Metrics

Scholarly and practitioner knowledge of the measurement of the impacts of these policies on employment is less well understood due to data limitations, inconsistent terminology and a lack of a sophisticated conception of causality. Scholarly research which can advance the data sophistication is required. On the one hand, the introduction of a green policy may decrease work in one area, but introduce new work in another. The skills to

do the new work may be learned, or new workers may need to be hired. Assumptions in models and varying categories of data further complicate meaningful analysis. The empirical literature provides contradictory findings on the impacts of green policies on employment. There are many issues including the lack of consistent definition of green skills, green jobs, green workers and reluctance to define each as green. While every nation considered has a database which is regularly updated, and some have green occupations as national classifications (USA), the identification of green skills and jobs is in its infancy (ILO, 2011).

Centralization and Decentralization of Training

Developing policies which will be strong enough to be durable and effective but flexible enough to adapt to regional and local environments is a challenge. The impacts of comprehensive climate intervention on employment are reduced with coherent national training schemes, administered at the sub-national and local government levels (ICCEPO, 2010). This includes a comprehensive mapping of skill ecosystems so that coherent, systematic development on the job can be planned in conjunction with green policies. Workforce development strategies that upskill existing workers and create new jobs will become increasingly important. (This raises the issue of whether generic skills such as adaptability and social skills are sufficient – and if so, which generic skills). What workforce abilities/skills may we need to train rapidly or shift to different regions (e.g. health related diseases with different climate) if as we approach 2/4/6 degrees of warming and need to adopt more dangerous carbon-taming technologies and how are these best administered. The case examples illustrated that both centralized (e.g. the Commonwealth, Germany and Scotland) and decentralized (e.g. Norwegian Centres of Expertise, Region of Illawarra) approaches concurrently maximize effectiveness of training. Centralized training is established at the national level but region training centres customize training to meet regional needs. More research is needed to understand the best institutional strategies and structures to optimize this top-down and bottom-up approach.

Climate Change Policy and Literacy

Governments learn from each other and often consider that for a given issue such as clean air or climate change, a given country or jurisdiction may often be a good example of success in that policy area. This happens when policy transfer occurs. Rose argues that there must be dissatisfaction in order for there to be lesson drawing (Rose, 1993) identifying five ways in which lesson drawing occurs including copying and emulation. Yet in order to copy or emulate, there must be sufficient capacity to do so and it may not be accurate or sufficient. The literature on diffusion of learning between nations is broad (*see* Bennett, 1992; Dolowitz & Marsh, 1996). First and second generation adopter case studies illustrated varying degrees of learning between each other (and with other jurisdictions). While the degree of learning was not the focus of this study first and second generation adopters learned more from their respective peer groups than between the generations. In terms of policy learning and strategic workforce planning from other jurisdictions, Canada, for example, could draw on international experiences and adopt or adapt best practices at the national level (i.e. the recently formed NWPA in Australia), industry level (i.e. Denmark's renewable energy), by corporations (i.e. Siemens SE) or by public-private partnerships (i.e. industry sector skill councils in Australia); both formally (i.e. updating courses or new courses in all nations) and informally (i.e. ad-hoc training as required see City of Sydney).

Summary: Research Implications

The study found that all first and second-generation adopters had medium to high degrees of policy coherence during the time periods examined, with varying degrees of integration with strategic workforce planning.⁷² This in part reflected political will that ensured that institutional strategies and the structures to advance them would be in place. However, comprehensive interventions also fail even with political support (Lindquist & Wanna, 2011) so policy coherence is not a given.

Strategic workforce planning is new field of research that builds upon scholarly research in two areas of scholarly research: comprehensive interventions and organizational studies. Research is required to advance both fields of study academically to support

practitioners. The five areas outlined above are all inter-related. Leadership is the key driver and has a prominent role in advancing the other four for it is political leadership which can direct institutional strategy and structure which in turn can ensure harmonization of policies, metrics allowing for more effective implementation and also ensuring adequate capacity is built to embed climate change knowledge and values throughout organizations. Strategic workforce planning can aid in this process through alignment at the policy level from the top-down and bottom-up, horizontally and vertically in all sectors and jurisdictions.

Closing Remarks

This study offers one overarching observation: in any jurisdiction, without the development of an appropriately trained workforce, the transition to a green economy may fail. When or if that happens, national and provincial or state governments will fail to meet environmental challenges and fail to encourage productivity growth. Neither option would be welcome.

This dissertation has considered a complex policy context and a future beyond conventional energy sources, along with complementary and essential strategic workforce planning for a future where technological advances, politics and institutions will change every day. The gaps between skill development and use may lessen if policies are more coherent and institutional and organizational capacity and capability optimized. Yet the global operating environment is fluid. If we are to meet the challenge of climate change, we must build institutions and societies that are resilient and adaptive.

Strategic workforce planning that is aligned with the development of climate policies will aid workers to transition to new employment. But employment impacts will not be eliminated entirely. Turnover is part of organizational dynamics, and a certain amount is healthy. Optimal organizational functioning depends on many variables, including striving for mutually coherent policies that are implemented with a capable and adaptive workforce. Workforce planning remains an imperfect process, not only because data metrics vary in sophistication but also because workforces have inherent unpredictability.

Readiness levels within countries vary. Political will comes and goes within nations and internationally. There remains uncertainty regarding technological innovation speed and costs.

Climate change, however, is more predictable. Science can measure atmospheric changes and correlate change to human behaviors. Science can also project scenarios of future climate based on changes in human behaviors. We know that innovations now will reduce climate change but that we are also committed to a certain degree of change already.

With the same innovation that created and sustained the industrial and technological revolutions we must advance solutions to mitigate and adapt to an inevitable change in the climate. Coherent policies, consistent political support, strong institutional and organizational capacity and supporting data capability are necessary conditions to master this challenge. Climate change is a unique challenge for society. We have the knowledge to understand it, to mitigate our effects and adapt - and, we must.

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Australian: An Act to “establish a proposed Australian emissions trading scheme designed to reduce carbon dioxide emissions and limit global warming” (Government of Australia, 2011). *Clean Energy Act 2011* (2011, November) (enacted).

Australian: An Act to” amend the *Clean Energy Act 2011*” (Government of Australia, 2012). *Clean Energy Legislation Amendment Act 2012* (2012, June 25) (enacted).

British Columbian: Regulations to “set targets to reduce air pollution from motor vehicles” (Government of British Columbia, 2012). *Motor Vehicle Act Regulations* (2012, April 20) (enacted).

British Columbian: An Act to “put a price on greenhouse gas emissions, providing an incentive for sustainable choices that produce fewer emissions” (Government of British Columbia, 2008). *Carbon Tax Act*, (2008, May) (enacted).

British Columbian: An Act to “set out British Columbia’s energy initiatives and puts into law, key objectives of the government's two Energy Plans (from [2002](#) and [2007](#)) and its 2008 [Climate Action Plan](#)” (Government of British Columbia, 2012). *Clean Energy Act*. (2012, May 31) (enacted).

British Columbian: An Act which “authorizes hard caps on greenhouse gas emissions, which made BC the first Canadian province to introduce such legislation” (Government of British Columbia, 2008). *Greenhouse Gas Reduction (Cap and Trade) Act* Bill 18 (2008, May) (enacted).

British Columbian: An Act which “focuses on reducing GHG emissions from certain industrial operations, while increasing opportunities in the bioenergy sector” (Government of British Columbia, 2008). *Greenhouse Gas Reduction (Emissions Standards) Statutes Amendment Act* , (2008, May) (enacted).

British Columbian: An Act to “promote the use of renewable fuel in transportation fuel blends, by setting new requirements for transportation fuels” (Government of British

Columbia, 2008). *Greenhouse Gas Reduction (Renewable and Low Carbon Fuel Requirements) Act*, (2008, May) (enacted).

British Columbian: An Act which “sets aggressive legislated targets for reducing greenhouse gases” (Government of British Columbia, 2008). *Greenhouse Gas Reduction Targets Act* (GGRTA), Bill 44 (2007, May) (enacted).

British Columbian: An Act which “enables implementation of a government commitment made in the 2008 Throne Speech to set vehicle greenhouse gas emission standards equivalent to those laid out in California’s 2004 Low-Emission Vehicle II regulations” (Government of British Columbia). *Greenhouse Gas Reduction (Vehicle Emissions Standards) Act*, (2008, May) (enacted).

British Columbian: An Act “often referred to as Bill 27, supports local governments in reducing greenhouse gas emissions, conserving energy and working towards creating more compact, green, and sustainable communities” (Government of British Columbia, 2008). *Local Government (Green Communities) Statutes Amendment Act*, (2008, May) (enacted).

British Columbian: An Act which “encourages public utilities to reduce greenhouse gas emissions, take demand-side measures and produce, generate and acquire electricity from clean or renewable sources” (Government of British Columbia, 2008). *Utilities Commission Amendment Act*, (2008, May) (enacted).

Californian: *Assembly Bill No. 32 Global Warming Solutions Act*. A bill to reduce greenhouse gas emissions. (enacted August 30, 2006).

Californian: A Bill which is intended to increase the use of alternative fuels in California (State of California, 2007). Assembly Bill 1007 adopted December 5, 2007.

Canadian: An Act to ensure Canada assumes its responsibilities in preventing dangerous climate change (Government of Canada, 2011). *Bill C-224. Climate Change Accountability Act. 1st Reading*. Followed Bill C-311.

Canadian: *Canadian Environmental Protection Act, 1999 to Limit Greenhouse Gas Emissions from New On-Road Heavy-Duty Vehicles and Engines*

Canadian: Regulations to reduce GHG emissions, pursuant to the *Canadian Environmental Protection Act, 1999*
The Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations, 2010. (enacted April 17, 2010)

Canadian: An Act which allows provincial and territorial agencies to choose to issue an inter-provincial license or permit, with discretionary conditions, to allow interstate movement (Government of Canada, 1985). The *Motor Vehicle Transport Act 1985* (MVTA) (enacted).

New South Wales: An Act to allow small renewable energy generators to feed-in to network. *Electricity Supply Act* (1995) and *Electricity Supply (General) Regulation* (2001) (enacted).

New South Wales: An Act to reduce greenhouse gas emissions associated with the production and use of electricity; and to develop and encourage activities to offset the production of greenhouse gas emissions. *Greenhouse Gas Reduction Scheme* (GGRS) (2003) (enacted).

Germany: An act to conserve energy (German Federal Ministry of the Environment, Nature Conservation, and Nuclear Safety. *Renewable Energy Sources Act* (EEG) (2009) (enacted).

Ontario: An Act which is “intended to expand renewable energy production, encourage energy conservation and create green jobs” (Government of Ontario, 2009). Bill 150, *Green Energy and Green Economy Act*, (2009, February 23) (enacted).

Queensland: *Sustainable Planning Regulation 2009*. (9 July 2010).

United States of America: An Act designed to fund training in support of green economy programmes in response to the economic downturn (United States of America). The *American Recovery and Reinvestment Act* (ARRA). (enacted 2009).

United States of America: An Act designed to control air pollution on a national level (United States of America, 1963) *The Clean Air Act* (1963, major amendments 1970, 1977, 1990). (enacted).

