

A new role for regional development agencies and the transition to a low carbon place

An innovation portfolio submitted by:

Mr Darren James Keegan, MEdSt (UNE), GradDip (ICCA), BCom (UWS)

For the award of

Doctor of Philosophy (Innovation) Ph.D.I

Submission date: 18 August 2017

Disclaimer: the views presented in this portfolio do not necessarily represent the views of any organisation the author is affiliated with.

Abstract

The New South Wales (NSW) Government has identified that the achievement of net-zero emissions by the year 2050 is a policy objective. Regional development agencies could play a vital role in this transition to a low carbon place. Many climate scientists have indicated that human greenhouse gas emissions need to reduce to avoid very damaging future climate change. As greenhouse gas emissions continue to increase and build up in the atmosphere, policy approaches have not been able to achieve significant reductions. This professional doctorate innovation portfolio addresses this problem from the perspective of regional development practice in NSW, Australia. Using a multi-method qualitative approach as a practitioner researcher, practice-based evidence was gathered from a range of participants from agriculture, business, community, policy, research and development, and town planning to identify possible policy approaches. The data were then analysed and the researcher identified an innovation. The findings indicate that regional development agencies could adopt the learning organisation structure to better understand this issue, and use this new structure to introduce a suite of new low carbon programs to provide transitional support to regional businesses. These findings would be of value to policy makers and researchers studying climate change mitigation and regional development.

Keywords: Climate change, regional development, learning organisation, policy, professional doctorate.

Candidate's Certification

I certify that the ideas, experimental work, results, analyses, software and conclusions reported in this dissertation are entirely my own effort, except where otherwise acknowledged. I also certify that the work is original and has not been previously submitted for any other award, except where otherwise acknowledged.



Signature of Candidate

18th August 2017

Date

Acknowledgements

I would like to acknowledge the following people who have been involved in this innovation portfolio. First, the guidance, love and support of my wife and children made this journey possible. Second, I offer my sincere thanks to Dr Philip Thomas and Prof Ted Alter for their guidance, patience and support. Third, I extend my gratitude to my work colleagues, interview participants, and my editor for giving me your time and thoughts. Last and not least, I express my gratitude to the University of New England and staff for providing me with the opportunity to participate in this professional doctorate program.

Table of Contents

Abstract	2
Candidate’s Certification	3
Acknowledgements	4
Presentation of the innovation portfolio	8
Navigating this portfolio	8
List of figures	10
List of tables	11
Book One: The context for my innovation	12
1. Introduction	13
2. The context: learning from the literature	18
2.1 Regional development agencies continue to promote high carbon patterns of living.....	18
2.2 Australia has committed to climate change action, therefore the policy objective is clear.....	24
2.3 International agreements to reduce global emissions have already been made	28
2.4 Sustainable development	31
2.5 The greenhouse effect and why it is important.....	35
2.6 Emissions continue to rise	37
2.7 Human activities contribute to the greenhouse effect.....	40
2.8 The stock and flow of greenhouse gases	42
2.9 Climate change: what might happen?.....	47
2.10 Humans may not understand the extent of damage they have brought on earth’s natural systems	52
2.11 The economy is growing and changing	55
2.12 Human populations are growing and becoming more urbanised.....	57
2.13 General observations why the community has resisted taking action on climate change.....	61
2.14 Why Australians have not taken action on climate change	65
2.15 People do not know what to do about climate change or have better things to do	70
2.16 Many people deny climate change.....	73
3. A brief description of my innovation	76

4. Originality	77
5. The boundaries and/or limitations of my innovation portfolio and innovation	77
6. The development history of my innovation	79
7. Key stakeholders and communication protocols	81
8. The quality criteria used to guide the development process	83
9. Book one conclusion	87
10. Book one references	89
Book Two: Obtaining and analysing practice-based knowledge.....	110
11. Introduction	111
12. Writing style	112
13. My assumptions	112
14. A brief introduction to the Doctor of Philosophy (Innovation) PhD.I	114
15. The research approach.....	117
15.1 The research paradigm.....	117
15.2 Interpretivist paradigm quality criteria	120
15.3 My positioning as a practitioner researcher	122
15.4 My use of two research frames	123
15.5 My use of an action research frame	124
15.6 My use of an action science frame.....	128
15.7 Overcoming a broad topic	133
16. Methods and data collection	136
16.1 Literature review.....	137
16.2 Participant data	138
16.3 Self-reflection	142
17. Results.....	144
17.1 Part one: Learning from practitioners working with town planning and standards	145
17.1.1 The town planning professional.....	145
17.2 Part two: Learning from practitioners within communities	153
17.2.1 The Bingara group session.....	156
17.2.2 The Armidale group session	167
17.2.3 The Tamworth group session.....	178
17.3 Part three: Learning from practitioners that work with communities	189
17.3.1 The Community development researcher practitioner interview.....	189

17.3.2 The community development practitioner interview	198
17.3.3 Research and development practitioner interview	205
17.4 Part four: Learning from practitioners about introducing a new policy	213
17.4.1 The Environmental Upgrade Agreement (EUA) practitioner interviews	213
17.5 Part five: Learning from a practitioner about the contemporary practice of policy making	221
17.5.1 The public policy practitioner-researcher interview	221
18. Results: a thematic table	230
19. Book two conclusion	235
20. Book two references.....	236
Book Three: The innovation	244
21. Introduction	245
22. The innovation	246
22.1 Workplace innovation one: Regional development agencies in the future transition to the double loop or triple loop learning organisation form.....	248
22.1.2 A double loop learning example: the declining cap emission trading scheme	255
22.2 Workplace innovation two: Implement actionable regional development agency policies to facilitate the ecological modernisation of the NSW economy	264
22.2.1 A double loop example: Increase product standards program.....	274
22.2.2 A triple loop learning example: Government sustainable procurement program.....	278
22.2.3 A double loop learning example: low carbon investment program.....	280
22.2.5 Example of a low carbon industry development program.....	288
23. A conceptual application of this innovation	290
24. Was I able to create change?	295
25. Portfolio conclusion	300
26. Book three references	309
Appendices	327
Appendix A – Ethics approval.....	327
Appendix B – Example invitation to participants.....	328
Appendix C – Interview questions	329

Presentation of the innovation portfolio

This innovation portfolio has been presented in three books. Each book represents a stage of the research process and is presented in the table below.

This table outlines how the structure of this innovation portfolio aligns with the traditional presentation of a doctoral thesis.

Table 1. The presentation of the innovation portfolio.

Abstract	Book One
Aim	
Background	
Methods	Book Two
Design	
Data collection	
Data analysis	
Results	Book Three
Discussion	
Conclusion	

Source: Author.

Navigating this portfolio

This innovation portfolio has been presented in three books and broadly reflects the recommended conceptual structure for the PhD.I (see figure 1). In Book One, the innovation conception and development history, the context of the innovation and how it was developed are described. In Book Two, the Innovation Impact and Change Report, the research paradigm and methodology are detailed. Finally, in Book Three, my innovation is presented along with my reflections and anticipations for my innovation, which highlights how my

policy framework innovation may be used in practice, and its connection to the data collected and my workplace.

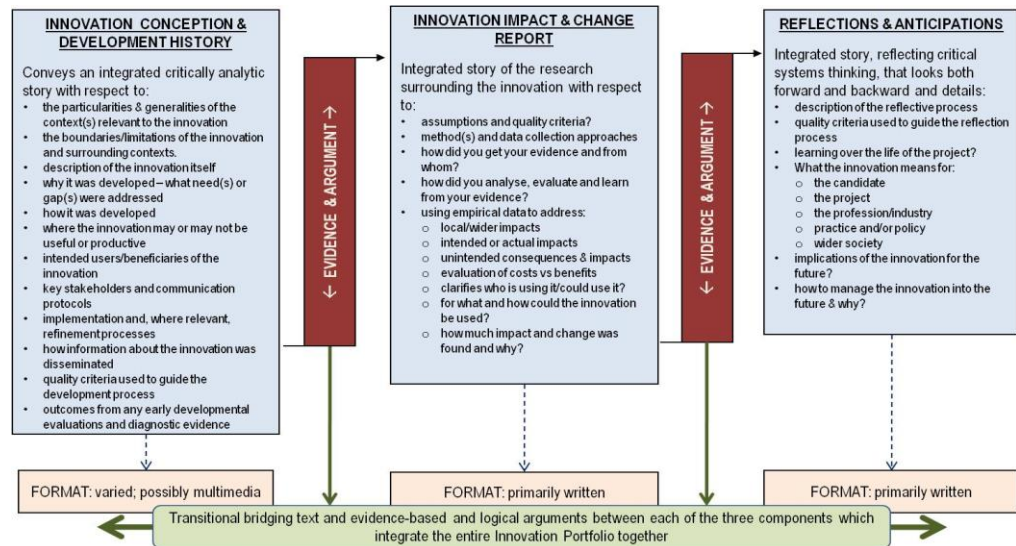


Figure 1. UNE innovation portfolio structure. From “*Professional Doctorate for Industry/Professions: Course overview*” by University of New England Australia, (n.d.) <https://my.une.edu.au/courses/2014/courses/PDIP>. Copyright. Reprinted with permission.

List of figures

- Figure 1. UNE innovation portfolio structure. From “*Professional Doctorate for Industry/Professions: Course overview*” by University of New England Australia, (n.d.) <https://my.une.edu.au/courses/2014/courses/PDIP>. Copyright. Reprinted with permission..... 9
- Figure 2. The rise of carbon dioxide emissions. From “*Graphic: The relentless rise of carbon dioxide*” by National Aeronautics and Space Administration (NASA). (n.d.-a). https://climate.nasa.gov/climate_resources/24/. Copyright. Reprinted with permission 37
- Figure 3. Emission projections. From “*Carbon Dioxide: Projected emissions and concentration*” by Data Distribution Centre, Intergovernmental Panel on Climate Change (IPCC), 2014. http://www.ipcc-data.org/observ/ddc_co2.html. Copyright. Reprinted with permission..... 38
- Figure 4. Emissions forecast by sector. From “*Australia’s Abatement Task and 2013 Emissions Projections*” by Commonwealth of Australia, 2013, https://www.environment.gov.au/system/files/resources/51b72a94-7c7a-48c4-887a-02c7b7d2bd4c/files/abatement-task-summary-report_1.pdf Creative commons by attribution..... 41
- Figure 5. The carbon cycle. From “*The carbon cycle*”, by the National Aeronautics and Space Administration (NASA). (n.d.-b). <https://earthobservatory.nasa.gov/Features/CarbonCycle/>. Copyright. Reprinted with permission..... 43
- Figure 6. Emissions since industrialisation. From “*The carbon cycle*”, by National Aeronautics and Space Administration (NASA). (n.d.-b). <https://earthobservatory.nasa.gov/Features/CarbonCycle/>. Copyright. Reprinted with permission..... 45

Figure 7. Global population forecast. From “ <i>World population prospects 2017</i> ,” by United Nations, 2017. https://esa.un.org/unpd/wpp/Graphs/Probabilistic/POP/TOT/ . Copyright. Reprinted with permission.....	59
Figure 8. My research method and data collection.....	137
Figure 9. The three phases.	247
Figure 10. A representation of the participants in an interdepartmental committee. Source: Author.....	250

List of tables

Table 1. The presentation of the innovation portfolio.	8
Table 2. Participant data collection methods overview.	141
Table 3. Thematic table.	231
Table 4. Themes across the data.....	232
Table 5. Linking themes to learning.....	254
Table 6 Abatement activities linked to my innovation.....	286
Table 7 Innovation pathway	297

Book One: The context for my innovation

1. Introduction

Scientists have predicted that future climate change may fundamentally change the natural systems on earth, which have historically supported the growth of human economic and social systems. The major climate changes include, but are not limited to, more volatile weather, rising ocean levels, biodiversity loss, heat stress, freshwater shortages, and food shortages. Many of these projected impacts will likely have severe negative consequences, and hence an argument can be established that future climate change should be avoided.

Climate change is the focus of my workplace problem. My workplace, the NSW Office of Regional Development, is a department within the NSW Government. The NSW Government has recently announced the *NSW Climate Change Policy Framework* (NSW OEH, 2016), which identifies the long-term objective of achieving net-zero emissions by the year 2050. This objective will be achieved by directing policies to: improving the investment environment, increasing energy productivity, capturing co-benefits, attracting industries, reducing risks, and managing impacts by conducting a number of implementation stages which includes “Investigate how to embed climate change emissions savings and adaptation in government decision making” (NSW OEH, 2016.p. 2). This establishes a clear workplace problem to address that I anticipated at the beginning of innovation portfolio research project.

For the purposes of this innovation portfolio, the definition of climate change refers to “change in the pattern of weather, and related changes in oceans, land surfaces and ice sheets, occurring over time scales of decades or longer”, and both humans and natural processes contribute to changes in the climate system (Australian Academy of Science, n.d. para 1). According to this source, climate change has occurred over thousands of years from natural processes like the Sun’s radiation and volcano eruptions, and from human activities like the emission of greenhouse gases (GHGs) into the atmosphere. The extent of human influence on climate change remains a contentious issue, as will be documented in later sections.

In response, climate scientists have argued for, and recommended, the reduction of human emissions of GHGs to mitigate and avoid the worst impacts of future climate change. Despite these arguments, this position does not have the support of many people, including decision makers and powerful interest groups, business, community and government. These people doubt the accuracy of climate change science, and argue that the remedy is worse than the disease in that the costs of changing human activities today to reduce emissions are too high. Therefore public policy has not yet delivered a comprehensive transitional process to reduce both the flow and stock of GHGs to levels that may avoid more rapid future climate change.

As a regional economic development practitioner with the responsibility of developing and enhancing the regional economic system, a major threat like

future climate change should be an important workplace issue. If predicted future climate change will change the environmental conditions that have historically supported the development of the regional economic system, and if business, community, and the government wish to sustain economic growth into the future, then this portfolio presents an argument that practitioners and researchers should actively seek out methods to reduce or eliminate high carbon patterns of human activities to limit future climate change, and incorporate this issue within their decision making processes and programs.

One way to reduce human GHGs is to transition to the low carbon place with an emphasis on creating the low carbon economy. Dou (2015, p.125) defines the low carbon economy as one with “low energy consumption, low emissions and low pollution” which replaces the current “high inputs – high outputs – high emissions” pattern. This means that energy production transitions from high fossil fuel dependency to renewable power, the transport sector transitions to low emission vehicles, that agriculture uses less inputs and uses soil and water more efficiently, and that the manufacturing sector uses less inputs and creates less waste and pollution.

This view of the low carbon place may discount the ability of future technology innovations to reduce emissions. One argument proposes that policy makers should wait for new technology to be developed rather than seek a curb on resource use limiting economic development and growth (Lomborg, 2009). Some respected organisations have also considered the use of

planetary geo-engineering technology, such stratospheric aerosol methods, cloud brightening methods, and space based solar radiation methods (The Royal Society, 2009). However, assumptions about the speed of technological innovation and deployment, and its ability to mitigate climate change may be ‘optimistic’ because supporters discount the complexity within our changing environment and our ability to develop multi-faceted solutions that do not create other potentiall undesirable impacts (Aversen, Bright and Hertwich, 2011), and because technology applications will need to substantially and annually reduce emissions over the coming century to offset annual economic growth (Mitchell, 2012).

Rather than limiting my innovation to the role of the economy, the *low carbon place* as a concept has been identified as the goal of my innovation. The low carbon place captures the spatial connection between the natural and man-made landscape (including cities and villages), the economic system (as production and consumption), and the political and cultural systems (social connection) across different spaces and scales (Bridge, Bouzarovski, Bradshaw, and Eyre, 2013). Spatiality is important because each place will have different economic, natural and social characteristics, and therefore different pathways to the low carbon place.

The word transition has been used throughout this innovation portfolio to indicate the type of movement needed to move from a high carbon pattern of living to a low carbon pattern of living. Transition means “a passing or

change from one place, state, condition, etc. to another” (Oxford University Press, 1997. p.1452). The use of this term regarding my innovation implies that the current high emission economic system needs to change and move towards a transitional model to foster the emergence of the low carbon place.

In this innovation portfolio, I have assumed that forecast future climate change will occur as predicted by the majority of leading climate scientists cited in this book, and I have accepted their recommendations to significantly reduce GHGs to mitigate future climate change. Using this assumption as my starting point, the question of how to reduce GHGs will be addressed in this portfolio from my unique perspective as a regional economic development practitioner in Australia.

In this first phase (book one) of the innovation portfolio, data was obtained from literature sources and presented as sixteen contextual features that the practitioner should understand when considering how to address this topic. These sixteen features have been used in order to construct the context for my innovation. In addition, a brief introduction to my innovation, the boundaries of my research, the development of my innovation, and stakeholder communication follows and forms part of the overall context for my innovation.

2. The context: learning from the literature

The following sixteen sections represent the contextual information the practitioner should become aware of in their deliberations about this issue. The data has been presented as *sixteen characteristics* to reflect a connection between the data, the research problem, and the practitioner.

2.1 Regional development agencies continue to promote high carbon patterns of living

Practitioners in regional economic development should first understand that they have a significant role in supporting the economic system. In my case, the New South Wales (NSW) Government's Office of Regional Development is my workplace. My role in this department can best be classified as a facilitator of regional development programs and projects between business, community and government. The typical role of an economic development practitioner has included, amongst other things, supporting business development, facilitating investment and tourism, co-ordinating other public sector activities, and providing advice to government (Collits, 2008). Such a broad role allows for active participation in local projects, but also, and of relevance to this innovation portfolio, for being involved in the development of public policy.

My workplace is guided by the NSW economic development strategy and economic development framework. The NSW Government's Economic Development Strategy has made a commitment to improving regional

services and the amenity of regional areas as places to live, play, and work (NSW Department of Industry, 2015). This economic development strategy has five goals for promoting regional economic growth: promote key regional sectors and regional competitiveness, drive regional employment and regional business growth, invest in economic infrastructure and connectivity, maximise government efficiency and enhance regional governance, and improve information sharing and build the evidence base. This strategy guides and informs the development of the economic system in my workplace and service delivery. A new overarching regional development framework identifies *three programs for investment*: Providing quality infrastructure and services to regional NSW, aligning effort to support growing regional centres, and identifying and activating economic potential (NSW Department of Industry, 2016, p.3).

The practices of regional development government agencies, like my workplace, have been commonly employed across developed nations like Australia (Planning Institute of Australia, n.d). Traditionally, regional economic development policies targeted sector-based industrialisation and industry attraction through centrally administered financial incentives. More contemporary approaches to regional development have prioritised more local decision-making and programs that support the competitiveness and development of local economic systems, and addressing more broad goals such as ‘quality of life’, ‘social cohesion’, ‘inequality’, ‘sustainability’ and ‘cultural

diversity' (Pike, Rodriguez, & Tomaney, 2007). Many Organisation of Economic Cooperation and Development (OECD) governments employ regional development policies that target the improvement of the regional economy by using programs that address regional competitiveness, infrastructure and workforce skills development (OECD, 2010). These goals and programs are reflected in the NSW Economic Development Strategy and the NSW Regional Development Framework, and therefore my workplace.

In Australia, successive governments have typically engaged in the practice of regional economic development. Most approaches have intervened in the market to improve access to services, helped diversify local economies into value-adding manufacturing and services, and provided funding for local amenity and equity (Collitts, 2012). In practice, these policies aim to sustain viable regional economies by assisting communities and businesses to overcome some of the barriers created by living far away from capital cities and large markets. The extent of government intervention has usually been limited by budget resources and the outcome of project evaluation applied to each intervention (Commonwealth of Australia, 2003), and these financial and evaluation limitations are constant hurdles for the practitioner to overcome.

The foundations for developing regional economies rest on the continued availability of usable and exchangeable cheap resources for use in the economic systems. The availability of such resources allow for the rapid development of advanced industrial production based on what Moeller

(2014, p.10) described as “increasing returns to scale/decreasing unit costs through exploiting productivity and wage differential”. This situation would lead to increased profit margins and allow for more rapid capital accumulation, which in turn attracts further capital investment. Moeller (2014) also argues that in the future natural resources may become scarce and may, as a result, cost more. If, as Moeller suggests, resource scarcity may lead to input-cost increases, this may decrease profits, all things being equal, and challenge existing business and economic development models. On the other hand, increasing input costs may also result in more local production and more careful use of natural resources. Prices therefore play a role in investment and production decisions. This interconnectedness between price and scarcity demonstrates the complex role of the policy practitioner trying to navigate how the government intervenes in the market, and what rules and regulations guide the behaviour of the participants in the economic systems.

Developing regional economies is a complex process. Several authors have tackled this topic in the Australian context. For example, Sorensen (2015, p.43) argues that regional Australia faces ‘tempestuous economic times where the only certainty appears to be rapid change over which political systems exert diminishing control’. Coupled with this change are changes in the linkages between economies, changes in the use and availability of information communications and technology, social changes, and psychological change (Sorensen, 2015, p43). Another two examples of regional economic complexity

is the dependence on sustainable resources and local decision making.

Hearfield and Sorensen (2009) highlight these points. First, regional economies not only need local infrastructure such as schools and hospitals, but also needs sustainable environments to foster economic development. Second, regional decision making often resides in capital cities and in the hands of people not necessarily familiar with local conditions, and this can result in decisions that do not recognise local decision making and collaboration. This makes local consensus difficult and exposes regional areas to wider national trends.

This complexity can be highlighted by an example about natural resource use and availability. At the extreme, if the rate of natural resource consumption leads to a decline of natural resources, then this situation reduces the level of resources available to sustain people in a community. As the Nobel Prize winner Lewis (1957, p.92) stated:

Many communities have come to grief for no better reason than that they have wasted their natural resources, perhaps by exhausting the soil, or by destroying their forests, or by working out their minerals without reinvesting the proceeds in creating other assets.

Lewis' short description is a neat summary of the types of decisions a policy maker needs to consider in practice. A poor decision may have serious long-term implications for communities, economies and the natural systems.

To achieve regional development in Australia, certain conditions need to be

present. According to Sorensen, Marshall and Dollery (2007, p. 312) these conditions include: 'stable investment environment', 'competitive risk-adjusted returns', 'competitive markets', innovation, law enforcement, 'a culture of risk-taking', ethical behaviour, research and development, social security support, 'efficient and effective infrastructure', targeted industry assistance, 'sensitive land-use planning', and conservation and sustainable management of natural resources and the environment. The extent to which a location achieves these conditions may be a good indicator of its development potential. Regarding this innovation, it does not follow that high emissions, high pollution, and high levels of waste is a necessary precondition of development. A low carbon economy could still sustain these preconditions identified by Sorensen, Marshall and Dollery (2007).

In summary, regional economic development approaches typically seek to enhance the economic system by mediating new jobs and investment. This enhancement has been achieved by increasing the access to cheap natural resources to support the activities of the economic system. However, this approach may have ignored the importance of sustaining the natural systems, and may have not adequately considered the impacts on the natural and social systems arising from economic activities.

2.2 Australia has committed to climate change action, therefore the policy objective is clear

Australia's climate change policy has changed considerably since 2007.

According to Talberg, Hui, and Loynes (2013), in 2007, the newly elected Australian Labour Government ratified the Kyoto Protocol to signal Australia's commitment to addressing climate change. Following this agreement, the Renewable Energy Target was increased by 20% in 2009, the Carbon Farming Initiative (CFI), the Clean Energy Finance Corporation was established with an AU\$10 billion finance facility, and in 2012 a fixed price on carbon emissions leading to an Emission Trading Scheme (ETS) was introduced. These measures demonstrated a hybrid policy approach to mitigate emissions, which included the use of market mechanisms, and an increased availability of climate change finance.

With the election of a new government in 2013, many of these initiatives have been terminated and replaced. The ETS was terminated and many climate finance support programs have been terminated or changed, with more emphasis placed on climate change adaptation. Talberg, Hui and Loynes (2013) suggested that the government began a legislative process to remove three key climate change programs: the Clean Energy Act, the termination and replacement of the Climate Commission, and the prevention of further finance to the Clean Energy Finance Corporation. These cycles of change create uncertainty and reflect the broader problem of creating stand-alone climate

change programs rather than embedding low carbon objectives within mainstream programs.

This new government then introduced the Direct Action Plan. According to the (Commonwealth of Australia, n.d, p. 3), the Australian Government plan is based on four pillars. The first pillar identifies how to reduce Australia's emissions by using the Emission Reduction Fund to fund private sector and community projects to avoid or reduce emissions through the Safeguard Mechanism, where emissions above business-as-usual baseline measurements require the purchase of carbon credits, and phasing out hydro fluorocarbons, which is a significant and harmful greenhouse gas. The second pillar identifies how the Australian Government will likely support clean and efficient energy initiatives by supporting the expansion of the renewable energy sector, supporting initiatives of the Australian Renewable Energy Agency (ARENA) and the Clean Energy Finance Corporation, developing an energy productivity plan, and creating a forum for developing and implementing more efficient vehicles. The third pillar identifies how to build resilience against climate change. This strategy relies on funding the research of the National Climate Change Adaptation Research Facility, and creating data tools to better inform decision makers. The last pillar identifies how the Australian Government will provide finance to a variety of funds, and by providing support to other countries addressing damaging rapid climate change. These pillars demonstrate a combined regulation, finance, and engagement model to be undertaken by the

Australian Government. However, the strategy does highlight how the mediation of these policies remains on the fringe, and has been conducted by environmentally orientated public agencies, like ARENA, rather than the Office of Regional Development.

The New South Wales Government has also developed a suite of policies to address damaging rapid climate change. According to the NSW Office of Environment and Heritage (n.d.), the strategies to reduce emissions align to the Australian Government. The NSW government has identified a range of practical actions such as: identifying a 20% renewable energy target, encouraging business energy savings, supporting low-income households to reduce their energy use, increasing public transport use and trips made by cycling and walking, and to making better use of town planning to keep jobs closer to homes. Like the Australian Government, the NSW Government uses the Department of Environment and Heritage to address industry environmental sustainability projects, which shows that climate change remains a more marginal issue compared to other key issues in the economic system, like business planning, industry development, infrastructure, marketing, skills, and trade.

The positioning of economic development departments, like the Office of Regional Development, away from sustainability programs disregards the potential economic benefits of mitigating climate change. Stern (2008), suggested that mitigation strategies to limit global concentrations of GHG's

to 550 parts per million would cost about 1% of global GDP each year from 2008 and for the next 100 years. Stern also suggests this cost will likely increase to about 4% of global GDP if the decision to mitigate is delayed by another thirty years. The challenge for practitioners is to argue that mitigation may save money, which given the limited financial resources available to government, would be one way to generate wealth and create new opportunities for economic growth. A strong argument can be made to mitigate emissions now to avoid much higher costs in the future, especially when our future earth will likely have more severe climate change impacts (Dietz and Stern, 2008). As Garnaut (2011, p. 26) stated there is “no evidence at this time, nor any danger of, over-investment in mitigation at the expense of investment in adaptation”. Therefore, mitigation should remain a key strategy to reduce carbon in the atmosphere by transitioning the economic system to low carbon activities.

Practitioners do not need to reinvent the wheel. Many existing plans already exist. The non-government sector has already identified strategies to create the transition to the low carbon place. ClimateWorks (2014) described a “four pillars” approach for creating a low carbon place. These four pillars are: energy efficiency, low carbon electricity, electrification and fuel switching, and reducing non-energy emissions. The authors conclude these measures could create a net-zero emission position in Australia by 2050 while still maintaining the economy. These pillars appear to align with the actions recommended by

the Australian Commonwealth and NSW Government. How these recommended strategies have been, or will be, facilitated or implemented remains an opportunity for regional development agencies within their existing role in supporting jobs and investment creation.

In conclusion, practitioners should understand that climate policies in Australia have changed during the past ten years, which is evidence of how complex this policy issue has been, and will likely continue to be in the future without a more comprehensive and actionable policy framework. However, the practitioner should recognise that the objectives have been set. A lot of technical analysis of GHG emissions, and potential emission reduction strategies, has already been identified. What policies are now needed and how to do it remains an unsolved question in my workplace.

2.3 International agreements to reduce global emissions have already been made

Climate change has been recognised as an important public policy issue and has been the subject of many global meetings and agreements. According to Talberg, Hui, and Loynes (2013), since the Stockholm Declaration in 1972, emerging scientific evidence has pointed to the trends of increasing GHG emissions and stocks of GHGs. Subsequent to Stockholm, the Rio Summit (1992) produced the Rio Conventions, wherein countries negotiated to agree to stabilise GHG emissions. This summit was followed by a series of

meetings and negotiations that led to the Kyoto Protocol (1997). The Kyoto Protocol set internationally binding GHG emissions reductions for participant signatory countries (United Nations Framework Convention on Climate Change (UNFCCC), n.d.-a). The UNFCCC has facilitated further agreements to extend the Kyoto Protocol into a second commitment period, with 28 countries as signatories (UNFCCC, n.d.-b). In Durban in 2011 the UNFCCC reported:

With grave concern a significant gap exists between the aggregate effect of the Parties' mitigation pledges in terms of global annual emissions of greenhouse gas emissions by 2020 and aggregate emission pathways consistent with having a likely chance of holding the increase in global average temperature below 2°C or 1.5°C above pre-industrial levels. (UNFCCC, 2011, para. 2).

While these various meetings did achieve agreements on limiting future emissions in many countries, it is not yet clear whether these agreements can be achieved in practice. The participating countries at the Durban 2011 meeting negotiated global GHG reductions amounting to only 60% of the level scientists predict is required to limit the future average global temperature increase to 2° Celsius (C) or less (UNFCCC, 2011). For some scientists, an average global 2°C increase would still be “disastrous” (Hansen et al., 2013, p15). Yet a 2°C increase is only one possible outcome. If current emissions continue unabated, a global warming range between 1.6°C and 6.9°C by 2100 is feasible (IPCC, 2013). This gap between what is required

and what has been achieved suggests that if current emissions have been reduced to the levels agreed in Copenhagen in 2009 and Cancun in 2010, the resultant emissions trajectories still indicate a greater than 3°C increase in average temperatures. These trajectories also indicate there is a 20% chance of a 4°C or more increase in average temperatures, with a 10% chance that these increases may occur before the year 2070 (IPCC, 2013; The World Bank, 2012). It follows that the continued failure to secure a longer term and multilateral public policy agreement on future emission trajectories, indicates total GHG emissions will, more likely than not continue to increase.

More recently, Australia participated in the Paris climate change talks. The Paris Agreement (COP21) seeks to: limit global warming to below 2°C, bring forward the global peaking of greenhouse gas emissions, establishes a binding commitment to prepare and implement national determined contribution (NDC) mitigation plans, conserve or enhance carbon sinks, supports sustainable development through market and non-market measures, strengthens national adaptation efforts, helps vulnerable countries for loss and damage, supports developing countries, commit to transparency, and undertake global stocktake (UNFCCC, n.d.). The Australian Government has signed this agreement, which sets an overarching target of emission reduction for Australia. Each nation will likely be responsible for implementing their own programs to achieve their agreed targets. The Australian Government has set new emission reduction targets as part of the Paris agreement, including to

“reduce emissions by 26-28% below 2005 levels by 2030.” (Australian Government, 2016. para. 1). The Australian Government has indicated that the policies to achieve this target already exist within the Direct Action approach (Commonwealth of Australia, n.d.). In the Australian example, the Direct Action program has been identified as a method for achieving Australia’s targets.

In summary, Australia and most other countries are a signatory to the Kyoto and Paris climate change agreements. This commits signatories’ economic systems’ to carbon emission reductions through a range of policies, some of which have changed, that supports a transition to the low carbon place. How to facilitate and coordinate from within the economic system is a question that remains unanswered in practice, but is addressed by my innovation.

2.4 Sustainable development

In recognition of the possibility of the exhaustion of natural and social systems resources, the term sustainable development was coined. Policies that support ‘sustainable development’ were developed to address societal concerns about the environment. One of the most commonly quoted definitions of sustainable development is contained in the *Brundtland Commission’s* report to the United Nations (n.d.-a):

Sustainable development is development that meets the needs of the

present without compromising the ability of future generations to meet their own needs (para.1).

In essence, sustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations (para.15).

This more holistic approach to economic development aims to overcome the depletion of natural resources by encouraging more careful resource consumption and a deeper knowledge and planning for the regenerative capacity of the natural systems, while preserving these natural systems for future generations.

While this definition of sustainable development appears relatively straightforward, widespread adoption and application has been difficult. Clayton and Radcliffe (1996, pp.168-179) offered an explanation. First, applying sustainable development means that people need to agree how the costs and benefits of damage are distributed, including the costs to be borne by future generations. Second, people cannot agree on sustainability goals because they cannot agree and do not yet have the mechanisms to deliver change. Third, people generally lack knowledge about the natural system as a system, and how this system is important to people's daily lives. Fourth, many people are more concerned about how sustainable development affects their lifestyles in terms of what they can do and what they can buy. Finally, many people

link sustainability with higher costs, which would adversely impact on the poor, and impact the daily lives of many people. These points should be important indicators to practitioners as these data identifies that costs and lifestyle change rank very highly in people's acceptance and deployment of sustainable development.

The management of the natural system has not been linked to mainstream regional economic development agencies. In the case of NSW and the regional development agency, the management of the natural systems has been the responsibility of the Office of Environment and Heritage (NSW OEH). The role of NSW OEH is to protect and manage the environment and heritage areas in NSW (NSW Office of Environment and Heritage, n.d.-a). In terms of industry-targeted programs, the NSW OEH Climate Change Program includes initiatives to assist adaptation to future climate change (NSW Office of Environment and Heritage, (n.d.-b). The NSW OEH also provides information and analytical assessment services, information sharing, and research. Specific sustainable business programs include energy and water conservation programs and waste programs. This department also manages the "Sustainable Advantage", "Energy Saver", and "NABERS" programs, providing education, networking and accreditation of environment related business initiatives (NSW Office of Environment and Heritage, n.d.-c). These programs aim to assist businesses to use fewer natural resources, and to become more sustainable and environmentally aware. In comparison, the Office of Regional Development

does not offer sustainability or low carbon programs.

The practitioner should understand that the economy, nature and society are all interrelated. The human created systems (economic and social) exist within, and depend upon, the natural system. By representing these three systems in this way, the tensions and trends of each system in relationship to each other become clearer. For example, in this dynamic system, the trend of an expanding economy might create tension in the environment and social systems. If the economic system grows, this further expands the total natural system. If the natural system declines, the social system might change in response. This interconnectedness also demonstrates the complexity of my topic, and how the major trends of climate change and population growth will likely overcome minimalist mitigation measures.

In conclusion, by using this sustainable development frame, the contradictions and limitations of our understanding of what we do as humans also becomes clearer. This frame allows an exploration of what we do and why we do it, and how human activities influence these three systems. In regard to my topic, sustainable development supports my description about how human activities have changed the climate, how climate change scientists forecast that these same activities will change the climate in the future, helps explain some of the reasons why humans have so far resisted attempts to mitigate future climate change, and why the major economic and social trends may make mitigation

even harder to achieve in the future.

2.5 The greenhouse effect and why it is important

Future climate change is related to the role of GHGs and the greenhouse effect. The climate science literature suggests carbon dioxide and other GHGs (GHG's) like methane and nitrous oxide, cause the 'greenhouse effect', where sunlight is trapped by the increased levels of atmospheric gases, warming the earth like a gardener's greenhouse. Of all the sunlight reaching the earth, the atmosphere reflects about one third, and the remaining two thirds reaches the surface, where only a portion is reflected back into space (US Environmental Protection Agency (US EPA), n.d.). This additional layer of gases comprise the GHGs released into the atmosphere by human activities, such as burning fossil fuels and deforestation, and natural processes like respiration and volcanic eruptions (National Aeronautics and Space Administration NASA (n.d.)).

Recognised scientific institutions, such as the USA EPA and NASA, accept the science of the greenhouse effect. This acceptance underpins the scientific analysis conducted by the Intergovernmental Panel on Climate Change (IPCC) climate change reporting project, and the multi and unilateral public policies on climate change. Indeed, Schelling (1992, p.1) suggests that "the greenhouse effect is not in dispute...only... its magnitude of impact on human welfare and the environment.". This recognition of the scientific

understanding of the greenhouse effect and its relationship to climate change should encourage practitioners to continue to explore policies to transition from a high carbon pattern of living to a low carbon pattern of living.

The scientific evidence about climate change, and the causes and likely impacts of climate change, continue to be collected, debated and discussed. A majority of leading climate change scientists and a majority of governments agree, that humans have been rapidly changing the earth's future climate. Researchers Anderegg, Prall, Harold, and Schneider (2010) found approximately 97% of leading published climate change science researchers are convinced by the evidence supporting the conclusion that humans have been influencing the climate. A majority of governments have also supported this scientific position. No fewer than 191 nation states and the European Union (EU) are signatories to the Kyoto Protocol, which commits signatories to reduce their GHG emissions through binding international agreements (UNFCCC, n.d.-a).

To summarise, the practitioner should be aware that the science of the greenhouse effect is commonly accepted, and that a majority of climate scientists are convinced by the evidence that humans have been changing the climate. As later sections will show, this view is not universally agreed, and climate change remains a contentious issue.

2.6 Emissions continue to rise

Total emissions and concentrations of carbon dioxide in the atmosphere have reached historically high levels. Figure 2 shows the level of atmospheric carbon dioxide, measured in parts per million (ppm) over the last 650,000 years. The current level of atmospheric carbon dioxide, and the acceleration rate since 1950, has not been observed in the measurements of atmospheric carbon dioxide concentrations spanning 650,000 years of earth's history.

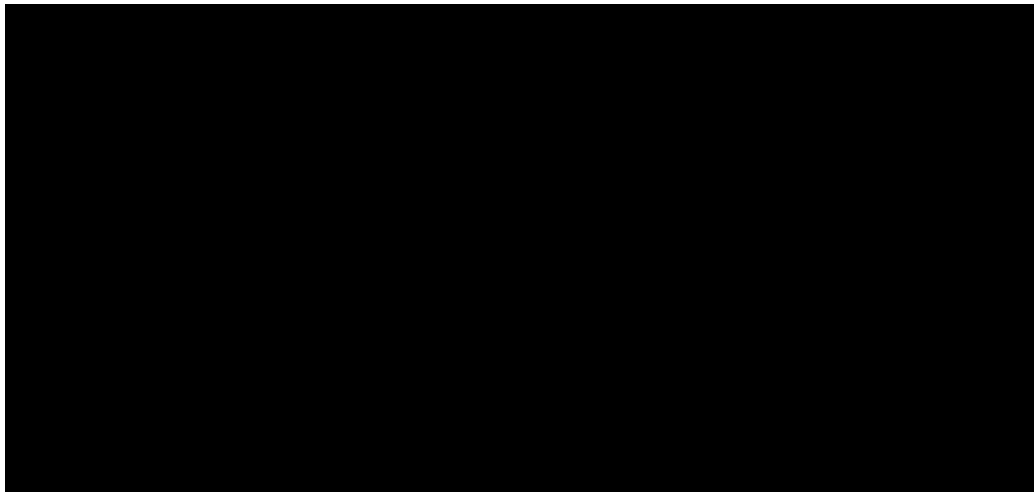


Figure 2. The rise of carbon dioxide emissions. From “*Graphic: The relentless rise of carbon dioxide*” by National Aeronautics and Space Administration (NASA). (n.d.-a). https://climate.nasa.gov/climate_resources/24/. Copyright. Reprinted with permission

The dramatic rise in concentration since 1950 is very noticeable and should be of concern. This spike in concentration aligns to rapid population growth (detailed in a later section) and human activities (also detailed in a later section). This observation suggests a new public policy innovation is needed now, more than perhaps in past decades.