United States of America: An Act designed to improve highway safety (United States of America, 1986). *The Commercial Motor Vehicle Safety Act* (1986) (enacted).

United States of America: An Act designed to establish national and state job training programmes to help address job shortages that are impairing growth in green industries, such as energy efficient buildings and construction, renewable electric power, energy efficient vehicles, and biofuels development (United States of America). The *Green Jobs Act*. (enacted 2007). The *Energy Independence and Security Act* (enacted December 2007) incorporates the Green Jobs Act of 2007.

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http://www.climateworksaustralia.com/low_carbon_growth_plan.html

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Appendix A

ABBREVIATIONS & DEFINITIONS

Abbreviations

ASETS	Aboriginal Labour Market Programming
ASSA	Academy of Social Sciences of Australia
ABRTCC	Australian Business Round Table on Climate Change
ACF	Australian Conservation Foundation
ACTU	Australian Council of Trade Unions
AGDCCEE	Australian Government Department of Climate Change and Energy Efficiency
ACEEE	American Council for an Energy-Efficient Economy
DEEWR	Australian Government, Department of Education, Employment and Workplace Relations
ATC	Australian Transport Council
AWPA	Australian Workforce and Productivity Agency
BC	British Columbia
CARB	California Air Resources Board
CCPA	Canadian Centre for Policy Alternatives
CERIC	Canadian Education and Research Institute for Counseling
NOC	Canada's National Occupation Codes
COPS	Canadian Occupational Projection System
CCS	Carbon Capture and Storage
CCS	Centre for Climate Strategies
CAR	Centre for Automotive Research
CWF	Centre for Workforce Futures
CEC	Clean Energy Council
CSSP	Clear Sustainable Skills Package
CCPI	Climate Change Performance Index
CGE	Computable General Equilibrium Model
CBC	Conference Board of Canada
CAHR	Council for Automotive Human Resources
COF	Council of the Federation
CMRTHS	Council of Ministers Responsible for Transportation and Highway Safety
CSIRO	Commonwealth Scientific and Industrial Research Organisation
EPI	Economic Policy Institute
E-RIC	Energy Regional Innovation Cluster
EDF	Environmental Defense Fund
EC	Environment Canada
FCRP	Foreign Credential Recognition Program
ANFA	French National Association for Training in the Automobile Sector
GGs	Green Goods and Services
GHG	Greenhouse gas
GHG	Protocol Greenhouse gas Protocol

GJI	Green Jobs Illawarra
GDP	Gross Domestic Product
GVM	Gross Vehicle Mass
HRSDC	Human Resources and Skills Development Canada
ICCEPO	Impacts of Comprehensive Climate and Energy Policy Options
ILO	International Labour Organization
IISD	International Institute for Sustainable Development
IPART	Independent Pricing and Regulatory Tribunal
IPCC	Intergovernmental Panel on Climate Change
IO	Input-Output Model
LMA	Labour Market Agreements
LMDAs	Labour Market Development Agreements
LCIS	Low Carbon Industrial Strategy
MITACS	Accelerate research program
NAICS	National American Industry Classification System
NEESI	National Energy Efficiency Skills Initiative
NGSA	National Green Skills Agreement
NRTEE	National Round Table on the Environment and the Economy
NVSSAP	National VET Sector Sustainability Action Plan
NWPA	National Workforce and Productivity Agency
NSW	New South Wales
BVET	New South Wales Board of Vocational Education
DECC	New South Wales Department of Environment and Climate Change
NSWGSS	New South Wales Green Skills Strategy
NSWGSSIP	NSW Green Skills Strategy Implementation Plan
NGO	Non Governmental Organization
NAICS	North American Industry Classification System
ONS	Office for National Statistics
OECD	Organization for Economic Co-operation and Development
PCIC	Pacific Climate Impacts Consortium
PICS	Pacific Institute for Climate Solutions
RGGI	Regional Greenhouse Gas Initiative
RCP	Representative Concentration Pathways
SPF	Skills and Partnership Fund
SA	Skills Australia
SCLC	South Coast Labour Council
SSROC	Southern Sydney Regional Organisation of Councils
SRES	Special Report on Emissions Scenarios
SIC	Standard Industrial Classification
SOC	Standard Occupational Classification
SC	Statistics Canada
SOC	Standard Occupational Classification
SDTC	Sustainable Development Technology Canada
TAFE	Training and Further Education Australia
BLS	The Bureau of Labour Statistics
CCS	The Center for Climate Strategies

CI	The Climate Institute
WB	The World Bank
WBCSD	World Business Council for Sustainable Development
WH	The White House
WRI	World Resources Institute
TWU	Transportation Workers Union
UA	United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry of the United States and Canada
UK	United Kingdom
UKCES	UK Commission for Employment and Skills
ONS	UK Office for National Statistics
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
NIESR	UK National Institute for Economic and Social Research
USA	United States of America
BLS	United States Bureau of Labour Statistics
NAS	National Academy of Sciences
VET	Vocational Education and Technical
W3	Work in a Warming World

Definitions

Best Practice A “proven method, technique, or process for achieving a specific outcome under a specific circumstance and in an effective way” (Wesley-Esquimaux, C. & Calliou, B., 2010, pg. 5).

Blue sky research Speculative research undertaken to promote creative thought about the future of the workforce. The goal is not to accurately predict the future, but to consider the possible options available (Workplace Research Centre (WRC), 2011, July, pg. 5).

Carbon pricing There are two general approaches to carbon pricing, including taxing the carbon in fossil fuels and by cap-and-trading carbon emissions. Putting a price on carbon provides incentives for individuals, businesses and government to modify behavior by “making more efficient use of fossil fuels, seeking better technologies and switching to lower carbon fuels (PICS, 2013).

Cogeneration and Trigereneration Cogeneration is the production of “heat and electricity from the same energy source”. Trigereneration combines the production of electricity, with heating and cooling (City of Sydney, 2007; Illawarra, 2009).

Commonwealth Also known as the Australian federal government.

Green economy Two of several variations are referred to in this report:

The “sector of the economy that produces goods and services with an environmental benefit” (Brookings Institution, 2011).

The “green economy is a fast-growing economic development model that focuses on the creation of green jobs, the promotion of real, sustainable economic growth, and the prevention of environmental pollution, global warming, resource depletion and ecological degradation” (Globe Foundation, 2010).

Green job Two of several variations are referred to in this report:

A green job is one that helps to “protect and restore ecosystems and biodiversity, reduce energy consumption, decarbonize the economy and minimize or altogether avoid the generation of all forms of waste” (United Nations Environment Programme (UNEP), 2008).

A green job is one that “works directly with information, technologies, or materials that minimize environmental impact, and *also* requires specialized skills, knowledge, training, or experience related to these areas” (Eco Canada, 2010).

Green skills Definitions vary, some of which are referred to in this report:

The “technical skills, knowledge, values and attitudes needed in the workforce to develop and support sustainable social, economic and environmental outcomes in business, industry and the community” (Australian Government, Department of Education,

Employment and Workplace Relations (DEEWR), 2009). Green skills are the “knowledge, training or experience as they relate to technologies or materials that minimize environmental impact: (Eco Canada, 2010). The “specific skills required to adapt products, services or operations to meet adjustments, requirements or regulations” designed to stem further climate change or adapt to the impact it is already having (Organization for Economic Cooperation and Development (OECD), 2010).

Green-collar workers “Managers, professionals and technicians who work in green organisations or who have green skills and responsibilities within other organisations that may be considered green; and services, clerical, sales and semi-skilled workers who work in green organisations”. (Ehmcke et al.2009, p 19).

Heavy duty vehicle A “vehicle with a Gross Vehicle Mass (GVM) of more than 4.5 tonnes, including rigid trucks, articulated trucks, non-freight carrying trucks, buses and heavy trailers” (Australian Government, 2009, p. 10; also see EPA, 2004).

Light duty vehicle “Passenger vehicles, sports utility vehicles and light commercial vehicles” (Australian Government, 2011, pg. 3; EPA, 2011).

Low carbon Often cited in scholarly literature and generally understood as energy from sources that are low or zero based GHG emissions.







Promising practice “An action, program, or process that leads to an effective and productive result in a situation” (Fels Institute of Governments, 2009, pg. 3).

Skills There are three groups of skills: basic skills; advance/knowledge-intensive skills; and converging skills (entrepreneurial and green which are defined as “specific skills required to adapt products, services or operations to meet adjustments, requirements or regulations designed to stem further climate change or adapt to the impact it is already having”) (OECD, 2010).





Strategic workforce planning is workforce planning and management process that considers quantitative and qualitative information, such as statistics or organizational design, so as to forecast future workforce scenarios and aid planning and policy decisions. It also considers the rate of climate change itself by drawing upon IPCC RCS scenarios.

Appendix B

PROFILE OF SELECTED NATIONS ENVIRONMENT (GHG) AND ECONOMIC (GDP) INDICATORS

Nation	GDP Ranking (World Bank)	GHG % of Global Emissions (United Nations) % of World's Emission	GDP per hour worked/ gap with respect to US (OECD) % points	Climate Change Performance Index Banking Overall Results (German Watch)	Low Carbon Competitiveness Index Climate Institute	Knowledge Economy Index (World Bank)	Innovation Scoreboard (Pro Inno Europe/Global)	Employment (National Statistics)	National Comprehensive Green Intervention Policies & Governance
Australia 	9 th US\$60,642	1.34%	-19%	40 th 	16 th	9 th	Next Best Performer (Global) Cluster 1	5.4% January, 2013	Clean Energy Future Plan Carbon Tax 2012 (will transition to cap-and-trade 2015) Light and Heavy Duty Vehicle Regulations Clean Sustainable Skills Packs (US \$94 Million)
Canada 	12 th US\$50,345	1.82% of world's emissions	-23%	58 th 	6 th	7 th	Next Best Performer (Global) Cluster 1	7.4% October, 2012	No Federal Policy on Climate Change/ Carbon Pricing Scheme Economy-wide GHG reduction target Light and Heavy Duty Vehicle Regulations Incentives to support clean tech industry HRSDC Green Jobs/Green Growth Plans Sector Councils (EcoCanada)
Denmark 	10 th US\$59,684	.15% of world's emissions	-11%	4 th 	Not ranked	3 rd	Innovation leader (Europe) Next Best Performer (Global) Cluster 1 Relative strengths Human resources, Finance and support and Throughputs Relative weaknesses Firm investments, Innovators and Economic effects	7.7% October 2012	DK Energy Agreement and various other green policies DK Energy agreement outlines a plan to create employment Led with technological advances (e.g. wind) Copenhagen first city Green Growth Strategy Framework. All green policies are accompanied with employment plans

Nation	GDP Ranking (World Bank)	GHG % of Global Emissions (United Nations) % of World's Emission	GDP per hour worked / gap with respect to US (OECD) % points	Climate Change Performance Index Ranking Overall Results (German Watch)	Low Carbon Competitiveness Index (Climate Institute)	Knowledge Economy Index (World Bank)	Innovation Scoreboard (Pro Inno Europe/Global)	Employment (National Statistics)	National Comprehensive Green Intervention Policies & Governance
Germany 	24 th US\$43,689	2.63%	-7%	8 th 	5 th	8 th	Innovation Leader (Europe) Next Best Performer (Global) Cluster 1 Relative strengths Intellectual assets Innovators and Outputs. Relative weaknesses Human resources, Finance and support and Linkages & entrepreneurship.	5.4% October, 2012	Energy Concept sets out Germany's energy policy until 2050 making it one of the most energy efficient and greenest economies in the world. Participates in European Union Emissions Trading Scheme. Education systems which trains apprentices for flexible employment. Dual vocational training system focusing on transfer of basic knowledge rather than
Norway 	4 th US\$98,102	.17%	38%	31 st 	Not ranked	5 th	Moderate innovator (Europe) Next Best Performer (Global) Cluster 1 Relative strengths, Human resources Finance and support Relative weaknesses Firm investments, Throughputs and Innovators.	3.0% September, 2012	Climate and Energy Fund Participates in the European Union Emissions Trading Scheme. International Climate and Forest Initiative (NOK 3 billion/year) Green Climate Fund Norwegian Centres of Expertise – regional inter-firm arrangements

Nation	GDP Ranking (World Bank)	GHG % of Global Emissions (United Nations) % of World's Emission	GDP per hour worked/ gap with respect to US (OECD) % points	Climate Change Performance Index Ranking Overall Results (German Watch)	Low Carbon Competitiveness Index (Climate Institute)	Knowledge Economy Index (World Bank)	Innovation Scoreboard (Pro Inno Europe/Global)	Employment (National Statistics)	National Comprehensive Green Intervention Policies & Governance
UK 	26 th US\$38,818	1.75%	-22%	10 th 	3 rd	14 th	Innovation leader (Europe) Next Best Performer (Global) Cluster 1 Relative strengths, are in Human resources, Finance and support, Firm investments and Linkages & entrepreneurship Relative weaknesses Throughputs, Innovators and Economic effects	7.7% January, 2013	Climate Change Act 2008 Low Carbon Industrial Strategy Skills Scotland UK Commission for Employment and Skills (UKCES) Green Skills Checklist National Training Centre for Sustainable Manufacturing Sector Skills Scotland & Wales
USA 	16 th US\$48,442	18.27%	0%	43 rd 	8 th	12 th	Innovation Leader (Global) Cluster 1	7.7% November, 2012	White House Office of Energy and Climate Change Policy Carbon Tax introduced in the Senate (2013) Energy Regional Innovation Cluster (ERIC) Green economy valued at 644 billion pounds leading world's clean tech industry Green Jobs Framework for Action US Department for Business, Innovation and Skills

GDP source retrieved from: http://en.wikipedia.org/wiki/List_of_countries_by_GDP_%28nominal%29_per_capita (World Bank) (February 12, 2013) US \$

GHG source retrieved from: http://en.wikipedia.org/wiki/List_of_countries_by_carbon_dioxide_emissions (United Nations estimate) (February 12, 2013) % of world's emissions

"The data was collected by the United States Department of Energy's Carbon Dioxide Information Analysis Center (CDIAC) for the United Nations. The data only considers carbon dioxide emissions from the burning of fossil fuels and cement manufacture, but not emissions from land use, land-use change and forestry."

Unemployment source retrieved from: http://en.wikipedia.org/wiki/List_of_countries_by_unemployment_rate (February 12, 2013). "Unless indicated otherwise, statistics are based on The World Factbook. Because international comparisons of unemployment rates can be misleading, several organizations adjust unemployment rates to a common concept to allow accurate international comparisons. These comparisons generally pertain to developed countries. They are prepared by the Division of International Labor Comparisons, Eurostat, and the statistical division of the OECD"

The Climate Change Performance Index Results 2013 retrieved from http://en.wikipedia.org/wiki/Climate_Change_Performance_Index (Germanwatch) (February 12, 2013). The assessments included energy-related emissions plus emissions due to land use change included deforestation for the first year which shifted the position of countries with a relevant share of emissions from the latter source. European countries "ranked best in using low-carbon resources for their energy production. Germany's 'energy transition' could prove to be a role model for other countries to reduce their fossil fuel consumption". The Climate Performance Index "reflects countries' efforts towards an efficient and low-carbon society, the climate policy of the observed countries is evaluated and the results" are reported (pg. 18). At the national level countries with the best policy are "Denmark, Iceland, India and China. In contrast, the bottom five countries in this category are all from Europe: Italy, Ukraine, Turkey, Greece and Spain". (pg. 18). The best international climate policy "is credited to Mexico, Denmark, Switzerland and Norway, whilst Turkey, Japan, Canada and Iran hold the lowest places in this category" (pg. 18).

OECD Labour Productivity/GDP <http://stats.oecd.org/Index.aspx?DataSetCode=LEVEL> GDP per hours worked/gap in GDP per hours worked with respect to the US in % points (February 12, 2013)

Knowledge Economy Index http://info.worldbank.org/etools/kam2/KAM_page5.asp (World Bank) (February 15, 2013). Benchmarks "country's position vis-à-vis others in the global knowledge economy. It was created by the World Bank Institute using the Knowledge Assessment Methodology".

Innovation Scoreboard <http://www.proinno-europe.eu/page/european-innovation-scoreboard-2009> (February 15, 2013) Available for European countries only. "This is the ninth edition of the European Innovation Scoreboard (EIS), which provides a comparative assessment of the innovation performance of EU27 Member States, under the EU Lisbon Strategy."

Global Innovation Scoreboard <http://www.proinno-europe.eu/page/global-innovation-scoreboard-1> (February 16, 2013). Available globally. Assessments by clusters.

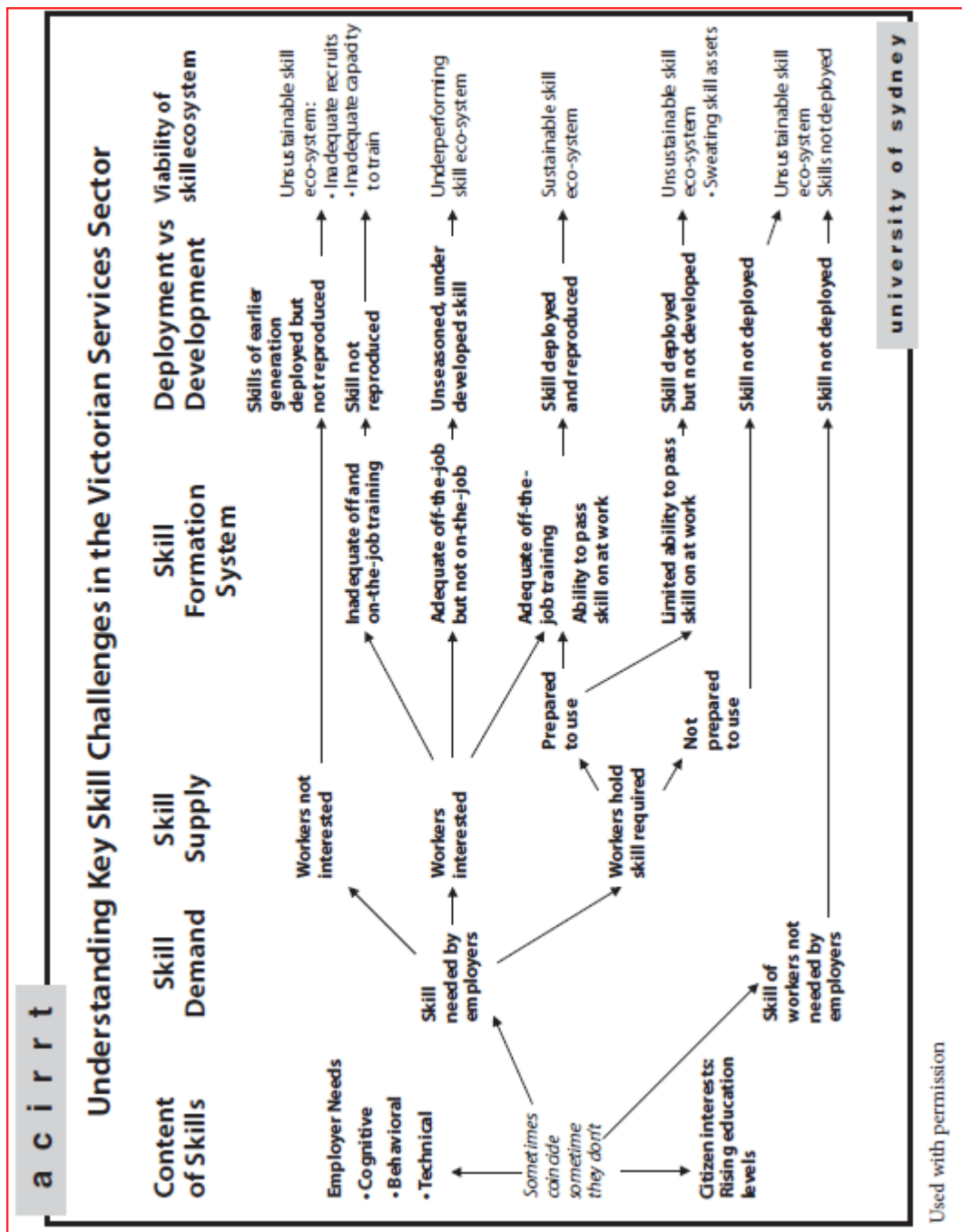
Cluster 1: Finland, Sweden, Denmark, Israel, Austria, France, Belgium, Italy, Norway, Japan, Germany, Switzerland, Netherlands, Australia, Canada, Republic of Korea and UK; Cluster 2: US and Luxembourg