Modelling by the IPCC (2014), shown in Figure 3, is useful to understand as a practitioner, because this modelling indicates the extent of change needed within the economic systems. Each modelled trajectory indicates that forecast future carbon concentrations will continue to rise rapidly over the next 100 years. Indeed, no trajectory shows a decline in the total accumulated stock of carbon dioxide equivalent units expressed as parts per million (ppm):

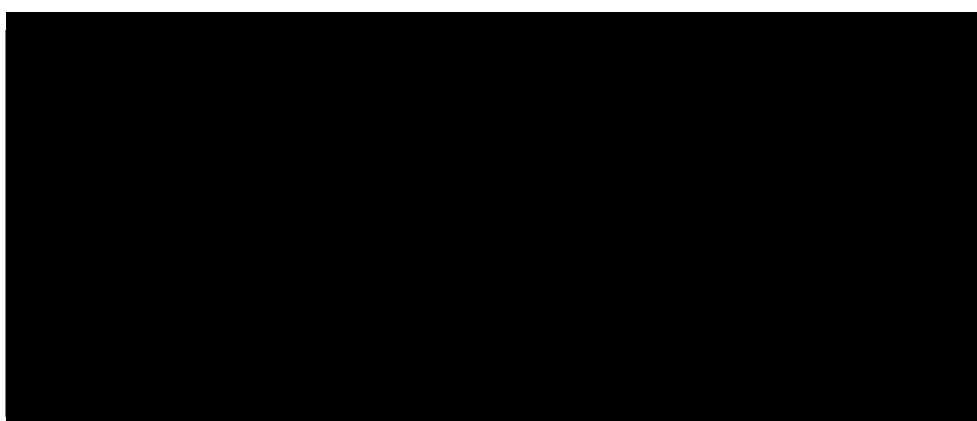


Figure 3. Emission projections. From “*Carbon Dioxide: Projected emissions and concentration*” by Data Distribution Centre, Intergovernmental Panel on Climate Change (IPCC), 2014. http://www.ipcc-data.org/observ/ddc_co2.html. Copyright. Reprinted with permission

The highest trajectory in Figure 3 was A1FI (Minicam (A1G)). This A1F1 modelled trajectory is achieved by assuming:

A future world of very rapid economic growth, low population growth and rapid introduction of new and more efficient technology. Major underlying themes are economic and cultural convergence and capacity building, with a substantial reduction in regional differences in per capita income. In this world, people pursue personal wealth rather than environmental quality. (IPCC, 2014).

This position is comparable to a business-as-usual approach. On the other hand, B1 in Figure 3 estimates the lowest modelled trajectory of forecast future carbon dioxide stock as a result of:

A convergent world with the same global population as in the A1 storyline but with rapid changes in economic structures toward a service and information economy, with reductions in materials intensity, and the introduction of clean and resource-efficient technologies. (IPCC, 2014).

Achieving B1 may require dramatic changes to the economic and community systems, and how these systems interact with the natural system. This B1 trajectory allows for major population growth, but also signals how major changes to the economic system can deliver substantial reductions in emissions to reduce or slow the build-up of concentrations. Therefore extrapolating the predictions by the IPCC (2014), shows that at worst, the total carbon dioxide concentrations may more than double by 2100 under an equivalent business-as-usual approach. At best, with dramatic changes to the economic and social systems, concentrations may only exceed 500 ppm by 2100. However, both scenarios suggest a significant amount of concentration will likely remain.

In conclusion, GHGs should be important to the practitioner. The evidence suggests that the total atmospheric carbon dioxide concentration already exceeds historical records. Furthermore, without significant action to reduce

the flow of annual emissions, the growth in GHGs concentration will likely continue. When these situations are combined, unless public policy delivers a strong mitigation initiative, the likely outcome would be a continued increase in the stock and annual emission of carbon dioxide.

2.7 Human activities contribute to the greenhouse effect

Human activities change the environment. One of the first examples of an agreed statement on how humans impact their environment is contained in the ‘Stockholm Declaration’ in 1972, which emerged from one of the first global meetings about the environmental impacts of human activities. The Stockholm Declaration attributes large-scale environmental transformation to the activities and capabilities of humans. This declaration is significant, as it recognises human dependence on nature and how humans have been changing the earth’s environment:

Man is both creature and molder of his environment, which gives him physical sustenance and affords him the opportunity for intellectual, moral, community and spiritual growth. In the long and tortuous evolution of the human race on this planet a stage has been reached when, through the rapid acceleration of science and technology, man has acquired the power to transform his environment in countless ways and on an unprecedented scale. Both aspects of man’s environment, the natural and the man-made, are essential to his well-being and to the enjoyment of basic human rights the right to life itself. (United Nations,

1972. p.3.)

The scientific capability and technology have developed to a point where the source of human GHG emissions can now be identified. This is shown in Figure 4 which highlights that Australia's historical and future projected emissions can be attributed to a range of industrial sectors.

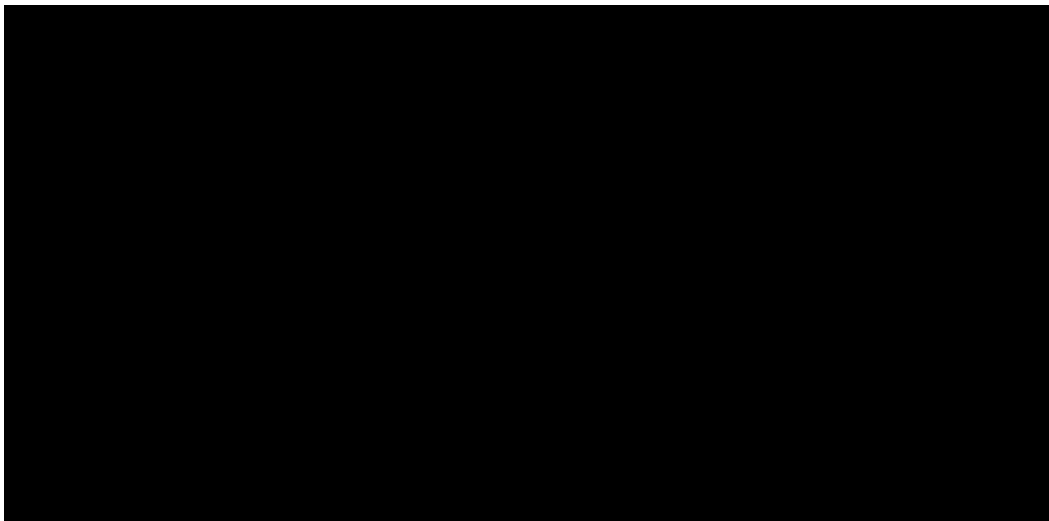


Figure 4. Emissions forecast by sector. From “*Australia’s Abatement Task and 2013 Emissions Projections*” by Commonwealth of Australia, 2013, https://www.environment.gov.au/system/files/resources/51b72a94-7c7a-48c4-887a-02c7b7d2bd4c/files/abatement-task-summary-report_1.pdf Creative commons by attribution.

The overall emissions are expected to increase by 2030, with variations in each sector. These data indicates that electricity, direct combustion, agriculture, fugitives and transport make up the bulk of emissions. These sectors represent an opportunity for the practitioner to implement policies that support emissions reductions.

Carbon dioxide is not the only gas in the GHG mix. The USA EPA (n.d.) describes other GHGs and their origins:

- Carbon dioxide – released by the burning of fossil fuels, solid waste, and wood; and some chemical reactions.
- Methane – released by the production of coal, gas, and oil; livestock and municipal waste.
- Nitrous oxide – released by agricultural and production processes and burning of fossil fuels.
- Fluorinated gases – synthetic gases from production such as Hydro-fluorocarbons, per-fluorocarbons, and sulphur hexafluoride.

These activities become targets for policies aimed at reducing emissions. The reduction or elimination of these activities leads to a reduction in these emissions. Just how to reduce or eliminate such emissions remains a policy challenge.

To sum up, the practitioner should understand that humans play a defining role in climate change. By identifying the origins of human GHG emissions by sector or by emission type, or even by activity, may lead to better-informed decision-making by society, industry and government.

2.8 The stock and flow of greenhouse gases

The total stock or concentration of GHGs and the annual flows of GHGs is

an important concept for the practitioner to understand. According to NASA's Earth Observatory data illustrated in Figure 5 the flows of carbon in the atmosphere can be identified. Yellow numbers are natural fluxes, red numbers are human emissions and white numbers are stored carbon. Each number represents carbon in gigatons.

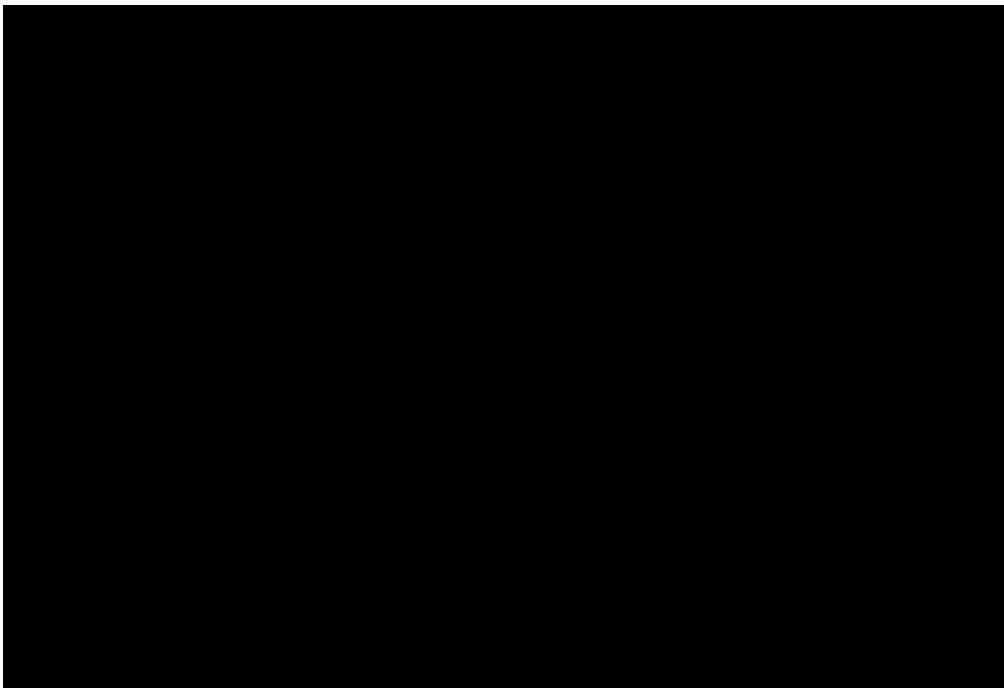


Figure 5. The carbon cycle. From "*The carbon cycle*", by the National Aeronautics and Space Administration (NASA). (n.d.-b). <https://earthobservatory.nasa.gov/Features/CarbonCycle/>. Copyright. Reprinted with permission

Figure 5 illustrates the complex flows of carbon between the atmosphere, plants, oceans, soil, and the key processes of photosynthesis, respiration and decomposition. Human activities have created direct emissions released into the atmosphere and, through land-clearing and soil changes, changed how much carbon plants and soils can store. In this respect, regional areas and the

role of agriculture are very important areas for considering how to mitigate climate change and create the low carbon place. Again, the practitioner should acknowledge these carbon flows and interdependencies within the environment.

The flow of carbon emissions arising from human activity has also increased. Since the industrial revolution, humans have been burning fossil fuels and clearing land and this has consistently increased annual emissions as shown in Figure 6. As stated in the previous paragraph, humans continue to change the landscape and plants and soils, thus reducing the amount of carbon stored through the carbon cycle. With increasing annual human emissions, and less storage capability, means carbon dioxide remains in the atmosphere. If humans wish to continue to develop and use high carbon patterns of living, then it follows that to avoid the rapid build of carbon in the atmosphere, humans need to reduce emissions, regenerate natural resources, or build or rebuild plant and soil capability to store more carbon.



Figure 6. Emissions since industrialisation. From “*The carbon cycle*”, by National Aeronautics and Space Administration (NASA). (n.d.-b). <https://earthobservatory.nasa.gov/Features/CarbonCycle/>. Copyright. Reprinted with permission.

According to Lazarus (2009), stock-and-flow conceptualises an input-output model of GHG emissions. More simply, the stock refers to the current stock or volume of GHGs in the atmosphere and the flow refers to the level of GHG coming into and flowing out of the atmosphere. For Lazarus (2009), the first problem of stock and flow relates to how long GHG’s remain in the atmosphere (p.15). He argues that some GHGs, such as PFCs, last thousands of years in the atmosphere, and can continue to contribute to the global greenhouse effect over that whole time. Even if annual emissions stopped now, the stock already in the atmosphere would persist for a long time. The second problem according to Lazarus (2009, p.15) is the flow of emissions “as long as the GHG emitted into the atmosphere is greater than the amount that naturally falls out every year, GHG concentrations increase over time”. Therefore, if the accumulated stock provides a base level of concentration, then more emissions add more stock. Consequently, the stock and flow ledger needs to be addressed by either reducing annual emissions or

enhancing the capacity of nature to absorb carbon dioxide. Therefore, the public policy challenge should be to identify and action methods to reduce emissions by an amount that also reduces the stock.

The problem of stock-and-flow is further complicated by the existence and impact of different GHGs. GHGs have often been measured or discussed in terms of carbon dioxide equivalents. Other GHGs have a higher concentration effect in the atmosphere than carbon dioxide, and can last longer in the atmosphere. According to USA EPA (n.d.):

- Methane, for example, has an effect 20 times that of carbon dioxide over a 100-year period.
- Nitrous oxide was approximately 300 times more powerful than equivalent carbon dioxide units.
- Fluorinated gases from human activity, like aluminium production, are more powerful per unit than carbon dioxide, with Hydrofluorocarbons (HFCs) lasting 1 to 270 years, Perfluorinated Chemicals (PFCs) 800 to 50,000years, and Sulfur hexafluoride (SF₆) 3,200 years in the atmosphere, with a global warming potential of 140 to 23,000 years.

Clearly, the GHG problem involves a range of gases and of these gases, nitrous oxide and fluorinated gases are much more powerful and last longer in the atmosphere than carbon dioxide. The implication of this is that much of the atmospheric concentration and global warming is already locked in. This evidence suggests efforts to mitigate future emissions will likely need to

be much larger and more direct in order to accommodate the expected impact from these long-lasting GHGs.

In conclusion, the practitioner should develop their understanding of the problem of stock and flow as it is an important feature of the greenhouse effect and future climate change. Public policies that seek to only marginally reduce the annual flow of emissions might fail to consider the annualised accumulation of stock in the atmosphere, and either makes future climate change more pronounced, or make future mitigation efforts harder. The lesson here is that mitigating annual emissions and seeking ways to reduce the stock should be the goal of transitioning to the low carbon place.

2.9 Climate change: what might happen?

Several studies indicate what might happen. The most notable joint scientific effort on predicting the impacts of climate change has been the Intergovernmental Panel on Climate Change (IPCC). The scientific evidence from this body has often been used as a foundation for multilateral negotiations. The IPCC was established to assess climate change, and now has thousands of scientists conducting and publishing research (IPCC, n.d.). Excerpts from the analysis performed by the IPCC (2007) articulate the following climate change impacts:

- Higher average temperatures create more heat stress on human

and ecological systems and have an impact on oceans, weather, water and food supply;

- Rising oceans may inundate coastal settlements and put coastal environments at risk. Some areas may even become uninhabitable;
- Increasing ocean acidification will likely accelerate marine and coastal species extinction and change the current ocean ecological biodiversity and food chains;
- Higher land-based flora and fauna species extinction rates will likely have serious impacts on local ecologies and communities; and
- Changing average temperatures will reduce freshwater availability.

Some countries may better adapt and/or mitigate forecast future climate change than others. Developing countries, for example, may pay a higher human and natural environment price for climate change, as they have less financial resources for mitigation or adaptation and high concentrations of urban poor (IPCC, 2007). In 2013, developing nations represented about 5.9 billion people out of the total estimated 7.2 billion people living on Earth (United Nations: Department of Social and Economic Affairs, 2013). By 2020, reduced freshwater access alone may severely impact 75 million to 220 million people living in Africa and 100 million people living in Asia. By the late 2020s, a further 7 million to 77 million people living in Latin-America and the people living on 51 small island states will feel climate change impacts (UNFCCC, 2007). Other impacts noted in this UNFCCC report

include increasing desertification, changes to food availability and growing seasons, more extreme weather and the prospect of large-scale human settlement evacuation. These developing countries have less ability to adapt or mitigate climate change but face some of the gravest consequences of climate change. What these data indicates is that these climate change impacts will likely not be uniform across earth. Schelling (1992) notes that the impacts of climate change may be different across the earth. Therefore different responses and a different intensity of responses will likely be required.

My primary research has been conducted in Australia, which is an advanced economy and therefore, one of the principle actors causing the greenhouse effect. It may also be likely to experience more severe climate change impacts in the future. Recent weather patterns in Australia highlight the destructive impact of extreme weather on an already fragile continent. According to Steffen (2013), Australia experienced its hottest month on record in January 2013, when all of Australia had an average daytime temperature of 39°C for seven consecutive days (2 to 8 January 2013). The previous record was four consecutive days. There has been only 21 days in 102 years where the maximum temperature across all of Australia has exceeded 39°C and eight of these days occurred between the 2 and 8 January 2013. Additionally, Steffen (2013) also suggests the record was broken for the hottest sea temperature for the Australian region in January and February

2013.

In my workplace region, the New England NW of NSW Australia, climate changes are predicted within the next decade. Scientists forecast this region will likely experience an average temperature increase of at least 1°C, droughts may become more severe, bushfire seasons may become longer, vegetative coverage may reduce and there may be more pressure on water availability, more extreme weather events, more ecological biodiversity stress, and more soil erosion (Steffen and Hughes, 2013). The New England northwest region of NSW, like most of regional Australia, is still dependent on agriculture production. Therefore, these forecast future impacts have major implications for local nature and the economic and social systems.

The Australian climate record is not dissimilar to global climate observations. Globally, 2016 was 1.1°C above the pre-industrial average and exceeded the previous record set in 2015, total carbon concentrations in the atmosphere exceeded 400 ppm, global sea ice declined at an unprecedented 4 million sq. kilometres below average, and global sea levels increased (WMO, 2017). Furthermore, each of the last three decades have been warmer than each previous decade (WMO, 2013). Globally, the WMO (2013) also noted several key global weather events in 2013:

- Australia had its warmest year on record, Argentina its second warmest year on record, and New Zealand experienced its third warmest year on record

- One of the strongest storms ever recorded (Typhoon Yolanda) hit the Philippines,
- Major droughts occurred in China, Africa and Northern Brazil
- Extreme flooding occurred on the border area of India and Nepal, and the Alpine regions of Europe, China, the Russian Federation, Sudan, and Somalia
- Oklahoma recorded its widest ever tornado
- Israel, Jordan and Syria recorded unusual snowfalls
- Record GHGs
- Record ocean height levels
- The Antarctic sea ice reached its highest recorded daily maximum.

It should be noted that volatile weather is not an unusual occurrence, but these events have been noted because of their intensity, rarity or how they have set new records across earth within the same year. These combined events suggest global weather volatility will likely impact regions differently, but each has an intensity to cause significant negative environmental, economic and community cost.

In summary, these data demonstrate that climate change impacts are significant, of varying intensity, and may already be occurring. The extent of damage and societal dislocation arising from climate change will occur relatively fast and not in a uniform manner. If recent weather patterns are

indicative of how bad the environment may become, then the practitioner should understand that these events do not occur in isolation. As stated, the natural system is interrelated to the economic and social systems.

2.10 Humans may not understand the extent of damage they have brought on earth's natural systems

Earth is a complex system, made up of interrelated subsystems like “the biosphere, atmosphere, lithosphere, and community and economic systems” (Donner, Barbosa, Kurths, and Marwan, 2009). These Earth systems are connected in ways we do not yet fully understand. One change over ‘here’ may create many consequences over ‘there’. Therefore, scientists convinced and unconvinced by the evidence of climate change still rely to a degree on what Donner et. al. (2009, p.3) described as “the conceptualization of high-dimensional complex dynamics by simplified low-dimensional models”.

Despite using the best scientific methods available, it is possible that this limitation means that forecast climate change, and its impacts, may occur in a different way than predicted by scientists. Even if humans possessed perfect knowledge of the earth's systems, decision makers and people in favour of economic and social priorities may still ignore this knowledge.

Humans have prioritised the economic and social over the natural for some time. Humans have been predator-like towards their environment; humans

target and “consume all edible species on earth” (Czech, 2008, p.1321). This predator like behaviour has led to habitat loss and fragmentation, overexploitation of species, more pollution, more future climate change, and the introduction of invasive species (WWF, 2010). The main driver, *prima facie*, has been to satisfy human needs and wants (Czech, 2008, p.1391; Randall, 1991, p.61). The problem is that our lack of understanding of natural systems means that the current rate of ecological biodiversity loss may be occurring as fast, or faster, than the habitat loss known to be associated with, and partly attributed to, the dinosaur extinction event (Iucn, 2004), which may even lead to a sixth major extinction event (Millennium Ecosystem Assessment, 2005). This view was also supported by WWF (2010), which highlighted a severe and rapid decline in ecological biodiversity in all but temperate climates.

Deforestation is another regionally important example. Globally, six million hectares of forest has been cleared annually since 2000 (Iucn, 2004). In regional Australia, forests have been cleared to pursue economic and social goals. Since European settlement, about 13% of all vegetation in Australia has been cleared through widespread land clearing to facilitate agriculture (Bradshaw, 2012). This clearing comprised:

34 per cent of rainforest, 30 per cent of Mallee (species), 60 per cent of coastal wetlands in southern Australia, 31 per cent of Eucalyptus (species) open forest, 99 per cent of temperate lowland grasslands and 34 per cent of Eucalyptus (species) woodlands.A net loss of

around 260,000 hectares of forest per year occurred between 2000 and 2004, mainly from clearing for agriculture and urban development. (ABS, 2010, p13)

Practitioners should be aware that even when better knowledge is available, complex systems are difficult to manage. One study provides a unique insight into how difficult the practice of natural systems management can be.

Moxnes (1998) described the results of research into a simulated theoretical fishery in Norway. The decisions made by humans resulted in the following observations:

- An over-capitalisation in equipment, excess harvesting and low capacity utilisation
- A lack of understanding of stocks and flows
- A lack of understanding of non-linear events
- Fishery decision making about the required future capital investment being based only on recent actual fishing outcomes and by trial and error.

In conclusion, the practitioner should approach the problem by acknowledging that people have a limited understanding about how the natural system works. Humans have had a dramatic impact on earth's natural systems, clearing forests and consuming ecology. Much of this destruction was in pursuit of economic and social goals. With so much damage already done to the environment, it is hard to see how regeneration can occur without significant coordination and financial support. Yet despite the best efforts of

the participants in Moxnes' study, a successful strategy to sustainably manage this fishery could not be found. This highlights the complexity facing the policy maker when designing interventions in complex systems.

2.11 The economy is growing and changing

The globalised economy has been, and remains, one of the most pervasive human subsystems on earth. Over time, the economy has grown from localised barter-based exchange to a large, globalised, money-based economy.

Associated with the emergence of the modern economy has been a continued trend of natural resource consumption and changing community dynamics.

Arguments about the need to grow and support the economic system have often been used to validate the continuation of GHG emissions and the use of natural resources.

The definition of the economy varies, from the Greek *oikonomos* where the head of the household makes decisions about what to do, to the self-organising systems as defined by the economist Adam Smith (Bruland, 2003). The Oxford University Press (1997, p.418) defines the economy as “the wealth and resources of a community especially in terms of the production of goods and services”. In 1960, the world's total gross domestic product was \$US1.3 trillion. By 2016, this had increased to \$US75.5 trillion GDP measured by sum value added by all producers with local currencies converted to \$USD

equivalent (World Bank, 2016).

With continued economic development, higher emissions of GHG are a real threat to strategies to mitigate emissions. Economic activity appears to be connected to carbon dioxide emissions (Lane, 2011). The largest economies, like the USA and China, emit considerable amounts of GHG emissions compared to poorer and less populated nations. According to Olivier, Janssens-Maenhout G, Muntean, and Peters, (2014) just over half of global GHG emissions have been attributable to China, the USA and the EU. This report also suggests Chinese and USA emissions continue to increase, but EU emissions have been decreasing. However, the rapid economic growth of the world's two most populous countries, China and India, remains of concern. This growth, unless low carbon places are created, will create even more annual emissions in the coming decades.

Forecast growth in other developing economies should also be of concern to practitioners. Countries with large human populations, like Brazil, China and India, have been industrialising. By 2050, Brazil, China and India could account for 40% of the world economy (United Nations Development Program, 2013). Likewise, if developing countries were grouped then their combined impact on global GDP is significant. For example, in 2005 the combined GDP's of Argentina, Brazil, China, Indonesia, Mexico, South Africa and Turkey equalled 50% of the total GDP of the USA (United Nations Development Program, 2013). According to this report, by 2013 the total

GDP of these countries approximately *equals* the GDP of the USA, and by 2030 it is expected that 60% of the world's middle classes will likely reside in the Asia-Pacific region. Therefore, economic power will shift more towards these developing countries as they industrialise, create wealth, consume and develop service economies.

In conclusion, the practitioner should recognise that the economic system has grown dramatically since 1960. Unfortunately, emissions are connected to economic activity, meaning that economic development implies increased emissions. As industrialisation spreads to other developing countries with a lack of mitigation policy and enforcement to encourage the low carbon place, emissions may further increase. The challenge is to encourage low carbon patterns of development in both developed and developing economies to mitigate future climate change.

2.12 Human populations are growing and becoming more urbanised

Future population trends could also influence future emissions trajectories and amplify any natural system change arising from future climate change. As stated in the previous section, increasing global populations will likely create more greenhouse gas emissions and demand more resources from the natural environment unless the low carbon place can be rapidly created. This is especially the case if future economic development trends follow the

strategies and techniques adopted in the 19th and 20th centuries by Western economic models.

The main indicator of risk is population growth. Global populations have been forecast to substantially increase by 2050, and this raises questions about the capacity of many countries and their people to adapt to or mitigate the effects of climate change. The overall global population growth is forecast to reach 9.6 billion by 2050, where:

World population of 7.2 billion in mid-2013 is projected to increase by almost one billion people within the next twelve years, reaching 8.1 billion in 2025, and to further increase to 9.6 billion in 2050. (United Nations. 2013, p15)

The following Figure 7 demonstrates global population forecasts to 2100.

Figure 7 shows that the median population prediction indicates that the population growth begins to level out and slow by the year 2050 but still will reach 11 billion people. The impact of +/- 0.5 children on the predictions should be noted. A reduction in births of 0.5 could result in overall population declining to less than 8 billion by the year 2100. Vice versa, additional births of 0.5 increases total population beyond 16 billion by the year 2100.

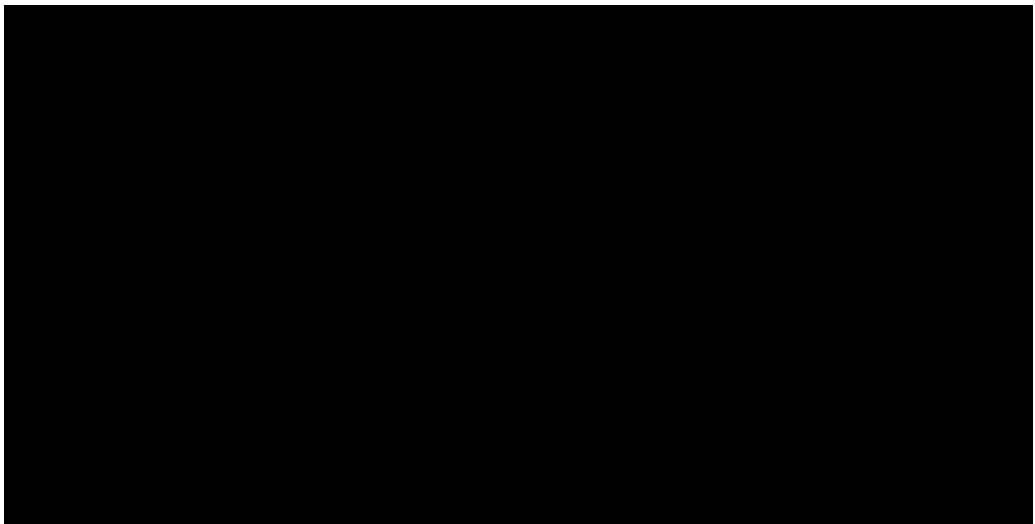


Figure 7. Global population forecast. From “*World population prospects 2017*,” by United Nations, 2017. <https://esa.un.org/unpd/wpp/Graphs/Probabilistic/POP/TOT/>. Copyright. Reprinted with permission.

In just 16 years’ time, approximately 4.9 billion people will likely be living in towns and cities, compared to an estimated 3.3 billion people in 2008 (United Nations, 2013). According to this UN report, the predicted rate of growth in urbanisation is historically high, with African and Asian urbanised populations predicted to double by 2030. In contrast, this UN forecast suggests developed nations’ urban concentration will likely only increase marginally and will likely remain fairly stable to 2050. In the Australian context, according to the Australian Bureau of Statistics (2014), the total Australian population is forecast to reach between 36 million and 70 million people by 2100, with 89% of Australia’s population living in capital cities by 2053. In Australia, people generally tend to live in cities, inner urban areas, and along or near the ocean coast.

There has been a range of reasons why urbanisation continues to grow. The reasons may vary at the individual level, but generally the United Nations (2013) credits this increase in urbanisation with the opportunities afforded to people living in urban areas compared to the opportunities in rural areas. The effect of this increasing urban concentration is that regional (or rural) areas have been experiencing declining populations in many advanced and developing countries. Many people leave rural areas and move to cities for economic opportunity. Some rural migration has been attributed to the environmental conditions of rural areas, including access to raw materials and amenities. In Finland, rural migration has been related to economic structural change, as many regions that were once dominated by resource-based economic activity transition towards knowledge and service based economic activities (Lehtonen, Tykkyläinen, and Voutilainen, 2012). Such a shift from a high dependency on resource-based economic activity to more non-resource dependent economic activity is also believed to contribute to population loss in rural USA (McGranahan and Beale, 2002).

Another factor may be the amenity of place. Both Lehtonen, Tykkyläinen and Voutilainen (2012) and McGranahan and Beale (2002) found rural migration in Finland and the USA can also be partly attributable to an observed desire to live in a more favourable climate or escape from “low amenity” living conditions. It follows that policymakers should question what the implications might be if future climate change further reduces the amenity of regional areas.

Could this lead to even more rural outward migration? A counterargument may then be made that public policy should consider the potential impacts of the low carbon place model to increase amenity and natural resources in order to preserve rural populations. Practitioners could then consider initiatives that regenerate or isolate areas of natural importance, or create new industries like tourism and other recreation-based activities (Deller, Tsai, Marcouiller, and English, 2001).

In conclusion, the practitioner should be aware that future global population growth and increasing urbanisation are important trends to consider when designing mitigation strategies in regional development agencies. With more people living closer together, opportunities to reduce transport emissions and increase natural vegetation regeneration or protection may arise. The practitioner should be aware that the environmental quality and amenities of regional areas may influence whether people move or stay in regional areas, and this insight should be used in regional economic development planning activities.

2.13 General observations why the community has resisted taking action on climate change

Many people in the community have resisted taking action on climate change. Their reasons vary, as will be shown in this section. Several studies are cited in

this section to demonstrate why people resist taking action on climate change.

First, one of the main challenges for public policy practitioners addressing a topic like climate change has been overcoming the terms “nature” and “environment”. According to Harvey (1993), these terms have been very problematic in the discourse about climate change. Harvey suggests these terms have become so common to everyone because nature and the environment exist all around us. As a result, everyone has an opinion about the environment, which then creates a very diverse set of views and therefore much ambiguity. Harvey does not suggest that attempts to overcome this problem, such as reframing discussions to assess the *health* of the environment, have not been successful, but highlights how discussions about nature and the environment inevitably fall back to asking how natural resources will be made available for participants in the economic and social systems. This fall - back position lies at the root of the problem. For the practitioner, this observation means that discourse about climate change needs to shift towards the health of the environmental systems while still preserving access to certain natural resources for the economic and social activity.

Second, humans generally view themselves as a species that can exist and adapt to the earth’s changing conditions (Dicks, 2011). This view presupposes that humans have the ability or the tools to adapt, either through biological adaptation, technology adoption and innovation, or by changing the economic systems. Such a view discounts the connection between, and reliance of, the

individual, man or beast, on its surrounding environment (Dicks, 2011).

Humans almost totally rely on the natural system to provide air, food and shelter and raw materials.

Three, a study was conducted by McCright and Dunlap (2003). In this study, the authors conducted a purposive study of participants from fourteen conservative think tanks that are considered to be influential on climate change policymaking. They concluded that participants perceived global warming as being a gradual and naturally occurring process, that global warming is a problem in the future and it would be a costly problem to address now, and that the very public debate between scientists and industry lobbying creates uncertainty.

Four, a study conducted by Feldman and Wilt (1999), who conducted a review of the literature about the bioregional characteristics of the climate change problem, found that community responses about climate change indicated uncertainty, and the effects of climate change over the long-term would allow time for more delay. This perceived uncertainty of climate science encourages doubt, which then disconnects the problem. These data also indicated that climate change felt quite distant, that vested interests influence policy-makers, and the level of collective action has been reflected, or limited, by the level of incentives. These responses indicate an observable tension between individual choices and priorities, and the uncertainty about the science and the role of

vested interests in policy making.

Five, Scruggs and Benegal (2012) analysed thirty years of survey data from sources such as Gallup, Pew and Stanford/Ohio State, Pew Centre, and European commission surveys from members in 27 countries for 2008 and 2009 and 2010. This study concluded that participants' concerns about current and future economic conditions influenced public opinion about climate change (Scruggs and Benegal, 2012). This suggests that the community might have been convinced that reacting to climate change might cost money or jobs, and this outcome was not a high priority for many people.

Six, Capstick (2013) identified themes emerging from datasets collected from other studies that investigated public perceptions of climate change. Capstick (2013, p.3489) found that individual action is perceived to be useless "in the context of inaction by others", and found the discourse about climate change leaned towards "fatalism", "resignation", and a "lack of agency" (p.3490), with the problem becoming "intractable" to most people (p.3494). Furthermore, Capstick (2013, p.3497) also found that many participants in the study suffered from "multiple conflicts between collective and individual interests, seen to be driven by factors such as self-interest and free-riding".

Last, members of the community try to make sense of climate change in the face of intentional and unintentional misinformation about climate change. This makes it harder for people to decide what is best for them individually

or as a society (Lewandowsky et.al, 2012). The origins of misinformation can easily be identified as: ‘rumours and fiction’, ‘governments and politicians’, ‘vested interests’, and ‘the media’ (Lewandowsky et.al. 2012, p.108), and people within each of these categories have varied reasons for promoting misinformation. What is important to note at this point, is that doubt about climate change scientific consensus, doubts about what to do, cautiousness about introducing new regulations have been and continue to be influenced by misinformation.

Although not exhaustive, these data provides the practitioner with information to better understand the context for this topic, and help develop strategies. The reasons behind non-action vary but can be summarised as wrestling with what to do, doubting climate change, being comfortable that climate change will take a long time, whether one can make a difference, and being concerned about what others are doing.

2.14 Why Australians have not taken action on climate change

Many people in Australia have also been uncertain about climate change. Several studies are cited in this section that highlights the Australian perspective on climate change and climate change action.

In the second annual survey of Australian attitudes to climate change, Leviston

and Walker (2011) describe how uncertain communities have been when interpreting information about climate change. This study surveyed 5030 Australians as part of a longitudinal research program and found 77% of respondents believed climate change was happening, 43% believed climate change has been happening and humans caused it, 4.5% had no idea climate change was happening, and 45% believed climate change is happening but it has been largely due to the earth's natural processes. Interestingly, according to this same report, women were found to be more likely than men to believe climate change is happening, and rural town residents were less likely to accept climate change. These same authors also measured responses against perceptions. Respondents also overestimated the number of people that deny climate change, as the participant estimate was 22% versus an actual 8%, indicating climate change deniers exert considerable influence over these community participants. These respondents were also asked to list whom they trust the most in providing reliable information on climate change. Interestingly, universities and scientists were ranked #1, followed by friends and family #2; with government and oil companies ranked second last and last respectively.

In rural Australia, climate change and the perception and dialogue about climate change display fairly unique characteristics. For example, Buys, Miller, and Megen (2012) conducted a case study analysis on two Australian regional areas in New South Wales and Victoria as part of a research project into

community perceptions about the forestry industry. These authors conducted twenty-three semi-structured interviews of community members in the Eden/Gippsland regions in NSW and Victoria, Australia. The participants included farmers, semi retirees, scientists, healthcare workers, a teacher, a student, a minister of religion, and a homemaker. Their findings indicated first, that rural residents who were genuinely concerned about climate change used the term “climate change”, where others less convinced about climate change used terms like “weather variability”. Second, those rural residents concerned about climate change were fearful of the impacts of climate change and the effect on their finances and businesses. Third, some participants acknowledged how important the success of agriculture has been in sustaining their communities. Fourth, the participants also identified that climate change would create ‘winners and losers’ by interpreting the positive and negative effects of global warming by using examples like increased cropping periods, increased tourism in coastal areas, which are offset by negative impacts like increasing sea levels, the threat from reduced water supplies, and drought. The participants in these case studies also indicated that their regions and businesses had the capacity to adapt to climate change in the future, when more action and leadership came from government.