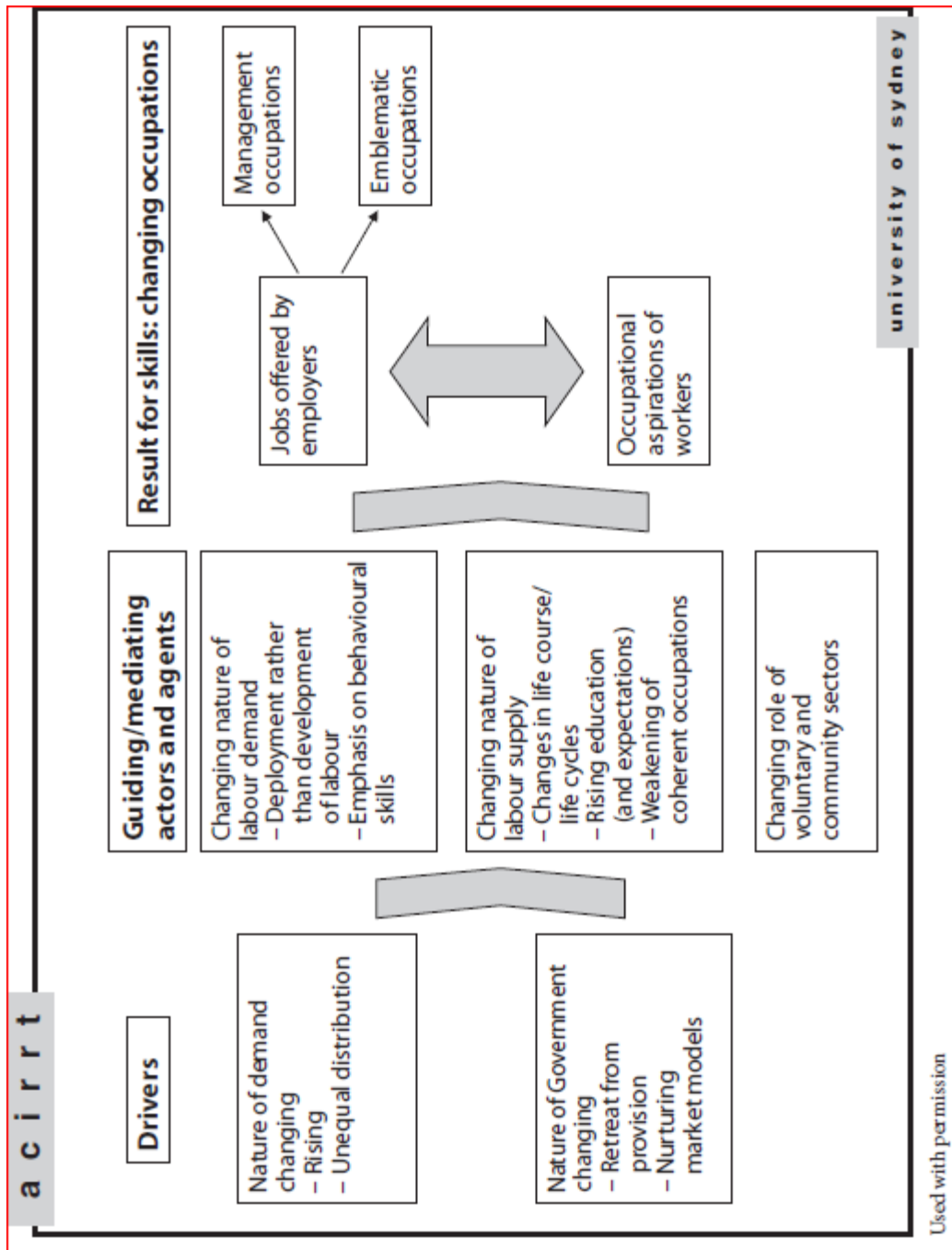
Low Carbon Competitiveness Index (G20) <http://www.vivideconomics.com/index.php/publications/g20-low-carbon-competitiveness-index-2012-update> (February 15, 2013). G20 assessment by Climate Institute (March, 2012)

"The low carbon competitiveness index measures the current capacity of each country to be competitive and to generate material prosperity for its residents in a low carbon world, based upon each country's current policies and indicators. Generally speaking, countries that have both high levels of GDP per capita and have acknowledged the need to orient their economies towards low carbon growth come towards the top of the low carbon competitiveness index. By contrast, countries towards the bottom of the index are Australia and non-Annex I nations that are heavily dependent upon carbon intensive production for income." "Australia is the only country not to have improved its index score between 1995 and 2008".

Appendix C

WORKFORCE PLANNING SKILL SETS





Appendix D

DISSERTATION INTERVIEW QUESTIONS

1. Current Role and Professional Background

Could you explain your current role and how you came to work in your current position?

Probes:

- What was your career path to this position?
- What is your educational background? Please include both degree programs and any supplementary courses you may have taken.
- What are the personal and professional experiences you draw upon to do your current work?

2. Organizational Mission and Vision

Could you tell me a little about your view of how your organization's mission is achieved? What are the main challenges? How much of the work is planned, active, and purposeful, and how much is responsive or reactive?

Probes:

- What types of problems is typically most challenging for your organization (your department, your job)?
- Describe these challenges or problems and provide examples.
- What are the key challenges or constraints in fulfilling this mission, particularly as it relates to climate-policy implementation?
- What other organizations do you work with in order to ensure that government's goals are met?

3. Climate Policy and Related Workforce-Planning Knowledge

Please explain your current knowledge of (your country, province, local government) climate policy. What are the most significant new climate-change policies in your estimation? Describe the role your agency or organization plays in advancing them. In your estimation, is the existing workforce adequately trained to implement these policies?

Probes:

- Were you in government and/or your current role when key pieces of climate-change legislation were introduced?
- How did the climate-change policy announcements affect your department or agency?
- Did you have new goals, mandates and tasks?

- Did this change the way you worked with other ministries, other levels of governments, or organizations in the for-profit and non-profit sectors?
- What is your organization or unit's role in delivering on climate-policy implementation?
- Did these policies result in new targets and expectations for your ministry? If so, what were they?
- What reporting mechanisms were developed?
- Were you involved in developing the reporting mechanisms, monitoring the progress of implementation, reporting, and/or placing or recruiting people to carry out these tasks?

4. Workforce Planning Systems

What are some of the key challenges your organization faces in recruiting and retaining employees who can advance climate-change policy? What are the key problems or challenges you face (including political, legal, and institutional factors) in this regard?

Probes:

- Is there a clear understanding of the competencies required to advance climate-change policies?
- What competencies are desired when recruiting for climate-change policy development, implementation and evaluation?
- Were the human-resources systems in place adequate for the recruitment of new workers?

5. Organizational Structures

Do you believe that the tasks of your organization are strategic and well coordinated with those of the hiring managers? Please discuss the horizontal and/or vertical coordination across your organization and between it and other levels of government.

Probes:

- How do managers in the departments/units within your organization, within your sector (if appropriate), with partners and with other levels of government interact with you to ensure that recruitment needs are aligned with the requirements of policy development and implementation?
- How do you seek to integrate your functions in this department/unit with those of policy developers in other organizations, sectors, with partners and/or other levels of government?
- Can you provide examples of occasions when these interactions led to successful outcomes?
- Can you give an example of an occasion when they did not?

- How might efforts be coordinated more effectively?

6. Innovation and Learning Strategies

Can you describe the types of climate-change related professional development and/or training programs that are supported by your organization?

Probes:

- Do you think knowledge development with existing staff is an effective way to advance climate-change policies?
- Can you provide examples of staff involvement in climate-change learning experiences?
- What are the social and educational factors which will do most to advance climate-change policies (e.g., formal and informal educational programmes, special training for key occupations, training and capacity building for policy and decision makers, knowledge sharing)?
- Could your organization benefit from enhanced climate-change knowledge? If so, what would be the next steps to take? If not, why not?
- What are the barriers to expanding organizational skills and knowledge?
- If [name the policies in a given jurisdiction] are “first-generation” policy interventions, what needs to be done to ensure that the future workforce develops the skills and knowledge required to implement these and second-generation interventions in the context of a multi-decade effort of governments and societies to address and adapt to climate change?

Appendix E

MITACS RESEARCH TURNOVER INTERVIEW QUESTIONS

Interview Questions

Strategic Workforce Experts

You are regarded as a workforce expert in retention and turnover. You have been invited to participate in this interview because you understand how turnover is currently tracked and which variables positively and negatively influence turnover. You also understand the different workforce dynamics in public and private sector organizations. This study seeks to develop a conceptual causal model on what factors contribute to the BC Public Service reaching optimal turnover rates.

Your expert advice will help further refine the development of a better model than currently is proposed designed especially for the BC Public Service. I've read what you have said about retention and turnover and would like to ask you some questions.

1. What human metrics are leading edge organizations measuring with respect to turnover quality?
2. Will this change in the next 5 years? If so, how?
3. What is optimal turnover in your opinion?
4. Do you understand turnover differently in a public vs. private organization?
5. The BC Public Service loses 15% of new hires within one year of service. If the BC Public Service could change hiring practices to better source/select high performers that will stay what competencies should the BC Public Service focus on?
6. Abelson and Baysinger (1984) hypothesized an optimal turnover model in which employee turnover and firm performance have an inverted U-shaped relationship: both overly high and overly low turnover are harmful and optimal turnover ranged between 5 – 20% for average performers. Kohn (2008) and Gleebbeek and Bax (2004) both tested the hypothesis. In the latter case, to demonstrate that the analysis could be performed by using only intraorganizational records. Kohn (2008) tested the optimal turnover model to a 10 year study in the public sector. He found that the inverted U curve can occur but only under certain conditions such as bringing in higher-skilled employees or alleviating stagnation and also that organizational type, as defined in the public administration literature, does not affect the results.

- What is the next frontier in the studies of optimal turnover in public sector organizations, in your opinion?

COMPARISON LITERATURE VS. BC PUBLIC SERVICE (REASONS TO EXIT BY AGE, TENURE, FUNCTION)

AGE

Research

√ Turnover hazard correlates with age; higher with younger workers.

BC Public Service

√ BC Public Service mirrors literature

√ Exit survey shows that # 1 reason for workers of all ages to leave is for career advancement seemingly contrary to the literature; even if cross segmented with tenure but it is higher for younger workers. Possible explanations: BC Public service exit survey may not provide sufficient reasons to accurately capture departures)

Analysis/ Implications

√ Younger workers have less invested with organizations, families & communities are more mobile and less certain of work direction but if they bond socially higher chances of staying so on boarding practises are important early on

√ Implications for ensuring career pathing and lateral mobility if promotions not suitable early on and must also ensure right hires for fit.

√ Fully on boarding new employees and identifying mentors to ensure job fit and satisfaction

√ Suggests that interventions to improve communications from leaders because it increases organizational commitment – a motivator factor

√ supervisory skills are important, the relationship with the supervisor is not the driving force to staying or leaving – it is a hygiene factor not a motivator

Tipping Elements/Points

√ Time is the tipping point. On boarding can moderate younger workers leaving.

√ Interesting work is a tipping element. Interesting work can sustain a worker particularly if it is paired with career pathing early on before exit decisions are made.

Tenure

Research

√ Turnover hazard peaks after entry and is highest in the first 2 – 3 years of service. It is generally higher with those who are not vested in a career or organization.

√ Turnover generally peaks after entry when initial dissatisfaction after comparison with job expectations occurs

√ Tenure will modify the negative effect of personal versus formal job searches on turnover hazards and search effects will decrease with tenure.

√ Fit is a predictor of engagement & productivity

√ Research says we know the least about what % of employee engagement is driven by individual traits (how much is driven by genetics, core personality, core values, life experiences?)

√ Most important factors: self-efficacy, locus of control, conscientiousness, self-esteem; studies show you will not get the results you want with efforts of engagement unless you have right talent

BC Public Service

√ Turnover hazard peaks after entry and is highest in the first 2 – 3 years of service;

√ Between 70 – 80% of new hires who left within the first year indicated career advancement and job fit were the top reasons.

√ Do not have information on effects of different job searches on turnover

√ Engagement scores (job, organization and BC Public Service Satisfaction scores) for those exiting with *less than one year* of service are significantly below the norms

Analysis/Implications

√ Implications for hiring for fit and career pathing early on turnover models which do not control for pre-entry search and selection processes “may suffer from an omitted variable bias (unobserved heterogeneity).

√ The more quickly new hires are socialized into a new organization positively turnover decreases. At earlier stages (newcomers), stated intention to quit and actual is higher than workers later on in career so need to pay attention to this feedback loop.

√ Low quality pre-entry information is more generally associated with formal search processes

√ The longer an individual stays, the stronger the job embeddedness and effects of unmet expectations can be replaced with positive job experiences if the organization is able to develop organizational commitment early on

√ Mapping these of top performers in the organization sheds light on attributes to hire

√ Genetic predictors of job satisfaction; studied identical twins separated at birth; 31% of job satisfaction could be accounted for by genetics (a predisposition);

√ Longitudinal studies have found a high correlation between personality at age 12 and job satisfaction;

Tipping Elements/Points

√ Time is a factor. Need on boarding and career pathing soon after entry.

√ Career Advancement

√ Socialization

√ Fit

√ Leadership (more important than supervisor relationship)

√ Transformational leaders can significantly positively affect intention to quit and actual turnover and increase organizational commitment;

Research

√Lower skilled jobs with low autonomy have higher turnover;

√Higher skilled jobs have lower turnover; greater autonomy more interesting work, less turnover, higher fit

BC Public Service

√Turnover was highest in those within the administration and senior administration category and in enforcement & corrections were the most likely to leave because the job did not fit with expectations

√Turnover is lowest in professional groups that have highest alignment with BC Public Service specific work, i.e. Policy analysts, science & technical officers

√The more organization specific human capital correlates positively with less turnover i.e. policy. The BC Public Service turnover is lowest in many of the organizational specific jobs such as policy & STO's.

√Engagement scores were lowest for administrative support and highest for those in science and technical officers

Analysis/Implications

√Those with lower skills sets with little job variance will turnover at a higher rate (i.e. Starbuck's baristas)

√However, regardless of skill level engagement scores were highest for those who left because of family circumstances.

√Job Satisfaction is important but not always as significant as studies indicate – it varies across individuals and professions. The stronger the fit the higher the satisfaction in general.

√The more organization specific human capital correlates positively with less turnover i.e. policy

√Commitment/Locus of Control: Highest level of engagement with professional jobs and studies showed this is not because the jobs were better but because there are higher cognitive abilities, more conscientious, emotional stability, higher internal locus of control

√Higher skill sets have more interesting work and a high degree of autonomy.

√However, high performers will leave if they do not have challenging work –

Tipping elements/points

√Fit

√Organization specific capital

√Skill Level

√Interesting Work

√Team-based work is an important predictor; social environment is important

Appendix F

LIST OF INTERVIEWEES

DISSERTATION INTERVIEWS (63 Total) 50/63 AGREED TO BE IDENTIFIED

Australia 14 (22%)

Australian Public Service

City of Sydney

Regional Government Illawarra

NSW Government

NGO's/Climate Research/Academics

Canada 43 (68%) *does not include turnover research interviewees

BC Government 25 (AVED; CAS/MOE; CSCD; MJTI; FLNR; PSA; WPLS)

Capitol Regional District

City of Vancouver City of Victoria

Clean Tech Companies

NGO's/Climate Change Research/Academics

United States 5 (9%)

California Energy Commission

California EPA

Governors Office

Workforce Investment Board

NGO

International 1 (ILO) (1%)

INTERVIEWEE	TITLE/ORGANIZATION	AGREED TO BE IDENTIFIED
CANADA		
Allison Ashcroft	City of Victoria, Sustainability Planner	✓
Sandra Evans	BC Government, PSA, Hiring Centre, Manager, Strategic Services	✓
Ben Finkelstein	BC Government, MOE, CAS, Manager, Green Communities	✓
Jenny Fraser	Change Adaptation Specialist BC Government, MOE, CAS, Climate	✓
Sarah Fraser	BC Government, Ministry of Jobs, Tourism and Innovation (MJTI), Rural BC Secretariat, Executive Director Rural BC Secretariat	✓
Lori Halls	BC Government, MOE, BC Parks, ADM BC Parks and Protected Areas Division	✓
Deborah Harford	ACT, SFU, Executive Director	✓
David Helliwell	CEO, Pulse Energy	✓
Sarah Hood	HR, Manager Workforce Development & Strategies Capitol Regional District	✓
Kathy Hopkins	BC Government, FLNR, Technical Advisor, Climate Change Ministry of Forests, Lands, Natural Resources (FLNR)	
Anne Horan	BC Government, Citizens Services, WPLS, Executive Director	✓
Sadhu Johnston	City of Vancouver, Deputy City Manager	✓
Cathy LeBlanc	BC Government, CSCD, Intergovernmental Relations, Senior Planner Community Sport and Culture Development (CSCD)	✓
James Mack	BC Government, MOE, CAS, ADM	✓
Tom MacDonald	Executive Director Local Government Management Association (LBMA)	✓
Christina Medland	City of Vancouver, Manager, Innovation and Learning	✓
Tina Neale	BC Government, MOE, CAS, Adaptation Advisor	✓
Tom Pedersen	University of Victoria, PICS, Executive Director	✓
Neil Peters	BC Government, FLNR, Section Head Flood Safety	✓
Kathy Philips	BC Government, Advanced Education, A/Executive Director	✓
Ted Sheldon	BC Government, MOE, CAS, Special Advisor, Communities	✓
Malcolm Shields	Director, Sustainability City of Vancouver	✓
Paul Shorthouse	Vancouver NGO, Director, Special Projects Globe Foundation	✓
Colleen Sparks	MOE, CAS, Director, Carbon Neutral Government BC Government	✓
Tory Stevens	BC Government, MOE, BC Parks Protected Areas Ecologist (Terrestrial)	✓
Lynda Tarras	Deputy, PSA	✓
Lee Theissen	BC Government, MOE, CAS, Executive Director	✓

John Tylee	City of Vancouver, VEDC, Director, Policy & Research, Green City	✓
Mossadiq Umedaly	CEO, Wellington Partners	✓
Juvarya Verasi	City of Vancouver, VEDC, Economist	✓
Jessica Vernhagen	BC Government, MOE, CAS, Western Climate Initiative, Director	✓
Sarah Webb	CRD, Climate Action Coordinator Capitol Regional District (CRD)	✓
Ann Williams	BC Government, PSA, Specialist, Compensation	✓
Jonathan Yuill	EcoCanada	✓
TOTAL 34/43	AGREED TO BE IDENTIFIED	
AUSTRALIA		
Sue Bearfield & Leigh Mabin	Skills and Training, NSW Government	✓
John Buchanan	Director, Workplace Research Centre University of Sydney	✓
Dr. Chris Briggs	Director, Office of Environment, NSW Government	✓
Jaleen Caples	City of Sydney, Workforce Planning	✓
Dr. Linda Colley	Queensland University (Informal conversation) Queensland Public Service Commission	
Dr. Matthew England	Director, Climate Research Centre, UNSW	✓
Justine Evessen	Employment Research Australia	✓
Brian Head	University of Queensland	✓
Alan Jones	Chief Development Officer, City of Sydney	✓
Dr. Mark Howden	Chief Research Scientist, CSIRO, Canberra	✓
Ray Markey	Director, Workforce Futures Marquarie University	✓
Katrina Skillern	Green Jobs Manager, Illawarra	✓
Dr. Anne-Maree Tiernan	Associate Professor, School of Government and International Relations, Griffith University	✓
Total 13/14	AGREED TO BE IDENTIFIED	
INTERNATIONAL		
Matthew Hengesbaugh Ian Barnes	ILO, Bangkok	✓
Total 1/1	AGREED TO BE IDENTIFIED	
California		
Mark Wenzel	Climate Change Advisor California EPA	✓
Tim Rainey	ED, California Workforce Investment Board	✓
Total 2/5	AGREED TO BE IDENTIFIED	

Appendix G BRITISH COLUMBIA (Table 7-2; Table 7-3)

Table 7-2: British Columbia Comprehensive Climate Change Intervention Coherence, Capacity, Capability

<p>Climate Change Policy (Coherence)</p>	<p>Institutional Strategy and Structure (Capacity)</p>	<p>Workforce Capability Metrics</p>	<p>Comprehensiveness of Interventions Degree of Integration/ Time (DOI) (Coherence, Capacity, Capability) Potential for Change and the Degree of Connectedness (PCDC) Low - Medium-High</p>
<p><i>Federal</i> Light and Heavy Duty Vehicle Regulations Incentives to support clean tech industry (diminished) Federal \$ set aside to support green initiatives not fully utilized <i>Provincial</i> Climate Action Plan (2008) GHG reduction targets 33% below 2007 levels by 2020 and 80% by 2050. BC – Vehicle fuel efficiency in 2008 harmonized with California 1st Carbon Neutral Government in North America Carbon Tax Act (2008) BC BioEnergy Strategy Mountain Pine Beetle Action Plan BC Air Action Plan BC Transit Plan Energy Efficient Building Strategy BC Green Building Code</p>	<p><i>Federal</i> HRSDC Green skills planning in Infancy – no specific activities targeted to support development of skills targeted to green economy – fragmented with provinces in this regard; labour market planning has varying degrees of coordination <i>Provincial</i> BC Public Service Agency Workforce Planning and Leadership Secretariat (2009 -2010) Variation in Federal and Provincial workforce development and planning processes corporately and within line ministries Sector Councils (i.e. Eco Canada) Green Team and Committees Foundation for the Pacific Institute for Climate Solutions Pacific Carbon Trust Western Climate Initiative</p>	<p><i>Federal</i> NOC Codes Statistics Canada (SC) CCCma – climate modelling <i>Provincial Statistics</i> <i>BC Public Service Agency</i> <i>BC Statistics</i> Not for Profits – Globe Private Sector - KPMG reports on clean tech</p>	<p>British Columbia has a Medium Degree of Integration of Policies and Medium Potential for Change Local Government policies have a medium degree of integration and a medium to high potential for change – with exemplars such as City of Vancouver - High Workforce planning approaches have a medium degree of integration and a medium to high degree of potential for change. <i>Federal</i> Reactive to policy shifts (e.g. US light and heavy duty regulations) vs. proactive; Lack of coordination between federal and provincial governments limited effectiveness of initiatives Changes in NOC codes would</p>

<p>Adaptation Planning</p> <p><i>Local Government</i> <i>Local Government (Green Communities Statutes Amendment Act, 2008)</i> Mandatory reporting on GHG reductions Adaptation planning – City of Vancouver first local government plan (2013) City of Vancouver 2020 Action Plan goals to double green jobs from 2010</p>	<p>Pacific Collaborative</p>		<p>allow for finer grain planning and resource mobility options <i>Federal/Provincial</i> Competing policies such as Subsidies to oil and gas Need consistent data and categories</p>
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Table 7-3: British Columbia Degrees of Coherence and Phases of Development

Research Questions & Key Variables	1980 – 2000 Pre Dissertation Study Period Cumulative Incrementalism	2000 – 2012 Period of Dissertation Study Effective Implementation	2012+ Post Dissertation Study Period Gradual Erosion
<i>Policy Coherence and Broader Contextual Environment</i> Degree of Integration	Low-Medium	High – Medium (end of 2011) GHG Emissions Reductions Target Act (2007) – 33% reduction target by 2020 and 80 % by 2050; carbon neutral government legislated Call for proposals Innovative Clean Energy Fund (2007) Carbon Tax, vehicle emissions standards, renewable and low carbon fuel requirements, green community development (2008) Climate Action Plan released (2008) Clean Energy Act (2010) BC Joins Western Climate Initiative (2007) Beginning of public consultations on cap and trade (2010) BC becomes first carbon neutral public sector (2011)	Medium-Low
Political Support (Consistent-Varies)	Low	High (Premier Campbell, 2000 – 2011) to Low (Premier Clarke (2011 – current) Establishment of Green committees in ministries Strong political and financial support for clean tech innovation	Premier Clarke (2011-current) Changing Political priorities; emphasis on LNG development; carbon tax frozen
Regional and Local government involvement (Leading – Following)		Local Governments required to report on GHG target reduction; compliance required 2008 – 2011 then voluntary City of Vancouver Greenest City 2020 Plan	Leadership from local governments: City of Vancouver; Capital Regional District – Planning for RSS; Local Governments reporting voluntary