In Australia, an observable connection between community attitudes about climate change and the moral foundations and political preferences of communities can be shown. A survey conducted by Dawson and Tyson (2012)

of 487 Australian adults between 18 and 86 years of age, found that the participants attitudes towards climate change could be related to their moral intuition and political preference. Specifically, these researchers identified that their participants with a moral foundation displaying strong views about harm or care and fairness and reciprocity tended to have a strong connection with accepting climate change. Holding such a view may indicate socialist or so-called left- leaning politics in respondents. On the other hand, these researchers found participants with a strong moral foundation displaying in-group and loyalty were less accepting of climate change, with preferences for outcomes or decisions to be made in the national interest of the “in-group” they belonged to. Furthermore, the moral foundation of authority and respect, as well as purity and sanctity, tended to align with the moderate right and conservative right of the political spectrum. This is relevant for the practitioner because community engagement with regional people will inevitably involve people with diverse views, and these views should be taken into account.

A study of political orientation and climate change belief in Australia was conducted by Leviston and Walker (2011). They found individuals who indicated they did not believe in climate change ranked their political orientation as the National Party (Conservative) and the Liberal Party of Australia (Conservative). About 32% of participants who believed climate change was happening, but only as a natural process, ranked the Liberal/National parties the highest. Those participants who responded that

climate change was happening and was human induced ranked the Australian Labour Party (Socialist/Centrist), Greens (Socialist), and Independents higher. These findings show how the community might generalise about climate change through the lens of their moral or political orientation. This could be particularly challenging for practitioners operating in conservative regional areas of Australia.

Young people in Australia may be adversely impacted by climate change. A study by Strazdins and Skeat (2011) surveyed twenty-four adult professionals about how climate change has been impacting on young people and children in Australia. This study found respondents connected climate change to a decline in mental wellbeing in young Australians, including children. The study also found that climate change would be an extremely important issue for young people and children in the future. Participants in the study indicated that young people and children do not have the opportunity to participate in public policy, and that more effort should be made to allow them to participate. Better community consultation and decision-making may form part of a broader solution to this problem.

In summary, the practitioner should understand that the Australian studies show that people in Australia appear to doubt the extent of climate change and weather change, people's views were aligned to their political views, and young people were concerned about their future prospects. These data should

indicate to the practitioner that mitigation policy is inherently political and intergenerational, and that policy equity will be important.

2.15 People do not know what to do about climate change or have better things to do

Several studies cited in this section identify that many people do not know what to do, or in their minds have better things to do than to address climate change. This indicates that people in the community, in leadership positions, or in business may need to be given guidance, rules or regulations, or better information, and that people need to understand why this topic is important and why they need to change.

Studies of USA and European views about climate change identified that people often did not know what to do about climate change, or prioritise other things over climate change. The research conducted by Lorenzoni and Pidgeon (2006) investigated USA and European perspectives on climate change by reviewing quantitative social surveys and qualitative in depth studies from various sources and research studies. Lorenzoni and Pidgeon were interested in observing how these perspectives influence people's priorities within their daily lives. They concluded that climate change is complex and misunderstood amongst laypeople in particular, especially when mitigation strategies would likely involve immediate loss of lifestyle. These authors also found there was an "awareness and concern" about climate change, but it was seen as less

important than other matters in people's lives. There was also evidence that climate change is perceived as negative and distant, which might inhibit their acceptance of the need to change, or help to delay changing their behaviour. Their study also found wide support for doing something about climate change, but there was also evidence of respondents having a limited understanding of what to do and the type of options available. Importantly, the respondents in this study indicated that they sought more government leadership to address the issue.

Similar findings about community attitudes toward climate change have been observed in the United Kingdom. The researchers Lorenzoni, Nicholson-Cole, and Whitmarsh (2007) asked participants what they perceived to be barriers to climate change action. Similar to other studies quoted in this section, the participants displayed a lack of knowledge about the causes and consequences of climate change and a lack of knowledge about potential solutions. There were also observations about participant uncertainty and scepticism about the concept of climate change, and concern about how accurate climate change information is. This scepticism also created doubt over how much of an impact individual actions to reduce climate change would make, and enhanced the view that climate change was a distant problem and would probably affect others more than the respondent. These results also indicated participant concerns about whether everyone was participating in climate change mitigation, so that one group was not being disadvantaged by another not

taking action (free-riding concerns).

Many people have been uncertain about the type of actions they could take to limit climate change. In a report for the UK Department of Transport, the researchers Anable, Lane, and Kelay (2006) were asked to review public perceptions about climate change and transport through literature review. Anable, Lane and Kelay cited evidence obtained in Hounsham (2006), where participants were asked what steps they could take to be more environmentally friendly. The survey responses in one study showed that 38% of the participants indicated that they did not know what to do, 32% responded that others have not been not been doing enough, and 25% responded that they did not know and could not answer any of the questions. This survey also found that 20% of participants that responded thought their actions would not make a difference to the overall problem of climate change, and 32% of participants responded that others are not doing anything. Anable, Lane, and Kelay also found that from a choice of actions about how to be environmentally friendly, about 27% of participants responded 'none of these' possibly indicating that an additional economic cost or behaviour change was not acceptable to them, or they had a limited interest in or were confused about what to do. These data indicate that policy makers and practitioners need to improve communication and provide more leadership in the community.

In summary, the practitioner could reflect on why people do not know what to do about climate change and why they should change their behaviour. This

is an opportunity for the practitioner to design appropriate programs, rules and regulations that help guide behaviour and motivate people to change.

2.16 Many people deny climate change

The studies cited in this section highlight how and why people deny climate change. This is important data for the practitioner to understand because programs will need community and political support. Deniers could be vocal stakeholders with power, and may be in a position to influence policy.

A study was conducted by Stoll-Kleemann, O’Riordan, and Jaeger (2001) of fourteen focus groups in the German speaking region of Switzerland between 1997 and 1999, and investigated a possible psychological basis for the denial of climate change. Stoll-Kleemann, O’Riordan and Jaeger (2001, p.112) identified nine strategies of climate change denial. Several strategies reflect findings already described in this section such as a denial of responsibility, ignorance, powerlessness, and fabricated constraints. However, several points of difference such as “the metaphor of displaced commitment” or “I protect the environment in other ways” is a strategy used by deniers. The second key difference was strategies to either “condemn the accuser” or reject “blame”. This indicates the use of defensive and offensive actions and language.

Many climate change sceptics contest scientific findings that support the proposition that humans have been contributing to climate change. Schmidt

(2010) provides several examples of what sceptics say. Firstly, Schmidt says sceptics argue that many more scientists probably doubt the evidence of climate change and its origins, but do not publicly reject the majority of scientists who support anthropogenic origins. Hence, this might mean a silent majority of doubters exists. Secondly, according to Schmidt, sceptics debate the climate change issue by arguing about different elements of climate change. Some support the evidence about climate change but claim the cause is more likely to be other factors, like sun cycles, rather than human factors. Thirdly, Schmidt argues that some scientists agree with man-made climate change, but claim the cost of mitigating future climate change might be higher than the actual future climate change impacts. This view suggests climate change should be considered within the context of a broad set of other priorities. Lastly, Schmidt suggests sceptics use strategies like amplifying scientific errors, and creating doubt in the media to challenge climate change science. These strategies create doubt and uncertainty in the minds of many people, particularly those in the community.

The data suggests that the evidence presented about climate change convinces a majority of experienced climate change scientists. The study by Anderegg et al. (2010) undertook to test the credibility of so-called climate researchers who were both “convinced” and “un-convinced” by the scientific evidence. These authors identified 1,372 climate researchers with a minimum of 20 publications (which reduced their participants to 908 researchers) and concluded that those

researchers unconvinced by the evidence represented only 2% of the top 50 scientists ranked in this study, only 3% of the top 100 and only 2.5% of the top 200 climate change researchers. This suggests over 97% of the top climate change researchers are convinced by the evidence. Strikingly, those researchers excluded from this list on the basis of having less than 20 publications, represent approximately 80% of those researchers unconvinced by the evidence cohort, versus less than 10% of the convinced cohort. These authors concluded that:

This indicates that the bulk of *unconvinced* by the evidence researchers on the most prominent multi-signatory statements about climate change *have not* published extensively in peer-reviewed climate literature. (Anderegg et al. 2010, p2)

This finding is also supported by another study:

The narrative presented by some dissenters is that the scientific consensus is ‘...on the point of collapse’...while ‘...the number of scientific “heretics” is growing with each passing year...’...A systematic comprehensive review of the literature provides quantitative evidence countering this assertion. The number of papers rejecting Anthropogenic Global Warming (AGW) is a miniscule proportion of the published research. Among papers expressing a position on AGW an overwhelming percentage (97.2% based on self-ratings, 97.1% based on abstract ratings) endorses the scientific consensus on AGW. (Cook et.al. 2013, p.6).

In conclusion, the practitioner should better understand the many reasons why

people in the community and in leadership positions deny climate change. This section presented a range of reasons how people deny climate change such as: waiting for others to act, other people not doing enough, people do not know what to do, and what can be done will do little. Other people argue about the validity and accuracy of climate science and refer to natural causes, while others point to data from the minority of academics who remain unconvinced by the data.

3. A brief description of my innovation

My innovation has been outlined in Book Three. In summary, the conclusions drawn from the data indicate the following initiatives could support regional development agencies to facilitate the transition to a low carbon place:

1. The regional development agency should create the double loop or triple loop learning organisation form to address this topic.
2. The regional development agency should adopt ecological modernisation programs.

This conceptual framework directly addresses my workplaces' priority to create a net-zero carbon NSW by the year 2050. Public and government support would be needed for this innovation to be introduced into the regional development agency. Once this support was obtained, my innovation could quickly achieve scale by diffusing throughout the regional development agencies in most advanced and developing countries.

4. Originality

A similar study that approaches for this topic from the perspective of a regional development practitioner in regional NSW, Australia, has not been found.

Studies that have been quoted in this first book have typically identified what can be done, especially in the urban space, and how much it might cost, but lack detail about how to implement transitional policies from a regional development practitioner perspective.

5. The boundaries and/or limitations of my innovation portfolio and innovation

The boundaries for this innovation portfolio have been described using Koroljungberg and Hayes (2010) description of instrumentalisation, study context and scope, and epistemological boundaries. The first boundary identified by these authors is instrumentalisation, which has been defined as the methods used to collect participant data in order to address the research question. In this innovation portfolio, my methods include literature reviews, informed person participant interviews, informed person participant workshops and practitioner-researcher self-reflection. Therefore the data collected have been limited by the professional experience and knowledge of these informed persons and their bias, and by my bias and capability to interpret and critically analyse these data as a practitioner and researcher. As such, a boundary has been created through limited sampling, bias, and my limited practice.

The second boundary is context and scope. The contextual analysis for the innovation has already been described in this book. These sections contextualise the natural, economic, and social systems that influence climate change policy. This establishes a boundary for the investigation as the data collected necessarily includes my interpretation of the interrelationships between these systems, and how these systems might influence my policy framework. The first limitation, scope, refers to the limitations of accessing a wider primary data source. As the researcher, I performed the roles of primary data collection, transcribing and analysis as a part-time distance student. Only 24 people participated in interviews or workshops. The one-on-one interviews, with the exception of the interview with the planning professional, occurred on the telephone. This approach might have missed important body language or the participant answers may have been affected by this approach. On the other hand, the three workshops were conducted face-to-face but were limited in size, typically 5 to 7 people, and the location, which was limited to the regional cities and towns of Armidale, Bingara and Tamworth in NSW. Therefore, my boundary and scope limits any possible generalisations drawn from my data analysis.

The third boundary relates to epistemology. In my policy framework, the epistemological boundary can be identified by my use of the interpretivist/constructivist approach to obtain data. Such data can be obtained via written and oral language recording, in interviews and self-reflection. In

this portfolio, semi-structured questions and vignettes has been used, and the data collected was transcribed and assessed by the researcher. The researcher categorised these data into themes to better understand how the participant responses could be applied to the research question,(Cooksey and McDonald, 2011). This epistemological approach also contributes to the originality of my innovation portfolio. My research stance and methods within this profession and within my location are an original contribution to knowledge.

6. The development history of my innovation

This innovation has emerged after several years of dedicated part-time study. The evidence collected has been influenced by my professional observations and my personal and professional journeys during that time.

On self-reflection, my concern for the environment grew after some personal life changes, and participating in the Masters of Economic Studies (UNE). In particular, the unit Natural Resource Economics was highly influential in my thinking about the interdependence of the economic, natural and social systems. In this very enjoyable and informative unit, I learned more about the limits of economic growth, the evolution of environmental or ecological concern, the methods for controlling and regulating environmental impacts, and the market failures in the current economic system. Despite having more concern about the environment, my knowledge and expertise were still very limited and my ability to undertake self and wider change was also limited.

After moving to Tamworth NSW in 2006 and becoming a regional economic development practitioner, my views about the economy and the environment changed. Witnessing firsthand the natural limits of the land, the reliance on water, extreme weather events and drought in the local area has changed my views about the environment. I began to realise how the natural system sustains both humans and non-humans. It occurred to me the natural system around me was the foundation for everything else.

As I learned more about the local natural environment and its relationship to the economic and social systems, I became more active in communicating and researching the issue of sustainability and climate change. One of the first actions I took was to co-found and chair the newly formed Northern Inland Sustainable Business Network (NISBN) (NISBN, n.d.). NISBN was created to assist businesses to reduce their environmental footprint, and therefore become more sustainable. NISBN continues its work today, and, with very limited resources, NISBN has delivered many good projects to local businesses community. In recognition of this work, NISBN has won national and local awards, and has been a very good example of how different departments from different levels of government can work together for the benefit of the local community and environment.

During the period from October 2013 until August 2017, I have analysed the data, conducted fieldwork, learned from my workplace experience, and conducted action research cycles of data gathering, analyses, adjustment and

self-reflection for this innovation portfolio. Also, during this time, I have engaged in deep reflection about the issues being addressed by my policy framework, and the data I collected during the research process. This deep reflection was necessary in order to achieve the goal of this professional doctorate: the creation of an innovation. The creation of a meaningful and valid innovation was personally important to me. During this time, it struck me that the future of earth is not only my future but the future of my children, every other human, and nature. My literature review clearly identified an urgent need to take dramatic action to mitigate future climate change. The literature and my engagement with other professionals also indicated effective solutions had not yet been found and implemented.

In conclusion, the development history of this innovation has spanned a number of years of part-time study. During this time, I have been able to combine practice knowledge with research knowledge in a process of creativity through reflection. This process has created an original contribution to this topic, and an actionable and scalable innovation.

7. Key stakeholders and communication protocols

The following key stakeholders in my innovation portfolio represent both internal and external organisations related to my innovation portfolio.

First, all three levels of government are stakeholders in my innovation portfolio. The Commonwealth Government, the New South Wales Government, and local governments may be impacted by my innovation. My innovation is described as a conceptual policy framework, which would be available for adoption by either or all three levels of government, or each one individually.

Second, my peers are stakeholders in my innovation portfolio. My innovation may influence or impact on other regional development practitioners and organisations, and the wider public service. My findings and innovation may be published in journals or presented at conferences, which will further disseminate my innovation. The first act of dissemination will likely be the completion of this innovation portfolio for the award of PhD.I. The second act of dissemination is to brief my employer about my findings prior to any external publication. This briefing will likely also present my workplace solution to my research issue, with an offer to begin a process of implementation. The third act of dissemination is to describe my findings in scientific journals. These journal articles will likely be co-written with my principle supervisor and co-supervisor.

Third, the UNE is a stakeholder. My innovation portfolio seeks to qualify for the PhD.I degree award, and the UNE has provided the course and supervisors to assist me to complete my innovation portfolio. Beyond this however, UNE

will likely also be a stakeholder in my future research endeavours and possibly my future career as a practitioner researcher.

Finally, the public is a stakeholder. My innovation portfolio has involved the public as participants in my innovation portfolio, and my innovation will likely involve a range of people in organisations or policy making roles who may be influenced by my research in the future.

In summary, these stakeholders are involved in my innovation portfolio and will likely remain important stakeholders for actioning my findings and facilitating future research I may undertake on this issue or another related issue.

8. The quality criteria used to guide the development process

The criteria used to guide the development process are based on Tracey's (2010) eight big tent criteria for quality research: a worthy topic, rich rigor, sincerity, credibility, resonance, significant contribution, ethical and meaningful coherence. Each criterion is addressed in the following sections.

I consider climate change research a worthy topic. This innovation portfolio targets a very serious global problem and approaches the solution from my perspective as an economic development practitioner in Australia. Given an agreed and implementable global solution has not been achieved, the topic is

timely, relevant, significant and interesting, and still encourages analysis and innovation.

The data collected and the analysis undertaken have been designed to ensure rich rigor. My approach used literature sources, primary data collection from interviews and workshops, and self-reflection of my practice. Such methods include using a combination of data sources to confirm or support statements made in this section (Cavana, Delahaye, and Sekaran, 2001). This method was considered the best approach as using triangulation enhances the validity and reliability of data (Patton, 2011).

The literature review conducted for this study identified information from peer reviewed journals, government websites and books, and interviews with 24 informed persons, including three group workshops in regional settings within my practice. The data were coded using Nvivo software to help to identify the themes. Cross comparison of themes then follows even though participants and session structures were not standardised across the data set.

My self-reflection diary includes 45 entries. The self-reflexivity process demonstrates my approach to developing sincerity in my research. This process includes entries about my emotions and thoughts during this research journey. My bias has been identified in this research process through a discussion about my practice and quoting from diary entries. Diary entries reflect my feelings

about the context and the research process, including descriptions about the emergent innovation.

I used methods to improve the credibility of the data I obtained, and my interpretation of the data. There are extensive references to the data sources including direct quotes. Where possible multiple data sources have been used. The data I collected from participant interviews were collected by me during the interviews, and only my handwritten notes were used to ensure the data recorded at the time reflects what notes I had taken. Direct participant quotes have been used to ensure there is a direct connection between participant responses and interpretation.

The subject and my research process have been personally meaningful. This subject should also resonate with the global community. Future climate change impacts require substantial public policy responses to avoid widespread damage to the natural, economic and social systems, and avoid the death or possible extinction of many of the earth's species. These impacts will also likely also deeply affect my practice, as climate change will probably require structural adjustments in the economy and its interaction with the environment.

The data collected about climate change, my interpretation of the contextual influences on public policy and economic development, my narrative about the innovation development history and the description of the innovation should make a significant contribution to knowledge. Personally, my policy

framework portfolio has made a significant contribution to my skills and has enhanced my ability to critically analyse and communicate issues. I also consider my findings to be relevant to policymakers and economic development practitioners.

My research has been conducted ethically. I have sought and was granted approval for my research and engagement with participants by the UNE Ethics Committee.

The title clearly states the objective of this research and is meaningful and coherent. The presentation of the innovation portfolio follows the recommended structure of the PhD.I. The solution, to be described in book three, was found by engaging with professionals and their practice to inform my practice as outlined in book two.

In summary, by addressing the eight big-tent criteria in the preceding paragraphs, my research approach for the development of my innovation can demonstrate that it is a worthy topic, with rich rigour, sincerity, credibility, and resonance, which makes a significant contribution to my workplace knowledge, has been conducted ethically and has been constructed with meaningful coherence.

9. Book one conclusion

In conclusion, book one outlined the context for the innovation that the practitioner should try to understand and consider before developing a new policy. These characteristics address what regional development agencies do, what climate change is and how it may impact earth's natural systems, how the economy and population continues to grow putting even more pressure on the climate, why some people do not take action, and why some people deny climate change.

This first book also introduced my innovation and how the innovation developed over time. The innovation includes a recommendation to adopt the learning organisational form in the regional development agency, and adopt ecological modernisation programs. This approach is transitional in nature as my workplace, as consistent with other regional development agencies, still relies on developing high emission regional economies. The development of the innovation was also described demonstrating how I learned more about my topic from conducting research and continuing my professional practice.

These sections also showed that the innovation is connected to the first and second phases of my research in a process of action research cycles that found new data which led me to subsequently adjust my enquiry. Additionally, the boundaries and limitations of my research were outlined indicating that the magnitude of the issue created a limit in scope, and that the small sample size

and my practitioner self-reflection limit generalisations.

Given that the context for my innovation has now been outlined, the next book outlines the second phase of my research. This next phase involves the collection of data from other practitioners in strategic positions of planning, communities, community development, environmental program delivery, and policy, with the aim to learn from other practitioners about *what works in practice*.

10. Book one references

A. E. M. O. (2014). NEM Electricity Demand Continues Downward Trend.

Australian Energy Market Operator (AEMO), Media Centre. Retrieved from <http://www.gbb.aemo.com.au/Media-Centre/NEM-Electricity-Demand-Continues-Downward-Trend>

ABS. (2010). Australia's Biodiversity, Year Book Australia, 2009–10.

Australian Bureau of Statistics. Retrieved from <http://www.abs.gov.au/ausstats/abs@.nsf/Previousproducts/1301.0FeatureArticle12009%E2%80%9310?opendocument&tabname=Summary&prodno=1301.0&issue=2009%9610&num=&view=>

Adger, N., Huq, S., Brown, K., Conway, D., & Hulme, M. (2003). Adaptation to climate change in the developing world. *Progress in Development Studies*, 3(3), 179–195.

Adger, W. N. (2003). Social capital, collective action and adaptation to climate change. *Economic Geography*, 79(4), 387–404.

Anable, J., Lane, B., & Kelay, T. (2006). *An evidence base review of public attitudes to climate change and transport behaviour: final report*. The Department of Transport, July 2006. Retrieved from http://www.fcrn.org.uk/sites/default/files/Evidence_of_public_attitudes_and_behaviour.pdf

Anderegg, W. R. L., Prall, J. W., Harold, J., & Schneider, S. H. (2010). Expert credibility in climate change. *Proceedings of the National Academy of Sciences of the United States of America*, 107(27), 12107–12109.

Australian Bureau of Statistics. (2017). 3218.0 - 2011 Census. *Quickstats*. Australian Bureau of Statistics. Retrieved from http://www.censusdata.abs.gov.au/census_services/getproduct/census/2011/quickstat/0

Australian Academy of Science (n.d.). *What is climate change?* Science Booklets, The science of climate change. Australian Academy of Science: Australia. Retrieved from <https://www.science.org.au/learning/general-audience/science-booklets-0/science-climate-change/1-what-climate-change>

Australian Government. (2016). *Paris Agreement*. Australian Government Department of Environment and Energy. Retrieved from <http://www.environment.gov.au/climate-change/australias-emissions-reduction-target>

Beatley, T., & Newman, P. (2013). Biophilic cities are sustainable, resilient cities. *Sustainability (Switzerland)*, 5(8), 3328–3345.

Bradshaw, C. J. a. (2012). Little left to lose: Deforestation and forest degradation in Australia since European colonization. *Journal of Plant*

Ecology, 5(1), 109–120.

Bridge, G., Bouzarovski, S., Bradshaw, M., & Eyre, N. (2013). Geographies of Energy Transition: Space, Place and the Low-Carbon Economy.(Report). *Energy Policy*, 53, 331-340.

Bridger, J. C., & Alter, T. R. (2008). An Interactional Approach to Place-Based Rural Development. *Community Development*, 39(1), 99–111.

Bruland, K. (2003). What is the economy in economic history? *Scandinavian Economic History Review*, 51(2), 32-44.

Buys, L., Miller, E., & Megen, K. (2012). Conceptualising climate change in rural Australia: community perceptions, attitudes and (in)actions. *Regional Environmental Change*, 12(1), 237–248.

Capstick, S.B. (2013). Public understanding of climate change as a social dilemma. *Sustainability*, 5(8), 3484–3501.

Cavana, R. Y., Delahaye, B. L., & Sekarin, U. (2001). *Applied business research: qualitative and quantitative methods*. Australia: John Wiley & Sons.

Clayton, A. M. H., & Radcliffe, N. J. (1996). *Sustainability: A systems approach*. London: Earthscan Publications.

ClimateWorks Australia, 2014, *How Australia can prosper in a low carbon*

world: Pathways to prosperity in 2050. ClimateWorks Australia. Retrieved from <https://climateworks.com.au/publication/report/how-australia-can-thrive-low-carbon-world-pathways-prosperity-2050>

Collits, P. (2008). *The Learning Practitioner*. SEGRA Conference papers, Albury NSW, August 2008.

Collits, P. (2012). Is there a regional australia worth spending big on? *Policy: a Journal of Public Policy and Ideas*, 28(2), 24–29B.

Commonwealth of Australia. (2003). *Government interventions in pursuit of regional development: Learning from experience*, Working Paper 55, Bureau of Transport and Regional Economics. Retrieved from https://bitre.gov.au/publications/2003/files/wp_055.pdf

Commonwealth of Australia. (2013). *Australia's Abatement Task and 2013 Emissions Projections*. Australian Government, Department of the Environment. Retrieved from https://www.environment.gov.au/system/files/resources/51b72a94-7c7a-48c4-887a-02c7b7d2bd4c/files/abatement-task-summary-report_1.pdf

Commonwealth of Australia. (2015). *Australia's 2030 emissions reduction target*. Australian Government, Department of Environment and Energy. Retrieved from www.environment.gov.au/climate-

change/publications/factsheet-australias-2030-emissions-reduction-target

Commonwealth of Australia. (2017). *Fact Sheet: Australian Governments' action on climate change*. Australian Government, Department of Environment. Retrieved from <http://www.environment.gov.au/climate-change/publications/fact-sheet-australian-governments-action-climate-change>

Cook, J., Nuccitelli, D., Green, S.A., Richardson, M., Winkler, B., Painting, R., Way, R., Jacobs, P. & Skuce, A. (2013). Quantifying the consensus on anthropogenic global warming in the scientific literature. *Environmental Research Letters*, Vol 8, 2013, 1-8

Cooksey, R., & McDonald, G. (2011). *Surviving and thriving in postgraduate research*. Prahran, Victoria: Tilde University Press.

Czech, B. (2008). Prospects for reconciling the conflict between economic growth and biodiversity conservation with technological progress. *Conservation Biology*, 22(6), 1389-1398.

Dawson, S. L., & Tyson, G. A. (2012). Will likely morality or political ideology determine attitudes to climate change? *The Australian Community Psychologist*, 24(2), 8–25.

De Blij, H. (2008). *The power of place: Geography, destiny, and globalization's rough landscape*. USA: Oxford University Press.

- Deller, S. C., Tsai, T.-H. S., Marcouiller, D. W., & English, D. B. K. (2001).
The role of amenities and quality of life in rural economic growth.
American Journal of Agricultural Economics, 83(2), 352–365.
- Dicks, H. (2011). The self-poetizing earth: Heidegger, Santiago Theory, and
Gaia Theory. *Environmental Philosophy*, 8(1), 41–61.
- Diesendorf, M. (2007). The base-load electricity fallacy. *Chain Reaction*,
(100), 26–27.
- Dietz, S., & Stern, N. (2008). Why economic analysis supports strong action on
climate change: A response to the stern review's critics. *Review of
Environmental Economic Policy*, 2 (1), 94-113.
- Donner, R., Barbosa, S., Kurths, J., & Marwan, N. (2009). Understanding the
earth as a complex system - recent advances in data analysis and modelling
in earth sciences. *The European Physical Journal: Special Topics*, 174(1),
1–9.
- Dou, X. (2015). The essence, feature and role of low carbon
economy. *Environment, Development and Sustainability*, 17(1), 123-136.
- El Kahal, S. (2001). *Business in Asia Pacific*. Oxford University Press.
- Engwicht, D. (1992). *Towards an eco-city: Calming the traffic*. Sydney:
Envirobook.

- Feldman, D. L., & Wilt, C. A. (1999). Climate-change policy from a bioregional perspective: Reconciling spatial scale with human and ecological impact. In M. V. McGinnis (Ed.), *Bioregionalism*, pp. 133–154. London: Routledge
- Ferguson, N. (2008). *The ascent of money; A financial history of the world*. Camberwell, Victoria: Penguin Books.
- Frankhauser, S. (2012). *A practitioner's guide to a low-carbon economy: lessons from the UK*. January 2012. Centre for Climate Change Economics and Policy, Grantham Institute on Climate Change and the Environment. Retrieved from http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2014/03/PP_low-carbon-economy-UK.pdf
- Frey, C., & Osborne, M. (2013). *The future of employment: how susceptible are jobs to computerisation?* Working Paper, September 2013, 1–72. Oxford Martin School, University of Oxford. Retrieved from <http://www.oxfordmartin.ox.ac.uk/publications/view/1314>
- Garnaut, R. (2011). *Update Paper one: Weighing the costs and benefits of climate change action*. Garnaut Climate Change Review – Update 2011. Commonwealth of Australia 2011. Retrieved from <http://www.garnautreview.org.au/update-2011/update-papers/up1-weighing-costs-benefits-climate-change-action.pdf>

Hanley, C., & Douglass, M. T. (2014). High road, low road, or off road? Economic development strategies in the American States. *Economic Development Quarterly*, 28(3), 220–229.

Hansen, J., Kharecha, P., Sato, M., Masson-Delmotte, V., Ackerman, F., Beerling, D. J., Hearty, P.J., Hoegh-Guldberg, O., Hsu, S-H., Parmesan, J., Rockstrom, J., Rohling, E.J., Sachs, J., Smith, P., Steffen, K., Van Susteren, L., von Schuckmann, K., & Zachos, J. C. (2013). Assessing “dangerous climate change”: Required reduction of carbon emissions to protect young people, future generations and nature. *PLoS ONE*, 8(12):e81648

Harvey, D. (2006). Neo-liberalism as creative destruction. *Geografiska Annaler, Series B: Human Geography*, 88(2), 145–158.

Harvey, D. (2007). *A brief history of neoliberalism*. Oxford University Press.

Hearfield, C., & Sorensen, T., (2009). Regional Economic Governance: A Technology of Government or Regional Autonomy in New South Wales? *Space and Polity*, Vol. 13, No. 2, 93–107, August 2009

Hobson, K., & Niemeyer, S. (2012). “What sceptics believe”: The effects of information and deliberation on climate change scepticism. *Public Understanding of Science*. 22(4): 396-412.

IPCC. (n.d.). *Organization*. Intergovernmental Panel on Climate Change

(IPCC). Retrieved from

<https://www.ipcc.ch/organization/organization.shtml>

IPCC. (2007). *Climate change 2007: Synthesis report*, IPCC Fourth

Assessment Report (AR4). Intergovernmental Panel on Climate Change

(IPCC). Retrieved from

https://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm

IPCC. (2013). *Climate change 2013 - the physical science basis*. Working

Group I Contribution to the Fifth Assessment Report of the

Intergovernmental Panel on Climate Change. Summary for Policymakers.

Retrieved from [https://www.cambridge.org/core/books/climate-change-](https://www.cambridge.org/core/books/climate-change-2013-the-physical-science-basis/BE9453E500DEF3640B383BADD332C3E)

[2013-the-physical-science-](https://www.cambridge.org/core/books/climate-change-2013-the-physical-science-basis/BE9453E500DEF3640B383BADD332C3E)

[basis/BE9453E500DEF3640B383BADD332C3E](https://www.cambridge.org/core/books/climate-change-2013-the-physical-science-basis/BE9453E500DEF3640B383BADD332C3E)

IPCC. (2014). *Carbon Dioxide: Projected emissions and concentrations*. Data

Distribution Centre, Intergovernmental Panel on Climate Change (IPCC).

Retrieved from http://www.ipcc-data.org/observ/ddc_co2.html

IUCN. (2004). *Afforestation and reforestation for climate change mitigation:*

Potentials for pan-european action. IUCN Programme Office for Central

Europe. Warsaw 2004. Retrieved from [http://foresteurope.org/wp-](http://foresteurope.org/wp-content/uploads/2016/08/Afforestation.pdf)

[content/uploads/2016/08/Afforestation.pdf](http://foresteurope.org/wp-content/uploads/2016/08/Afforestation.pdf)

- Koro-ljungberg, M., & Hayes, S. (2010). Proposing an argument for research questions that could create permeable boundaries within qualitative research. *Journal of Ethnographic & Qualitative Research*, 4(3), 114–124.
- Lane, J.-E. (2011). CO₂ emissions and GDP. *International Journal of Social Economics*, 38(11), 911–918.
- Lazarus, R. J. (2009). Super wicked problems and climate change: Restraining the present to liberate the future. *Cornell Law Review*, 94, 1153-1234
- Legras, B. (2013). Climate change sceptics. *European Review*, 21(S1), S85–S93.
- Lehtonen, O., Tykkyläinen, M., & Voutilainen, O. (2012). Root causes of rural decline in economic well-being in Finland. *European Countryside*, 4(3), 217–239.
- Leviston, Z., & Walker, I. (2011). *Second annual survey of Australian attitudes to climate change : INTERIM REPORT*. CSIRO National Research Flagships Climate Adaptation, 1–35. Retrieved from <https://publications.csiro.au/rpr/download?pid=csiro:EP116224&dsid=DS2>
- Lewandowsky, S., Ecker, U.K.H., Seifert, C.M., Schwarz, N., & Cook, J., (2012). Misinformation and its correction: continued influence and successful debiasing. *Psychological Sciences in the Public Interest*, 13(3),

106-131.

Lewis, W. A. (1957). *The Theory of Economic Growth*. Allen Unwin.

Lomborg, B. (2009). Technology, Not Talks Will Save the Planet. *Finance & Development*, 46(4), 13-14.

Lorenzoni, I., Nicholson-Cole, S., & Whitmarsh, L. (2007). Barriers perceived to engaging with climate change among the UK public and their policy implications. *Global Environmental Change*, 17(3-4), 445–459.

Lorenzoni, I., & Pidgeon, N. F. (2006). Public views on climate change: European and USA perspectives. *Climatic Change*, 77(1-2), 73–95.

Matthews, T. (2011). *Climate change adaptation in urban systems: Strategies for planning regimes*. Urban Research Program Research Paper 32. Queensland University of Technology. Retrieved from https://eprints.qut.edu.au/62271/1/Climate_Change_Adaptation_in_Urban_Systems_Author%27s_Accepted_Copy.pdf

McCright, A. M., & Dunlap, R. E. (2003). Defeating Kyoto: The conservative movement's impact on U.S. climate change policy. *Social Problems*, 50(3), 348–373.

Mcgranahan, D. A., & Beale, C. L. (2002). Understanding rural population loss. *Rural America*, 17(4), 1–11.

- Millennium Ecosystem Assessment. (2005). *Ecosystems and human well-being: synthesis*. Island Press: Washington DC. Retrieved from <http://www.millenniumassessment.org/documents/document.356.aspx.pdf>
- Mitchell, R. (2012). Technology Is Not Enough. *The Journal of Environment & Development*, 21(1), 24-27.
- Moeller, J. O. (2014). Into the age of non-economics. *The Singapore Economic Review*, 59(03), 1450028-1-1450028-28.
- Moxnes, E. (1998). Not only the tragedy of the commons: Misperceptions of bioeconomics. *Management Science*. 44(9), 1234-1248
- National Aeronautics and Space Administration (NASA). (n.d.-a). *Graphic: The relentless rise of carbon dioxide*. NASA Earth Observatory. Retrieved from https://climate.nasa.gov/climate_resources/24/
- National Aeronautics and Space Administration (NASA). (n.d.-b). *Climate change: How do we know?*. Global Climate Change Vital Signs of the Planet. Retrieved from <http://climate.nasa.gov/evidence/>
- National Aeronautics and Space Administration (NASA). (n.d.-c). *The carbon cycle*. NASA Earth Observatory. Retrieved from <https://earthobservatory.nasa.gov/Features/CarbonCycle/>
- Needham, S. (2008). *The potential for renewable energy to provide baseload power in Australia*, Research Paper no. 9 2008–09, Science,

Technology, Environment and Resources Section, Parliament of Australia
Parliamentary Library. Retrieved from
http://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/rp0809/09rp09

NISBN. (n.d.). *About: Northern Inland Sustainable Business Network*.

Northern Inland Sustainable Business Network: Australia. Retrieved from
<http://www.nisbn.org.au/>

NSW Department of Industry. (2015). *Economic development strategy for regional NSW*. New South Wales Government: Australia. Retrieved from
<https://www.industry.nsw.gov.au/invest-in-nsw/news-and-events/news/new-economic-development-strategy-for-regional-nsw>

NSW Department of Industry. (2016). Making it happen in the regions: Regional development framework. New South Wales Government: Australia. Retrieved from
https://www.industry.nsw.gov.au/__data/assets/pdf_file/0018/93222/regional-development-framework.pdf

NSW Office of Environment and Heritage. (n.d.-a). *Who we are*. NSW Government, Office of Environment and Heritage. Retrieved from
<http://www.environment.nsw.gov.au/whoweare/>

NSW Office of Environment and Heritage. (n.d.-b). *NSW action on climate change*. NSW Government, Office of Environment and Heritage.

Retrieved from <http://climatechange.environment.nsw.gov.au/About-climate-change-in-NSW/NSW-Government-action-on-climate-change>

NSW Office of Environment and Heritage. (n.d.-c). *Support for small businesses*. NSW Government, Office of Environment and Heritage.

Retrieved from

<http://www.environment.nsw.gov.au/grantsandfunding/business.htm>

NSW Office of Environment and Heritage. (2016). *NSW climate change policy framework*. NSW Government, Office of Environment and Heritage:

Sydney. Retrieved from

<http://www.environment.nsw.gov.au/topics/Climate-change/Policy-framework>

OECD. (2010). *Regional development policies in OECD Countries*.

Organization for Economic Co-operation and Development (OECD).

Retrieved from [http://www.oecd.org/cfe/regional-](http://www.oecd.org/cfe/regional-policy/regionaldevelopmentpoliciesinoecdcountries.htm)

[policy/regionaldevelopmentpoliciesinoecdcountries.htm](http://www.oecd.org/cfe/regional-policy/regionaldevelopmentpoliciesinoecdcountries.htm)

O'Neill, M. (2012). Transnational education: A case study of one professional doctorate. *Higher Education Studies*, 2(4), 14-30.

O'Neill, M. (2012). Transnational education: A case study of one professional doctorate. *Higher Education Studies*, 2(4), 14–31.

Olivier, J. G. J., Janssens-Maenhout G, Muntean, M., & Peters, J. A. H. W.

(2014). *Trends in global CO2 emissions: 2014 Report*. PBL Netherlands Environmental Assessment Agency, The Hague. Retrieved from http://edgar.jrc.ec.europa.eu/news_docs/jrc-2014-trends-in-global-co2-emissions-2014-report-93171.pdf

Oxford University Press. (1997). *The Australian Concise Oxford Dictionary*. Third Edition.

Patton, M. Q. (2011). *Developmental evaluation: Applying complexity concepts to enhance innovation and use*. The Guilford Press.

Pearce, D. & Turner, R. (1990). *Economics of natural resources and the environment*. Prentice Hall.