Appendix H NEW SOUTH WALES (Table 8-2; Table 8-3)

Table 8-2: New South Wales: Comprehensive Climate Change Intervention

<p>Climate Change Policy (Coherence)</p>	<p>Institutional Structure and Strategy (Capacity)</p>	<p>Workforce Development Metrics (Capability)</p>	<p>Comprehensiveness of Interventions Degree of Integration/ Time (DOI) (Coherence, Capacity, Capability) Potential for Change and the Degree of Connectedness (PCDC) Low- Medium-High</p>
<p><i>Commonwealth</i> Clean Energy Future Plan 2011 Carbon Tax 2012 Light and Heavy Duty Vehicle Regulations Green Car Innovation Fund (2009) Environment Ministries and Departments</p> <p><i>New South Wales</i> 1st Mandatory GHG 2003emissions trading scheme limiting carbon emissions from electricity suppliers NSW Greenhouse Plan (2005) targets 60% reduction by 2050 and reducing GHG emissions by 2025 to 2000 levels Building Sustainability Index NSW Energy Management Policy</p> <p><i>Regional/Local Governments</i> City of Sydney (Carbon Neutral 2008) Sydney 2030 goal to use 100 % local generation and fill 30% of requirements by renewable energy by 2030</p>	<p><i>Commonwealth and State</i> Clean Sustainable Skills Package (US \$94 million) part of Clean Energy Act Australian Workforce and Productivity Agency (AWPA) (US \$3 Billion over 6 years) with specific funding for HR and skill identification National Green Skills Agreement National VET Sector Sustainability Action Plan National Centre for Vocational Education and Training and various state Board of Vocational Education Training Australian Education Union Australian Qualifications Framework Council Goals for integrated skills training & planning Sector Skills Councils – 11 nationally and environmental scans for new skills and knowledge requirements NSW Green Skills Strategy and Implementation Plan Green Plumber – sold to California Illawarra First Green Jobs Plan in NSW Sydney 2030 plan – included job targets</p>	<p><i>Commonwealth</i> ANZSCO Codes industry (ANZSIC) Australian Bureau of Statistics (ABS) Access Economics and CSIRO Modelling Employment Impacts Multiple other agencies (employers, unions, state and local government) Several studies on impacts of green policies on employment CSIRO estimates more than 500,000 workers will require green skills and training by 2026 and 2 million in low impact sectors Data capability ongoing issues <i>New South Wales</i></p>	<p>NSW has a Medium – High Degree of Integration of Policies and High Potential for Change Local Government policies have a medium degree of integration and a medium to high potential for change Workforce planning approaches have a medium- High degree of integration and a medium to high degree of potential for change.</p> <p>Gap closing between federal and state green policies with new Clean Energy Future plan aimed to improve coordination of climate change agenda (as of 2012) Proliferation of responses at State levels to green policies has produced a fragmented systems of different State government and industry-led initiatives AWPA is planning to conduct more in depth supply/demand analysis – aligning categories, analysis and scenarios</p>

Table 8-3: New South Wales: Degrees of Coherence and Implementation Phases

Research Questions & Key Variables	1980 – 2000 Pre Dissertation Study Period Cumulative Incrementalism	2000 – 2012 Period of Dissertation Study Effective Implementation	2012+ Post Dissertation Study Period Effective Implementation Graduated Erosion
<i>Policy Coherence and Broader Contextual Environment</i> Degree of Integration	Low-Medium	High Greenhouse Gas Plan (2005) NSW Plan (2021) 1 st world’s mandatory carbon trading (2003)	Medium Lost momentum with carbon tax axing by Abbott in 2013 begun by Gillard (2012) impacted states as states discontinued carbon pricing with advancement of national scheme
Political Support (Consistent-Varies)	High at state level – 1995 -	High – Medium (2011 – onwards)	High – Medium (2014)
Regional and Local government involvement (Leading – Following)		Energy Precincts Established with Workforce Plans (2009)	
<i>Institutional and Organizational Capacity in the Transactional Environment</i> Degree of Connectedness	Medium	High (integration with AWPAs launch 2012)	Medium (AWPA demise but still focus on skill development and institutional structure alignment with states)
Workforce development and planning approaches (proactive – reactive) dedicated agencies	Medium	Medium - High Illawarra Green Jobs Plan (Rural Regional Plan) Greenhouse Gas office closed	High
Learning strategies	Medium	Medium - High	
<i>Capability of the Workforce Potential for Change</i>	Medium	High	Medium
Strategic workforce planning (Linking policies and impacts on labour; horizontal and vertical approach, metrics)	Medium-High	Medium- High Clean Sustainable Skills Package (CSSP) Skills Australia (2008) Green Skills NSW continues NSW 2021 plan has goals to increase skills	Medium – High

Appendix I CALIFORNIA (Table 9-2; Table 9-3)

Table 9-2: California: Comprehensive Climate Change Intervention

<p>Climate Change Policy (Coherence)</p>	<p>Institutional Strategy and Structure (Capacity)</p>	<p>Workforce Development Metrics (Capability)</p>	<p>Comprehensiveness of Interventions Degree of Integration/ Time (DOI) (Coherence, Capacity, Capability) Potential for Change and the Degree of Connectedness (PCDC) Low- Medium-High</p>
<p><i>National</i> White House Office of Energy and Climate Change Policy Energy Regional Innovation Cluster (E-RIC) Green economy valued at 644 billion pounds leading world’s clean tech industry Light and Heavy Duty Vehicle Regulations (2011) followed California President’s Climate Action Plan task force (2013) – help state energies prepare for climate change</p> <p><i>California</i> Climate Change Scoping Plan (2008) AB32 (2006) targets Cap and Trade with Quebec (2014)</p>	<p><i>National</i> Federal Departments of Labour and Education and Transportation GreenJobs Council (2008) GreenJobs Framework for Action US Department for Business, Innovation and Skills Department of Labour and Education US\$130 million to support regional energy efficiency research centre including specialized workforce development programs</p> <p><i>California</i> California Employment Development Department California Air Resources Board California Energy Commission GreenJobs Economic Development Strategy California Workforce Investment Board (1998)</p>	<p><i>National</i> Bureau of Labour Statistics (BLS) regarded as superb data Multiple other agencies interpret data – more than 10 federal agencies National classification of green jobs US Department of Labour</p> <p>California</p> <p><i>Regional</i> Workforce Development and Planning – Regional Planning examples of innovation (Sustainable Skills Ecosystems, SSES)</p> <p><i>Future</i> Blue Sky Research conducted by USA National Academy of Sciences – excellent research community regarded as leading Research on the Future of Work (2008)</p>	<p>California has a High Degree of Integration of Policies and High Potential for Change Local Government policies have a medium degree of integration and a medium to high potential for change Workforce planning approaches have a medium degree of integration and a medium to high degree of potential for change.</p> <p>The state and national approach to SWP is fragmented and decentralised labour market with skills and workforce development</p>

<p>Solar Hot Water & Efficiency Act (2007) California Long Term Energy Efficiency Strategic Plan (2008) Green Building Initiative California Water Action Plan</p> <p><i>Local Government</i> Local governments required to reduce GHG by 15 % by 2020 in Climate Change Scoping Plan SB 375 (2008) established process for local governments to plan for GHG emission reductions and to develop sustainable communities including public transit</p>	<p>Western Climate Initiative (2007) Pacific Coast Collaborative (2008) Economic & Technology Advancement Advisory Committee established – benefits of cap and trade California Climate Action Registry (2001)</p>		<p>policies and practises to match; a large set of data but poorly link;</p>
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Table 9-3: California: Degrees of Coherence and Implementation Phases

Research Questions & Key Variables	1980 – 2000 Pre Dissertation Study Period Cumulative Incrementalism	2000 – 2012 Period of Dissertation Study Effective Implementation	2012+ Post Dissertation Study Period Cumulative Incrementalism Effective Implementation
<i>Policy Coherence and Broader Contextual Environment</i> Degree of Integration	Medium	High White House Office of Energy and Climate Change Policy (2008) – coordinate policy on energy and climate Energy Regional Innovation Cluster	High
Political Support (Consistent-Varies)	High	High	Governor Brown (2011 -
Regional and Local government involvement (Leading – Following)		High	
<i>Institutional and Organizational Capacity in the Transactional Environment</i> Degree of Connectedness	Low AB 32 (1991) in development	High Global Solutions Act (2006) Climate Change Adaptation Strategy (2009) Climate Registry Voluntary (2009) AB 32 (2006) Heavy and Light Duty Vehicle Emissions (2007) – State followed by National EPA	Medium
Workforce development and planning approaches (proactive – reactive) dedicated agencies	Medium	Medium - High WCI (2003 – 2010) Western States and Provinces	High WCI, Inc. Quebec and California partnership
Learning strategies	Low - Medium	Medium	Medium

Endnotes

¹ Even if emissions were stabilized at 90% below present levels, temperatures would increase by 2°C by 2050 (Weaver et al. 2007).

² Quebec introduced a tax of CDN \$3.50/tonne on gasoline in 2007, and Alberta put a carbon tax on companies emitting more than 100,000 tonnes of GHG annually to either reduce emissions by 12 percent per barrel of oil, pay \$15/tonne of emissions above that limit towards a technology fund, or purchase offsets. California, Colorado and Maryland introduced carbon taxes in 2008, 2006 and 2010 respectively. California's then-Governor Schwarzenegger introduced a carbon tax on businesses of US \$4.4 cents/tonne, and a cap-and-trade system (Bill AB 32)

³ See Ecosystems Marketplace for more information on the NSW abatement introduced in 2003: http://www.ecosystemmarketplace.com/pages/dynamic/web.page.php?section=carbon_market&page_name=gas_market.

⁴ In this dissertation, strategic workforce planning is defined as a workforce planning and management process that considers quantitative and qualitative information, such as statistics or organizational design, so as to forecast future workforce scenarios and aid planning and policy decisions. It also considers the rate of climate change itself by drawing upon IPCC RCS scenarios.

⁵ Today there are 'over 60 international treaties, agreements and conventions dealing with the environment' (Yencken, 2002: 82).

⁶ Institutional design refers to how a government is structured in order to fulfill its functions. Institutionalism argues that agenda setting is 'bound' by the institutions which shape politics including constitutions, bureaucracies and rules. Specifically, Parsons (1997: 226) argues that "in the last few decades the formation of policy agendas has increasingly been influenced by institutionalized policy analysis in modern think tanks" – in other words, by institutional factors. Hall's study of economic policy making in Britain and France concluded that the economic policy in both countries was the result of "institutional structuring of state-society relations" (Parsons 1997: 334). Hall warns that while institutions provide the context within which policy decisions are made, they do not eliminate the free will of policy makers (Hall, 1986: 259; Parsons, 1997: 336).

⁷ This was dubbed the *Durban Platform for Enhanced Action*.

⁸ Overall critical infrastructure protection and planning resides with a host of public agencies from all levels of government, and work is needed to coordinate planning across jurisdictions to ensure consistent standards' (Harford, 2008: 6). The Institute for Catastrophic Loss Reduction (ISLR) recommends that communities "incorporate natural hazard assessments into municipal planning to minimize risk and enforce building codes to ensure enhancement of structural resilience" (McBean et al., 2003). "Most Canadian emergencies are managed municipally or provincially; however, some adaptations such as emergency management initiatives require input from higher levels of government; therefore, coordination at and among all levels is key" (Harford, 2008: 10).

⁹ Notably, Sweden leads in carbon price of \$130/tonne, the UK at \$24 – \$30, Australia is introducing the carbon tax in 2012 at \$23 – \$25/tonne, Denmark is currently at \$16/tonne, British Columbia at \$30/tonne, California at \$13 – \$21/tonne, Norway at \$53/tonne and the UK at \$24 – \$30/tonne (CI, 2012, pg 25).

¹⁰ 'Copying' refers to adoption more or less intact of a programme already in effect in another jurisdiction. Emulation is adoption with adjustment for different circumstances, of a programme already in effect in another jurisdiction. Hybridization combines elements of programmes from two different places. Syndissertation combines familiar elements from programmes in effect in three or more different places. Finally, Inspiration refers to when programmes elsewhere are used as intellectual stimulus for developing a novel programme without an analogue elsewhere.

¹¹ While difficult to calculate directly, measuring and understanding workforce capability helps determine ‘optimal’ turnover. When there is too little or too much turnover, performance can drop because of either organizational stagnation or working relationship disruptions (Breen, 2010). Empirical studies on turnover by March and Simon (1958) proposed that individual employees’ perceptions on the *ease* and *desirability* of making a move drove turnover (Lee & Mitchell, 1994, p. 52). These constructs are now regarded as the conceptual foundations of much of the literature on employee turnover [Hulin et al., 1985 (Lee & Mitchell, 1994, p. 52)]. Human resource flows can converge to tipping points, which can incrementally slip towards stagnation (at <5 per cent in the BC Public Service, see Breen, 2010) or service collapse. Conversely, appropriate flows lead to workforce optimization. For these reasons, optimal turnover is different between top performers and the remainder of the workforce. Fewer turnovers are desirable within top performers, but enough should take place in order to avoid stagnation. (It’s important to note turnover varies greatly between private and public sectors; public sector stability is necessary for service provision to citizens). Understanding an organization’s turnover profile is critical for strategic workforce planners looking to understand policy effects, particularly for advancing climate change policy that requires varying skill sets at different times of policy development and execution.

¹² Studies consistently link job satisfaction and turnover. Supervisor satisfaction is a key consideration in the public service as bureaucrats or life long civil servants who are desired for their acquired subject knowledge are wanted to be retained. These specialized skill sets are sometimes referred to in the civil service as key or special knowledge skills and the strategic workforce divisions within government work hard to understand the profile of these workers and provide suitable retention incentives. Work availability, career expectations and intentions to stay were identified early as good predictors of turnover. Variables identified in 1970s turnover studies remain some of the best predictors. Age [younger workers are more likely to leave for many reasons including job mobility (Moblely, 1979, Price, 1977 pg. 96)], length of service (turnover is higher for short tenure), age, poor match between job and individual, and inadequate socialization are good predictors, adding empirical evidence of the importance of socialization. Gender is a predictor only as it interacts with other variables. Education does not have a consistent relationship in empirical studies, as there is a wide disparity of education quality. Biographical data can also predict turnover (Price, 1977: 90).

¹³ Joined-up thinking is the capacity to co-ordinate all elements of a system in service of a common goal. In the quest for sustainability, ‘this would involve growing our capacity to align the designs and practices of our institutions to facilitate a coherent, effective response to climate change. It would require viewing the problem of sustainability from multiple viewpoints (e.g. equity, economy, culture, age, locale) and scales (space and time)’ (Pacific Institute for Climate Solutions, 2010: 5).

¹⁴ See *Appendix C* for Workforce Planning Skills and Drivers of Skills Matrix (used with permission from the Workforce Research Centre, University of Sydney) as a sample of strategic workforce planning in Australia.

¹⁵ The EPA’s (2011) analysis of models says that single-sector analysis is possible on a bottom-up basis, but can only assess partial effects of regulation on employment – it does not account for impacts on other connected sectors. New jobs in environmental goods and services potentially have a “multiplying effect across supply chains” (ILO, 2011), such as wind energy; these effects should also be considered. Other projection models include: (1) the computable general equilibrium (CGE) model, and (2) the input-output (IO) model. Both include supply and demand assumptions and the labour market. The first assumes equilibrium in markets, and doesn’t include involuntary turnover. (The latter is normally used for regional analysis). However, weaknesses remain. Neither model can capture labour moving between sectors, or overall effects of labour policies such as immigration, retirement age, pension changes, or impacts of technology.

¹⁶ Both environmental and economic measures are highlighted in *Appendix C Profile of Economic and Environmental Indicators of Selected Nations*.

¹⁷ MITACS is a federally-funded, Canadian not-for-profit that funds internships and student research. A MITACS research grant that was partnered with the BC Public Service Agency in the BC Government in order to conduct research turnover in the BC Government (26,000+ employees) was initiated in 2008. Research was conducted through analytics on at the divisional, organizational, sectoral and whole of government levels, and cross-tabulated to engagement and exit surveys. The two year study of turnover with actuarial support provided an excellent understanding of the capacity and limitations of government data. It also showed turnover by key occupations and skills and the relationship to leadership, job functions and organizational variables. MITACS funded attendance at various conferences (see Conferences, Symposiums, and Seminars, below) coloured understanding of current research. Interviews were done with strategic human resource managers and directors in the BC Public Service, with at least one representative from each of the government's 25 internal organizations. A report *Tipping Points: Understanding Turnover in the BC Civil Service* (December, 2009) was completed. This dissertation draws upon the literature on turnover and a study conducted on turnover in the BC Public Service in the analysis of the findings and in the framework.

¹⁸ The Government of Canada offers student affiliate research opportunities. Environment Canada sought to understand the relationship between green policies and the impacts on employment. Environment Canada commissioned an international literature review on this subject. This opportunity was concurrent with a travelling and study abroad in Australia (2012) and drew upon international expertise at the Workplace Research Centre, University of Sydney and relative documents, particularly the ILO and OECD. The dissertation considers green growth frameworks such as the OECD (2011, 2012, c, b) and ILO's (2011, 2012) research on green skills and green growth, which consider both economic and environmental variables. The green growth framework was developed for national level assessment and was modified to "highlight issues of transition that are most relevant for local areas" (OECD, 2012, p. 11). A report *Mind the Gap: Bridging Policies and Skills. Lessons from Abroad* (March, 2013) was completed.

¹⁹ The Commonwealth of Australia offers merit-based international scholarships for postsecondary study in Australia. In 2012 as a recipient of an Australian Endeavour Fellowship a six month abroad study experience based at the University of Sydney's School of Business Workforce Research Centre deepened my knowledge of international approaches to workforce planning and environmental policy particularly the Australian approach. A site excursion with the New South Wales Office of Environment to Bungendore Capitol Wind Farm north of Canberra was particularly noteworthy as were the opportunity to attend, firsthand various seminars (e.g. seminars on workforce planning, Commonwealth seminar presenting the newly formed Australian Workforce Productivity Agency). In addition to the opportunity study with scholars at the University of Sydney, in-person interviews were conducted. These experiences contributed to the aforementioned Environment Canada report.

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University of Sydney, in-person interviews were conducted. These experiences contributed to the aforementioned Environment Canada report.

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²⁴ See President Obama's Inaugural Address Transcript: "We will respond to the threat of climate change, knowing that the failure to do so would betray our children and future generations," he said. "Some may still deny the overwhelming judgment of science, but none can avoid the devastating impact of raging fires, and crippling drought, and more powerful storms. The path towards sustainable energy sources will be long and sometimes difficult. But America cannot resist this transition; we must lead it."

²⁵ While strong economic and environmental indicators (see Appendix B) do not necessarily mean that energy and/or climate change policies are comprehensive, they are indicative, especially the environmental indicators that energy policy is in effect. Canada and Norway for example have high GDP and low GHG emissions overall globally per capita but policy coherence is stronger in Norway than Canada. Canada rates much lower than Norway on the climate watch index. GHG emissions overall can be misleading; per capita GHG emissions are still much higher in Canada and the US than China, though the former two have seen emission declines recently, while China's are rapidly increasing.

²⁶ *Ethical Considerations.* All interviews followed the rules for protection of human subjects established by the University of Victoria's ethics approval process, ensuring confidentiality and anonymity. The questionnaire was approved by the University of Victoria's ethics approval process. All interviewees from Australia, except one, allowed their respective organizations to be identified in the Environment Canada report. Interviews conducted for the MITACS research study also followed the rules for protection of human subjects established by the University of Victoria's ethics approval.

²⁷ See Appendix D for the Interview Questions, Appendix E for the BC Public Service Turnover Study Interview Questions; and Appendix F for the List of Dissertation Interviewees (*who consented to be identified*).

²⁸ Appendix B outlines a profile of GHG emissions (WB, 2011), Climate Change Performance Index Ranking (GermanWatch 2013) and the Low- Carbon Competitiveness Index (Climate Institute, 2012). In terms of workforce and economics, GDP compared to the US is considered, as it generally indicates standard of living (OECD, 2013). Knowledge Economy Index (World Bank, 2012), the Innovation Scoreboard (Pro Inno, 2012)

and labour statistics such as unemployment are also indicators.

²⁹ Denmark is ranked 10th in GDP (WB, 2011) and emits .15% of global GHG emissions (WB, 2011). It ranks 4th on the Climate Change Performance Index (German Watch, 2012), 3rd on the Knowledge Economy (WB, 2012) and is considered an Innovation Leader (both at the European and Global levels) (ProInno, 2012).

³⁰ Danish Ministry of Climate, Energy and Building: “This agreement implies a 12% reduction of gross energy consumption in 2020 in comparison to 2006; a share of 35% renewable energy in 2020; and 50% wind energy in Danish electricity consumption in 2020” Retrieved from <http://www.kebmin.dk/sites/kebmin.dk/files/climate-energy-and-building-policy/denmark/energy-agreements/FAKTA%20UK%201.pdf> October 30, 2014

³¹ Contact the author for further details on first generation adopters.

³² Germany is ranked 24th in GDP (WB, 2011) and emits 2.63% of global GHG emissions (WB, 2011). It ranks 8th on the Climate Change Performance Index (German Watch, 2012), 5th on the Low Carbon Competitiveness Index (CI, 2012) and 8th on the Knowledge Economy Index (WB, 2012) and is ranked as an Innovation Leader in Europe and a Next Best Performer on the Global Index (ProInno, 2012).