Pike, A., Rodriguez-Prose, A., & Tomaney, J. (2007). What kind of local and regional development and for whom. *Regional Studies*, 1 (9), 1253-1269.

Planning Institute of Australia. (n.d). *Rural and Regional Development (12/10)*. Policy. Planning Institute of Australia (PIA). Retrieved from <https://www.planning.org.au/documents/item/2275>

Plummer, R., & Fitzgibbon, J. (2006). People matter: The importance of social capital in the co-management of natural resources. *Natural Resources Forum*, 30(1), 51–62.

Randall, A. (1991). The value of biodiversity. *Ambio*, 20(2), 64–68. Retrieved

from <http://www.jstor.org/stable/4313778>

Schelling, T. C. (1992). Some economics of global warming. *The American Economic Review*, 82(1), 1–14.

Schmidt, C. W. (2010). A closer look at climate change skepticism. *Environmental Health Perspectives*, 118(12), A536-A540.

Scott, D., Brown, A., Lunt, I., & Thorne, L. . (2004). *Professional doctorates : Integrating professional and academic knowledge*. (The Society for Research into Higher Education). Maidenhead: Open University Press.

Scruggs, L., & Benegal, S. (2012). Declining public concern about climate change: Can we blame the great recession? *Global Environmental Change*, 22(2), 505–515.

Sorensen, T., (2015). Regional development in an age of accelerating complexity and uncertainty: T owards survival strategies for a sparsely settled continent. *Local Economy* 2015, Vol. 30(1) 41–52

Sorensen, T., Marshall, N. & Dollery, B. (2007) Changing Governance of Australian Regional Development: Systems and Effectiveness, *Space and Polity*, 11:3, 297-315

Steffen, W. (2013). *The Angry Summer*. Climate Council.
<https://www.climatecouncil.org.au/angry-summer>

Steffen, W., & Hughes, L. (2013). *The Critical Decade: Extreme Weather*.

Climate Council. Retrieved from

<https://www.climatecouncil.org.au/extreme-weather-report>

Stern, N. (2008). The Economics of Climate Change. *American Economic*

Review, 98 (2), 1-37.

Stoll-Kleemann, S., O’Riordan, T., & Jaeger, C. (2001). The psychology of

denial concerning climate mitigation measures: Evidence from Swiss focus groups. *Global Environmental Change*, 11(2), 107–117.

Strazdins, L., & Skeat, H. (2011). *Weathering the future: Climate change,*

children and young people, and decision making. A report to the

Australian Research Alliance for Children & Youth March 2011.

Retrieved from

https://www.researchgate.net/profile/Lyndall_Strazdins/publication/265182433_Weathering_the_future_Climate_change_children_and_young_people_and_decision_making/links/55e6500008aebdc0f58bb2ee.pdf

Talberg, A., Hui, S., & Loynes, K. (2013). *Australian climate change policy to*

2015: a chronology. Parliament of Australian Parliamentary Library,

Research Paper Series 2015-16. Retrieved from

http://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/rp1516/Climate2015

The Royal Society, 2009. *Geoengineering the climate: Science, governance and uncertainty*. The Royal Society.

https://royalsociety.org/~media/Royal_Society_Content/policy/publications/2009/8693.pdf

The World Bank. (2012). *Turn down the heat: Why a 4°C warmer world must be avoided*. A Report for the World Bank by the Potsdam Institute for Climate Impact Research and Climate Analytics. November 2012.

Retrieved from

<http://documents.worldbank.org/curated/en/865571468149107611/pdf/NonAsciiFileName0.pdf>

The World Bank. (2016). *GDP (current US\$)*. World Bank national accounts data, and OECD National Accounts data files.

<http://data.worldbank.org/indicator/NY.GDP.MKTP.CD?end=2016&start=1960>

Tracy, S. (2010). Qualitative Quality: Eight “Big-Tent” Criteria for Excellent Qualitative Research. *Qualitative Inquiry*, 16(10), 837-851.

Tuan, Y.-F. (1973). Ambiguity in attitudes toward the environment. *Annals of the Association of American Geographers*. 63(4), 411-423

UNFCCC. (n.d.). *Summary of the Paris Agreement*. United Nations Framework Convention on Climate Change (UNFCCC). United Nations. Retrieved from

<http://bigpicture.unfccc.int/#content-the-paris-agreemen>

UNFCCC. (n.d.-a). *Kyoto Protocol*. United Nations Framework Convention on Climate Change (UNFCCC). United Nations. Retrieved from http://unfccc.int/kyoto_protocol/items/2830.php

UNFCCC. (n.d.-b). *Status of the Doha Amendment*. United Nations Framework Convention on Climate Change (UNFCCC). United Nations. Retrieved from http://unfccc.int/kyoto_protocol/doha_amendment/items/7362.php

UNFCCC. (2007). *Climate Change: Impacts, vulnerabilities and adaptation in developing countries*. United Nations Framework Convention on Climate Change (UNFCCC). United Nations. Retrieved from <http://unfccc.int/resource/docs/publications/impacts.pdf>

UNFCCC. (2011). *Report of the conference of the parties on its seventeenth session, held in Durban from 28 November to 11 December 2011*. United Nations Framework Convention on Climate Change (UNFCCC). United Nations. Retrieved from <https://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf>

United Nations (n.d.-a). *Our Common Future, Chapter 2: Towards Sustainable Development, A/42/427*. Our Common Future: Report of the World Commission on Environment and Development, United Nations (UN) Documents. Retrieved from <http://www.un-documents.net/ocf-02.htm#I>

United Nations. (1972). *Report of the United Nations conference on the human environment*. Stockholm, 5-16 June 1972. United Nations. Retrieved from <http://www.un-documents.net/aconf48-14r1.pdf>

United Nations. (2013). *World population prospects: The 2012 revision. Highlights and Advance Tables*. Department of Economic & Social Affairs. United Nations New York. Retrieved from https://esa.un.org/unpd/wpp/publications/Files/WPP2012_HIGHLIGHTS.pdf

United Nations. (2017). *World population prospects 2017*. Population Division. Retrieved from <https://esa.un.org/unpd/wpp/Graphs/Probabilistic/POP/TOT/>

United Nations Environment Programme. (n.d.). *Declaration of the United Nations Conference on the Human Environment*. From Report of the United Nations Conference on the Human Environment, Stockholm, June 1972. Retrieved from <http://www.un-documents.net/unchedec.htm>

United Nations Development Programme. (2013). *2013 Human Development Report; The Rise of the South. Human Progress in a Diverse World*. Human Development Reports. United Nations Development Programme (UNDEP). Retrieved from <http://hdr.undp.org/en/2013-report>

United States Environmental Protection Agency (USEPA). (n.d.). *Climate Change: Basic Information*. United States Environmental Protection

Agency (USEPA). Retrieved from
https://19january2017snapshot.epa.gov/climatechange/climate-change-basic-information_.html

Van Rensburg, W. (2013). Climate Change Sceptics Revisited: Creatures of Culture. *Melbourne Journal of Politics*, (36), 31–50.

WMO. (2013). *WMO Statement on the status of the global climate in 2013*.

World Meteorological Organization (WMO). WMO -No. 1130. Retrieved from https://library.wmo.int/pmb_ged/wmo_1130_en.pdf

WMO. (2017). *WMO Statement on the State of the Global Climate in 2016*.

World Meteorological Organization (WMO). WMO-No.1189. Retrieved from <https://public.wmo.int/en/resources/library/wmo-statement-state-of-global-climate-2016>

Woolcock, M., & Narayan, D. (2000). Social capital: Implications for development theory, research , and policy. *The World Bank research observer*, 15(2), 25-249

WWF. (2010). *The Living Planet Report 2010. Biodiversity, biocapacity and development*. World Wide Fund for Nature (WWF).

Book Two: Obtaining and analysing practice-based knowledge

11. Introduction

This second phase seeks to gather data from practitioners in order to inform my innovation. This second book two of my innovation portfolio outlines my research approach and methods, and describes my analysis of the data collected from participant interviews and participant group sessions.

As this professional doctorate award requires the creation of an innovation for my workplace, the data collected from other practitioners have been used to inform my innovation. This book is my findings on what I have learned from discussing this issue with participants who have relevant practical experience of their community, their businesses, their social structure, policy development and implementing policies in the community. Such an approach reflects how a practitioner-researcher might research this topic when the goal is to create an innovation, which is actionable and based on evidence.

The following sections first describe how I used an interpretative inductive paradigm to address my topic, and the use of multiple methods, including research frames and self-reflection, to collect my data. The results of my data collection then follow where each participant interview and group session has been described and themes identified. The final sections summarise the thematic analysis and describe how these themes are used in the final book.

12. Writing style

Book Two has been written using first and third person narrative. I believe this approach best reflects my role as both innovator and researcher in this portfolio development. If the aim of interpretive research is to further develop my practice by using scientific methods of investigation and self-reflection, then the use of first person narrative is appropriate where the description of the results clearly identifies my role in both the collection and critical analysis of the data. Third person narrative has also been used and provides a contrast and clear identifier between my observations as a researcher and the observations of other authors.

13. My assumptions

To restate, the continued emissions of harmful GHGs may cause adverse and undesirable future climate change for regional NSW. The reduction or even elimination of these emissions should continue to be a public policy priority. The lack of successful emissions reduction to date suggests further innovation is required.

Future climate change may have significant implications for the practice of regional development. The practice of regional development, as stated in the previous book, seeks to develop regional economic systems in order to create more economic activity and conditions favourable for investment and job creation. The impacts of climate change will threaten future economic

activity by creating conditions that are unfavourable for investment and job creation. This is the workplace challenge addressed by my portfolio.

My approach to this study is based on my initial assumption of the problem I have attempted to address. I began this study by assuming two things. The first assumption is that in order to create the low carbon place, localised strategies to mitigate harmful emissions should first target emitters where the emissions occur. By addressing this, I could challenge the more contemporary approach favoured by policymakers in recent times, namely the introduction of multilateral market-based instruments that treat emissions in terms of atmospheric emissions and as tradable commodities, that rely on pricing emissions to incentivise the reduction of emissions.

The second assumption is that many existing policies could already exist and be adapted and better synthesised into a new framework. By addressing this assumption, I could find data or create an innovation that was not a 'silver bullet' for the research problem. This assumption led me to consider existing service delivery processes and institutional design alongside new program development. In effect, this approach opened up the potential for a broader innovation rather than a singular program or process change.

14. A brief introduction to the Doctor of Philosophy (Innovation) PhD.I

This portfolio has been completed to meet the requirements of the Doctor of Philosophy (Innovation) (PhD.I). The PhD.I is a doctoral research higher degree awarded by the University of New England Australia (UNE), and is structured to combine academic and workplace knowledge. The PhD.I assessment structure can include both coursework and workplace knowledge (O'Neill, 2012) and acknowledges the creation of new or original knowledge by a researcher situated within their profession (UNE, n.d.).

The award is designed specifically for professional or practice-based innovation research, and supports professionals seeking to enhance their practice by fostering the creation of knowledge within “professional life and work” through an academic process which “privileges professional knowledge” (Scott, Brown, Lunt, & Thorne, 2004, p.36). As Scott, Brown, Lunt, and Thorne (2004, p.42) state, the professional doctorate acknowledges and values that knowledge and innovation may reside within the professional, as “knowledge may originate from and within the professional practice, and yet the solution for the practitioner (controlled and ultimately validated by the University as disciplinary knowledge) may be found within the disciplinary practice”. In its essence, combining practice with research seeks to obtain knowledge that is implementable and relevant to a workplace issue.

Within this context, the PhD.I particularly fosters innovation and knowledge creation within industry and the professions. The design of the PhD.I addresses the criticism that scientific knowledge often fails to connect to practical application and doesn't "bridge the divide" between academic institutions and practice (Dustin, Schwab and Hendricks (2016). the challenge is to combine both as:

Practices validated by rigorous research that may be perceived as less relevant often fail to be implemented or sustained widely because they do not fit nuanced, real-world contexts such as schools and classrooms; and relevant research that may be perceived as less rigorous is liable to promote ineffective practices. (Smith et.al, 2013, p160).

Stokes (1997) used the work of Louis Pasteur, called Pasteur's quadrant, to highlight the difference between pure basic research, pure applied research, and user-inspired research (Arnold, 2008). Stokes used Bohr, Edison and Pasteur as examples of these research categories. According to Arnold (2008), pure basic research refers to knowledge but not intended use, pure applied research refers to developing practical solutions, some scientific work is neither theoretical nor practical, and some are use-inspired. The difference can be understood by classifying Pasteur's Quadrant according to the institution likely to be researching problems. Tushman and O'Reilly (2007) classify the quadrants according to basic disciplinary research, professional schools and business schools, and consulting firms.

Tushman and O'Reilly (2007) concluded that to overcome the problem of bridging the divide between theoretical knowledge and practice, doctoral programs should embrace both *rigor and relevance*, as represented as Pasteur's Quadrant, and that researchers should be encouraged to ask questions that are *managerially important*. In this respect, I selected UNE's PhD.I because the academic process (rigor) values the practitioner researchers' knowledge (relevance) and I was able to address the *managerially important* question about our workplace role in the transition to the low carbon place.

My research, as outlined in this innovation portfolio, has addressed the challenges of future climate change as a practitioner-researcher in regional economic development. The following three books outline how I have used an inductive qualitative research method, using action research and action science frames, and my use of self-reflection in action, to gather and interpret the data that I have collected. This approach reflects my role as an active participant in the research design, data collection and interpretation, and self-reflection in action research processes seeking a use-inspired innovation. This was an original approach to my topic, and was necessarily action-based because my topic is managerially important and has been, and remains, a global and fluid social issue.

15. The research approach

The following paragraphs outline my research approach. These sections outline the research paradigm and quality criteria, researcher positioning and the use of action research frames.

15.1 The research paradigm

I have used an interpretivist paradigm for this study. Within an interpretivist paradigm, the researcher investigates the “lived experiences” of participants and “how they socially construct their reality” (Cavana, Delahaye, and Sekarin, 2001, p. 9). The researcher, therefore, observes the data in “context” and acknowledges the role of the researcher (Cooksey and McDonald, 2011, p. 189). In this study, the data obtained from the participants have been thematically scrutinised in the context of the researcher’s professional knowledge. It should be noted that the participants were not directly asked for a policy solution, but instead were asked a series of probing questions in semi-structured interviews and workshops so their issues and concerns could be better understood. Their contextualisation of the issue, their experience of climate change, and their views were recorded at the time of the interview. These data were then coded in an emergent thematic analysis, which informs the innovation or conclusion of this study.

There are three disadvantages of using the interpretivist paradigm. First,

according to Cavana, Delahaye and Sekarin (2001, p. 9), the interpretation of the data under the interpretivist paradigm could become too “subjective”. The subjective interpretation is a necessary approach that incorporates the value of my professional experience and the professional experience of the participants interviewed for this study. Second, the data obtained under the interpretivist paradigm approach may be too thin or localised. In this study, to overcome thin or localised data barriers, the data sample included eight one-on-one interviews from regional and non-regional locations, and three workshops in three regional locations. The volume of data and the use of different formats and questions maximised the scope of the data collected, while the three workshops in three geographically linked inland towns in NSW provided an opportunity to analyse the data from a geographic regional perspective, while also creating an opportunity to compare the data between small-medium-large inland locations with different economic and social systems. Finally, the interpretivist method may not seek action arising from the research project. This is not the case with my innovation portfolio, as the reflections in Book Three contain actionable recommendations that can be considered in order to change both policy settings and organisational design. Given my workplace constraints and the political nature of the policies in my innovation, I am unable to fully action my research. Instead, my research findings will be communicated in various forms of media, such as academic journals, and further research into some of the issues I have identified may be undertaken.

My methods adopted Patton's (2011) bricolage framework, which was drawn from the Levi-Strauss description of the bricoleur, who would travel about and come across things to make from what was at hand. This approach was necessary to create my innovation, which combines observation of data with practical solutions derived from self-reflection on my professional practice. Patton (2011, p264) suggested that "Drawing on creativity and pragmatism opens up new possibilities...including new alternatives and emergent forms of data collection and transformed evaluator and innovator relationships." My adoption of bricolage allowed me to bring together multiple methods of data collection, like mixing semi-structured interviews with vignettes, individual interviews and group sessions, and pursuing little known pilot programs (e.g. the Environmental Upgrade Agreement). The use of multiple methods in this study is a "within-paradigm triangulation" approach (Cooksey and McDonald, 2011, p.202) with the aim of obtaining practice-based data from people who may not be consulted for their opinions on the subject.

My approach to this study privileges business over other interest groups. This is necessary because of the market-based economy and the dependency between business and government (Lindblom, 1977). Like many market-based capitalist economies, the success of business in Australia reflects the success of the wider economic system. To achieve economic growth, jobs and investment is just one of the many goals of economic development;

Not surprisingly then, my approach accords with Lindblom's description of the public official cognisant of business needs, which has tempered my innovation, while at the same time potentially making my innovation more palatable to business interests and, therefore, more actionable as:

Government exercises broad authority over business activities. But the exercise of that authority is curbed and shaped by the concern of public officials for its possible adverse effects of business since adverse effects can cause unemployment and other consequences that government officials are unwilling to accept. (Lindblom, 1977, p.178)

In summary, my use of the interpretivist paradigm has created a more open and flexible approach, and clearly identifies and supports my role as a participant in this study. The use of bricolage has been identified to indicate the flexible research approach undertaken in this portfolio, and how the influence of business in the wider economic system has influenced my innovation.

15.2 Interpretivist paradigm quality criteria

According to Cooksey and McDonald (2011), there are four key quality criteria to be considered by the researcher using the interpretivist paradigm approach: authenticity, sufficiency, transparency and transferability. Each criterion is addressed in the following paragraphs.

First, I have sought to maximise the authenticity of both the participant and my interpretation and self-reflection data by capturing the comments recorded at

the time. Where possible, I have used quotes that I have recorded during the interviews and workshops with participants or entries from my research diary.

Second, the size of the sample reflects this researcher's intent to obtain sufficient data to make conclusions. Although limited by my resources and access to participants, a substantial amount of fieldwork was conducted during this study using a variety of methods and settings to capture a rich, unique and valuable data set.

Third, regarding transparency, another researcher could observe similar meanings in the data from other participants in either of the locations sampled in this study or from sampling participants from within the professional categories sampled in this study. Another researcher could obtain data from similar communities or professions, and use the questions developed for this study.

Last, the data has meaning for other contexts (transferability), such as ethics, social cohesion, regional development, participatory government and other geographical locations, especially in industrialised Western societies.

Where appropriate, I have used triangulation methods to support my findings. Such methods include using a combination of data sources to confirm or support statements made in this section (Cavana, Delahaye and Sekaran, 2001), and this has enhanced the validity and reliability of the data (Patton, 2011). In

this study, I have used the literature to establish the context for my policy framework in Book One. In Book Two, I collected participant data and used literature sources to support my observations. In Book Three, I will use the data collected in Book One and Two, along with my self-reflection in action to create my policy framework.

In conclusion, I have applied the interpretivist quality criteria to my primary data collection, and used other sources to support my observations. I have made clear how my interpretivist approach addressed the quality criteria, and how limited data make generalisations about the results difficult.

15.3 My positioning as a practitioner researcher

I am positioned as an actor in this study to seek an innovation and to improve my own practice, and therefore contribute to the practice of the wider economic development profession. I am not an independent observer of events or phenomena, but rather an active participant in an evolving process of investigation and innovation. This means I have actively framed and pursued research into my topic, and adopted my research approach to learn from other people and the literature.

Practice-led problem solving is an important feature of action research. Schon (1983) states that practitioners can be observed creating artistic responses using forms of self-reflection. This self-reflection and design is embedded in the

practitioner's experience where they see or experience a problem "again and again" (Schon, 1983, p.60). Schon also suggested that professional practitioners are often typical people who provide services like 'accountancy, law and medicine', and these professionals 'practice self-reflection daily', 'even unconsciously', as part of reflecting on the issues at hand, or on how they handled a situation.

This self-reflection is a form of self-learning, and allows for adjustments and further investigation into practical problems thus creating valuable knowledge and possibly improvement. Hence, the connection between the practice of professionals and the emergent research process is made, and this approach aligns with the aims of the professional doctorate degree.

15.4 My use of two research frames

My topic is an important workplace issue because the role of the regional development practitioner, which, restated, is to develop and grow the economic system, will be challenged by the predicted implications of future climate change unless actions can be taken now that mitigate the extent and intensity of these changes.

My topic has been investigated from my workplace perspective, and the outcome, which is described as an innovation, could lead to action. In my regional development agency role, I have a limited capacity to create action for

this topic. In the regional development agency I am obligated to remain apolitical, not speak publicly, or be critical publicly or in contradiction to the policy of the day, and to follow internal policies and procedures of the department. Furthermore, I have little authority as my position is in the middle management levels. As will be shown in this portfolio, my ability to influence decision-making has been enhanced, and now I have more opportunities to influence policy.

To overcome these challenges, I have adopted two research frames for this study. While acknowledging my workplace limitations, I have adopted research frames from action research and action science in order to better collect and learn from the data. The action science frame reflects my pursuit of the data in order to create my policy framework, while the action science frame reflects my explanation of how my policy framework can be actioned within my workplace or the wider public service organisation. Both of these frames are explained in the following sections.

15.5 My use of an action research frame

An action research frame has been adopted. In this section I define action research and identify what elements of action research are used as a frame for my study.

As my study aims to develop an innovation from the data collected from the

intersection of research and professional practice, action research offers many advantages as a frame. First, action research is a scientific research frame that can be used to assess my own practice to determine whether it is satisfactory or needs improvement in a particular area (McNiff, 2013). My conclusions could lead to the generation of new knowledge, the self-improvement of my practice or even the development of new theories of practice (Koshy, 2005; McNiff, 2002). As a practitioner, I am therefore seeking to improve my practice by identifying a particular issue or need.

Second, the aim of action research aligns with the aim of the professional doctorate award. The aim of action research is to pursue action (innovate) and research (understanding) at the same time (Patton, 2011, pp. 280-283). Patton suggested that action research is an emergent process that can use stakeholder engagement and reflective practice to test both the validity of a model and seek feedback from participants to further enhance the model. Action research recognises the role of the researcher as an “actor” in the research process.

Third, practice-led problem solving is an important feature of action research. As already stated in section 15.3 above, practitioners solve problems everyday by assessing problems and identifying solutions, and using self-reflection to further improve their performance or technique.

Fourth, action research involves a practitioner’s community of practice. This approach can be found in educational action research, where the teacher

engages with students to address a workplace issue or improve teacher performance (NSW Department of Education and Training, 2010). This is similar to my engagement with my community of practice. For example, my research has engaged with a town-planning practitioner to understand the town planning legislation barriers for a particular business expansion. What I have learned from this engagement has further informed my practice and improved my knowledge and capabilities to perform my work.

Fifth, the objective of conducting action research is to improve my practice. According to Minichello, Sullivan, Greenwood, and Axford (1999), action research increases personal capabilities, seeks to improve society, helps the researcher learn from their workplace and helps to co-create knowledge from interactions with others. In my portfolio, the topic has been identified is a challenging and complex issue, which has required an innovative approach and the creation of an innovation. This is a new skill for me in my workplace and will assist me in the future to address complex policy issues. In addition, my topic has been a very contentious and important policy problem, and my innovation may make an important contribution to the historical failures of policy approaches, and offers insights into future approaches and programs that could be designed and implemented.

Last, in my study I used action research cycles to assess the data collected, learn from the data and adjust future testing to incorporate new ideas. The action research cycle process typically involves first observing the data

(research/data collection), then reflecting on the data collected (critical reflexivity), followed by planning the next step in the research process (strategic action plan) and then acting on the next step that has been identified (implementation) to form a spiral of decision-making and action (Koshy, 2005, p. 7). These cycles were essential for the purposes of creating an innovation from the data, and demonstrate that the innovation was a result of practice based self-reflection and on-going professional practice knowledge accumulation.

Action research has attracted criticism, especially from positivist researchers. Kock, McQueen and Scott (1997) provide examples of how action research can be designed to overcome positivist criticisms. According to these authors, the first criticism about action research is about the low level of external validity in action research, which can be overcome by using cycles to expand the scope of the research and be flexible to increase the generalisability of findings. The second criticism relates to action research having a low level of control of the research environment variables. Kock, McQueen and Scott (1997) suggest that high levels of control over the research environment in the social sciences may cause behaviour change in samples. Again, cycles can overcome this issue as the researcher reacts to any change in behaviour and seeks to collect data across the cycles. The third major criticism is the level of researcher involvement in research. The positivists suggest this might lead to bias. Kock, McQueen and Scott (1997) indicate that the cycle process is actually a process

of identifying and correcting issues with previous cycles and make the researcher's role more transparent. Therefore, action research in this study case does not hold itself out as non-biased research.

In summary, my use of action research as a frame has assisted me to collect and interpret my data. Because of my topic's complexity and its contentious nature, my professional knowledge as it stood before beginning this study did not allow me to make valid conclusions about an actionable policy framework. By using an action research frame, I have been able to refine my approach to data gathering while collecting data leading to more relevant and complete data. Furthermore, I have undertaken this innovation portfolio from my workplace position as a regional economic development practitioner, which has offered both a unique perspective and conclusion for this topic. Finally, my engagement with other practitioners has created a process of co-learning and co-creating of the potential policy issues and solutions for the transition to a low carbon place. The data obtained have been an invaluable source for the development of my innovation and the process of self-reflection during the course of my study.

15.6 My use of an action science frame

The aim of my research approach was to seek participant's professional knowledge to inform my innovation. The action science frame has been used for my study because of the individual and organisational learning insights

this approach has provided. By adopting an action science frame, my innovation addresses how workplace systemic organisational change may be needed to transition my innovation into action. The following paragraphs explain my use of action science in this portfolio.

Action science is concerned with the behaviours participants display about the issues under study, how these behaviours prevent progress, and how they could be overcome (Argyris and Schon, 1989). By using action science, individuals' acting and thinking in organisations can produce valuable insights, and, by using these insights, the researcher can encourage organisational learning (Argyris, 1995). In order to develop my policy framework, I undertook to seek information from other professionals. In this respect, I wanted to identify participants' views about the topic from their lived experience, which may differ from their conduct in their professional role. In this respect, action science is a useful frame.

The basis of action science is the concept of theory-of-action, where the researcher attempts to identify the "deliberate behaviour" of a participant to understand why certain behaviour occurs, and possibly to predict future behaviour (Argyris and Schon, 1982). To identify the theory of action in participants, the behaviours observed can then be classified as either espoused theory or theory-in-use. An espoused theory is what people say they do, and theory-in-use is what they actually do (Argyris and Schon, 1982). In other

words, a public servant may prefer less government regulation, however in practice, this public servant may prefer or use more government regulation.

What participants do and believe can then be further classified into organisational behaviour. According to Argyris and Schon (1982), these actions are “governing variables” displaying the characteristics of Mode I or II behaviour. The observation of Model I behaviour typically includes actors who wish to define goals and try to achieve them, maximise winning and minimise losing, minimise generating or expressing negative feelings and being rational. Each of these governing variables leads to certain behaviours that the proponents of action science argue limit an organisations’ problem solving and would be characteristics of single loop learning. Instead, behaviour can be orientated towards Model II governing variables, which rely on valid information, free and informed choice, and an internal commitment to the choice and constant monitoring of its implementation (Argyris and Schon, 1982). If Model II is achieved, these authors argue that organisations may improve their performance. If managers implement actions to introduce Model II behaviour, it could create double loop learning in an organisation, and this would be an improvement over single loop learning outcomes (Argyris and Schon, 1982). The difference between single loop learning and double loop learning would be when:

A person learns a new technique for suppressing conflict. He engages in double-loop learning when he learns to be concerned with the surfacing

and resolution of conflict rather than with its suppression. (Argyris and Schon, 1982, p. 19).

In its essence, this quote demonstrates how the double loop learner attempts to understand the drivers causing the conflict rather than seeking to manage the implications arising from conflict. This distinction is also made clear by Pahl-Wosti (2009, p. 359), whereby, single loop learning would be a “refinement of actions to improve performance without changing the guiding assumptions and calling into question established routines”, where improved information and modelling might suggest increasing the height of a dike or increasing the size of reservoirs. In contrast, double loop learning would involve questioning and reframing the assumptions about the goals and how to achieve them, leading to experimentation and innovation, which would then lead to a deeper consideration about “relocating dikes, retention areas and restoration of floodplains rather than simply increasing the height of dikes” (p. 359). In my research project, single loop solutions demonstrate that the organisation is not a learning organisation and would likely repeat past mistakes or maintain the status quo, which may not be desired by management, workers, customers or the broader community. On the other hand, double loop solutions would be innovative, as the workplace issue is questioned and reframed, experiments could be conducted, and further deeper consideration would be presented.

The single and double loop concept has been expanded to triple loop learning. Triple loop learning is more transformational, where actors seek a paradigm

shift that not only changes institutions and structures, but also changes the “underlying norms and values” (Pahl-Wosti, 2009, p. 359). In the case of climate change and floodplain management, Pahl-Wosti suggested triple loop learning would lead to introducing more actor groups into a network, changing boundaries, introducing new regulatory frameworks, introducing integrated landscape planning, and adopting more system indicators. In my research project, triple loop solutions would begin to question the preference for market-based solutions over direct government control, consider banning certain high greenhouse gas emission activities previously considered sacrosanct, like oil and gas production, or fundamentally question whether government or business is the correct organisation to carry out environmental regulation.

Action science has been criticised. Lipshitz (2000. pp471-472) argues that organisational learning is a difficult concept to understand and apply especially when “a failure to specify in concrete form how learning by individual organisational members is transformed into organisational-level learning”, that data is difficult to obtain, that the concept of double loop learning is not “neat” but is actually “fuzzy”, and that the concept is subject to the overuse of jargon which makes the concept harder to understand and implement. In this study, action science has been used as a frame in order to inform a possible conceptual innovation. Further research into the design and implementation of learning organisations would be needed to implement this innovation.

In conclusion, this second frame has provided an institutional perspective on the data collected from professionals, and has informed the creation of my innovation. Because of the nature of my innovation, institutions play an important role when considering and implementing public policy. A potential gap in knowledge may exist regarding what public servants consider as policy options. Do they consider issues in terms of double loop learning, do they consider strategic planning in a manner that reflects a learning organisation, or do they need a pathway or checklist to help them to go deeper and consider this important topic as a double or even triple loop learning opportunity?

15.7 Overcoming a broad topic

I had to overcome many topic challenges. A major challenge was establishing a boundary for such a broad topic while using appropriate methodologies, given the intent and requirements of the professional doctorate, and overcoming my resource limitations. Not all of these challenges were known at the beginning of the research process and, in response to emerging observations, changes were made to the original research plan presented during the confirmation process. This section describes why and how these changes were made.

First, a boundary for this topic was required. The chosen topic of a new role for regional development agencies and the transition to a low carbon place is a clearly defined aim. Climate change is a very contentious issue that impacts on the interaction between the natural, economic and social systems on earth,

and these impacts are forecast to occur in the future, well beyond the current lifespan of many people living today. This complexity is best illustrated from the literature on a community planning research project in Port Orford, USA. Despite the research project targeting Port Orford (Cone, Rowe, Borberg, and Goodwin, 2012), the extraordinary quantum of impacts and their interrelatedness can be viewed as a mix of ecosystem, economic, human, infrastructure, government and weather nodes. Each node has a set of subthemes. In particular, the term “uncertainty!” features in the middle of the figure and lacks interconnections between the other factors. But this uncertainty shows why the topic continues to be contentious and fluid, as the community and policymakers actively explore potential solutions.

My second major challenge was the selection of appropriate research methodologies to satisfy the professional doctorate requirements. In its essence, the UNE Professional Doctorate Industry and Professions aims to support practitioners to research industry or profession issues, and to create an innovation, that could be a new good or service, or make a significant contribution to knowledge. As the professional doctorate emphasises the value of my practice-based knowledge, my practice became a key part of the research process. This requirement created an additional challenge where bias was embraced rather than avoided, in order to create a practical solution.

The UNE Professional Doctorate requires the identification of an innovation from the research. Although UNE does not specify what constitutes an

innovation for the purposes of this award. The creation or identification of an innovation implies the researcher has a unique role in critically analysing the data and combining these data with practice knowledge to create something new.

The third major challenge was overcoming my resource limitations. To address my topic, it would not be unusual for a team of experienced multi-discipline researchers to conduct research with a large budget and dedicated research time. For example, the community planning research project conducted in Port Orford (Cone, Rowe, Borberg and Goodwin, 2012) involved a team of researchers. In comparison, I have completed this innovation portfolio alone, with the exception of supervisors, colleagues and participants. Therefore, participants were selected using convenience sampling, and the analysis of the data and subsequent writing of this innovation portfolio took several years.

My fourth limitation was time. My research was completed on a part-time basis while juggling full-time work commitments and family life. Despite these challenges, the research design maximised researcher time, and the action research cycle supported intermittent periods of study and work on the portfolio.

Finally, my initial conception of the innovation was a barrier. I had been subject to significant formal education and work exposure that extolled the role of the markets in capitalist economies. This view rests on an assumption that

the markets make the most efficient decisions and the government should remove itself as far from the markets as possible, and this may have impacted on the development of my innovation. My search for an innovation began on the basis of creating new market mechanisms. As my interviews were conducted and I learned more from my professional experience, this solution did not look actionable in my workplace. Instead, as more evidence was collected during my research, government intervention became more dominant in my self-reflection processes.

What I have learned from this insight into my research barriers and my initial innovation led me to undertake action research as part of my multi- method qualitative approach. I clearly was not well informed about the policy enabling processes needed to transition to a low carbon place, and I needed to engage with others who might know more about these issues before creating my innovation.

16. Methods and data collection

The methods used included a literature review, the collection of primary data from individual interviews and group workshops, and my practitioner self-reflection as shown in Book Two figure 8.

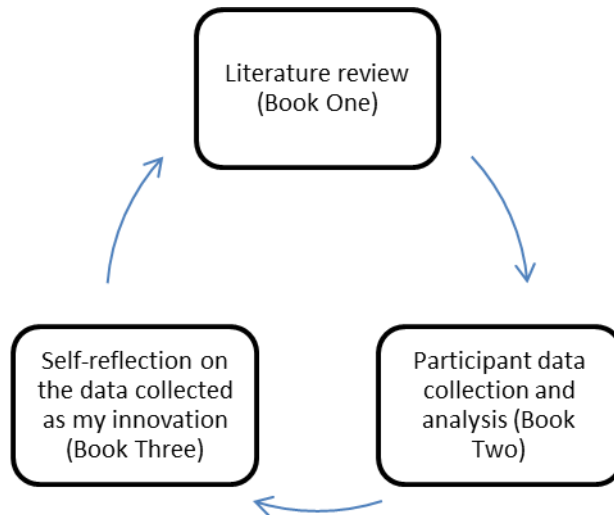


Figure 8. My research method and data collection.

16.1 Literature review

Literature sources were used in Book One to establish evidence for my policy framework's context. The innovation's context was described through the frames of my workplace and the three major subsystems on earth: economic, natural and social. The literature was used to identify the characteristics of these frames and to argue why my policy framework is needed.

Literature sources are also used to support my observations of the participant data in Book Two. Despite an emphasis on primary data collected from the participants, literature sources are quoted to support my analysis.

In Book Three, I use literature sources to support my policy framework as a result of my self-reflection-in-action. This approach has been adopted from

the literature, and literature sources are used to support my policy framework and organisational changes for my profession.

16.2 Participant data

Participant data was obtained to gather practitioner evidence about attitudes to climate change, and to reveal their preferences for the types of adaptation or mitigation action they expect to be involved in or would be willing to carry out. These data informs my self-reflection-in-practice to create my innovation.

Participants were selected using convenience sampling. Convenience sampling is a non-randomised sampling that has been used in this portfolio to target participants based on their expertise in certain fields or their geographic location (Farrakhi & Mahmoudi-Hamidabad, 2012). As these authors indicate, convenience sampling is a convenience to the researcher given, in this instance, limited resources and the difficulty recruiting large numbers of participants. In this approach however, sample size is not important. The locational and practical expertise of the participant are of most concern to the researcher in this study. Understandably, Farrakhi and Mahmoudi-Hamidabad indicate that such an approach can create a bias in the research and should limit generalisations. These two disadvantages are made clear throughout this portfolio.

The questions were presented to participants as either semi-structured probing

questions or vignettes. Semi structured interview questions were asked during the interview or group session. Semi structured interview questions provides limited guidance to participants about the topics of interest for the researcher while simultaneously allowing participants some flexibility to digress or explore topics more deeply (Gill, et.al. 2008). The vignette provides a ‘snapshot’ situation which is given to the participant, with just enough information to allow the participant to imagine real life responses (Hughes, 1998). Additionally, Hughes suggests that the vignette creates a situation where the participant can explore the situation in a way that is ‘non-personal’ and ‘detached’ leading to observations that may be closely aligned to real life behaviour. However, the main criticism of the vignette approach appears to be that the real life responses claimed as an advantage are difficult to measure unless the situation actually arises. In this study, the vignette was used as an alternative questioning method to allow participants to explore their responses to the situation rather than through semi-structured probing questions.

The researcher recorded participant responses at the time of interview or group session. Audio recording was not used due to two reasons. First, the participants in the group session was known to the researcher and the presence of an audio recorder may limit what these participants would say and limit the researchers interpretation of what was said, the body language used, the arguments made, and the main points being said (Sutton and Austin, 2015). Second, the transcription of data requires significant resourcing and analysis

(Sutton and Austin, 2015). These resources were not available to this researcher. However, it should be acknowledged that audio recording can improve data quality and storage (Berazneva, 2013). The quotes attributable to participants are reproduced as close as possible to the field notes recorded by the researcher. Although this may present as grammatically weak in places, this was done to ensure the comments are reflected as accurately as possible.

Table 2 highlights the overall participant data gathering method used in this study. As the table indicates, participants were recruited individually and in groups based on their expertise, my knowledge of their practical experience and their location and availability.

Table 2. Participant data collection methods overview.

Data Source	# of Participants	Method of recruitment	Face-to-face or telephone	Questioning technique	Was the researcher the only one present and taking notes?
The town planning professional	1	Convenience sampling	Face-to-face	Semi-structured	Yes
The Bingara group session	5	Convenience sampling	Face-to-face	Semi-structured	Yes
The Armidale group session	7	Convenience sampling	Face-to-face	Vignette	Yes
The Tamworth group session	5	Convenience sampling	Face-to-face	Vignette	Yes
The community development professional (Nth America/Australia)	1	Convenience sampling	Telephone	Semi-structured	Yes
The community development professional (Aust/Asia/Europe)	1	Convenience sampling	Telephone	Vignette	Yes
The low carbon research professional	1	Convenience sampling	Telephone	Semi-structured	Yes
The Environmental Upgrade Agreement practitioners	3	Convenience sampling	Telephone	Semi-structured	Yes
The policy professional	1	Convenience sampling	Telephone	Semi-structured	Yes

Themes are identified and the data was coded using the analysis software tool NVivo. The data were collected during the group sessions and interviews and recorded in my research field note journal. I reflected on the data post

collection and identified major themes. In some instances, several themes were identified. I then coded field notes to each theme, assisted by NVivo software and relying on my interview notes as the only source of data. This increased the accuracy and validity of the data.

My observation of the data and reflections formed the basis of the thematic analysis. Thematic analysis is used to identify and analyse data by identifying patterns, and is a useful approach to organise data (Braun and Clarke, 2006). According to Braun and Clarke, the themes are identified and coded based on an inductive interpretation of emergent themes, or researcher judgement, with no clear rules about what constitutes which theme is important.

In order to enhance the rigour of the data, a final action research cycle thematic analysis was performed. These themes were specifically identified and tested after they emerged from critical analysis of the data in Books One, Two and Three.

In summary, thematic analysis is used to code the data collected during the group sessions and interviews. I, as the sole researcher, identified and coded these themes from the data that I recorded during the interviews.

16.3 Self-reflection

I use reflective practice as a frame to create my policy framework. My reflective practice process involves actively self-reflecting and interpreting

the events and interactions that I have had with participants (Bolton, 2006). This has been achieved by blending theory with practice, and by identifying and interpreting what I have learned from the data and the research process (Thompson and Pascal, 2012).

My application of self-reflection was emergent and fluid rather than static. As I learned more from my study and workplace, my reflections on my innovation, which were created as a conceptual policy framework, changed because of the five additional years of professional experience in the public service during the period of this research.

The reflection-in-action frame values professional knowledge. Schon labels this “reflection-in-action”:

We know in what we do by the way in which we do it, is what I mean by knowing-in-action. And in this capacity to respond to surprise through improvisation on the spot is what I mean by reflection-in-action. (Schon, 1987. para.10)

And

It (reflection-in-action) involves a surprise, a response to surprise by thought turning back on itself, thinking what we’re doing as we do it, setting the problem of the situation anew, conducting an action experiment on the spot by which we seek to solve the new problems we’ve set, an experiment in which we test both our new way of seeing the situation, and also to try to change that situation for the better. And,

reflection-in-action need not be an intellectual or verbalised activity.
(para.11)

The value place in professional experience is of direct relevance to the development of this innovation. The combination of practical experience gained over time with data collection and self-reflection should be a unique approach to this problem. My approach is more concerned with practical implementation.

In summary, my application of self-reflection has been invaluable during the process of research data collection, interpretation of results and innovation identification. Self-reflection has allowed me to think more deeply about my topic, how I addressed my topic, who I was speaking to, what questions I asked, and how I interpreted my data.

17. Results

The following sections describe the details and my identification of themes from the participant interviews and group sessions conducted in this innovation portfolio. For each interview or group session, I first introduce who I interviewed, why they were interviewed, when, where and how they were interviewed, followed by a description of the themes that were identified.

17.1 Part one: Learning from practitioners working with town planning and standards

This interview with a planning professional was conducted with the aim of identifying practitioner insights about how planning regulations and consultations could work to support the transition to the low carbon place.

17.1.1 The town planning professional

Introduction

In my professional practice, I understood that the planning legislation has been an important policy that defines much of the interaction between government and businesses, which is necessary for achieving regional development outcomes. If, for example, a business wanted to conduct operations, extend or build new premises, the local and state planning departments would assess applications for land-use planning, building construction, business operations, land subdivisions and infrastructure (Tamworth Regional Council, n.d.). In NSW, the planning and development of human landscapes occurs in accordance with the *Environmental and Planning Act 1979* (NSW), and is overseen by the NSW Department of Planning and Environment (NSW Department of Planning and Environment, 2015). This department also oversees major project development, regional planning, priority growth centres and precincts, and provides policy advice to the NSW Government (NSW Department of Planning and Environment, n.d.). It was important to conduct

this interview to obtain data from a professional working with the legislation to gain practice-based knowledge from an informed person about the potential use of the planning legislation in NSW Australia to create the low carbon place.

The town planning professional (referred to hereafter as P1) is an informed person professionally known to this researcher, and was selected for their expertise and experience working with the New South Wales (NSW) Planning Legislation. This face-to-face interview was conducted on the 24 October 2013 in North Western NSW. P1 was recruited using convenience sampling and was asked a series of semi-structured probing questions sent prior to the interview and repeated during the interview. The researcher took field-notes as the only researcher present. The estimated age of the subject was 40-50 years of age.

What did I learn?

The following themes were observed from this interview.

Theme 1: existing product and town planning regulations could be used

The opportunity with regard to the town planning system, according to P1, is to raise existing standards. For example, the local building codes applied in the planning process could mandate higher environmental criteria in order for projects to be approved. As P1 said:

The planning legislation already promotes the use of BASIX, Building Council Australia registration (which are minimum standard instruments)... the planning system is not preventing people from

becoming, as an example, energy efficient. However, the opportunity in the existing planning system is to create higher standards.

Despite this comment, there are some limitations on exactly how far standards can be lifted without changing the legislation. P1 observed that existing minimum benchmarks are no longer satisfying all council areas. Some jurisdictions have sought to unilaterally increase standards but are restricted by the legislation in its current form.

In summary, the planning system could be used to create the low carbon place. The Planning Institute of Australia (n.d.) also confirms that planners could have a key role in guiding climate change adaptation and encouraging better environmental outcomes through energy and water efficiency and built environment improvements. Also, the essential legislation is already activated and only requires changes to minimum allowable standards for buildings, energy efficiency, construction materials, green spaces, cycling paths, industrial development and town planning. The opportunity to increase the powers of this authority to enforce the low carbon transition is an opportunity for a Western style capitalist country like Australia.

Theme 2: Many decisions are made with a preference for the lowest initial cost

My second observation was that P1 observed a widespread and demonstrable community preference for least-cost solutions. In P1's experience:

The community views increased planning controls as more cost, and cost is always minimised in development projects. In my experience, unless low carbon choices are mandatory, or a design/proposal needs to meet mandatory requirements, developers choose lower cost options. So, in reality, developers do not actively pursue low carbon innovation information unless it will cost less or they need to find it to comply.

This can be interpreted to mean that projects are designed and delivered to operate for the least initial financial cost. In other words, form no longer has primacy over function, as developers and decision-makers trade off design or lifetime or lifecycle costs for lower construction costs. This least-cost approach appears to reflect the primacy of self-interest. For many community members, developers and industry, this least-cost promotes self-interest by maximising profits. According to P1:

Self-interest is still a huge issue. The community is happy to be low carbon as long as it doesn't cost anything.

In practice, P1 also suggested the lifetime costs of a development are rarely considered important. These costs are usually transferred to a consumer. This preference for least-cost is very visible in commercial development. According to P1:

Commercial properties have very little consideration of green building practices, except in isolated examples. In my experience, commercial buildings are designed to fit the purpose intended, for the lowest cost possible, and to maximise returns or competitive advantage in the rental market.

Likewise, civil engineering works and public buildings also give very little consideration to low carbon options as

Things like bridges and roads are designed to achieve an outcome, like cross a river and support volumes. So strength and durability is a key consideration rather than low carbon.

In practice then not all development of place making infrastructure can focus singularly on environmental outcomes. In some instances, the achievement of low carbon might at best be avoided by some degree. It might be argued that greener materials and methods could be used to construct the highway or carbon-offset credits could be purchased to offset the highway's carbon emissions. It is however, hard to imagine how to avoid all of the carbon emissions of highway construction unless the construction of the highway was avoided by establishing alternative transport options like rail.

Another observation about the least-cost phenomenon is the perception that additional environmental regulation means more cost. P1 challenged this position by stating that:

The planning system is not placing unreasonable demands on developers but it is not really driving innovation and environmentally friendly outcomes either.

I made an entry in my research diary where I emphasised this point and concluded that self-interest was the main motivator for this behaviour:

People and businesses would only build facilities to meet minimum legislated requirements. Such a decision was influenced by a tendency for least-cost options. This suggested many people act in their self-interest.

In summary, residential and commercial developers and the wider community appear to prefer least-cost options for initial construction, and place less emphasis on lifecycle costs. This means that instead of designing energy efficient buildings, developers seek to lower initial construction costs, and may avoid energy efficiency design or materials because the legislation permits them to do so. This is a result that is not attributable to the legislation itself, but its application. According to P1, there is scope to increase standards without incurring significant extra cost, and that this legislated increase in standards would lead to low carbon settlement patterns and construction.

Theme 3: More government leadership is required because participants were concerned about climate change

My third observation of this interview identified the importance of government providing more leadership on this issue in the future. P1 suggested more government leadership is needed to successfully create low carbon places. P1 suggested that:

All three levels of government could assist with the expansion of low carbon living.

In particular, P1 suggested that the Australian Commonwealth Government could show more overall leadership, while the state government could apply the legislation as a path for local government to assess applications. P1 referred to the following example:

Places like Sweden have had more leadership on this issue and are actually investing in new technology...the leadership can use the planning system. Such strong leadership combined with community demands could create the low carbon economy, increase competitiveness and create jobs.

Political leadership on Australian climate change policy has not been completely absent. P1 used the following example by stating that:

The moral challenge statement was made by the then Australian Prime Minister Rudd in 2007. However, this commitment was made during good economic times. Since 2007, the economic conditions have not been as good, and another government was elected, which has different views...the new Prime Minister Abbott (and government), and influential commentators are opposed to climate change action and believe climate change is not real. So, naturally, how do communities invest in this?

According to P1, the new government and their influential stakeholders appear to remain concerned about the potential financial and job impacts on high carbon industries, like coal fired power generation, as a result of transitioning to a low carbon economy. P1 said:

Transitioning to a low carbon economy is a trade-off between preserving existing industry skilled workers and helping transition workers into renewable energy sector... The car industry is an example of existing workers who may need to transition to new work. This may be a rough landing for many people.

In summary, more government leadership on this issue would assist the practice of using town planning to create the low carbon place. Specifically, the national government could provide the overall direction, and the state and local governments in Australia could change and enforce their existing legislation regimes, and provide support for transitioning workers in affected industries.

Conclusion

In summary, the evidence collected from this planning practitioner indicated that the planning system could be a key policy for creating the transition to a low carbon place. As the planning system is a legislative tool used by government to guide building design and development, business operations, urban and rural layout and future expansion, and infrastructure design, the key opportunity is to raise standards to prioritise low carbon outcomes. This would require changes to existing legislation and may financially impact on existing business and community facilities and operations. With more government leadership, assistance could be provided to those industries and workers affected by these policy changes.

Changes to standards may, however, introduce additional costs on businesses and the community. P1 considered the preference for least-cost solutions to be a major barrier facing the transition to the low carbon place. If my innovation was to overcome this barrier, then access to additional and subsidised finance may be required to lower the cost of making low carbon investment.

It must be acknowledged that P1 had been in the public service and was very experienced with the planning systems and was interviewed for her/his practical experience or experience-in-the-field. Hence, P1 may be biased in favour of government regulation over market-based solutions because of their experience with regulations and limited exposure to market mechanisms.

17.2 Part two: Learning from practitioners within communities

The following sections describe my analysis of the data obtained from conducting community group sessions. These group sessions were conducted with the aim of identifying the views of community participants, who were practitioners in their field, about climate change and the transition to the low carbon place.

Participants in the three workshops were asked to complete a survey. The survey was sent prior to the workshops asking participants to answer ten questions. The following section describes my analysis of their responses.

The data indicated 40% of the participants were between 55-64 years, 33% were 45-54 years, 13% were between 35-44 years, and 13% were between 25-34 years. No responses were recorded for 18-24 years. The responses indicated eight participants were male and seven were female (53.33% versus 46.67%). The data indicated that 53% of participants identified “government”, 13% agriculture, 13% business support and logistics, 13% education, and 6.6% not-for profit. The data also indicated that 46.7% of the participants held university degrees and 33% held postgraduate degrees.

The data indicated that 26.67% responded that climate change was ‘extremely important’; while 66.67% responded ‘important’ and 6% (or one response) indicated ‘neutral’. No respondents indicated ‘not really important’, ‘not important’ or ‘I’m undecided’.

The participants were asked whether a price on carbon would be effective. The respondents indicated 33.33% agreed ‘yes, very effective’ and 26.6% indicated ‘yes, slightly effective’. Interestingly, 20% of respondents indicated ‘not sure’, while 6.67% and 13.3% indicated ‘no, not really effective’ and ‘no, it is really not the answer’. An additional question was asked about whether the money raised from carbon pricing could be used in revenue recycling and financing options for the innovation. The data indicated 66% of respondents agreed ‘yes, all of it’, while 20% agreed ‘yes, some of it’. Two participants (13.3%) indicated they were ‘not sure’ and zero participants indicated ‘no, it should go

completely into overall government services or tax cuts?.

The next question sought to identify the participant's capacity to identify where emissions come from. The question asked how the participant ranked the following sectors in order of their contribution to carbon dioxide equivalent emissions in the Australian economy (1 is highest and 7 is lowest). The data suggested participants ranked the sectors in the following order: electricity generation, transport, agriculture, industrial processes, waste, fugitive emissions, and land-use change. The Australian government data indicates sector contribution of GHGs in the following order: energy, gas and water (34.9%); agriculture, forestry and fishing (18.3%); manufacturing (12.9%); services, construction and transport (11.9%), (Australian Government, 2015).

The researcher sought participant knowledge about emission in their place. In particular, the responses might give an overall level of agreement or disagreement about the status of low carbon between participants. The data indicated 66.6% (ten responses) suggested their place was an 'average carbon emitter', while 13.33% (two responses) indicated their place was 'high carbon emitter'. On the other hand only two responses indicated 'slightly low carbon' while 6.6% were 'neutral'. No participant indicated 'very low carbon'.

These data was useful contextual information about the participants. The data confirmed that a mix of participants of age and sex was sampled, and that these participants held government and private sector positions. The data indicated

that not all participants were concerned about climate change, and that just over half of the participants thought a price on carbon would be effective or slightly effective in reducing emissions. Also, two thirds of participants believed the revenue raised from carbon pricing should be recycled back into low carbon projects. Finally, participants appeared to accurately identify the list of major emitters by sector in Australia suggesting that they had good common knowledge about the economy and emissions.

17.2.1 The Bingara group session

Introduction

In my professional practice, I had worked with stakeholders in Bingara and with members of the Bingara District Vision 2020 group. In the northern inland region of New South Wales, Bingara is a small town within my workplace operational area and lies within the Gwydir Shire Council boundary. Bingara has a population of 5,258 people (ABS, 2017). Bingara is approximately 170 km's from Tamworth (the region's major city) and is located between the two major north-south highways (Newell and New England). The following industries, in order of appearance, are the major employers in the Gwydir Shire Council region: agriculture (668 people), health care and social assistance (151), education and training (133), public administration and safety (130), and retail trade (113) (RDANI, n.d-a). Gwydir's gross regional product (GRP) of \$239.704 million, per capita GRP of \$48,279, and per worker GRP of

\$154,150 (RDANI, n.d-b) makes this location the smallest economic region out of the three locations in this study.

Like many small inland towns, Bingara faces many economic development challenges. My professional observations of Bingara's challenges include the continued trend of declining population attributed to rural migration to the cities, its dependence on agriculture and the ageing profile of residents.

Nonetheless, Bingara has tried to address these negative forces and become more proactive. The Bingara community has invested in a range of educational infrastructure, and niche projects like the Living Classroom which demonstrates sustainable farming and urban practices.

The participants were recruited from the Bingara District Vision 2020 group, which is the local chamber of commerce. I selected Bingara because Bingara is a small inland regional town dependent on agriculture that had supported local projects that addressed climate change and regeneration. This group session was conducted face-to-face on 10 December 2013 in Bingara, NSW. The participants recruited comprised three females and three males, one participant was under 40, three participants had farms, one participant worked in local government, two participants were semi-retired, married and were former business owners, and three participants had previously held leadership positions in community organisations. These participants are referred to hereafter as B1, B2, B3, B4, B5 and B6 to protect their identity. In this group session, participants were asked a series of probing semi-structured

questions, and these questions were then discussed in the group setting as I took notes while the participants spoke.

What did I learn?

The following themes were observed from this interview.

Theme 1: existing product and town planning regulations could be used

The participants in this group session tended to favour government-led programs that would involve regulation and standards. In contrast, only one participant made a negative reference to market-based mechanisms. These comments also reflected how participants in this workshop tended to find solutions by referencing their local experience and situation, which is also a theme. For example, participant B5 made a reference to local car-pooling or bus solutions for local commuters, and linked this comment with the level of waste recycling:

We should consider carpooling to work or use the bus. Fuel has become too expensive and so I will now consider it. We do look after the environment, but we do not recycle. Local government should also crack down on waste recycling.

In response, participant B2 listed a range of regulations for public buildings, groundcover, working hours, renewable energy, public transport and agriculture that could be initiated through government regulation. Again, these comments were made with reference to a local experience or situation:

All public buildings require air conditioning. All buildings should be changed to natural ventilation or become carbon neutral. Benchmarks could be set for groundcover on public land, like stock routes and parks, and on agriculture land. Working hours could also be changed to allow more car sharing; so everyone starts at different times. Rural areas should move off the grid and renewables would be cheaper to maintain. The government needs to lead by example, like insulating public buildings (as mentioned above) and rethink public transport across Australia. We have long distances to cover with public transport. In agriculture, soil health instead of production should be the focus.

Because agriculture is important to the sustainability of Bingara and its surrounds, participants often referenced agriculture in their response. In the following comment, participant B4 spoke about carbon in soils and the possibility of soils sequestering carbon, which would require government regulation and standard setting. Also, in the following exchange, the reference to market-based mechanisms, like a carbon tax, was made:

B4: soil health is the pinnacle as a basis for carbon in soil. We need to know more about soil based carbon sequestration. We know we can use evidence for deciding but the scientific community is making it difficult with uncertainty. Say, trees are not bred for food production versus farm use, and we are doing this at home.

B1: I agree. Soil is a priority and is most effective. We sell too much product. We need to cut back on carbon emissions and not look to sequester carbon as a right to emit more carbon. Earth finds its equilibrium and we should do the same. Carbon management should be the carrot and not the stick. A carbon tax doesn't work. A tax doesn't

work. If you target farmers as a win: win, with the carrot, this is logically the only way.

In conclusion, government regulation appeared to be a key action that could be undertaken to create a low carbon place in Bingara. Participants made references to government regulation to change behaviour, use regulation to introduce benchmarks, improve public transport and to improve the soils of the local agriculture sector.

Theme 3: More government leadership is required because participants were concerned about climate change

The evidence obtained from the participants in this group session indicated that government leadership would be needed because the participants were concerned about climate change. B4 stated:

I think the evidence of Climate Change is well in truly in. There could be some doubt I suppose, but I think it is more about the intensity of future changes. I think though that the overwhelming evidence, more than 90%, supports climate change and if you had a more than 90% chance of being hit by a bus you would take some action to avoid buses. Government policy continues to deny it.

Participants were seeking leadership because they were concerned about climate change. B1's statement provides evidence of this position:

There are two things here: cyclical climate change and anthropogenic climate change. We also have land mass and continental changes occurring. The real question is whether the burning of fossil fuels has

sped up changes - tipped the climate to a point that is not recoverable. And sea levels? Well 20% of the world's population may need to be relocated or will migrate soon.

Data indicating concern about changes in the weather, possibly caused by climate change, and its impact on local farmers was also observed. B2 said:

We will be blessed if there is no loss of rainfall in our area...But I am seeing an increase in climate weather extremes. People are still uncertain about what will happen next. This uncertainty means that some people are moving into new ways of thinking while others remain as linear thinkers.

In summary, the data indicated that participants in this group session sought more government leadership because they were concerned about the impact of climate change. The participants used specific local examples related to their experience to make their argument.

Theme 4: Governments needed to become more trustworthy

The evidence obtained from this group session suggests participants desire more government leadership to address climate change impacts and improve local economic, environmental and social systems. These Bingara participants made comments to indicate that they do not fully trust the government's ability or intent to effectively deal with this problem. The following comments by B2, the most vocal on this issue, showed how deep this concern is, and linked this mistrust to the power held by those socioeconomic participants dependent on

fossil fuels, and a government body keen to acquire more power:

B2: There is a reason for the denial. The whole socioeconomic structure is for combustion. Governments can't find a way to change the status quo without losing their power. If everyone could generate their own power people would be less dependent on the grid and government. The government wants you to be dependent and they provide services to make sure you are dependent. But will we reach 9 billion people?

B2's mistrust of government went even further than climate change policy by questioning the influence business has over politicians.

B2: But government is enthralled by business as contributors. Government is interested in their relationship to corporations. Government is invalidating itself. A local MP probably hears more from corporations and their lobbyists than their local constituents.

In summary, several participants appeared to have a high level of mistrust in government, and its ability or willingness to address climate change. This lack of trust was caused by their perception about the influence and power wielded by socioeconomic participants preventing change and maintaining high carbon patterns of living. Interestingly, these participants referred to 'government' rather than individual political parties on the left-to-right spectrum, which suggested that their mistrust may be deeply held and may extend into other issues beyond climate change.

Theme 5: Decision-makers could talk to local people and make better use of local information

Participants were observed making references to this theme when responding to questions or in discussion with other participants. An example was observed in the following exchange arising from a probing question:

Question 2 – Let’s talk about how climate change, as you witness it, is impacting on your lifestyles?

B5: I have seen a lack of water on our property. I value water and we are more and more careful the less we have. I think climate change is on a global scale but having this debate continue about whether it is happening or not is a waste of time. It doesn't matter if you “believe in climate change” or not. Earth will hit you hard and we are going to pay some price. At home I am seeing changes, like the ground dries out a lot quicker after rain.

B3: I’m seeing higher temperatures or warmer day’s...maybe?

B5: The warmer days have an impact on your body. I see my young kids out in the sun and they get affected quicker than I did. The boys look for the shade quicker than we did, and I am only in my thirties.

B2: Humidity is different now.

B3: Weather forecasts in the morning have UV warnings and they seem to go for longer in the day. Now they are from 8.30 am to 4.30 pm or later.

B5: in the height of summer we used to play cricket all day and I can’t remember being burnt. If we did it wasn’t much. And we didn’t use sunscreen and all that. No, it seems more intense and the kids get burned after half an hour or so.

B1: I think autumn and spring are noticeably warmer. The shoulder periods that lead to the change in the seasons seems shorter. We transfer into warmer weather quicker and we hang on to summer temperatures longer.

B2: I think the average temperatures are higher with no break.

As Bingara is located in a predominately agricultural production area, comments about land changes were not surprising. One participant noted the risks about monoculture agriculture in a changing climate. B1 said:

I'm not on the land, but for 25 years I have seen an increase in monoculture agriculture, of about 95% of local properties, where cattle were say 70% before. And this is a high-risk strategy for the longer term. We won't realise this until we have a major disaster.

B2 also said:

I've been on my property for 12 years and climate change wasn't on my radar. But it has an immediate impact like creek flows and floods. East of Glenn Innes, the rain has actually increased, yet other towns have less rain.

Participants also reflected on their past in order to make their point. The following comment from B5 seeks to contribute to an exchange in response to the probing question about whether they think urban lifestyles were more sustainable prior to 1940:

I think country Australia has changed a lot slower than in the cities. But I think the key change came in the 1970's and I think this had to do with globalisation influences. My sister was born in 1977 and I was born in 1971. I had garden jobs to do and only some basic toys. She

had mass-produced toys, like cabbage patch kids, and a family treehouse. This caused changes in the family unit. When I was young Australia and country Australia still had some distance. You couldn't get the American toys. But after 1977 you could get anything and everything. I can't remember going to a McDonalds as a kid.

In summary, Theme 5 demonstrated that participants in this group session tried to understand this issue by using their lived experience and their local environment as reference points. This highlights how my innovation needs to create local solutions for transitioning to the low carbon place, and needs to recognise the social importance of having strong communities who feel empowered to make change and survive climate change.

Conclusion

In summary, these participants, as practitioners in their own right, highlighted how they would create the transition to the low carbon place. Their solutions pointed to more government regulations, agricultural soil improvement, benchmarking and monitoring, recycling, renewable energy, local food production, and a restoration of the local community as it was decades ago.

This discussion was mostly conducted with references to the local context, which reflected both the probing questions presented and the responses given. Participants consistently spoke in terms of their personal situation or their local experience of changing environments or events. In particular, participants referred to weather volatility like heat stress, changes in the length of

seasons and future rainfall changes, which is not entirely surprising given Bingara's reliance on the agriculture sector and its reliance on the weather.

The major theme was participant mistrust of government. Several participants displayed great suspicion about the capacity and motives of government in climate change policy. They made comments that clearly demonstrated a lack of trust between government and the community. Participants made references to powerful stakeholders and how they continue to dominate decisions.

According to these participants, this is preventing any real government action to create the low carbon place, and, despite this barrier these participants sought real Government action. Hence the paradox; the participants desire action by Government but were observed to mistrust government. On the other hand, participants made very little mention of industry climate change or market mechanisms.

I made an entry in my diary on 12 Dec 2013 p. 20, reflecting on this group session. I wrote that the participants displayed very modern views despite the region being particularly conservative. I also noted that the group wanted to move the discussion past the climate change science and that carbon and climate change were discussed in the context of other day-to-day issues, like children's development, old age and concepts about society. Furthermore, I noted that participants already detected physical changes to their environment. One interesting discussion thread suggested participants wanted more emphasis

on youth taking a greater role in decision-making.

17.2.2 The Armidale group session

Introduction

Armidale is a medium sized town in inland rural NSW within the operational area for my professional occupation. In 2016, the Armidale regional area is located in the highlands of the New England region and had a population of 29,499 (ABS, 2017). The following industries, in order of appearance, are the major employers in Armidale Shire Council region: education and training (2,466), health care and social assistance (1,566), retail trade (1,455), agriculture (1,068), and accommodation and food services (946) (RDANI, n.d-a). Armidale's gross regional product (GRP) was \$1,851.798 million, per capita GRP \$64,973, and per worker GRP \$160,343 (RDANI, n.d-b).

The Armidale group session was conducted as an expanded sample during my reflections in the action research cycles. This additional group session was needed to help to triangulate data between more than one site, and gather more data by engaging with more professionals in the community from a different place. I selected Armidale to contrast with Bingara and Tamworth. Armidale is heavily dependent on the University of New England campus and its staff and students. In comparison, Tamworth does not have a traditional broad offering university campus and its local economy is more dependent on agriculture value-added manufacturing. On the other hand, Bingara is the smallest of the

three sites, and has the least economic diversification and financial resources of the three economies. This approach establishes a data set between regional large city, regional mid-tier city and regional town in New South Wales. All three sites are within my workplace responsibility.

The approach to questioning was also different from the Bingara group session.

The participants in Armidale were asked a vignette:

Imagine you are who you are now, in your current space/lifestyle/home/job/income/family. Now, imagine this same point in time is a few years from now. The climate has become considerably worse; noticeably worse. All of a sudden, this morning actually, you hear a major announcement by all levels of government – we need to take urgent and drastic action now. All levels of government are in agreement and it has bipartisan political support. What happens next?

The vignette indicated to participants that urgent and drastic action was to be taken, and that an announcement had been made. As the participants were given this question during the session, their initial thoughts are an important observation. What this action may be, and whether government, business, or individuals would be asked to deliver those actions, was left open. The structure of the question was aimed at aligning the responses to my workplace.

This group session was conducted on 5 February 2014 in Armidale, NSW.

Seven informed participants identified as A1, A2, A3, A4, A5, A6 and A7 were recruited using convenience sampling. Two participants were from a university, one participant was from local government, three participants from state government, one participant worked in sustainability and environmental management systems, several participants had small businesses, and each participant had worked in a business. All participants appeared to be over 40 years of age, were locally based and appeared to know each other.

What did I learn?

The following themes were observed from this interview.

Theme 1: existing product and town planning regulations could be used: existing product and town planning regulations could be used

The Armidale participants in this group session spoke very broadly about a range of issues. They did speak about product standards and town planning, but this was not the strongest theme. Like previous interviews, the participants in this group session indicated that product standards and regulation would be the policy option that would most likely need to be adopted. For example, the following exchange between several participants indicates the level and type of government intervention would be necessary:

A1 You need to get the community involved.

A2: This needs to be done. We need a top-down approach led by the

Commonwealth Government.

A3: We also need to change how we live.

A4: We need help to make sense of what is being proposed.

A2: New guidelines will need to be defined. The Commonwealth Government needs to give a directive on water usage and waste.

A1: Any policy decision needs to include the community.

A3: The policies should consider the lifecycle of waste, of anything produced, and overall production.

A2: Every product or service needs to be audited

The following paragraphs highlight how participants made more direct references to specific policy initiatives based on their experience and knowledge. Several participants addressed the urban building issues confronting capital cities. In the following example, participants spoke about the regulation of energy use in properties in Sydney (Australia), and the regulation of commercial and residential buildings in Toronto (Canada):

A3: Energy use in Sydney is not properly utilised. People go to their work and then go home yet the city is lit up for 10-14 hours! Can we do better?

A5: Toronto is a great example of better planning. Any commercial building must be one third residential.

A2: Yes, city blocks should go back to the old model with mixed shops and residential areas.

The following comment highlights how a participant attempted to provide an overall framework that represents a possible policy solution:

A2: The policy approach needs to be equitable, with clear guidelines and agencies to deliver support. The delivery should be through agencies with policies including penalties to encourage systematic behavior modification, an emission trading scheme should be introduced, and some direct action policies like subsidies might also be used.

In summary, these participants would look for standard setting and regulation over market based mechanism. Despite the vignette question, participants had the opportunity to highlight business and individual policies or even refute that government should lead this intervention. With the exception of one comment made by one participant, participants did not consider business and voluntary programs would be effective.

Theme 3: More government leadership is required because participants were concerned about climate change

This theme was also observed in the Bingara group session. The participants in the Armidale group session also spoke a lot about government leadership and their concern about climate change. Regarding government leadership the

following comment by A2:

Guidelines need to be defined. The Commonwealth Government needs to give a new directive on water

Several participants entered into a short conversation about political leadership figures and how one participant felt about the lack of political knowledge the wider Australian community had in order to encourage more leadership on this issue.

A1: the message is coming from the top. You have Abbott (then Prime Minister of Australia) and others argue about what they believe, but it's not based on real information.

A5: we as a community need to get smarter politically.

A4: it seems like it is un-Australia to be critical about how things are done now.

One participant said that the acceptance of climate science would be a key first step for governments to take. This participant also stated that the pressure of climate change may eventually change people's minds. A6 said:

If the science is eventually accepted it would be a trigger for action. And precisely it needs to say this - we know this now and we see this trend. When we see people accepting the science is when real change will happen - but I think only when a level of panic sets will we see change.

In summary, participants sought more government leadership and were concerned about the climate change situation turning into an emergency.

They also spoke about the acceptance of climate science and how that might trigger more action when the situation became an emergency.

Theme 7: Decision makers should do more to ensure equity in their policy

My observation of the information indicated that all participants in this group session held concerns about the equity of the current policies addressing my topic, and how other members of the community, particularly those with low incomes, would adapt to climate change. Participants in this group session displayed concern for the welfare of residents who could not afford insulation or higher energy costs, and who might end up on the streets. Being located at such a high altitude, living on the streets in Armidale is very dangerous in the winter months. Interestingly participants in this group session also displayed a sense of confidence about how well their town would adapt to climate change. A2 categorically expressed their concern about equity in climate change policy:

But it (the policy response) needs to be equitable, with guidelines and agencies with responsibility to deliver projects.

Several participants had concerns about whether many people in regional Australia could afford to upgrade their heating or cooling:

A6: Livability at the local level will be impacted by extremes in temperature, or drought, so heating and cooling in housing will be key things to consider

A1: But poor people couldn't afford to upgrade their heating and cooling!

I probed further and asked could climate change put local lives at risk? A1 responded by saying that:

People will freeze to death if they can't use their heaters...many people wouldn't be able to survive the cold nights in Armidale.

Several participants showed strong concern for future generations. One participant A1 said:

Climate change is killing my great-great grandchildren.

Participants also demonstrated concern about the equality of climate change mitigation efforts of wealthy countries and poor countries.

A3: We (Australia) need to lead on reducing our environmental footprints.

A6: The developing world is looking at surviving on a daily basis, one day to the next.

A2: Two thirds of the global population does not even have electricity.

Participants also demonstrated a willingness to discuss equity in terms of the volume and intensity of response by individual countries and between

countries. In response to discussions about India and China and their contribution to carbon emissions relative to Australia:

A1: India and China have done nothing compared to what we have done.

A5: They are doing a lot! In Australia we are the second highest per capita emitters of carbon.

A3: I heard Australia is number one.

One participant made a specific reference to economic development models. Should developing countries be allowed to follow the Western economic model, vis-à-vis high emissions? A3 said:

China and India are Third World countries and always look to First World countries for their development. It's their pathway to prosperity. They copy us. The only difference is we have 20 million people and they have 1 billion people each. We need to accept that.

In conclusion, my observation of the participants and the data recorded indicated that these participants are highly concerned about the equity or fairness of climate change and policies. They spoke about personal, local, national and international aspects of climate change, where they acknowledged that current patterns of living needed to change, but any change should be fair and protect the more vulnerable people in our local and international communities.

Theme 4: Governments needed to become more trustworthy

Like the Bingara workshop, these participants were observed to mistrust government leadership on this issue. They made references to powerful stakeholders, the lack of community drive, and some of the tactics used to influence local communities. For example, the participants made the following comments:

A3: Our political leadership is not telling us what to do. The problem is community sentiment is now very low. Our Prime Minister hasn't acted well and even said climate change is not happening. This position is not getting people to do something. We need to sell to our leader that we want more progress on climate change.

A5: We do have a voice.

A6: One of things that the political process has learned is to use the politics of fear. Climate change has become a football match of fear between two teams.

A3: Yes, but these two teams are proposing only two ways. Who umpires?

A6: Fear is tapped into. Putting an emotional case to society makes it easier to manipulate with fear.

A5: Divide and conquer!

A6: Yes, and we get sucked into it. We need our leadership to see the big game.

Summing up, these participants did not trust government. They were suspicious of government motives, and whether government could deal with climate

change. They spoke about tactics used to manipulate the community and how the community still looked to government for leadership.

Conclusion

The Armidale participants provided a vibrant and willing discussion. A wide-ranging discussion of opposing and supporting views was observed between participants, who were very willing to engage and debate. Despite this observation, this group session did not differ markedly from the Bingara group session, despite the use of the vignette question.

The Armidale participants, like the comments observed in Bingara, tended to make reference to their local context. For example, because Armidale is a high altitude city many residents already could not afford insulation or higher energy costs. Interestingly, participants in this group session also displayed a sense of confidence about how well their town could adapt to climate change. One such example was that these participants thought Armidale might be a desirable location for the migration of businesses and people based on climate science modelling.

Another interesting observation about this data is that participant views were not always entirely accurate. For example, the comment about China and India not doing enough about climate change is not supported by the data. According to Williams (2014), China has introduced a range of mitigation measures designed to reduce GHG emissions, including carbon pricing, reducing

energy intensity, and supporting the deployment of renewable energy.

However, Williams also recognises that China's emissions were 20 times greater than Australia and are on track to be more than double the USA.

I reflected on this group session on the 24 February 2014, some two and half weeks later. I wrote how I was very pleased with the group session and participants, and thought the participants were very confident in Armidale adapting to climate change. This was quite a different impression than I had from Bingara. I referred to their confidence about their water supplies but noted that I tended to agree that the water could probably be traded away for other purposes, and having such rich resources would mean that Armidale may have to relinquish these assets for other communities.

17.2.3 The Tamworth group session

Introduction

Tamworth is a large regional city located in regional NSW. Tamworth is a city in inland rural NSW within the operational area for my professional occupation. Tamworth regional area had a population of 59,663 (ABS, 2017). The following industries, in order of appearance, are the major employers in Tamworth Regional Shire Council region: health care and social assistance (3,439), retail trade (2,715), manufacturing (2,087), education and training (2,044), and accommodation and food services (1,638) (RDANI, n.d-a). Tamworth's gross regional product (GRP) was \$3,567.857 million, per

capita GRP was \$63,382, and per worker was GRP \$162,360 (RDANI, n.d-b). .

In my professional observation of Tamworth, I note clear differences with Armidale and Bingara. Unlike these towns, Tamworth is already a large regional centre and has, for some time, been drawing in new residents from intra and interstate and from within this region. However, unlike Armidale and Bingara, the Tamworth region is highly dependent on the successful production of agriculture to provide raw materials for the local food processing industry. Given this dependence, I knew the environment was important to the community, but I did not understand their views about climate change action.

The Tamworth group session was an additional session to gather data between small, medium and large regional towns from within my practice, and to engage with more professionals in the community. The approach to questioning was also different from the Bingara group session but similar to the Armidale session. The participants in Tamworth were asked a vignette.

Imagine you are who you are now, in your current space/lifestyle/home/job/income/family. Now, imagine this same point in time is a few years from now. The climate has become considerably worse; noticeably worse. All of a sudden, this morning actually, you hear a major announcement by all levels of government – we need to take urgent and drastic action now. All levels of government are in agreement

and it has bipartisan political support. What happens next?

This group session was conducted on 6 February 2014 in Tamworth, NSW. A total of five informed people were recruited using convenience sampling, and are referred to hereafter as T1, T2, T3, T4, and T5. Three participants were employed by the government sector and two people were employed by private sector. Three males and two females participated, with the youngest person approximately 35 years of age and the oldest approximately 55. All participants were current residents of the Tamworth region.

What did I learn?

The following themes were observed from this interview.

Theme 1: existing product and town planning regulations could be used

The participants in this group session expected environmental standards would be a tool used by government to create a low carbon place in Tamworth. This theme had been consistently observed in the previous group sessions, and suggested that market-based mechanisms may not work in Tamworth. For example, T2 said some of the appropriate policies might be already in place but need tightening:

Each Government agency, say the Department of Education, might look at how training might help address these issues. But you did say drastically? I guess a lot of policies achieve certain things already, so it

may just need to go through existing policies and they tighten them up. Other organisations, like those in the private sector, might see it as an opportunity. They say “I can do this” so when it comes to the local rubbish tip they might put machines in for methane capture and make a business of it, or maybe another organisation steps up.

T3 thought government could set a better boundary for polluters by using more ‘carrot’ incentives:

The government could tackle the large polluters and set the economic climate and individuals will follow. There will be a need for enforcement but also a need for a reward system. Maybe use a little more carrot rather than the stick to make a difference?