³³ Norway is ranked 4th in GDP (WB, 2011) and emits .17% of global GHG emissions (WB, 2011). It ranks 31st on the Climate Change Performance Index (German Watch, 2012) and 5th on the Knowledge Economy Index (WB, 2012) and is ranked as a Moderate Innovator (European Index) and as a Next Best Performer (Global Index) (ProInno, 2012). Relative strengths on the index included human resources and finances.

³⁴ The Oil Fund (previously known as The Petroleum Fund of Norway) was established in 1990 to counter effects of decline in income over time, was ranked in 2011 as the largest pension fund in the world. A portion of the fund established a lifelong learning fund. Two wealth funds were established: The Government Petroleum Fund (Global) and The National Insurance Scheme Fund (Norway). In 2009, more than 250,000 are employed directly or indirectly the oil and gas industry in Norway Retrieved from (<http://www.statoil.com/en/about/history/oilnorway40years/pages/default.aspx> November 14, 2014).

³⁵ The United Kingdom is ranked 26th on GDP (WB, 2011) and emits 1.75% of global GHG emissions (WB, 2011). It ranks 10th on the Climate Change Performance Index (German Watch, 2012), 3rd on the Low Carbon Competitiveness Index (CI, 2012), 14th on the Knowledge Economy Index (WB, 2012) and is ranked as an Innovation Leader in Europe and Next Best Performer globally on the Innovation Scoreboard (ProInno, 2012).

³⁶ Contact the author for further information on first generation adopters.

³⁷ Contact the author for further details on second generation adopters.

³⁸ Total interviews conducted in Canada: 43/63 interview not including interviews with strategic workforce planners for the MITACS/BC Public Service research on turnover in the BC Public Service.

³⁹ The International Energy Agency, established by the OECD, acts as an advisor to member states on energy security, economic development and environmental protection. Canada is a member along with 28 other member states. The IEA was established by the OECD.

⁴⁰ In Canada, approximately 82% of emissions comes from energy and primarily from Saskatchewan and Alberta, and BC and Quebec have the lowest per capita emissions (National Round Table on the Environment and the Economy, 2012).

⁴¹ The newly formed Canadian Climate Forum (CCF) is independent of both EC and NRCAN and will build upon the work of its predecessor organization.

⁴² On March 13, 2000, legislative authority for controlling on-road vehicle emissions was transferred to Environment Canada under the Canadian Environmental Protection Act 1999 (CEPA 1999). Under CEPA 1999, the *On-Road Vehicle and Engine Emission Regulations* were promulgated on January 1, 2003, and came into effect on January 1, 2004. A series of regulations followed including the light and heavy duty vehicles regulations released in the 2012 period and after.

⁴³ The author had a long conversation with HRSDC staff in March, 2013 to ascertain current green skill strategic workforce planning and the staff confirmed that it was not fully developed nor communicated broadly.

⁴⁴ Vancouver Sun (February 10, 2007). "He's proving pretty flexible for the U-turns he makes in policy," said University of Victoria political scientist Norman Ruff. "Given what the polls are telling us about the importance of the environment, he's had to make this a major theme of his throne speech." VICTORIA -- Premier Gordon Campbell is planning to launch a major "green initiative" next week that will follow much of the script that Gov. Arnold Schwarzenegger has laid down in California to combat global warming.... The premier's advisers are trumpeting the upcoming announcement as a policy shift as surprising as one that saw Campbell move from being a skeptic on native land claims to the man who, 18 months ago, launched a "new relationship" with aboriginals and began fast-tracking multibillion-dollar land-claim settlements. Campbell never supported targets set out by the Kyoto accord to limit climate change, saying they were unfairly imposed. But as climate change emerged as a hot political issue in recent months, Campbell instructed his bureaucrats to come up with a model that will closely follow the path set by Schwarzenegger, once the Hummer-loving film star who as governor later embraced a green agenda that propelled him to a landslide victory in the 2006 California election.... In BC, greenhouse gas emissions soared by 30 per cent from 1990 to 2004."

⁴⁵ Vancouver Sun (February 10, 2007). "To hammer home his commitment, Campbell plans to meet with Schwarzenegger. That is likely to result in an attempt to forge an accord for future co-operation, perhaps also involving Oregon and Washington states."

⁴⁶ The Western Climate Initiative was started in 2007 by five western states and four Canadian provinces to determine ways to reduce GHG emissions.

⁴⁷ Vancouver Economic Development Commission. The City of Vancouver established Vancouver Economic Development Commission (VEDC) to help grow the City of Vancouver's economy by emphasizing green development. Two key goals of the Greenest City 2020 Plan were to attract green investment and talent.

⁴⁸ The Bioenergy Research & Demonstration Facility is the first demonstration of its kind in the world of a community-scale heat and power system fuelled by biomass (Retrieved from <http://sustain.ubc.ca/research/signature-research-projects/bioenergy-research-and-demonstration-facility> November 26, 2014).

⁴⁹ The Workforce Planning and Leadership Secretariat was formed in 2009 and was renamed as the Business Leadership Secretariat in 2010.

⁵⁰ More than one million new jobs are estimated in the period from 2010 – 2020, with more than one third being net new jobs due to economic growth (Government of British Columbia, 2010). Almost eighty percent of these new jobs will require some level of post-secondary training (Government of British Columbia, 2010). In addition to projected net population increases from job growth, BC also projects population growth from retiring Canadians emigrating from other provinces which will place increasing demands on energy supply and other public services

⁵¹ The Globe Advisors market report British Columbia's Clean Energy Supply & Storage Sector. Industry Insights on Job Creation and Investment Promotion in BC's Clean Economy (Globe Advisors, 2012, pg. 1) stated that in 2011 the clean energy supply and storage sector in BC was "estimated to have generated some \$4.9 billion in gross domestic product (\$3.9 billion direct and \$1.0 billion indirect) and 25,100 full-

time equivalent jobs (13,000 direct and 12,100 indirect). The job opportunities in the Globe Advisors report were “quantified using updated and proven methodologies that allow for the identification of industries and occupations that are part of this sector in BC” (Globe Advisors, 2012, pg. i.). The Globe Advisors report also stated that “experienced engineers, technicians and skilled construction trades people continue to be among the most difficult occupations to source for this sector, especially for projects located in northern and more remote locations. While there is no shortage of new graduates with the theoretical skills, the lack of hands-on experience with specific advanced clean energy technologies is preventing many academically-qualified individuals from finding employment in this sector” (pg. 1) and recommends that “public policy support is required in order to accelerate investment and employment growth in this sector...greater support for developing the province’s expertise and the ability to exploit both domestic and international opportunities is paramount for this sector’s success” (pg. 1).

⁵² BC Government estimates range from 117,160 direct and 48,840 indirect full-time equivalent green jobs in 2008, 7.1 per cent of BC’s total employment (Government of BC, 2012, p. 26). Companies ranged from 150 – 500 employees per company, with revenues up to \$500 million.

⁵³ The carbon tax was dismantled with the 2013 Liberal Abbott government election and the future of the carbon pricing scheme was unclear. In May, 2014 the Labor government introduced draft legislation that includes a carbon emissions scheme.

⁵⁴ Currently, there are “in excess of 200 relevant programs around Australia in States and Territories. Many have the potential to interfere with an emissions trading scheme The States and Territories, over a decade, filled the policy vacuum left by the Commonwealth Government” (Wilkins, 2008). Now the Commonwealth is leading and the States and Territories are withdrawing (Wilkins, 2008). On 1 July 2015, the “carbon price will transition to a fully flexible price under an emissions trading scheme, with the price determined by the market” (Storey et al, 2012, pg. 2).

⁵⁵ The Green Car Innovation Fund was initiated in 2009 with an objective to green the auto industry in Australia over 10 years. Models changed but the environmental benefits to date have not achieved objectives; none of the cars to 2013 met green guidelines in leading markets. 13,000 jobs have been lost in the auto industry since the announcement and Ford has announced it is closing down its Australian manufacturing operations in 2015. Australian auto industry accounts for 0.003% of global cars of 180,000 in 2012 whereas the US produced 120,000,000 and China produced 200,000,000 in the same year.

⁵⁶ Australia is ranked 9th in GDP (WB, 2011), and emits 1.34% of the world’s GHG emissions (WB, 2011). It ranks 40th on the Climate Change Performance Index (GermanWatch, 2012) and 16th on the Low Carbon Competitiveness Index (CI, 2012). It ranks amongst the top ten in the Knowledge Economy Index (WB, 2011) and Innovation Scoreboard (ProInno, 2012).

⁵⁷ In 2013, [Department of Climate Change and Energy Efficiency was reconfigured to the Industry, Innovation, Climate Change, Science, Research and Tertiary Education](#) and subsequently morphed into the Australian Department of the Environment (DOE) along with DEWHA [name changed to Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) in 2013].

⁵⁸ The Clean Energy Legislation Amendment Bill 2012, a Bill for an Act to amend legislation relating to clean energy, and for other purposes was enacted 2012.

⁵⁹ The researcher attended the AWPA announcement and unveiling of its strategy in August, 2012 in Sydney, New South Wales. As of July 1, 2014 the AWPA ceased to exist and was replaced by the Department of Industry.

⁶⁰ The GreenPlumber skills training initiative has trained more than 9,000 plumbers from the 2000–2010 period and the programme now includes New Zealand and the United States. The State of California has a licence to train 40,000 people (ILO, 2012, pg. 137).

⁶¹ California recently purchased rights to train up to 40,000 people on the Green *Plumber* qualification (ILO, 2012, p. 137, 197).

⁶² The Green Skills Agreement sets out the terms between the Commonwealth Government and the States for financial support for training the workforce.

⁶³ NSW invests an estimated \$8 billion is spent on environmental goods and services each year to reach these goals. NSW has “set a target for 12 per cent of Sydney’s water to be recycled by 2015 - that’s 70 billion litres of water every year – and for 4,000 GWh of annual electricity savings by 2014 and a Waste and Environment Levy to reduce waste disposal and an increased recycling target from 26 to 66 per cent by 2014”. Retrieved from: www.nsw.gov.au February 20, 2014.

⁶⁴ Total 5 interviews conducted in California by phone in 2013.

⁶⁵ See <http://www.reuters.com/article/2012/04/13/us-usa-campaign-green-idUSBRE83C08D20120413> Retrieved March 2, 2015).

⁶⁶ Contact the author for further details on first and second generation adopters.

⁶⁷ Danish Ministry of Climate, Energy and Building: “This agreement implies a 12% reduction of gross energy consumption in 2020 in comparison to 2006; a share of 35% renewable energy in 2020; and 50% wind energy in Danish electricity consumption in 2020” Retrieved from <http://www.kebmin.dk/sites/kebmin.dk/files/climate-energy-and-building-policy/denmark/energy-agreements/FAKTA%20UK%201.pdf> October 30, 2014

⁶⁸ Germany is ranked 24th in GDP (WB, 2011) and emits 2.63% of global GHG emissions (WB, 2011). It ranks 8th on the Climate Change Performance Index (German Watch, 2012), 5th on the Low Carbon Competitiveness Index (CI, 2012) and 8th on the Knowledge Economy Index (WB, 2012) and is ranked as an Innovation Leader in Europe and a Next Best Performer on the Global Index (ProInno, 2012).

⁶⁹ Contact the author for further details on first and second generation adopters.

⁷⁰ Contact the author for further details on degrees of integration of first and second generation adopters.