Several participants spoke about product bans with specific references to consumer goods and agriculture. The following exchanges highlight how participants thought product bans could work in practice:

T3: Take your washing machine example. Why not make minimum energy and water use specifications compulsory?

T1: Why is an inefficient washing machine even available in the store? They are not really serious about climate change. Money talks and bullshit walks!

T2: You do get rebates for installing an efficient washing machine?

T1: Why not ban the products? If we are really fair dinkum about climate change...

T5: The government could put limits on the types of lights we use, even use industry shutdowns and food rationing.

T4: We'll definitely need to be more 'cold' about how we decide about what is allowed and what is not allowed. Programs that try to subsidise is small change and is only corporate welfare and is not going to achieve much. We should be asking whether it is viable to farm in areas like North Queensland and grow cotton where there is not enough water.

T4: Growing cotton in Narrabri? Yeah swell idea.

In conclusion, to create the low carbon place in Tamworth, standards would need to change to reduce environmental impacts. This would likely include legislating consumer goods, limiting production in certain areas and for certain products, and redirecting agricultural production. This indicates a more interventionist government rather than a reliance on market-based mechanisms.

Theme 6: Climate change divides communities

The evidence in the group session shows participants indicating a perceived difference between those identifying themselves as being 'green' and those that do not. Several participants became quite enthusiastic about discussing the perceived emergence of an environmental 'club'. This club label infers a new class in society or an exclusive membership to an organisation that has its own rules and norms.

T1: I believe in the club scenario. We have a herd mentality. In a club scenario, you feel the topic, people are like minded, and there are plenty

of clubs from which to choose. I do think that being part of an environmental group is considered a cool thing.

T4: It's a bit like religion. If you are born into it it's a difficult thing to change.

T1: Take smoking. I'm from a smoking family. My grandfather smoked and I smoked. I quit five years ago and my husband quit as well. My daughter doesn't smoke. In my day it was the done thing. It was cool before and we did it. Now, my daughter doesn't approve of smoking.

T2: The Prime Minister is building a green army; it's a club, it has membership!

T4: Clubs have elitist attitudes.

T3: The environmentalists don't promote themselves well. You are (either) doing the right thing or the wrong thing. But this alienates those not involved. A lot is achieved in business because it is based on positives and good outcomes, rather than by berating people endlessly, or attacking and spitting and lecturing at people about their behavior.

Not all participants in the workshop accepted climate change. The following example is an exchange between T1, T2 and T3, which began by T1 challenging the other participants about the climate change science indicating more changing weather patterns:

T1: I want to put the cat amongst the pigeons. We are talking about this as if everyone is assuming climate change will happen. I don't necessarily agree. Have we considered, say during our driest January and I'm not that knowledgeable, but we didn't have industry before and we coped. In the past, Australia had inland oceans. So a complete other way of looking at this is to see why dry times had occurred in the past?

In the whole history of Australia, are human impacts the biggest influence on the climate, or are there changes in the atmosphere to make droughts come and go?

T2: If we take a risk and we don't do something now, we have no way to respond in the future.

T1: But what caused the biggest drought in the past? I'm not an academic but I think that to adapt to drought we need to create a bigger catchment and store more water.

At this stage of the conversation I interjected and asked: are you talking about large scale engineering or even geo-engineering solutions? The response was indicative of local knowledge being used to support T1's argument but also drew in T1's issues about equity between big industry and others in the community.

T1: Yes if we know we will get a massive drought. I agree it is always more expensive to do the right thing, but you just don't feel empowered if big industry escapes from making the effort. If we could have industry that doesn't pollute - great! But let's not put all our eggs in one basket...industry will not stop polluting. Is it the sole reason why we have floods?

In conclusion, it was not clear whether participants thought they were part of this club or even wanted to be part of the club. But the evidence suggested that the participants perceived a clear mark of distinction between those in the club and those out of the club, and this might be important when designing climate change policy.

Theme 7: Decision makers should do more to ensure equity in their policy

Participants in this group session displayed concerns about water use in industry versus the community. The discussion displayed emotion between farm production and urban living, perhaps indicating a divide between the two groups in the community in regard to water consumption between industry and the community. The discussion thread is reproduced to demonstrate these positions as participants debated who in the community should have priority over limited water:

T2: Now take town water restrictions. I drive home past lucerne farmers pumping huge amounts of water while people in town can't water their gardens.

T1: But the farmers supply feed and we rely on it!

T2: You need to be compassionate about who needs the water. If you keep watering your lawn during summer it is not going to survive in our conditions, so you accept that it won't, stop watering and save water.

T1: I hate to agree, but little gardeners, like one next door to me, have this lush and green lawn and gardens when farms need it most.

T2: But the little gardeners buy their water too!

I also asked participants about homeless people and climate change, which was a discussion in the Armidale group session. Only one participant directly answered the question and it was a very cold response:

DK: Poor people were mentioned in the group session in Armidale, where it was said that a rapid cooling event might leave people homeless if they couldn't afford heating, and that the buildings they lived in might not be ready, and so people would die?

T3: A lot of people die every day and we smile and go on. But it comes down to money. If more important people began to die then things might change.

DK: Like the attention given to a celebrity drug overdose death?

T1: It's not our farmers on the front. They are committing suicide about climate change.

To sum up, these participants were concerned that others were not doing enough to address climate change or environmental damage. Talk about limiting access to natural resources triggered sharp responses from some participants. The comments suggested that not all policy options were on the table, and that if policies were to be successful, everyone had to be part of the solution.

Theme 8: Powerful stakeholders influence policy

Participants had concerns about the role of powerful stakeholders in the decision making process. These participants used references to powerful stakeholders as a means to point out what was wrong, and why policies might not work:

T5: The previous Commonwealth Government tried to put economic caps on big carbon. So the industry lobby's the government and says

it's a bad idea and they have the power to influence the decision.

T3 suggested industry had the means to avoid the rules (not specifying which rules), which creates an uneven playing field across industry:

T3: Even with rules, businesses tend to skirt around them. It is not a level playing field.

T1 suggested that some companies are so big and powerful they can just reject initiatives:

T1: The government may want to bring out new policies to lower carbon but the vested interests, like those people in the oil sector, they say no.

Several participants also spoke about their level of 'trust' in government. These comments were made in reference to their trust in what was said and what was done:

T1: We are told one story, but behind the scenes you hear another. So you don't trust them.

T3: What it means is that we have less trust in authorities and less willingness to trust.

T5: Big government and big people are against policies to address climate change.

T1: We have even seen how people in authority support something, and then we hear they have taken kickbacks for being against it!

In summary, participants indicated that powerful stakeholders play a key role

in policymaking and often prevented change. The participants were openly suspicious about the impact this influence had on policy-making in the past, however they did not offer solutions for this problem.

Conclusion

I made a note in my journal on the 6 February 2014, p.28 regarding how this group session demonstrated the complexity of the issue when dealing with the community. These participants showed more caution than Bingara and Armidale. Personal sacrifice emerged as a key issue for these participants who argued that their own sacrifices could make little impact while industry continued on its business as usual approach. I also observed that one participant was quite dominant in the discussion, and the vignette created an immediate pause. It became clear to me that these participants had not thought a lot about what they might do or expect to see. Consistent with other practitioner interviews such a lack of thought suggested participants expect to be given directions or a framework to act, and they did not oppose this approach during the group session. I also noted that access to finance was an issue and a lot of the discussion focused on energy and agriculture.

My analysis of these data is that participants in this Tamworth group session were very engaged with the issue and provided great details and excellent examples of the issues facing regional communities. Participants often made comments to support their own self-interest. This was evident in the emergent

theme where participants demonstrated concern that any climate change initiative should impact on everyone and not benefit one industry over another. Participants also made very clear that any individual effort they might make to address the issue of climate change would make little difference given the lack of effort from others overseas.

17.3 Part three: Learning from practitioners that work with communities

The following two interviews were conducted with community development practitioners. This approach sought to identify the capacity of communities and the level of consultation or facilitation that would be needed to support the transition to the low carbon place.

17.3.1 The Community development researcher practitioner interview

Introduction

Prior to conducting this interview, my view was that a large proportion of the North American community and their government and industry have been, and remains, quite sceptical about climate change. Indeed, the USA is not a signatory to the Kyoto Protocol and had recently indicated its intention to withdraw from the Paris Accord (United Nations, 2017). Like in Australia, I assumed the North American countries had powerful environmentalists and powerful interests preventing action on climate change. Many significant

industries and organisations have an economic interest in preventing change. I did not know in depth the reasons behind this scepticism or lack of action on climate change, with the exception of the reasons that were attributed to economic reasons alone.

This participant, referred to hereafter as P2, was an informed person professionally known by this researcher, and was selected by using convenience sampling for their expertise and application of community programs, sociology research, and community development projects in North America and Australia. This interview was conducted by phone on 17 January 2014. The estimated age of this participant was 30-35 years.

The aim of this interview was to understand North American community views about climate change and the major barriers facing policy innovation. I was particularly interested in understanding the capacity of community to collectively take action and where they could look for leadership. I also wished to understand what mechanisms might be employed, what policies might be expected and what community projects might be initiated. A second interview with a community development practitioner with experience in Australia, Asia and Europe follows this analysis.

What did I learn?

The following themes were observed from this interview.

Theme 4: Governments needed to become more trustworthy

Mistrust of government was a theme that was observed throughout this interview. The participant said that the USA population that would identify as conservatives hold a general mistrust of government when the government tries to increase its role in society. P2 said:

What conservatives fear the most, in my opinion, is not climate change. These people respect freedom and liberty and fear that the government will take these rights away. And they have reasons to worry about that.

P2 also said that some people in the USA consider that climate change is a vehicle for government to increase power, but that this might have been an excuse made by people not wishing to change their ways. P2 said:

People are skeptical over here that the climate change issue is a cover to exercise more government power. And real path-dependent folks (those that do not think we need to change), they also might believe it is a cover, but their real reason is they don't want to change their lifestyles and habits.

Likewise, P2 stated that conservative states held common values, particularly those with large rural areas, which united their beliefs about climate change:

Pennsylvania and Texas has a very common culture: hunting, fishing and a hatred of politicians! The conservatives are really united against the current President Obama.

Furthermore, P2 suggested that in community development in the USA, a practitioner should guard against overt government intervention if community support was needed for a project:

People are willing to reason as long as the government is not telling them they have to do it.

Summing up, community mistrust of government is a real policy consideration for my innovation and was a theme observed in the community workshops and this community practitioner interview. For my innovation to work, this suspicion of government seizing power because of climate change needs to be addressed through better community consultation. The practitioner should avoid community engagement based on the government imposing policies on the local communities, but should instead seek to co-create acceptable local initiatives with the community.

Theme 13: Support for market-based mechanisms was low

This theme was tested. The market-based solutions theme was tested during an action research cycle to confirm the preference for government-led policy action. P2 made a specific reference to market based solutions after speaking about the general mistrust of government in the community. P2 said that climate change policies that use market-based solutions and was led by the markets would be more amenable to conservatives in the community in the USA. P2 said:

I'll wager with you that if the green movement never took the route to mandate climate change outcomes in this country, but instead looked to the free market, the not-for-profit sector and laws that totalised Federal power, than 80% of conservatives would be on board with taking action on climate change. A Nobel Prize winning economist named Ostrom found that local groups manage the commons better than larger institutions.

In conclusion, this is instructive data because these comments confirm that the creation of the low carbon place should be place-specific, which could allow local market-based solutions to develop, rather than relying on government regulation alone. The key point is that government programs should intervene to the point where markets have the right signals to produce better goods and services that mitigates rather than exacerbates climate change.

Theme 5: Decision-makers could talk to local people and make better use of local information

P2 suggested that those delivering programs or attempting change could use improved community facilitation techniques and the use of visual imagery when engaging with the community. Following this statement, I asked P2 about public lands and the possibility of residents in a street coming together to work on low carbon projects? P2 suggested that urban bioremediation using streetscapes and ecological improvement could lead to urban beautification, which could create a way for new resident attraction or even tourism. This is how a place like Texas could support progressive measures.

Let's talk about how you sell this in Texan speak. It would be a street beautification project to attract residents and tourism to the general public. This is how taxes can support progressive measures. It can't be too 'government' or with too much political baggage.

In my street I could approach my neighbors, explain the project near the swampy area on the street and how funding and new infrastructure will improve the waterway and be a new attraction. Now we are talking. I would get an artist in to help visualise the concept as we developed it.

P2 also stated that localised or project-specific engagement would be better than broad government schemes. P2 said:

One of single biggest issues in my discipline is that we do a bad job of helping people visualise what a development looks like. Images speak to people differently. Books are different. I can describe a site to the community as an abandoned factory, where we have removed the toxic waste and undertaken bioremediation works. I could also describe the site would include mixed development with garden and parks that retains some of the old building. But until they can see it I do not know if they will like it. It's the lesson from Apple's Steve Jobs who said that "you have to show people what they want then they say they want it", or something like that. So in my example of my street project, the bioremediation expert comes in and spear heads this project with a program and manner to match the audience. It's like playing in a band and trying to play German songs at a Jewish wedding. If you have a good practitioner and remember your audience it's a communication improvement. A facilitator has value in practice and sets the tone and works to the sensitivities of the community group.

In summary, my innovation should seek to improve localised and facilitated community engagement. This engagement should also include the use of imagery and trained community consultants to take people through the issues and reach an agreed outcome. Allowing this issue to be played out in the mainstream media or online has not yet proved successful. Significant doubt remains in the community about climate change and what to do about it.

Theme 6: Climate change divides communities

In this interview, P2 made clear that climate change has an impact on people within communities, with clear lines appearing between those that embrace change to mitigate climate change and those that wish to preserve the status quo. P2 said:

I think it depends whether ‘being green’ fits with their identity. Again, the scientific debate is a social identifier. Are people taking action or are they buying the social identity? For many it’s part of who they are or want to be seen as having concerns about the climate. A lot of people who care about climate change belong to the same organisations, drive the same vehicles, do the same leisure activities and buy the same things from the grocery store. So when a climate change sceptic launches with “you’re a bunch of granola eating hippies” the response is “you’re putting me down you redneck”. Caring for the environment in the USA is associated with higher education and the academic elite, which is not also viewed favorably by the conservatives. It’s the poor versus academic power issue.

P2 also used local stories about community division after a probing question from the researcher.

Interviewer: I am reminded of that *South Park* episode my colleague told me about. They labeled the hybrid car a ‘smug-mobile’!

P2 responded:

Yeah. For example I read about a really conservative guy who went to a farmers market to give local eating a go. He went there and he said they really treated him with disdain and disgust. He didn't dress the right way and he was really treated awfully. Some people might be swayed but then when you show up to the party you're ridiculed.

P2 took this personal identity theme further by making the following comment about credibility and observance, and how people view their lifestyles as part of their rights. The comment reflects how a person might be asked to join a club. P2 said:

There is a level of raw emotion about this. It's a real identity nerve you have struck. You have to be a saint or you discredit yourself. It's like “I work for charity” and someone says “you live in a very nice house!” The substantive issue is about identities. It's not just about the climate changing, it's about “me living my life the way I want” in an environmental good or wasteful bad way. And this is a ‘good and bad’ position, like ‘left or right’ arguments.

Summing up, communities have been divided between those who identify as being concerned about climate change but have not changed their behavior,

those that have adjusted their behavior, and those who are not concerned about climate change. In this participants experience, people often identify with their particular club and either actively reinforces this view by interaction or simply by excluding others from their club. For my innovation this is a key consideration. A new policy is likely to either overcome or reinforce such community divisions, which may define the failure or success of such a policy.

Conclusion

My analysis of these data first indicates that the USA participant was clearly concerned about government power and any imposition on personal freedom. This was in contrast to Australian participants views, which encouraged and welcomed more government intervention and regulation. For my innovation to work in the USA, P2 suggested that the use of the markets would be a better strategy.

The second observation was that climate change has divided the community. Many people have created an identity based on climate change and have created a club like cohort with people either in or out of the club based on rules governing acceptable behavior. Those not in the club could be negatively viewed and vice versa. Overcoming these divisions through better community engagement and localized policy orientation will be a key factor in the success of my innovation.

The third observation was that community facilitation would be a key strategy for my innovation. Community members in the USA may respond to facilitated community consultation, especially where visual imagery is used.

17.3.2 The community development practitioner interview

Introduction

The community development practitioner interview was conducted as part of an expanded sample seeking more data about community approaches and barriers to creating the low carbon place. The group sessions and participant interviews conducted previously indicated that the community held complex views about issues like climate change. Gathering more data was essential to learning more about potential solutions.

The participant, referred to hereafter as LE, is an informed person known to this researcher, and was selected for their expertise and application of community programs and community development projects in Australia and internationally. The aim of this interview was to further investigate community capacity about climate change, and the likely responses to climate change required based on this practitioner's experience. LE was recruited using convenience sampling, and this interview was conducted by phone on 11 February 2014. This participant's age was estimated to be 60 years of age. The participant was asked the same vignette question used in previous practitioner interviews and the researcher took notes during the interview.

What did I learn?

The following themes were observed from this interview.

Theme 8: Powerful stakeholders influence policy

Rather than being openly mistrustful of government, as in previous practitioner interviews, LE was more concerned about the role of powerful interest groups in the policy and leadership process. LE said in response to the vignette question:

Your question talks about the government but not about business?
Business has a vested interest in this. So I ask you, do industrial activities as we see it today survive or is it subsidised like agriculture?

LE made several references about the power of these groups. LE made statements that the power of these groups is immense, and questioned how democracy could continue in Australia. LE stated that:

The *lobby-ocracy* has taken over democracy in Australia. The media is corrupt and tightly controlled by industry. So will it convey the message or could it aim to overthrow the government? The government must see the light and they must stop the *lobby-ocracy* and break down the vested interests that are creating this pickle. So we should move to a new model representing the true value of pollution in all sectors.

Summing up, LE made several references about the role and influence of powerful stakeholders on policymaking. As my innovation will identify potential policies to transition to a low carbon pattern of living, with the

absence of major visible environmental impacts that cause economic damage, those people with financial or other interests in high-carbon industrial models and assets will likely resist any changes.

Theme 9: The revenue collected from carbon taxes should be recycled into projects that support lower emissions

LE spoke confidently about redirecting government revenue to support specific initiatives, but did not identify any connection between the revenue raised by a cap and trade emissions trading scheme or a carbon tax. Revenue recycling was not a theme observed in the preceding interviews. Revenue recycling in this context means redirecting taxation revenue collected from high-environmental impact activities and subsidising other low impact activities. LE said:

If the government made the announcement as you suggest, policy changes should target food, health, power, transport and shelter. Do you know we pay \$7 billion per annum in fuel subsidies for agriculture and mining? Well I set up one of the first solar panel exporting businesses in Australia in 1992 and I only received \$70,000 in subsidies versus the \$7 billion these agricultural and mining businesses get. So the majority of the subsidies are paid to large high polluting industry. So in the “Houston we have a problem” moment we should refocus these subsidy regiments to low carbon lifestyle and low carbon stuff.

LE made the connection between subsidies for economic activity versus sustainability, and how these subsidies could be redirected. LE said:

Our taxation system is based on essentially those producing wealth and workers. Those creating jobs get a subsidy and exploration

companies and trucking companies use assets and do not get charged for it. Subsidies are based on government wanting economic growth, which is inversely related to sustainability. Give tax breaks to producers who can produce more output but with less pollution. Mining wouldn't do well out of this sort of approach.

LE also made comments about providing additional subsidies for developing the renewable energy sector in Australia. LE said:

Token money is given to new industries rather than investing in them. In power generation, we are in the perfect position to power ourselves by the sun.

The following comment highlights how the existing subsidy structure may support production and job creation, but does not fully take into account the wider economic impacts on society arising from associated environmental and health outcomes. LE said:

The arguments that support food producer subsidies are not valid as the cost is shifted to health, fuel and trees. On a global scale polluting industries should be charged more and the natural resources should be given to those who don't pollute. You can do it quickly.

Massive and extraordinary efforts have been made to hold back renewable energy. Coal mining jobs losses? It downplays the thousands of jobs created by going sustainable.

In summary, recycling revenue was a theme observed in these data from the comments made about redirecting subsidies, which is government revenue

collected from taxpayers, into low carbon or low environmental impact activities. By redirecting subsidies, economic activities might change.

Theme 6: Climate change divides communities

In terms of the capacity or readiness of communities, LE had confidence in communities playing a significant role in climate change or carbon reduction.

LE said:

Communities are quite savvy and want to play in this space. In my own village, it's a solar village with some hydropower. I established this village 30 years ago and we have composting toilets and we harvest water. Lots of Australian places are doing it, or trying to do it, but everyone does not support these things. A long time ago I argued for feed-in solar to the electricity grid as a solution, rather than off-grid and people laughed at me. Now people flood to these places, we have feed-in solar systems and take responsibility for their pollution.

According to LE, the community is ready and needs subsidies and government leadership. LE said:

All roofs in Australia could be used to power our own needs and industry needs. A backup source of electricity is needed as well. You cannot subsidise this process too quickly. The community is ready but they need the government to go for it.

LE also made reference to community empowerment in this process instead of relying on government. By empowering community to create the low carbon

place, other benefits may occur. LE said:

Community equals empowerment. Start with community power systems and businesses building new eco-friendly shelter and we can create new jobs. This is not a problem in communities.

Consistent with the previous community practitioner interview, LE stated that community facilitation needed to be supported by professionals and institutions. LE said:

We need professionals in communities. Best practice standards are needed for these decisions. We need someone to advise against dumb ideas and we need expertise, good governance and good institutions.

In conclusion, this participant stated that climate change divides communities and this would only be overcome by better facilitation (theme 5). Specific examples have been outlined that demonstrates how LE referred to personal experience.

Theme 12 take personal action

LE spoke strongly about personal action and responsibility, and suggested tools to support people to reduce their impact on the local environment. Personal responsibility implies that people should understand how their actions impact the environment, and how damaging these activities have been. LE said:

It's very hard to get people to understand that life is like a bank account and each person should know their pollution ledger and know how

much you pollute during your lifetime. But this goes against the consumer lifestyle...this tool could be used by (the) Government.

LE used an example from their experience. A village needed to better understand their carbon emissions, so data was obtained which allowed the villagers to understand their impacts and compare their electricity use with others. LE indicated that the establishment of benchmarks would help transition to a low carbon place. LE said:

In my work a little village wanted to know their carbon emissions so I asked the electricity provider and they wouldn't give out that information. Its easy of you do a per capita calculation. So it might be worse than Sydney and so we then ask what are we doing wrong?

So if we set personal goals and community goals on pollution we could use an index as a benchmark. Even a State versus state (NSW v Qld), nation versus nation (Australia v China) index would be good. If an individual doesn't know, how can they make a response? We are all walking pollution!

In conclusion, LE indicated that people should take action to curb their impact on the environment, and suggested benchmarking and measurement systems to achieve this. According to LE, each person could do better and contribute to creating the low carbon place.

Conclusion

LE's contribution was thoughtful, radical and voluminous, which was not unexpected. LE holds strong views about the climate and the environment

and its role in supporting communities. In LE's practice, the environment appears to be very influential on community development outcomes.

The role of powerful stakeholders in policymaking was clearly a strong theme, as was community engagement and personal action. These themes indicated a strong preference for policies that support communities to mitigate or adapt to climate change locally. According to LE, many people within communities are ready and have already proven themselves capable of creating the low carbon place.

LE's comments also indicated that the transition to the low carbon place also involves more complex issues, such as social structure, economic structure, taking personal action, changing key assumptions about how production systems are structured, how shelter is constructed, and how transport moves people and goods. These suggestions would be considered in my workplace as radical approaches to the problem. Nonetheless, more radical solutions may be needed to transition to the low carbon place.

17.3.3 Research and development practitioner interview

Introduction

The aim of conducting the interview with the research and development practitioner, hereafter known as LC, was to learn about the features of the low carbon place and identify any issues or barriers preventing the creation of low

carbon places. The participant was selected as an informed person experienced in the research and development, design and functioning of low carbon places. This interview was conducted by telephone on 13 of February 2014. The estimated age of this participant was 50-60 years of age.

What did I learn?

The following themes were observed from this interview.

Theme 10: Leaders could do more to encourage low carbon research and development, and innovation

According to the data obtained, LC argued that the government could improve support for low carbon innovation. This was an essential policy consideration within the broader context of manufacturing competitiveness and achieving better environmental outcomes. LC said:

We need to look at innovation and support opportunities more. In Australia, we have industries that are already contracting and others with decreasing competitiveness.

We speak of technology bailing us out but we need investment or this opportunity doesn't appear. We should be looking into how we produce things, how we provide consulting services and start to play in the high value-added sector. Photovoltaic is arguably the high end of research in Australia and there is some evidence it is world-leading research. About 80% of that research is conducted by the UNSW yet next to nothing is manufactured in Australia.

LC emphasised that mitigating carbon is also an economic opportunity. If global efforts to reduce carbon increase, then the world's nations will seek out low carbon goods and services. Interestingly, LC did not think taxes would create a better outcome than supporting research and development and industrial change. LC said:

Australia should be targeting high end and value added commercialisation. Carbon dioxide reduction is in that space. We assume that the world will need to deal with carbon emissions. To target these opportunities we need to forget about taxes or whatever. We need mechanisms to support innovation at the high end.

If you are going to produce little widgets then China will beat Australia every single time. Solar cells are in the national interest as a source of innovation.

LC made clear that not enough support is provided to low carbon research and development. In particular, research that leads to new technology that has the potential to be commercialised in Australia needs more support. LC said:

There is not much research support in these areas, which suggests a lack of connection in a policy sense. If you have new technology you give Australia industry competitive advantage.

In conclusion, LC indicated that more support for low carbon innovation is a necessary and practical measure that would facilitate the low carbon place. LC did not consider that the level of support to date for low carbon research and development is adequate, and that what support has been given so far did not

lead to commercialisation and manufacturing of these goods in Australia. This is a lost opportunity for the Australian economy, which, according to LC, should aim to become a world-leader in low carbon technology.

Theme 11: A low carbon place can create other benefits

According to LC, low carbon living has the potential to deliver spill over benefits. LC first stated that there would be other benefits derived from low carbon living. In terms of buildings, LC believes low carbon means energy efficient homes. This could mean healthier lifestyles, better wellbeing and saving money. Another key feature of low carbon urban design is green space. LC believes the best business case could be made for commercial buildings. LC said:

In a low carbon building, like a six star rated building or higher, you get end-to-end environmental quality, like natural lighting and ventilation, and this helps people be happier and more productive. This should add to the business case supporting the low carbon building, as the salary of the people in the building lifecycle is not a capital cost. A 1-2% improvement in productivity from changing a space makes a much stronger business case.

LC also made reference to hospital design, town planning and the urban scale in Canberra. LC said:

Canberra Health found that a better design led to an improvement in core health as visits to hospitals can cost more than \$2 billion a year. A

better-designed urban scale leads to more walking and cycling and improved health.

So the cost of not building such an urban place could cost \$2 billion. LC believes planners instructing development should use policy to encourage low carbon design at all levels.

LC also spoke about the relative competitiveness of Australian manufacturing versus Chinese manufacturing to support the development of high end products, like what would be required for the low carbon place. LC said:

If you are going to compete, say at making little cheap widgets, then China will beat us every single time.

LC did discuss the use of government expenditure on environmental programs and doubted the benefits such expenditure can achieve. LC said:

The Australian Government has spent millions of dollars on various environmental programs and it is not clear what some of this spending has achieved. The Australian Government has \$80 million budgeted for specific low carbon type programs and another \$30 million is budgeted in local government. The desired outcomes are not clear with this \$80 million expenditure. A lot of carbon needs to be removed for that level of funding.

According to LC, the technology now available for low carbon has improved and is more cost competitive. LC said:

Projects are assessed through a financial lens; how much more money you need to pay...low carbon living should be clever and integral to design and plan for the additional cost.

Nonetheless, the additional benefits of such an investment outweigh the costs.

LC said:

The low carbon place would cost very little. For example, the design of my house means we have no cooling or heating, we have rated appliances, and a solar PV system. These design options might make you think this is a high cost design. But it has saved money. All that was needed was slightly larger eaves on the house roof and more thermal mass. My house is uncomfortable for only for a couple of weeks per year. But life was not meant to be lived at 22° Celsius all year.

At the urban planning level, LC suggested there is no concern about too much cost.

Take the cost of a personal car versus public transport. Private transport is more expensive but people still do it. The Scandinavians are the wealthiest people and they tend to use public transport and are past having two to four cars and showing off the BMW in the driveway syndrome...Scandinavians now have solar PV on their roofs and they don't worry about what is parked in the driveway.

LC did admit low carbon living could create more costs. In terms of costs there are additional costs with adopting low carbon lifestyles, but the opportunities outweigh these additional costs. LC argued that to address this cost imbalance

you need good research and tools, good designs and planning systems to achieve the overall environment and social outcomes in Australia. LC explained an example to emphasise this point:

A product, like product A, might be more expensive but over its lifecycle it is cheaper. In renewable energy, a good supplier of installed PV can have a payback period of three years. So 52 cents per KWH ends up being 25 cents per KWH off the peak. This is 25 to 35 cents cheaper.

Summing up, LC made several arguments to support the spill-over theme identified in the data. The main spill-over benefits included cheaper running costs, better health outcomes, new industries, less costs and better environmental outcomes. These spill-over benefits are important policy considerations when analysing the cost or benefit of a particular policy approach.

Theme 2: Many decisions are made with a preference for the lowest initial cost

LC used several examples to support the statement that the public's consideration of costs does not adequately consider lifecycle costs or spill-over benefits. LC said:

Basically we look at our options based on information that is often a misconception and misrepresentation of the facts, that is at best misinformed and that gives preference to front-end costs and short-term views of life and opportunity. So when we look at a project we

should be asking how much more money do you need to pay up front versus its lifecycle and what are the spill-over benefits? So we then can make our decisions based on clever design. Unfortunately, our planning processes are so addicted to least cost preferences.

Summing up, LC stated that the least-cost approach commonly adopted in Australia has led to worse lifecycle cost outcomes, less productivity and higher environmental impact.

Conclusion

My analysis of these data indicated that LC thought that the low carbon economy could create many spill-over benefits. These benefits could be captured by the Australian economy transitioning to a low carbon place, and also selling this expertise internationally to other nations transitioning to the low carbon place. In other words, the transition to the low carbon place should be viewed as an opportunity.

The data also indicated that research and development support could improve in order to commercialise more goods and services in Australia. Many problems could be addressed by new technology especially emissions from buildings. Rather than importing these products, Australia should seek to develop local industry solutions.

Last, the least-cost preference prevalent in Australia has failed to consider lifecycle costs. Instead of trying to improve productivity, cheaper upfront

costs have led to higher running costs and less productivity. If the least-cost preference could be overcome, then the transition to the low carbon place might be an easier path to navigate.

17.4 Part four: Learning from practitioners about introducing a new policy

In this section, an analysis of the data collected from three interviews with three practitioners is provided. The aim of these interviews was to better understand practice based issues and examples of what worked and what didn't work with people who have recently introduced a new policy that could be used to support the transition to the low carbon place.

17.4.1 The Environmental Upgrade Agreement (EUA) practitioner interviews

Introduction

In New South Wales, the Environmental Upgrade Agreement, hereafter referred to as the EUA, is a new policy assisting strata building owners and tenants to invest in low carbon technologies to retrofit buildings. Under this arrangement, the EUA brings together the building owner, the tenant, the financier and local government to access longer term and lower interest rate loans for upgrade works including:

Energy and water efficiency, renewable energy, reducing greenhouse gas emissions, preventing or reducing pollution, reducing the use of

materials, recovery or recycling materials, monitoring environmental performance, and encouraging alternative to car travel such as walking and cycling. (NSW Department of Environment and Heritage, n.d.).

The program was identified during my literature research cycle. At the time of conducting my field research, there was little literature evidence that identified the success or experiences relating to the implementation of the EUA in Australia. Using my action research approach, and with a lack of literature about EUA's operating in Australia, I decided to increase my sample and further investigate the EUA. Consistent with the other interviews, I sought the views of the professionals using the EUA in practice. I intended to assess the EUA's suitability for my innovation and understand what these practitioners had learned about introducing a new policy. I recruited three participants, referred to hereafter as E1, E2 and E3 using convenience sampling identified through internet searches. These three interviews were conducted with E1 on the 24 January 2014, E2 on 4 February 2014, and E3 on 6 February 2014. All three interviews were conducted by telephone. The estimate age of participants was 25-40 years.

What did I learn?

The following themes were observed from this interview.

Theme 3: More government leadership is required because participants were concerned about climate change

The EUA is interesting because it brings government regulation and the markets together in a localised and mediated process. This combination has been achieved by state government providing the legislation to provide the framework or rules for the EUA, the state government providing support in the form of supporting the employment of local facilitators, the private sector providing the finance, local government administering the repayment schedule connected to land taxes, the landlord investing in new technology, and the tenant helping to repay this investment through returning the reduced utilities costs.

The EUA could also bring forward investments for low carbon projects. E2 said:

The EUA could be good for building owners by bringing forward upgrades. By applying the EUA the tenant has a potential to save money on utility costs. Under the legislation if a tenant saves money from a EUA, say on lighting, there is a "split incentive" where the building owner can ask the tenant for a contribution to the extent of the money saved. This can bring forward decisions to invest that may have waited until the end of current leases when contracts could be renegotiated.

Summing up, the EUA provides a policy framework for strata building environmental upgrades. For the purposes of my innovation, the EUA framework uses a model that the government provides the framework and the mediation while connecting individuals or business to green finance. This

framework could be expanded and financially supported to increase scalability.

Theme 15: Overcoming the split incentive has worked

According to E2, overcoming the split incentive has been an important part of the EUA design. The split incentive occurs in energy efficiency projects where neither the building owner nor the tenants have the incentive to invest in energy efficiency as the other party bears the utility costs. According to E2:

The advantage of the EUA is also its biggest disadvantage. The nature of the collateral allows banks to go low cost and long term (low and long), for example a loan for 20 years at a fixed interest rate. The key was to overcome the split incentive so building owners could unlock revenue from tenants. The big disadvantage is that it relies on the relationship between the tenant and the landlord.

E1 also spoke about the potential for increased demand for environmental upgrades given future climate change impacts. In cities, rising overall temperatures could be amplified by the 'heat island effect', and this could lead to more heat stress in the city areas. E1 said:

Local government has a limited sphere, but could provide more services like warnings, provide more public buildings as shelter, provide more buses that could pick up passengers in cooler locations, and assist more in bushfire risk reduction.

Theme 14: Policies should encourage better access to green finance

E1, E2 and E3 showed consistency when describing the EUA in Australia. The

EUA is a statutory charge made against the land by local government in order to repay a loan through a third party financier. The land secures the loan and is the highest order security for the loan. This allows the financier (banks) to provide longer commercial loans (over ten years compared to two years) with fixed interest rates. These loans are also not means tested against an individual, and repayments occur through a charge and collect system associated with local government land tax.

The EUA might have several key advantages and disadvantages over traditional finance models. According to E1:

The advantages are that the EUA can increase the value of buildings, is a good form of finance, can increase building performance, and can increase rental yields. We do not have data as yet on occupancy effects as the older buildings in Parramatta already have high vacancy levels. The EUA can also stimulate the local rental market. However, some upgrades may have occurred anyway.

E2 also said that the EUA could also bring forward investments for low carbon projects:

The EUA could be good for building owners by bringing forward upgrades. By applying the EUA, the tenant has a potential to save money on utility costs. Under the legislation if a tenant saves money from a EUA, say on lighting, there is a 'split incentive' the building owner can ask the tenant for a contribution to the extent of the money saved. This can bring forward decisions to invest that may have waited until the end of current leases when contracts could be renegotiated.

E2 stated that in comparison, under a traditional lending arrangement to upgrade a building, the landlord would need to wait until the expiration of each tenant lease to charge more for any electricity bill savings. Therefore, the landlord has to wait until a new lease can be negotiated. Under the EUA, the charge can be agreed between the landlord and the tenant immediately in an existing lease. In theory, this could bring forward investments in renewable energy. Without the EUA, the landlord might not make the investment. The key factor with the EUA appears to be the ability to better ‘leverage up’ the building than traditional forms of financing and pass through costs. E1 provided the following example:

One project in Parramatta supported an investment of \$1 million for energy efficient lighting and an electricity co-generation plant worth \$26 million.

Despite these benefits, E2 considered the EUA to be a “niche product that was not going to change the world”. E2 confirmed at the time of the interview about eight agreements worth about \$35 million had been made. One of these projects, a tri-generation plant within a building, was worth \$26 million, of which \$10m was provided by the private sector finance company under the EUA.

The EUA has the capacity to stimulate local economic activity, which achieves both economic development and environment outcomes:

In the macro economy, the energy efficiency outcomes could stop expenditure with energy retailers but landlords could instead invest the money in capital improvements in buildings and create additional jobs. Therefore the money could go directly into the Sydney economy or where the building is located.

According to E3, the biggest challenge delivering the EUA in practice has been the relationship between local government and building owners or landlords:

This is always a fraught relationship. The building owners complain about local government and their fines for rubbish and the like, and the development application process. It's a love-hate relationship.

To sum up, better access to green finance could provide the right incentives for more investment in low carbon products, like energy efficiency technology for buildings. In the marketplace, finance that increases returns or shares risks would be more likely to succeed. However, this may require private and public sector financial products such as the EUA.

Conclusion

The EUA program appears to have three advantages relevant to my innovation. First, the EUA overcomes the split incentive. All parties to the EUA benefit from the EUA by entering into agreements to reduce environmental impacts while sharing the lifecycle costs of undertaking specific upgrade works. Second, the EUA brings together financier, government, tenant and landlord to undertake environmental upgrades for commercial buildings. This existing

legislation could help to facilitate the creation of the low carbon place, especially in cities with large buildings. Last, the EUA would be scalable as existing legislation has already been created and introduced, and this type of legislative change can be introduced into many jurisdictions.

Two disadvantages can be identified. First, the EUA only applies to commercial property that is leased to a tenant. This limits the scope of the EUA program. If the EUA could be applied to manufacturing, residential and agricultural land, then the EUA could be very effective in facilitating investment in environmental upgrades. Second, the EUA is dependent on the parties taking on more debt. This may be unavoidable to bring forward investments in low carbon technology while acknowledging that the capacity of applicants in the residential and agricultural sectors to service more debt may be limited.

The EUA program structure, if not the existing program, could be part of my innovation framework provided that the EUA could be made relevant to regional economies and expand beyond building efficiency. In regional economies agriculture, manufacturing and transport are high emission sectors that need assistance to upgrade their facilities and machinery to reduce their emissions or impacts on the environment.

17.5 Part five: Learning from a practitioner about the contemporary practice of policy making

The following interviews were conducted with the aim of identifying contemporary policy making and how these processes could be used to support the transition to the low carbon place. The key observations have been expressed as themes and are described in this section. These data will help those seeking to create new low carbon programs.

17.5.1 The public policy practitioner-researcher interview

Introduction

In order to better understand policymaking in general, and not just the issues facing environmental or climate change policy-making practitioners, I created a revised list of questions for the public policy practitioner-researcher interview. These revised questions addressed the concerns of non-environmental or climate change policymakers as the policy formation process may require broader support from policymakers and their advisors. This informed person, referred to hereafter as POL, has both practice experience of applied public policy and academic experience analysing public policy. This practitioner was recruited using convenience sampling and the interview was conducted by telephone on 29 February 2014. The estimated age of this participant was 50-

60 years.

What did I learn?

From the data collected, the following themes were identified.

Theme 16: Powerful stakeholders influence on policy making can be ranked

I learned that in contemporary policymaking more economic power equals more stakeholder influence over policy. POL suggested that power is defined by economic power “BHP is a big stakeholder in the mining industry and the biggest miner”. POL explained an example of the exercise of this power in policymaking by referring to former Prime Minister Rudd and the mining tax:

Prime Minister Rudd wanted to tax the mining industry. It was a dumb thing to do. When he announced the tax it attracted an attack by the largest export industry, with plenty of money and who were pissed off they had not been consulted about this policy. So the mining industry basically said ‘screw you mate’ we have money to burn on this.

Size in the form of membership or population size, emotional appeal and public profiles also make powerful policy stakeholders. The comparative size of the stakeholder, in terms of numbers or membership, defines the next powerful group. POL used the example of trade unions, which have declining member numbers but continue to be powerful in the teaching and education policy development. The next powerful group are those with emotional appeal.

POL highlights the disability sector as a powerful group as it's hard "not to like them or leave them out of the process". POL said that power also rests with those sectors with big public profiles.

POL clarified that this order of influence can change depending on who is in government. Indeed the Government and its apparatus give legitimacy to groups by including them or excluding them in the policy process or by giving or taking away resources So for example POL said:

The Australian Labor Party (ALP) regards trade unions as a very powerful group. The non-ALP parties might still work with the trade unions but do not like them. This is especially the case for parties that are pro-business and pro-economic growth. To these groups, unions are seen as the enemy.

POL made a comment that some groups also become more or less powerful depending on the issues of the day or what is current. So if "the left-handed wombat is becoming extinct you could begin the policy process by speaking to their association".

Summing up, according to POL, this hierarchy of influence has been a key determinant of public policy practice. Those with economic power have the most power over policymaking, followed by numbers (size), emotional appeal and public profile. When viewed through this hierarchy, it is not surprising that the fossil fuel industry has been supported. It has all the elements of influence

as defined by POL: economic power, size, emotional appeal and public profile.

Theme 3: More government leadership is required because participants were concerned about climate change

In each instance, POL gave examples of public policy in Australia and how it passed or failed POL's suggested characteristics. For example, I learned from POL that good public policy is one that defines the problem appropriately, considers how to deliver the policy, and also considers whether it is ethical and likely to receive support in the community:

The public policy process relies on good evidence and develops a solution to the problem, is cost effective and efficient. It should ask what administration is required? Is the policy constitutionally appropriate? Is it ethical? Is it good politically and is it sellable? There is no use having a great policy solution if it's not supportable.

POL supported this line of discussion by giving an example of the Liberal Party's 'Fightback' package developed in the 1990s for an upcoming election:

The program was nationalistic and contained extensive modeling for the Goods and Services Tax (GST) but the policies could not be sold to the public and the election was lost. It failed the basic elements of good policy.

The second example POL used to describe this point is the process of financial deregulation:

This was a good policy. The policies started with John Howard as Treasurer in 1979 and led to the Hawke-Keating Governments of the 1980-1990s implementing these reforms. These policies included microeconomic reforms like reducing tariffs in the dairy industry. The Menzies Government is also an example where policies to improve education attainment and services were taken slowly step-by-step.

In contrast, I learned that bad policy does not define the problem and the solution is expensive. POL began by using the Gonski review of Education commissioned by the Gillard Government. In POL's practice opinion:

The policy did not define the problem and the solution was expensive. Education is a state government responsibility. So, politically, it was not feasible and it was too expensive and only might solve the problem. This policy was really a 'Rolls-Royce model'.

According to POL, the National Broadband Network (NBN) project in Australia is another example. Again POL argued that the "problem being addressed was not made clear and the policy response was extraordinarily expensive".

I then learned that good policy (compared to bad) has more winners than losers, even though there will be some losers. POL used the example of the Goods and Services Tax (GST). The:

GST is a good policy, everyone pays, it simplifies who pays and catches a lot of people not paying tax, and it hasn't increased income tax as a percentage of GDP. So in effect the GST has brought more money for the government and reduced the number of people avoiding paying tax.

In comparison, POL believed the Carbon Tax policy was poor policy:

The carbon tax on the other hand, maybe not a bad idea, but it was done like a back door solution. In a democracy you need openness, consultation and political feasibility.

In conclusion, the data from POL indicates that more government leadership is needed to design effective policies that define the problem correctly and the solution addresses the problem effectively.

Theme 5: Decision-makers could talk to local people and make better use of local information

The following sections discuss policy consultation. POL argued that good policy in a democracy should have openness, consultation and be politically feasible. According to POL, policymakers should seek stakeholder support when designing policy:

Every policy area has what I call the 'village'. Some are industrial villages and some are farming villages and each has a particular community. Although government should govern with the interests of the wider population, the greatest good for the greatest number, they are caught in engaging in stakeholder interest groups who are highly organised and small in numbers. Take for example the taxi industry.

It is highly regulated, prices are controlled, and taxi drivers and their organisations are highly organised. A taxi license costs \$1 million so it's in their interest to organise themselves.

According to POL, every policy can be conceptualised like a village: some parts are industrial, some parts are farming and each has its own community. POL summarised this by identifying two groups: producers, like those providing goods and services such as teachers and unions; and consumers or customers in the wider population. Both had organised stakeholder interest groups, which often influences government, and these groups can be highly organised. POL said:

In the education sector, there are many organisations with an interest in public policy like the Australian Education Union, the Independent Education Union, state governments, various associations for non-government organisations, the Independent Schools Association, the Principals Associations and primary and secondary schools associations. There are also other groups like service providers and Universities Australia. These groups go to Canberra, the capital city of Australia, and see the lobby industry. So how do these groups get involved? They try to have direct input on the policy process through the parliamentary committees, they go through the minister's door and the public service. They even enter the public debate by writing columns to influence public opinion or even buying advertising. Some groups spend millions of dollars on advertising.

Nonetheless, POL believed that advertising was not the only way interest

groups could engage in the debate. Most liked to get involved quietly and not attack the government of the day. POL said that:

Parliament House is a big house with many windows and many doors and many ways of getting in. The government can't keep all the doors closed, the house needs fresh air and so they talk to the interest groups and invite them into the house.

To sum up, POL highlighted how community engagement is a daily occurrence for policymakers. POL likened Parliament House to a village with many doors, and with many ways of getting in to see people to make your case.

Conclusion

My analysis of these data indicated that the modern Australian policymaking process is complex and involves power relationships between internal and external network actors. Such a policy process elevates the importance and influence of important stakeholders external to the public service. This contemporary approach also prioritises stakeholders based on their economic power or breadth of membership, the emotional issues they might represent, or their public profile. This led to the identification of the theme hierarchy of influence.

POL also used contemporary policy examples extensively to explain the practice of policymaking. This is consistent with the approach taken by other participants. My observation of this approach suggests that my innovation

needs to relate to local experience or practical experience. My innovation needs to speak to peoples lived experience rather than forms of abstract policy products that are difficult to understand, or makes it hard for people to relate the policy to local impacts.

18. Results: a thematic table

After conducting, observing, testing and reflecting on the data collected from these interviews and group sessions, the following table is the consolidated table of the themes identified from the data. All in all, 16 themes were identified as shown in Table 3. Themes have been classified as either ‘observed’ in the data, or specifically ‘tested’ as part of action research cycles. These themes represent the characteristics of future policy design.

The researcher identified themes through observation and then allocated data to these. The data was then coded to themes using NVivo software. The following table 4 represents a count of data entries allocated to each theme across the sample. The highlighted boxes indicated when themes were identified. These data demonstrates both the commonality of themes across the sample, and the volume of themes.

Table 3. Thematic table.

Theme identified	Observed or specifically tested
Theme 1: existing product and town planning regulations could be used	Observed
Theme 2: Many decisions are made with a preference for the lowest initial cost	Observed
Theme 3: More government leadership is required because participants were concerned about climate change	Observed
Theme 4: Governments needed to become more trustworthy	Observed
Theme 5: Decision-makers could talk to local people and make better use of local information	Observed
Theme 6: Climate change divides communities	Observed
Theme 7: Decision makers should do more to ensure equity in their policy	Observed
Theme 8: Powerful stakeholders influence policy	Observed
Theme 9: The revenue collected from carbon taxes should be recycled into projects that support lower emissions	Observed
Theme 10: Leaders could do more to encourage low carbon research and development, and innovation	Tested
Theme 11: A low carbon place can create other benefits	Observed
Theme 12: Take personal action	Tested
Theme 13: Support for market-based mechanisms was low	Tested
Theme 14: Policies should encourage better access to green finance	Tested
Theme 15: Overcoming the split incentive has worked	Observed
Theme 16: Powerful stakeholders influence on policy making can be ranked	Observed

Source: Author

Table 4. Themes across the data

Themes	Planning Interview	Bingara Workshop	Communities North America/Aus Interview	Armidale Workshop	Tamworth workshop	Communities AUST/Euro/Asia Interview	R & D Interviews	Total
Theme 1: existing product and town planning regulations could be used	5	6	1	23	13	6	4	58
Theme 2: Many decisions are made with a preference for the lowest initial cost	8	8	1	5	5	7	6	40
Theme 3: More government leadership is required because participants were concerned about climate change	3	30	3	39	19	9	3	106
Theme 4: Governments needed to become more trustworthy	0	12	3	9	4	5	1	34
Theme 5: Decision-makers could talk to local people and make better use of local information	8	49	7	37	11	12	8	132
Theme 6: Climate change divides communities	0	2	7	9	8	0	1	27
Theme 7: Decision makers should do more to ensure equity in their policy	0	16	2	13	16	8	0	55
Theme 8: Powerful stakeholders influence policy	0	10	0	5	6	14	0	35
Theme 9: The revenue collected from carbon taxes should be recycled into projects that support lower emissions	2	0	0	2	0	4	2	10
Theme 10: Leaders could do more to encourage low carbon research and development, and innovation	0	8	1	10	6	8	10	43
Theme 11: A low carbon place can create other benefits	1	1	0	2	2	1	4	11
ACTION RESEARCH CYCLE								
Theme 12: Take personal action	0	4	1	10	14	12	1	42
Theme 13: Support for market-based mechanisms was low	1	0	0	5	4	4	1	15
Theme 14: Policies should encourage better access to green finance	3	0	5	2	2	1	0	13
Sum totals	31	146	31	171	110	91	41	621
	Emergent themes identified							
Theme 15: Overcoming the split incentive has worked								
Theme 16: Powerful stakeholders influence on policy making can be ranked								

The data indicates strong connections and volumes of responses in a number of themes. The following paragraphs provide examples of cross sectional relationships observed in the data.

First, regarding theme 5 decision makers could talk to local people and make better use of local information. This was a significant theme for the Bingara workshop and subsequently the Armidale and Tamworth workshops. This theme indicates that group sessions of local people wanted policy makers to ask them what they think will work locally and what they are seeing. For this innovation community engagement and local knowledge would be an important policy tool.

Second, the references to theme 3 indicated that more government leadership is required. These participants spoke about government facilitating change rather than industry. The data suggests that some practitioners thought that the government was the best organisation to lead initiatives like community engagement and the implementation of tighter product and town planning regulations.

Third, decision makers should do more to ensure equity (theme 7) in their policy. The data indicates that people were concerned about people using resources, the poor, the developing world, and whether government policy was fair. This should indicate to the policy maker that equity is an important community concern, especially when the community may be seeking more

government leadership and more community engagement.

Four, a low carbon place can create other benefits (theme 11) was mentioned most often in the research and development interview, perhaps reflecting the practitioner's knowledge about the topic. This observation can also be seen in the preceding paragraphs whereby the group session participants wanted more community engagement and wanted their local knowledge involved in the decision making process.

Five, support for market-based mechanisms was low (theme 13) and the data was observed by conducting an action research cycle and specifically testing this theme. The aim was to confirm that the participants did not indicate that market based solutions were preferred over government leadership and regulation. These participants had the opportunity within the group session or interview to argue for less government regulation, but according to the data, they did not do this.

Last, overcoming the split incentive has worked (theme 15) and powerful stakeholders influence policy-making (theme 16) can be ranked were not allocated in the table. This occurred because the EUA interviews were distinctly targeting the implementation of a new program, and the aim of the policy interview was to understand contemporary *general* policy making. The allocation of data to the themes would not provide any significant insights that

could be validated.

In conclusion, the cross section data table provides a level of validation across the data set. The data indicates that the community wanted to be involved and felt that they would have some specific and valuable knowledge about their local area, the government should provide leadership, and that policies should be fair. On the other hand, there appeared to be little support for market mechanisms. These themes should inform the deliberations of the practitioner.

19. Book two conclusion

To sum, sixteen themes have been identified from the data. These themes represent the characteristics that the practitioner should consider for future policy design. According to these themes, future policy should be based on characteristics like more government leadership, equity, and using local knowledge. These themes then become a foundation for both the internal policy design processes, and the objective of the final policies.

These themes have been influential on my self-reflection-in-action processes I have used to develop an innovation from these data. The primary themes largely challenged my preconceptions about what practitioners would look for in a successful and comprehensive policy program to create the low carbon place. I anticipated that market based solutions would be the predominant solution offered by these practitioners. In my mind, market based mechanisms like carbon taxes and emission-trading schemes should have featured more

prominently in these interviews. Instead, these practitioners overwhelmingly sought more traditional government regulation, product bans, financial subsidies, energy efficiency and town planning regulations, to create the low carbon place.

These participants were also quite suspicious about government leadership, but still sought it, even though they knew that those with power influenced policy. This may be hindering progress to create the low carbon place, and would be a key consideration for the design of my innovation.

In the next and final book, I have detailed my innovation. My innovation synthesises what I have learned from completing book one and book two, into an actionable and scalable innovation.

20. Book two references

Argyris, C. (1995). Action science and organizational learning. *Journal of*

Managerial Psychology, Vol. 10, No. 6, pp.20-26.

Argyris, C., & Schon, D. A. (1974). *Theory in practice; Increasing personal effectiveness*, San Francisco CA: Jossey-Bass Publications.

Argyris, C., & Schon, D. A. (1989). Participatory action research and action science compared. *American Behaviourial Scientist*, Vol. 32, No. 5, pp.612-623.

Arnold, D. (2008). Cultural heritage as a vehicle for basic research in computing science: Pasteur's quadrant and a use-inspired basic research agenda. *Computer Graphics Forum*, 27(8), 2188-2196.

Australian Bureau of Statistics. (2012, December 11). *Australian farming and farmers*. Retrieved from Australian Social Trends Dec 2012, <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4102.0Main+Features10Dec+2012>

Australian Government. (2015). *National inventory by economic sector 2013*. Department of the Environment. Retrieved from <http://www.environment.gov.au/climate-change/greenhouse-gas-measurement/publications/national-inventory-economic-sector-2013>

- Baskerville, R. L., & Wood-Harper, A. T. (1996). A critical perspective on action research as a method for information systems research. *Journal of Information Technology*, Vol. 11, pp.235-246
- Berazneva, J. (2014). Audio recording of household interviews to ensure data quality. *Journal of International Development*, March 2014, Vol.26(2), pp.290-296
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, Vol.3, Issue. 2, pp.77-101.
- Cavana, R. Y., Delahaye, B. L., & Sekarin, U. (2001). *Applied business research: qualitative and quantitative methods*. Australia: John Wiley & Sons.
- Cone, J., Rowe, S., Borberg, J., & Goodwin, B. (2012). Community planning for climate change: visible thinking tools facilitate shared understanding. *Journal of Community Engagement and Scholarship*, Vol. 5, Issue. 2, pp.7-19.
- Cooksey, R., & McDonald, G. (2011). *Surviving and Thriving in Postgraduate Research*. Prahran, Victoria: Tilde University Press.
- Delaney, L., Egan, M., & O'Connell, N. (2011). The experience of unemployment in Ireland: a thematic analysis. UCD Geary

Institute Discussion Paper Series, UCD Dublin. Retrieved from <http://www.ucd.ie/geary/static/publications/workingpapers/gearywp201116.pdf>

Dustin, D. L., Schwab, K. A., & Hendricks, W. W. (2016). Pasteur's quadrant: A conceptual framework for bridging the "great divide" between higher education and professional practice in parks, recreation, and tourism. *Scholarship*, 31(2).

Farrokhi, F., & Mahmoudi-Hamidabad, A. (2012). Rethinking convenience sampling: Defining quality criteria. *Theory and Practice in Language Studies*, 2(4), 784-792

Gill, P., Stewart, K., Treasure, E., & Chadwick, B. (2008). Methods of data collection in qualitative research: interviews and focus groups. *British Dental Journal*, 204, 291–295 (22 March 2008)

Kock Jr, N. F., McQueen, R. J., & Scott, J. I. (1997). Can action research be made more rigorous in a positivist sense? The contribution of an iterative approach. *Journal of Systems and Information Technology*, Vol. 1, Issue. 1, pp.1-24.

Koshy, V. (2005). *Action research for improving practice: A practical guide*. London: SAGE Publications.

Lipshitz, R., (2000). Chic, mystique, and misconception: Argyris and Schon and the rhetoric of organizational learning. *The Journal of Applied Behavioural Science*, 36(4), pp.456-473

McNiff, J. (2002). *Action research for professional development: Good advice for new action researchers*. (3rd ed.), Retrieved from <http://www.jeanmcniff.com/ar-booklet.asp>

McNiff, J. (2013). *Value & virtue in practice based research*. Dorset: September Books.

Minichello, V., Sullivan, G., Greenwood, K., & Axford, R. (1999). *Handbook for research methods in health sciences* (1st ed.). Australia: Addison Wesley Longman Pty Ltd.

NSW Department of Office and Heritage, (n.d). *Environmental Upgrade Agreements*. NSW Government: Sydney. Retrieved from <http://www.environment.nsw.gov.au/business/upgrade-agreements.htm>

NSW Department of Planning and Environment. (2015). *Annual report 2014-15*. NSW Government. Retrieved from http://www.planning.nsw.gov.au/About-Us/~/_media/1AB1D6346477477B80A3E2BA2FE7436B.ashx

NSW Department of Planning and Environment. (n.d.). *Plans for your area*. Retrieved from <http://www.planning.nsw.gov.au/Plans-for-your-area>

Pahl-Wosti, C. (2009). A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change*, Vol. 19, pp.354-365.

Patton, M. Q. (2011). *Developmental evaluation; Applying complexity concepts to enhance innovation and use*. New York: The Guildford Press.

Planning Institute of Australia. (n.d.). *Planning in a Changing Climate (08/15)*. Planning Institute of Australia Policy. Retrieved from <https://www.planning.org.au/policy/climate-change-0510>

RDANI (n.d.a). *Economy profil: Industries by employment*. Regional Development Australia Northern Inland (RDANI). Retrieved from <http://www.economyprofile.com.au/northerninland/industries/employment>

RDANI (n.d.b). *Economy profil: Gross regional product*. Regional Development Australia Northern Inland (RDANI). Retrieved from <http://www.economyprofile.com.au/northerninland/industries/gross->

regional-product

Schon, D. (1984). *The reflective-practitioner: How professionals think in action*. United States: The Perseus Books Group.

Smith, G., Schmidt, M., Edelen-Smith, P., & Cook, B. (2013). Pasteur's quadrant as the bridge linking rigor with relevance. *Exceptional Children*, 79(2), 147-161.

Stokes, D. E. (1997). *Pasteur's quadrant: Basic science and technological innovation*. Washington, DC: Brookings Institution Press

Sutton, J. and Austin, Z., (2015). Qualitative Research: Data Collection, Analysis, and Management. *Can J Hosp Pharm*. 2015 May-Jun; 68(3): 226–231

Tamworth Regional Council. (n.d.). *Planning and Development*. Retrieved December 15, 2016, Tamworth Regional Council. Retrieved from <http://www.tamworth.nsw.gov.au/Planning-and-Development/Planning-Development>

Tushman, M. and O'Reilly, C., (2007). Research and relevance: Implications of Pasteur's Quadrant for doctoral programs and

faculty development. *The Academy of Management Journal*, 1
August 2007, Vol.50(4), pp.769-774

United Nations, 2017, *Note to Correspondents on the Paris Climate Agreement*. United Nations Secretary-General Statements, 4
August 2017. Retrieved from
<https://www.un.org/sg/en/content/sg/note-correspondents/2017-08-04/note-correspondents-paris-climate-agreement>

Williams, L. 2014. *China's climate change policies: actors and drivers*.
Analysis. The Lowy Institute.

Book Three: The innovation

21. Introduction

As the data in this innovation portfolio have shown, there remains a need for innovative solutions to address my topic. As stated, the NSW Government has identified that policies to achieve net-zero emissions need to be investigated. My innovation directly targets this objective, and therefore my workplace problem, by identifying the possible ways a regional economic development agency could consider and implement a range of programs.

Although the NSW Government has identified the zero-net emissions objective, NSW and global emissions continue to increase and the resultant stock of GHGs continues to increase. Therefore, the task to reduce the stock-and-flow of emissions becomes harder the longer the transition to a low carbon place takes. However, it is not clear from the evidence collected in Book One and Two, whether enough community members and practitioners support actions to move away from high emission patterns of living. Many people still fear the economic consequences arising from a transition from high emission economic systems to low or zero emission economic systems. Additionally, some people still remain suspicious about climate science and remain suspicious about government motives. Some people even worry about profits and their jobs, and other people simply do not have the power to do something or do not know what to do. These views need to be considered before developing a policy that actively engages with the community and delivers local change that people can see and relate

their experience to.

The research question I have been addressing in this portfolio sought to identify how a transition to a low carbon place may be facilitated by my workplace. So far, I have gathered data from the literature and other practitioners in the community. What follows in this third and last book, is a description of this innovation, which has been created from self-reflection-in-action as a practitioner, which represents a practitioner solution to this research question. In the following sections, I first describe this innovation as a framework, and then outline the two key transitions needed to support this change. Both transitions are then outlined in more detail, followed by a theoretical application to the dairy industry, because this type of industry is often located in regional areas, and involves further processing and distribution, and selling final products. In the final sections I self-reflect about whether I created any change by this innovation and the likely impact on my profession and me as a practitioner. Last, a portfolio summary concludes this innovation portfolio.

22. The innovation

As a result of conducting phases one and two of this innovation portfolio, sixteen features the practitioner should know was identified plus sixteen themes arising from the data collected from participants. To transition to a low carbon place as a workplace issue would require the introduction of two key internal transitions in a regional economic development agency in the future. At the

time of writing, these two components of my innovation were not observed within my workplace:

1. Regional development agencies transitioning to the double loop or triple loop learning organisation form to develop solutions
2. Regional development agencies transitioning to ecological modernisation programs.

The connection between the three phases of research and the innovation is best highlighted in Figure 9 below. This demonstrates that the sixteen context characteristics and the sixteen practitioner themes are data to be considered by a learning organisation as identified in phase three.

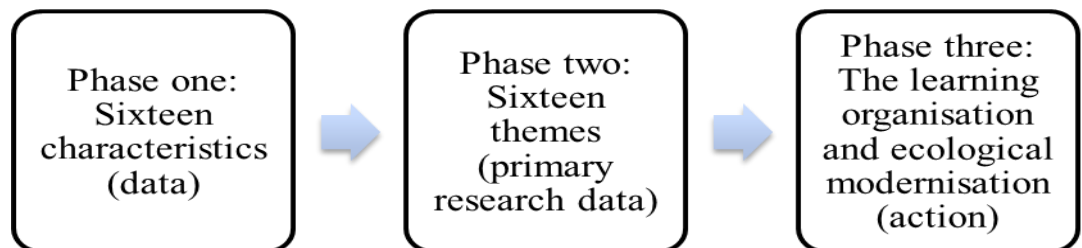


Figure 9. The three phases. .

In some respects my innovation portfolio reflects some of the work conducted by Leach (2012). As a public servant, Leach (2012) studied his workplace barriers and bottlenecks of extension policy in natural resource management in Queensland, Australia. Leach's study also adopted double and triple loop frames as a method to engage in internal dialogue (the innovation pathway), approached the problem as a practitioner (addressing the workplace problem), and identified recommendations to overcome the policy barriers identified in the study (the innovation). Like my portfolio, such innovations may improve workplaces and make a contribution to our professions.

In summary, to create the transition to a low carbon place necessarily requires the public service to transition to learning organisation frameworks, and requires regional development policies to transition to reflect ecological modernisation practices. In the following sections, each of these transitions has been described in more detail.

22.1 Workplace innovation one: Regional development agencies in the future transition to the double loop or triple loop learning organisation form

In my workplace practice, I have recently participated in an interdepartmental committee that developed policy advice in relation to major infrastructure investment in regional NSW. I was selected to participate based on my

experience in regional economic development and my economic and financial background. The other participants came from departments like infrastructure, treasury, planning, environment, agriculture and the central agency representing the Department of the Premier and Cabinet. This form of policy development process is very common within the government.

To transition to a low carbon place, the deliberations of interdepartmental committee structures need to change by adopting learning organisation frames. In this sense, the regional development agency as lead agency would adopt double loop or triple loop learning forms and adopt this approach for the workings of the interdepartmental committee. Interdepartmental committees are convened with public servant representatives from core and/or impacted departments (Bridgman and Davis, 2004). Necessarily, such representation on an interdepartmental committee would likely include a broad representative membership from departments like the treasury, environment, industry and finance, and representatives from health and education. Each participant would also likely bring different backgrounds, perspectives and skills to the committee. Obviously, not all public servants participate in this process. In my practitioner experience, interdepartmental committee representatives are selected for their specific expertise and each participant brings varying expertise and departmental agenda to the process, as represented in Figure 10 below.

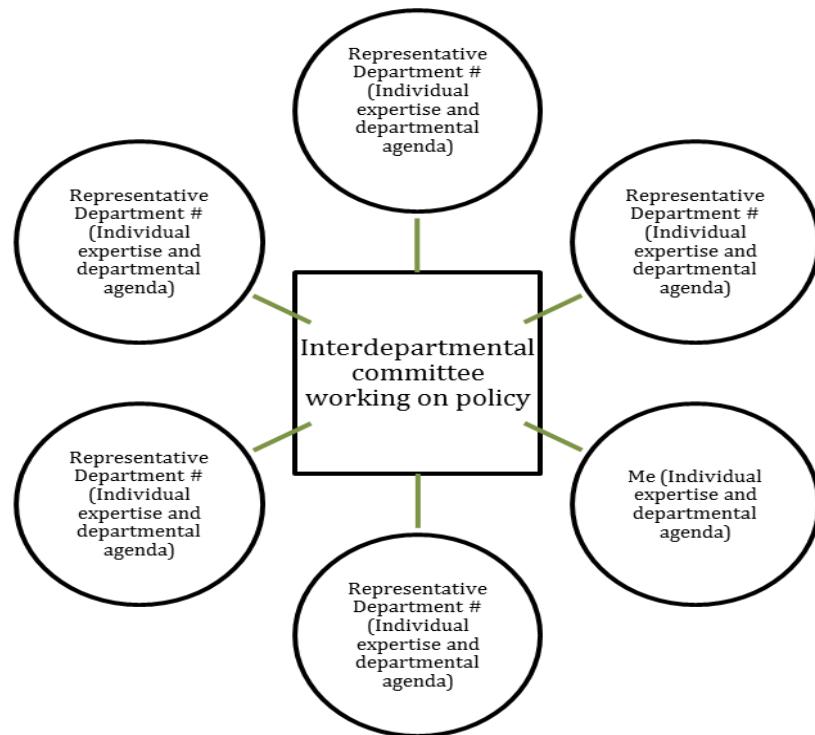


Figure 10. A representation of the participants in an interdepartmental committee.

Source: Author

The single-loop and double-loop learning concept by Agyris (1976) has been used as a frame alongside the extended triple-loop learning by Pahl-Wostl (2009). When practitioners on a future interdepartmental committee consider how best to create a low carbon place, their deliberations should adopt the basic principles of the learning organisation by using the following application of single, double, and triple learning approaches (Pahl-Wostl, 2009). It was not possible in this research project to observe this list being used; however this may be an opportunity for further research. Instead, the expansion of the themes into single-loop, double-loop and triple-loop involved identifying one question that

could be addressed by participants on the interdepartmental committee.

In simple terms, according to Agyris (1976), when people do not question how things are done in an organisation, and they do not question the underlying reasons why an organisation or a person do something, this is called single-loop learning. In this environment, people tend to use control over others to make decisions, while remaining alert and defensive to perceived threats to their authority, position or status from others in an organisation. Because of this defensiveness, the feedback obtained within the organisation lacks all the details and this prevents learning.

Double-loop learning would be a more desirable approach. Agyris (1976) stated that double loop learning occurred when a person in an organisation questions how and why things are done in a particular way. Double-loop learning allows people to explore topics and challenge the status quo. This allows people to become committed to new ways of doing and thinking about problems or processes in an organisation, and often facilitates power sharing and openness between peers.

Extending double-loop learning even further, triple loop learning questions why we believe the things we believe, why we believe them, encourages people to challenge the existing order and seek new paradigms (Pahl-Wostl, 2009, p. 359). Triple loop therefore represents a very deep consideration of the issues facing

this topic, and this might be very challenging for public servants serving in bureaucratic structures.

If practitioners understand the differences between single, double and triple loop learning, then change can begin to be initiated. These differences can be highlighted in the following situations. First, the practitioners participating in this interdepartmental committee should be aware of their individual and collective behaviour that reflects single loop learning. In the single loop, discussions about how to create the low carbon economy may likely involve the endorsement of existing regulations or programs, dismissal of more radical approaches, reliance on existing codes of practice, and no changes to existing governance regimes. In this single loop example, the powerful role of certain stakeholders in the community (Theme 8: Powerful stakeholders influence policy), usually economically large stakeholders (Theme 16: Powerful stakeholders influence on policy making can be ranked), seek to influence policy making that may prevent climate change action being taken that is not in their interest, then more government leadership is needed (Theme 3: More government leadership is required because participants were concerned about climate change).

Second, practitioners could adopt double-loop learning. In the double loop, these practitioners would identify that existing approaches have been deficient and have largely prevented the transition to a low carbon place. These practitioners would begin to search for new ideas and new actors, and their networks

might be consulted, valid information is sought and used, and increased transparency introduced. This approach may lead to the consideration of the introduction of higher product standards (Theme 1: existing product and town planning regulations), which could be used. These concerns about increased costs relate to the theme (Theme 2: Many decisions are made with a preference for the lowest initial cost) were challenged, and it was found that many benefits of a low carbon place (Theme 11: A low carbon place can create other benefits) outweighed the cost.

Last, practitioners could seek to adopt triple loop learning as the basis of their interdepartmental committee interactions. In the triple loop, these practitioners would consider changing existing institutions, changing governance and regulation frameworks (Theme 4: Governments needed to become more trustworthy), changes in power over decision-making (Theme 9: Powerful stakeholders influence policy), and increased community decision-making (Theme 6: Climate change divides communities). This approach may identify ways to create a low carbon place not previously thought possible.

Therefore, the themes identified from my data gathering and observations in Book Two can be classified according to how they might be used within a learning organisation approach by an interdepartmental committee. This is illustrated in Table 5 below where themes are linked to learning.

Table 5. Linking themes to learning

Theme 1: existing product and town planning regulations could be used	Double loop
Theme 2: Many decisions are made with a preference for the lowest initial cost	Single loop
Theme 3: More government leadership is required because participants were concerned about climate change	Double loop
Theme 4: Governments needed to become more trustworthy	Double loop
Theme 5: Decision-makers could talk to local people and make better use of local information	Double loop
Theme 6: Climate change divides communities	Single loop
Theme 7: Decision makers should do more to ensure equity in their policy	Single loop
Theme 8: Powerful stakeholders influence policy	Double loop
Theme 9: The revenue collected from carbon taxes should be recycled into projects that support lower emissions	Double loop
Theme 10: Leaders could do more to encourage low carbon research and development, and innovation	Double loop
Theme 11: A low carbon place can create other benefits	Double loop
Theme 12: Take personal action	Double loop
Theme 13: Support for market-based mechanisms was low	Double loop
Theme 14: Policies should encourage better access to green finance	Double loop
Theme 15: Overcoming the split incentive has worked	Triple loop
Theme 16: Powerful stakeholders influence on policy making can be ranked	Triple loop

Source: Author

Table 5 illustrates how the themes identified from the data represent single, double and triple-loop considerations. When observed through this frame, the data indicates predominantly double loop themes, which suggests that perhaps existing policies may be single loop approaches. In addition, even deeper

learning was observed by the themes classified as triple loop. These triple-loop themes indicate that more radical changes could be identified like how participants indicated that government regulation was preferred over market mechanisms, recycling revenue might be important, and that governance networks may need to change to address the power exercised by certain groups within society.

In conclusion, these themes represent what characteristics a new public policy should contain. To explore how this approach may lead to new policy considerations, the following three examples suggest how a learning organisation approach may consider double and triple loop policies to transition to a low carbon place.

22.1.2 A double loop learning example: the declining cap emission trading scheme

The use of market-based mechanisms to help transition to a low carbon place was a theme identified in my observation of the data collected from the literature. I had anticipated that this would be a strong theme, however after testing for this theme in an action research cycle, the results indicated quite the opposite. The participants interviewed indicated that more traditional government regulation would be preferred over more market-based mechanisms. Despite this, the following exploration of a market-based mechanism might highlight how a learning organisation approach may use best practice examples,

and combine other elements, like revenue recycling.

An emissions-trading scheme (ETS) is a market-based instrument that was created to reduce emissions using carbon pricing and property rights. The theory behind the emissions trading scheme is that polluters will emit pollution while ever it is economically profitable to do so; therefore, a price on emissions will eventually create a situation whereby it is not profitable to emit pollution (Pearce and Turner, 1990). These authors suggest the market process will, through the trade of permits between polluters participating in the scheme, arrive at the optimal level of pollution.

Many governments have introduced the ETS as a climate change mitigation tool. Approximately 850 million people globally are now exposed to an ETS, including people living in the EU, China, Japan, the Republic of Korea, Saudi Arabia, India and South Africa (Flannery, Beale, and Hueston, 2012). The evidence suggests an ETS, such as the European Union ETS, has wider appeal due to the tradability of permits between jurisdictions, lower compliance costs and higher liquidity (Aldy and Stavins, 2012). Additionally, carbon pricing has been observed to be a highly efficient and reliable policy approach, with the dual benefit of being effective and providing an additional source of Government revenue (Stiglitz, 1998). Such widespread implementation should be an indicator to policymakers in my practice that an ETS is commonly used. To demonstrate double loop learning, practitioners would need to find which characteristic of an ETS appears to work better, which scheme is more

equitable, or which scheme creates other benefits, and consider the key features of other demonstrably successful ETS programs.

Two ETS schemes from countries with similar economic systems to Australia would be Europe and the USA. According to Brown, Hanafi, and Petsonk (2012), the EU ETS has been successful at reducing emissions with an estimated cost of only 0.01% of Gross Domestic Product to the EU economy, which was well below forecast. By 2009, the EU ETS had lowered emissions across the EU's 27 participant member states by 17% on the 1990 levels. The EU ETS Phase II and Phase III will require further reductions to the total allowable emissions cap to be 20% lower than 1990 levels (Aldy and Stavins, 2012). The USA example is the cap and trade Regional Greenhouse Gas Initiative (RGGI) ETS. The RGGI applies to the power/energy sector in nine north-eastern and Mid-Atlantic States in the USA, and aims to reduce emissions by 2020 to 45% lower than in 2005 by using a declining cap (International Carbon Action Partnership, 2015, p. 12). In summary, the key observation for the practitioner is that both the EU ETS and RGGI have declining total emission caps, each program recycles revenue, each program appears to have created benefits, and each program has reduced emissions.

Evidence from practice indicates that the ETS has benefits and shortcomings. According to Grubb, Brewer, Sato, Heilmayr, and Fazekas (2009, p. 3), the key lessons learned from the European Union ETS were that the ETS works, people learn how to use and access the ETS, carbon prices change to reflect the

market, the ETS does not create large negative impacts on the economy and the international competitiveness of participants in the ETS does not significantly decline. However, the emission trading schemes in Norway and NZ are two examples where the planned emissions reductions have not yet been met.

According to Meckling (2014), carbon markets in these countries do not have large industries capable of supporting carbon markets, and there have been regulatory shortcomings, issues about governance and market conflicts. In the Australian context, the Australian Government's experience of introducing a hybrid ETS had mixed outcomes. A targeted business survey in 2013 indicated costs had been passed through by 70% of businesses, that under 70% of companies that had responded had not reduced carbon intensities as 50% lacked worthwhile identifiable options, fewer than 40% lacked funding, and fewer than 40% did not consider the carbon price a high priority (Australian Industry Group, 2013). These are important practical lessons for public officials to consider when contemplating the design of an emissions trading schemes, and points to the need to adopt double loop learning.

In summary, the declining cap ETS model appears to be effective in many jurisdictions. The ETS can reduce emissions while simultaneously creating new jobs. The lessons about poor design and implementation have been identified and can be avoided by the prudent practitioner.

3.2 Double loop – recycle the ETS revenue into the transition to a low carbon place

Like the market-based mechanisms outlined in the previous section, participants did not make strong references to revenue recycling. This reflects single-loop learning rather than the potential for double loop learning outlined in this section.

Empirical evidence suggests revenue can be collected and then allocated to projects to further reduce emissions, pollution and poor environmental outcomes (i.e. revenue recycling). The International Council on Mining and Metals (ICMM) (2013) assessed 16 carbon pricing programs operating with revenue recycling. The ICMM found that revenue recycling into low carbon investments is very popular in seven out of eight North and South American schemes. In Europe, schemes preferred revenue recycling into “broader economic support” (International Council on Mining and Metals, 2013, p. 15). The ICMM also identified existing carbon pricing mechanisms without explicit revenue recycling, including the New Zealand ETS, the EU ETS Phase I and II, the Tokyo cap and trade, the Republic of Ireland carbon tax and the UK Carbon reduction commitment. The ICMM also noted that China, South Africa, and South Korea proposed introducing carbon-pricing programs.

The evidence also suggests that recycling revenue can lower utility costs and create jobs. The RGGI claims to have created US\$1.6 billion in net

economic benefits, recycled US\$1.1 billion into subsidies to assist consumers with higher electricity costs, created 16,000 jobs and reduced economic leakage from the local economy (RGGI, 2013). The key point is that RGGI proceeds are also invested back into low carbon projects. The RGGI proceeds could create US\$2 billion in lifetime energy bill savings for more than three million households and 12,000 businesses, save 37 million British Thermal Units of fossil fuels, avoid eight million tons of carbon dioxide emissions, and create US\$700 million in new investment.

The recycling of the revenue raised from carbon pricing is not always implemented. Government stakeholders may consider many other competing spending priorities as being equally or more important. For example, the state of California USA implemented the California Global Warming Solutions Act of 2006 (AB32) (California Air Services Board, 2014), and this Act provides clear guidance on the options they considered for recycling their carbon revenue. The following five actions were considered:

1. Redistribute the revenue to compensate those that suffer from carbon pricing.
2. Recycle revenue into other government commitments like health and education.
3. Recycle funding into initiatives that directly support the achievement of the goals of AB32.

4. Recycle the revenue to households to compensate for any impacts on prices or to compensate households for the damage done by industry and other economic activities.
5. Use the revenue to reduce government taxes. (Burtraw, McLaughlin, and Szambelan, 2012, p. 17)

This list includes how funds have been recycled into broader tax issues such as distribution and equity, whereby any potential cost increases associated with industry compliance forms an argument for compensation to certain sections of the community that might suffer from higher prices. However, based on what I have learned during this portfolio and my practice, strategies 1, 2, 4 and 5 do not directly address the goal of this innovation or the cause of the stock-and-flow problem. Only strategy 3 can achieve the goal of this innovation, particularly when used in combination with private sector finance. Strategies 1, 2, 4, and 5 were options to address equity. As the planning practitioner stated:

The carbon tax (in Australia) was designed to bring a price on carbon to change consumer preferences. However, the revenue was returned to the community as compensation. With more money, people consumed more, which changed their consumer patterns again adding to the overall carbon load.

The redirection of existing subsidies may be added to the pool of recycled revenue funds that could be directed to measures that further reduce GHG, whether that be in energy, agriculture, transport or manufacturing sectors. The International Monetary Fund estimates post-tax energy subsidies paid to

consumers and producers was \$4.9 trillion or 6.5% of global GDP in 2013, and this amount could reach \$5.3 trillion in 2015 (Coady, Parry, Sears, and Shang, 2015). These same authors do argue that subsidy reform would likely impact on the poor and vulnerable in many developing countries. When combined with the revenue raised from emissions trading schemes, the reform of existing fossil fuel subsidies could create a significant pool of finance available to support private co-investment of public investment in transitioning to a low carbon place.

Summing up, the recycling of emission trading revenue into low carbon initiatives has been used in certain jurisdictions with good outcomes for lowering the emissions, pollution and other environmental damage. A single-loop approach would dismiss this option, and either use the collected revenue in general government spending programs, or compensate consumers. A double loop approach would recognise that the revenue raised could further help reduce emissions if allocated to projects that further remove emissions from daily life, thus achieving the goal of transitioning to a low carbon place.

- **3.3 Triple-loop learning example – the Montreal Protocol**

One of the key observations of the participant interview data was that participants thought product regulations could be a policy tool used by government (Theme 1: existing product and town planning regulations could be used), to the extent that participants nominated the use of product bans to limit GHG emissions. The interdepartmental committee might consider an

approach where they seek to extend a global agreement to eliminate, over time, all human created greenhouse gas emissions. Such an international agreement would be binding and enforceable, with clear greenhouse gas reductions and a timeline to eliminate all emissions. The agreement would then be enforced within signatory states, and could compel economic participants to change their practices.

The most likely international agreement to achieve these reductions would be the Montreal Protocol. The Montreal Protocol was signed by participant countries to regulate the use of certain industrial products that contributed to an expanding hole in the ozone layer in earth's atmosphere (United Nations Environment Programme, n.d). This protocol included an agreement to a gradual phase out of damaging ozone-depleting gases. This agreed phase out has been very successful in practice:

In 2010, the decrease of annual GHG emissions under the Montreal Protocol is ~10 Gt of avoided CO₂-equivalent emissions per year → 5 times larger than the annual emissions reduction target for Kyoto Protocol 1st commitment period (Bodeker, 2012, p. 12).

The Montreal Protocol appears to be demonstrably effective and has the added benefit of being used and commonly accepted. A new revised Montreal Protocol could include all greenhouse gas emissions. The authors (Molina, Zaelke, Sarma, Anderson, Ramanathan, and Kaniaru, 2009) found that the implementation of strict air pollution controls within the Montreal Protocol

could eliminate more than 50% of key GHGs like nitrogen oxide and carbon dioxide.

Australia is already familiar with the Montreal Protocol requirements as Australia was one of the first signatories agreeing to the protocol and has met its obligations so far (Australian Government, n.d). Therefore, this policy tool could be an opportunity to lock in longer-term global reductions in harmful GHGs using an established and effective global protocol.

In summary, the Montreal Protocol is a good example of an existing multilateral agreement that is already agreed and implemented, and with empirical evidence of success. An expansion of the Montreal Protocol to eliminate all human created greenhouse gas emissions would be indicative of triple loop learning.

22.2 Workplace innovation two: Implement actionable regional development agency policies to facilitate the ecological modernisation of the NSW economy

The second workplace change needed to create a low carbon place would involve the revision of the role and functions of regional development agencies in the future. As highlighted in the following sections, this change would require a shift in regional economic development policies from an ecologically blind program that has supported new job creation and investment, into an

ecologically driven modernisation of the regional Australian economy.

According to the definitions already stated, this would be more reflective of paradigm shift away from fossil fuel led development towards low carbon development, which would be a characteristic of triple loop learning.

As outlined in Book one, a typical regional development agency's aim is to create new jobs and new investment capital, and support economic activities like exports and innovation. Regional economic development programs have been delivered or offered based on an assessment against program criteria that prioritised the creation of new jobs and new investment generated. There has been, so far, no shift in program guidelines towards a full consideration of the net environmental impacts arising from these regional development projects outside of the traditional environmental protection regulatory sphere. Instead, regional development agencies accept that if the operations or the design of a project have met the environmental conditions set by other regulatory authorities, like the environmental protection authority or Local Government Act, then a project meets the environmental requirements for regional development government programs.

During the course of this study, I have learned that the jobs and investment created by regional development agencies are outputs or outcomes of other processes. The main process is capital. To fundamentally understand economic development one must grasp how capitalism works. I have been influenced by the work of Harvey (2015, p. 70) who has described capital as a "process"

and a “thing”. Harvey argues that the most desirable process of capital is the accumulation of capital. Capital is attracted to things that will most likely lead to the accumulation of more capital that can then be used elsewhere to further accumulate more capital, and so on and so forth. On the other hand, capital as a thing is the term used by Harvey to describe the physical characteristic of capital, which might be cash, gold, or machinery. If a project is attractive for the accumulation of capital then physical capital will be used to realise the project and create surplus capital (i.e. a return or profit).

The implications for regional development arising from this recognition of capital as a process and a thing, is that regional areas will usually only develop under conditions where capital can further accumulate. If a project, a location, or an industrial sector does not offer capital accumulation, then capital will not invest, or capital will physically withdraw and seek another project to accumulate more capital. Under these definitions of capital, future climate change poses a mortal threat to the future prosperity of regional areas. If regional areas are dependent on agriculture, and for example the weather becomes more volatile which affects crop yields each season (i.e. increases production volatility), then the attraction of capital accumulation would be reduced. Therefore, regional development agencies should ideally adopt the best policies to suit emerging conditions to encourage capital. One such emerging condition is future climate change.

Such a change does not necessarily change the jobs and investment objectives of the regional development agency. A transition to a low carbon place will likely require new green jobs. A study by Bowen and Kuralbayeva (2015) found green growth leads to new job creation. In the Australian context, one estimate by the Australian Conservation Foundation and Australian Council of Trade Unions (2016), found that over 1 million new jobs could be created by 2040, and gross domestic product (GDP) could be 13% higher if strong environmental action is taken. According to these author's calculations, these benefits would accrue if emissions were reduced to 80% of 2005 levels by the year 2040.

Therefore, if my workplace objectives are more jobs and investment, then ecological modernisation (EM) appears to be an appropriate methodology to reduce emissions. Ecological modernisation brings together the goals of participants in the economic systems and the needs of the ecological environment. The proponents of EM argue "that economic growth can be decoupled from environmental damage by adopting better technology and improving decision making structures" (Howes, et. al. 2009, p.7). Ecological modernisation proposes that participants in the economic systems seek to become more ecologically efficient by reducing pollution and waste streams, reducing inputs into the manufacturing or service process thereby reducing natural resource use, and substituting resources use to more ecologically favourable materials (Morad, 2007). To achieve this, EM should be embedded within existing institutional, economic and technological structures (Giddens,

2009).

To implement EM, several key changes must be made. The state must become a facilitator between the available technology, the private sector, the state, and the environment (Mol, 2000). This means creating institutional change to reflect the needs of the ecological environment (Mol, 2002) rather than just the needs of the economic and social systems. While institutional change may appear challenging, the EU has used EM to underpin EU environmental policy since the 1990s (Sezgin, 2013).

The theory of EM demonstrates the differences between strong and weak versions of ecological modernisation (EM):

- A weak EM views the environment through an economic lens compared to the strong version, which uses an ecological lens.
- A weak EM relies on technology for change when strong EM seeks out changes in systems, governance and institutions.
- A weak EM also entails a minimal role of government while strong EM proposed substantial intervention.
- A weak EM relies on policy instruments, while a strong EM would be more communicative.
- A weak EM would result in technocratic and closed decision-making while a strong EM entails deliberative democracy and open decision-making.

- A weak EM would be locally or nationally focused while a strong EM would be internationally focussed. (Howes, et. al. 2009)

Given the stock and flow of GHG in the atmosphere as stated previously, my innovation should adopt the strong version of ecological modernisation, as it proposes stronger government intervention to manage the participants in the economic system, impacts on ecology over economic interests, institutional restructuring, more deliberative community participation, and international scalability.

Once introduced, my policy framework will likely change the role of regional economic development agencies in Australia. According to a study by Beer and Maude (2002), the top five functions of economic development agencies in Australia were, in order of response: assistance with major events, marketing the region, help to gain access to government funding, assist with the provision of information about government programs and tourism promotion. These authors conclude that practitioners are deeply embedded in their communities but “we should be concerned that Australian economic development bodies appear to lag behind comparable agencies in other countries in the implementation of new approaches to regional development and in facilitating technological development” (p.85). The functions of regional development agencies in Australia should change to reflect the emergence of an economic system that increasingly values less impact on the environment, productive efficiency, less

waste, more renewable energy, better design and more competitive international products.

Participants in the interviews indicated that they sought more government leadership to direct industry, that government should place more restrictions on polluting activities and support research and development. In my policy framework, regional economic development agencies would facilitate ecological modernisation of the economic system by acting as the central agency coordinating participants in the economic system and government initiatives. The regional development agency would be given the task of creating a low carbon place. This approach would somewhat reflect the role of the Japanese Ministry of International Trade and Industry (MITI). The MITI has been credited as having had a significant role in post-war Japan's industrial success typically by using planning to encourage growth industries, and using tools such as tariffs and quotas to support new emerging industries (Morris-Suzuki, 2000). A strong ecological modernisation version of the regional development agency would resemble the influence of organisations like MITI, where direction and support could be given to projects in Australia that create a low carbon place.

Participants in the interviews indicated that they supported better community engagement and facilitation. In my innovation, the regional development agency would allocate 'caseworkers' to projects in the economic system, and work with these projects to create a low carbon place. The regional development agency would facilitate these projects across the government agencies and draw in

expertise and programs to address the needs of each ‘case’. Over time, each participant in the economic system within a region would receive assistance to become low carbon, and as a result, the regional economic system should reduce its impacts on the environment and create a low carbon place. The regional development agency would work through issues like low carbon investment costs, the enhancement or protection of biophysical features (climate, soil, topography and vegetation), demographics (population and density), existing infrastructure (transportation networks, heat, and power supplies, housing, commerce and industry), and local governance structure (Raciti et al., 2012). For example, the regional development agency could facilitate low cost residential initiatives like sealing air leaks, installing more insulation, adjusting cooling and heating thermostats, maintenance and boiler replacements which might, in total, save between 9 and 13% in annual emissions (Raciti et al., 2012). Such reductions could be readily achievable using existing technology or introducing higher standards for their use. The key change is that the regional development agency would facilitate these initiatives.

The regional development agency would also make use of the various policy levers outlined in my policy framework to incentivise the transition to a low carbon place. Such a role is not too distant from the current activities of regional economic development agencies. Currently, a business development manager in a regional development agency would conduct a needs assessment on participants in the economic system to expand their business, and assist the

participants to make improvements, undertake activities like marketing or attendance at a trade show, or apply for funding.

The legislation guiding the practices of the regional development agency does not appear to be a barrier. The objective of the Regional Development Act 2004 (NSW Government, 2015) is to:

- (a) To help fill gaps left by the market system,
- (b) To promote economic and employment growth in regions,
- (c) To assist regional communities to capitalise on their regional strengths, to broaden and reposition the industry base of their regions and to develop new products and new markets,
- (d) To develop regional or local solutions for regional or local business development problems. (Section 3).

The Regional Development Act 2004 appears to give the Minister the authority to give other assistance (other than financial), or financial assistance using programs approved by the Director-General. According to the objectives of the Act, the department could give assistance to the transition to the low carbon place if the government could establish that low carbon development and goods and services is a gap in the market. The government would also need to establish that assistance would help the development and growth of regional areas and allows communities to develop their strengths and help diversify their economies by developing solutions for business problems (like carbon reduction). If these factors could be established, then it is feasible that new

programs could be developed and implemented.

As stated, GHG emissions attributable to human activities have been linked to global warming. In economic terms, the “whole GHG problem appears to have arisen from a dramatic case of market failure” (Andrew and Thynne, 2008. p. 394). The “market failure arises because the economic costs of GHGs are not priced, and producers and consumers, including those suffering the economic effects of climate change, are thus not able to factor these costs into their calculus.” (Rosewarne, 2010. p. 23).

Given the guidelines for new proposals, this market failure creates an opportunity for the practitioner to put forward policies for consideration. The development of new policy in the NSW Government requires the completion of the cost-benefit analysis that addresses, amongst other criteria, an identified market failure (The Treasury, 2017). In this treasury guide, pollution is considered a negative externality where “goods impose costs on unrelated third parties to a transaction that are not paid for. The market is likely to over-provide this type of activity.” (p.25). Additionally, this guide identifies that the cost of carbon can now be reliably estimated using market prices, and suggests that “climate change impacts should be assessed like any other risk factor that effect the economic lifecycle of assets” (p61). The precondition of the existence of a market failure appears to be met by the evidence about climate change. The treasury guide provides that public service with the opportunity to begin

designing and testing various ecological modernisation programs.

In summary, under my innovation, the regional development agency would only be working with participants in the economic systems that comply with new government regulations for creating a low carbon place. These regulations would be needed to compel participants in the economic systems to undertake ecological modernisation processes in conjunction with their caseworker. A participant in the economic system would need to comply with new standards and licences, and understand the longer-term pollution reduction goals and how these goals may inform future investment decisions. One further advantage is that the legislation appears to be already in place, so new programs could easily be implemented once the policy the new policy objectives and programs had been developed.

22.2.1 A double loop example: Increase product standards program

The data collected from the participants interviewed indicate that increased product standards (Theme 1: existing product and town planning regulations could be used) could be a policy to transition to a low carbon place. This theme was observed in reference to participant comments about consumer goods, industry sectors and town planning regulations. The intent of such an approach would be to raise the environmental minimum standards required for a project or a good to decrease its environmental impact.

By using the double loop approach, the practitioner would realise that, in the Australian context, product regulatory frameworks already exist and can be enforced by legislation and regulatory authorities. For example, the minister can ask participants in the economic systems to meet certain minimum safety information standards, and make mandatory reporting of environmental incidents supported by a system of penalties and fines (Australian Competition and Consumer Commission, 2015). Governments in Australia have also established regulatory agencies to monitor environmental impacts. In NSW, for example, the NSW Environmental Protection Agency (NSW EPA) investigates incidents of pollution, and can also licence activities (NSW Environmental Protection Agency, n.d.). These licences are issued according to a demonstrable assessment of environmental impacts from industrial and business operations, are a method to license and regulate future environmental impacts, and compel the collection and analysis of measureable performance data. In Australia, the commonwealth and state governments have existing legislation governing environmental impacts. For example the commonwealth government manages environmental impacts through the *Environment Protection and Biodiversity Conservation (EPBC) Act*, and the NSW Government uses the *Protection of the Environment Operations Act 1997* (Australian Government), n.d). The question remains as to whether these standards have been effective given the changes in environmental conditions or predictions about climate change. It appears that the opportunity to revise and steadily increase minimum standards appears

administratively straightforward using this existing legislation. However, the politics of such a change may be more difficult.

The practitioner would also find that product standards have also been used in the USA to improve air quality and reduce pollution. Between 1970 and 2012, the *Clean Air Act 1970* led to a 72% decline in aggregate national emissions of six common air pollutants despite the national economy growing by 21% (United States Environmental Protection Agency (USEPA), n.d.). The Clean Air Act also claims that:

- Air quality improvements prevented 205,000 early deaths between 1970 and 1990;
- An improvement of IQ test scores in children and improved the national average life expectancy;
- 2010 crop and timber yields rose by a further US\$5.5billion;
- Improved visibility from reduced air pollution in national parks and metropolitan areas was estimated to have created more than \$34billion in economic benefit; and
- Cost benefit analysis of the Clean Air Act found a US\$2 trillion benefit to the USA by 2020.

Practitioners could also use land-use and town planning standards to create a low carbon place. The data obtained during the participant interview with the planning practitioner indicated that land-use and town-planning regulations

could be useful policy options for stronger government leadership. As stated in Book two:

The planning regime in NSW is generally quite flexible and accommodates initiatives for energy efficiency and water efficiency. Each site or development application is different of course and issues may arise around site placement (passive solar) and the surrounds.

The Planning Institute of Australia also confirms that planners could have a key role in guiding climate change adaptation and encouraging better environmental outcomes through energy and water efficiency and built environment improvements (Planning Institute of Australia, n.d.). Some even argue that planners should become more actively engaged with developers to ensure sustainability goals are met within proposed development designs. In Australia, most state legislatures include the need to, as a “preceding” requirement, take into consideration how a development project meets the principles of sustainable development, ecologically sustainable development and intergenerational sustainability principles (Montoya, 2013). This insight creates a new opportunity to use practice experience to change town planning and product standards to achieve the objective of creating a low carbon place, and demonstrates how double loop learning approaches can yield new data for decision making.

22.2.2 A triple loop learning example: Government sustainable procurement program

The practitioner could assess government procurements policies to create the low carbon place. This could include implementing a government sustainable procurement program (SPP). The SPP typically assesses how well a potential supplier addresses defined environmental criteria in a contract. These criteria might include measurements of packaging use, waste, the movement of goods and purchasing decisions (Brammer and Walker, 2011). Public procurement policy has long been used as a tool to improve environmental outcomes. For instance, the UK Government identified procurement procedures as a tool to assist in the transition to the green economy (Environmental Audit Committee, 2012).

Government procurement in Australia is a large sector in the economy. In 2013/14, the Australian Commonwealth Government issued AUD\$48.9 billion on 66,047 public procurement contracts on a ratio of 39% goods and 61% services (Australian Government Department of Finance, n.d.). Across the Organisation of Economic Development (OECD), government procurement averaged 13% of Gross Domestic Product (Organisation for Economic Co-operation and Development, n.d.). If government procurement became more 'sustainable', then significant environmental improvements might be achieved.

Existing models may already exist. The NSW Local Government Association has designed a new procurement program called ‘Sustainable Choice’ to support sustainable local government procurement (Local Government NSW, n.d). The NSW Government also supports this program. The supplier database in this program provides a range of “indicators of sustainability factors that may be attached to a company and/or its products on this site that prospective companies can identify, and local government can make informed procurement decisions”. The aim of Sustainable Choice is to identify the degree to which a potential supplier meets these criteria in order to qualify to tender for government contracts. This local government program references the concepts of Quadruple Bottom Line being, environmental, social, and financial and governance (civic leadership) to underpin the aims of the Sustainable Choice program. Tenderers for these contracts are expected to identify, address and comply with these criteria as part of the contract tender evaluation process. With further investigation, the practitioner may consider that Sustainable Choice might be a model that could be expanded and enforced.

If the practitioner only considered single-loop learning, then this would indicate that government procurement would not achieve a low carbon place and might be more expensive. This would dismiss about 12% of gross domestic product or US\$6 trillion of annual economic activity each year as a potential target for environmental improvement. On the other hand, a double-loop approach would recognise that this is a large market, and that new industries may emerge

because of this requirement. A double loop approach would also recognize the potential for change. With 88% of GDP not covered by a government sector sustainable procurement approach, there is a lot of scope to expand sustainable procurement into the private sector. The difference between single and double loop learning shows how procurement may play a role in the transition to the low carbon place.

22.2.3 A double loop learning example: low carbon investment program

The regional development agency could consider government policies to provide more financial support packages to encourage low carbon investment. The practitioner would identify that these measures may typically involve policies to lower a project's risk profile by removing investment barriers, use public guarantees to lower investment risk and provide more public seed capital (KPMG International, 2013). The challenge, then, is to create policies that mobilise public and private finance within the context of clear future environmental targets, a new public policy to transition to a low carbon place, and with competing government budget priorities.

The practitioner would identify that investment is needed alongside investor confidence. A lot of investment is required to reduce emissions. For example, between 2004 and 2009, the average cost of constructing a wind farm in Europe was €140 million or €1.7 million per installed Mw, and building an energy smart

grid in a city of one million households was estimated to cost €2.6 billion (Whitehouse, Lacy, Veillard, Keeble, and Richardson, 2011). As stated previously in this portfolio, the EU has an established and stable cap and trade emissions trading scheme and other stable environmental programs that create an atmosphere of future investment certainty. Investing in renewable energy and energy efficiency infrastructure is a substantial long-term investment that requires a level of investor confidence.

With the proliferation of available climate-based instruments, a substantial pool of available financial capital for projects should be available to create the low carbon place. In 2014, climate-themed bonds and other debt instruments available for low carbon investments were estimated to be worth US\$502.6 billion (Climate Bonds Initiative, 2014). The literature also indicated that governments had committed to raising the available pool of finance. In 2009 the Copenhagen Agreement led to countries pledging US\$30 billion over 2010 and 2012, and another US\$100 billion to 2020 in climate finance (Jotzo, Pickering, and Wood, 2011). This additional finance could be accessed by projects to lower emissions and improve the climate. The literature also identifies several other climate finance instruments that address climate change and the low carbon place by using urban development funds like the London Green Fund holding fund (Swinney and Wilcox, 2013), and social bonds (Tomkinson, 2012). The structure and targets of these bonds should be of interest to the practitioner using double loop learning.

By adopting a double loop learning approach, the practitioner would identify that attracting low carbon investment from Australian superannuation funds would become a priority for the regional development agency. Besides traditional debt financing arrangements, the Australian superannuation sector is a major potential source of climate finance. The total pool of Australian superannuation is estimated to reach AU\$7.6 trillion by 2033 if the legislated compulsory superannuating contribution rate is increased from 9% to 12% (Deloitte, 2013). Such a large pool of funds will inevitably seek to make investments in a range of projects in order to achieve positive returns for their members. Unlocking this vast pool of finance would potentially accelerate the transition to a low carbon place.

A double-loop approach might also entail the consideration of the Environmental Upgrade Agreement (EUA). As buildings are a major source of carbon emissions, implementing a program that fosters shared costs and benefits between building owners and their tenants by reducing the financial costs of low carbon technology adoption could make effective impacts on creating a low carbon place. As stated previously in Book Two, the EUA is a statutory charge made against the land by local government in order to repay a loan through a third party financier. The land secures the loan and is the highest order security for the loan. This allows the financier (banks) to provide longer commercial loans (over ten years compared to two years) with fixed interest rates. These loans are also not means tested against an individual, and repayments occur

through a charge and collect system associated with local government land tax. The effect of this agreement is to increase positive cash flow by stretching the loan over the longer term, and potentially sharing the benefits and costs between the landlord and tenant. An expanded version of EUAs, or better facilitation by the regional development agency, could improve access to a new finance instrument given the need to adopt new low carbon technology and retrofit existing infrastructure. A green-field (or new) and high risk infrastructure investment needing major financial capital is not necessarily required in all cases to achieve substantial emission reductions. For example, if organisations cumulatively invest €2.3 trillion in 15 commercially viable low carbon technology applications, the European Union could reduce its year 2020 emissions to 83% of 1990 levels (Whitehouse, Lacy, Veillard, Keeble, and Richardson, 2011). Indeed as (Raciti, et al., 2012) stated, that the technology available today could be used to reduce emissions.

In summary, the practitioners in the regional development agency would facilitate better access to finance for the ecological modernisation of Australia. There are significant pools of funding already available and seeking investments with stable long-term returns. Such a change may also create the type of investment environment that would be attractive to capital, as more capital would be required to invest in energy efficiency, retrofitting buildings, investing in new machines and new products. The identification of this opportunity is one of the advantages of using double loop learning.

22.2.4 A conceptual ecological modernisation program framework in practice

To demonstrate a full suite of programs from the switch to ecological modernisation, the following Table 6 is sourced from literature and adapted to match the conceptual programs identified in this innovation.

The data sourced from the literature indicates the type of activity required to meet the abatement potential (column 1), for example the energy sector, and identifies the estimated carbon dioxide equivalent abatement potential (column 2). The next column (column 3) links each targeted sector activity to my innovation while the regional development agency is identified as the lead-agency in column 4.

From these data, 24 targeted activities have been identified. For example, the industry sector has four activities listed that could theoretically achieve an abatement of 37 metric tonnes of carbon dioxide equivalent (MtCo2e) per annum. The first is energy efficiency, which could be supported by a range of programs identified in my innovation and led by the regional development agency as either a direct program or through facilitation. For instance, the low carbon finance assistance program may assist businesses to retrofit energy efficiency machinery, like power correction units, or install a solar PV system to generate low carbon energy. Likewise, the low carbon town-planning program would require applicants to reduce their emissions in their development

applications from high carbon industries and could direct industry developments to include solar passive design and building energy efficiency.

The second example is forestry, which has an abatement potential of 70 MtCo_{2e} achieved by activities such as reforestation, reduced deforestation and regrowth clearing, and forest management. The low carbon town-planning program could be used to identify minimum tree coverage on land and prevent further deforestation from land clearing. Additionally, the low carbon government sustainable procurement program could be used to purchase paper-based products from forests that meet the low carbon product standards program. Also, the proposed low carbon research and development program could be used to research better ways of managing forests. Once again, the regional development agency would facilitate these programs

To demonstrate this table conceptually in practice, the following example would be representative of a typical program administered by the regional development agency. The following theoretical program brochure would be indicative of how a program to support the low carbon transition of the agriculture sector would appear and be actioned. This has been constructed from my practitioner experience developing programs in my work place.

Table 6 Abatement activities linked to my innovation

1. Activity to achieve abatement potential	2. Abatement potential MtCo2e	3. Link to this innovation policy framework	4. Co-coordinating agency
Energy sector 1. Onshore wind 2. Coal to gas shift 3. Solar thermal with storage. 4. Reduced transmission and distribution losses 5. Carbon capture and storage. 6. Geothermal	77	<ul style="list-style-type: none"> • Low carbon town planning program • Low carbon product standards program • Low carbon finance assistance program • Low carbon government sustainable procurement program • Low carbon - Energy Sector Emissions Trading Scheme 	The regional development agency
Forestry 7. Reforestation 8. Reduced deforestation and regrowth clearing 9. Forest management	70	<ul style="list-style-type: none"> • Low carbon town planning program (land-use) • Low carbon product standards program • Low carbon finance assistance program • Low carbon government sustainable procurement program • Low carbon research and development program 	The regional development agency
Industry 10. Energy efficiency 11. New technologies 12. Cogeneration 13. Other opportunities. Fuel or	37	<ul style="list-style-type: none"> • Low carbon town planning • Low carbon product standards program • Low carbon finance assistance program • Low carbon government sustainable procurement program 	The regional development agency

ingredient shift, industrial process improvement and reducing discharges of natural gas		<ul style="list-style-type: none"> • Low carbon research and development program 	
Agriculture 14. Reducing cropland soil emissions 15. Reducing livestock emissions 16. Pasture and grassland management 17. Cropland carbon sequestration 18. Degraded farmland restoration	32	<ul style="list-style-type: none"> • Low carbon town planning program • Low carbon product standards program • Low carbon finance assistance program • Low carbon government sustainable procurement program • Low carbon research and development program 	The regional development agency
Buildings 19. New builds. Increasing new builds' energy efficiency above current standards 20. Improved efficiency through technology 21. Energy waste reduction	28	<ul style="list-style-type: none"> • Low carbon town planning program • Low carbon product standards program • Low carbon finance assistance program • Low carbon research and development program 	The regional development agency
Transport 22. Internal Combustion Engine (ICE) vehicle efficiency 23. Alternative power technology 24. Biofuels	6	<ul style="list-style-type: none"> • Low carbon town planning program • Low carbon research and development program • Low carbon government sustainable procurement program 	The regional development agency

Source: adapted from ClimateWorks, (2010).

Permission granted.

22.2.5 Example of a low carbon industry development program

The following paragraphs are a conceptual program designed to highlight how my innovation could be applied in practice. The structure of this program broadly follows standard programs already offered by my workplace (NSW Department of Trade and Industry, n.d.):

Low carbon agriculture program (LCAP)

Future climate change predictions indicate that our climate may substantially change. Many of these changes will incur additional costs on our community, and place more pressure on our economy, infrastructure and government services. Future climate change may also make many farming businesses unsustainable, which will impact on our regional communities.

The (Insert) Government recognises that mitigating carbon emissions now may reduce future climate change. In response, the (Insert) Regional Development Agency invites applications from eligible entities for low carbon transition financial assistance. Successful applicants will receive financial assistance to support eligible activities..

Who is eligible?

The following entities are eligible for LCAP assistance:

Sole traders and corporations

Incorporated associations and other not-for-profits

What is an eligible activity for LCAP?

The following activities are eligible:

Reducing cropland soil emissions

Reducing livestock emissions
Pasture and grassland management
Cropland carbon sequestration
Degraded farmland restoration

What financial assistance is available?

The financial assistance range for LCAP is a:

Minimum AU\$100,000
Maximum AU\$1,000,000

How is the financial assistance offered?

The financial assistance packages are offered as a:

Small one-off co-contribution grants upon completion of the project; and
Financial subsidies, including interest rate deductions, offered under the
(Insert) Environmental Upgrade Agreement.

How to apply

To make an application please contact your local (Insert) Regional
Development Agency office.

Conclusion – workplace innovation two

The regional development agency could adopt ecological modernisation as the cornerstone of its approach to transition to a low carbon place. This would entail a workplace transition from ecologically blind programs to ecologically focused programs based on the development of programs using double or triple loop learning thinking. Such an approach would likely lead to new programs in product standards and town planning, government incentives, finance, and sustainable procurement.

23. A conceptual application of this innovation

To demonstrate the capability of this innovation to create a low carbon place, this innovation framework below has been theoretically applied to the food-processing sector, which would be a common industry sector in regional NSW. The first principle of this innovation indicates that a future government has strongly committed to intervening in the economic system to create a low carbon place. The learning framework approach would identify that intervention includes ‘mainstreaming’ a low carbon place by re-tasking the office of regional development to work solely on reducing emissions from the economic system and provide additional budget to facilitate such change. No government support would be provided for activities that would increase the total of stock and flow of GHGs into the atmosphere. Also, this theoretical future government may

have committed to a revised Montreal Protocol that locked in signatories to the complete removal of the use of GHGs in the economic system over the coming decades, and to a revision of all product and town planning standards.

The report by the Australian Industry Group (Ai Group) (2011), describes the carbon abatement options in the supply chain for an ice creamery that produces two- litre tubs of ice cream for human consumption. The supply chain includes the following processes:

- Ingredients sourced from dairy farms including dairy milk, cream and milk powders.
- Ingredients sourced from sugar cane farms
- Ingredients sourced for flavours and other speciality ingredients
- Plastic sourced for packaging
- Processing plant
- Cold storage
- Retail

The Ai Group study assessed the lifecycle carbon footprint of a tub of ice cream and identified that 88% of total carbon emissions are found in the dairy farming processes, and include methane emissions from cows and nitrous oxide from manure (43% of the total). As stated in book one, these gases are important

GHGs. Other supply chain processes such as retail freezers using electricity and refrigerant loss are 36% of the total, and the electricity and natural gas used in the ice cream processing plant are 9% of the total. The relevant sectors are dairy and retailing.

Using the Ai Group example, my innovation would indicate that the following ten actions would be facilitated between the regional development agency (the agency) and the client.

1. The agency would establish a relationship with the relevant industry sector bodies and use or engage with the existing resources developed by these organisations. For example, the Dairying for Tomorrow organisation has already developed a carbon calculator for dairy farms (Dairying for Tomorrow. (n.d)).
2. The agency may provide financial assistance to help participants in this supply chain use existing resources or provide financial assistance to sector-wide industry associations to create and maintain such tools.
3. The representative of the agency and the client would conduct a life cycle assessment for the ice cream entity as the entity producing the final consumer good, including the mapping of the supply chain participants and goods and services. From the lifecycle assessments, the agency would identify that the dairy farm, retail freezers and the operations of

the ice cream manufacturing facility contribute 88% of the total carbon emissions for this product.

4. The agency would first engage with the dairy farmers and would work with the farmers to reduce net greenhouse gas emissions, source lower carbon fertilisers and improve land-use. Under the innovation, the farm may be required to reduce its net greenhouse gas emissions annually under a declining cap by 5% per annum. Given the cows produce the milk and are essential, and given that technological solutions to reduce or remove the emissions from the cows and manures are maybe not yet available, the farmer may need to buy net carbon offsets in the emissions trading scheme and attract carbon offset payments by planting trees. If the dairy farms became carbon neutral, then 43% of the emissions arising from the tub of ice cream would be removed.
5. The agency would then engage with retailers of this product to understand their processes and sources of electricity. Given that the retailer as an economic entity would already be required to work with the regional development agency, it is likely the retailer would be planning to convert their electricity source from fossil fuels to renewables, especially in refrigeration.
6. The agency would provide access to financial assistance programs, like

the Environmental Upgrade Agreement, to help retailers install renewable energy.

7. The agency would also engage with the ice cream manufacturing processes for this product. As this process contributes about 9% of total carbon emissions due to electricity and natural gas, the regional development agency could help the client access financial assistance to switch their electricity and energy source from fossil fuels to renewables.
8. The agency and the client would also investigate how the final product could be improved to comply with new and more stringent product standards. Product packaging would be a key area of concern. The product standards would require the product packaging to be made from less carbon intensive materials, including having a higher recycling content. For example, the AI Group (2011) report indicated that the resources for the plastic tub, which is the packaging for the final consumer of ice cream, could be sourced from suppliers of lower carbon polypropylene, and increased polypropylene recycling. Likewise this report suggests that the packaging for other ingredients could also be made from less carbon intensive materials.
9. In the background, the government would be conducting a process to remove subsidies currently available to high carbon emitters. This

change may have a material impact on the client or their future investment decisions.

10. To support the future competitiveness of the ice cream manufacturing industry the government would provide additional finance for low carbon research and development. The required research and development would be facilitated by the caseworker in the agency. This would help entities to identify their lifecycle carbon footprints and identify new opportunities.

In conclusion, this example demonstrates how the regional development agency would use programs and client engagement to reduce carbon in the dairy industry. Although this was a theoretical application of my innovation, this application is representative of working with clients and programs in practice.

24. Was I able to create change?

My proposed innovation is conceptual and therefore has not been implemented in the regional development agency. Many of these reforms may need political support and legislation, and such a process is difficult to undertake from my existing workplace. As a public servant, I am not allowed to undertake such political processes and I should remain apolitical in the conduct of my employment. Instead, my policy framework may serve as advice to broaden the internal dialogue between public servants, and the additional knowledge I have

acquired from completing this study means I can be more informed when I participate in future internal discourse about this subject.

Despite these limitations, I did theoretically apply this innovation to a regional industry example. In the preceding sections I outlined how this innovation would theoretically apply to the dairy industry. Although this was a high level analysis about how the regional development agency would use this innovation to support the dairy industry, this would be how a practitioner in the regional development agency would strategically plan their engagement with the dairy client. This example demonstrates the potential of my innovation.

To deploy this innovation, two logical pathways might be considered. First, publish my findings and let others use this work to pressure for change is an innovation pathway. On one hand this allows others more connected and less restricted than me to pursue my idea. On the other hand, powerful interest groups may prevent this innovation being adopted by departments. Second, the innovation pathway could be initiated internally by initiating an internal working group or interdepartmental committee targeting the NSW government's new objective for NSW to become net-zero emissions by the year 2050. This pathway is described using Table 7 below.

Table 7 Innovation pathway

	Political Domain	Policy Domain	Administrative Domain
Identifying issues	Stakeholders submit concerns about climate change	Monitoring trends	The on-going collection of data
Policy analysis	Issue raised within government	Establishment of an Interdepartmental Committee (IDC)	Agencies prepare briefing papers for IDC
Policy instruments	Stakeholders submit preferences for instruments	IDC incorporates stakeholder submissions for consideration	Agencies prepare detailed technical data for IDC
Consultation	Political actors meet with stakeholders	Agencies meet stakeholders Refinement of options	Agencies meet with stakeholders Refinement of data
Coordination	Political actors push for a solution	IDC finalizes options and prepares a cabinet submission	Agencies prepare briefing papers for IDC
Decision	Cabinet considers policy proposal	Central agency distributes decision and coordinates implementation	Agencies receive advice and allocate resources
Implementation	Public announcements and advice to stakeholders	Agencies begin to implement new policies	Program criteria finalised and launched into the public domain Agencies begin facilitation and assessment of applications

Evaluation	Stakeholders provide feedback on the issue and how effective the solution has been implemented	IDC continues to evaluate program and provides advice to government and agencies	On-going evaluation and reporting of programs
-------------------	--	--	---

Source: adapted from Bridgman and Davis (2004, pp30-32)

This table identifies how this innovation could be progressed within the public service once the political part of the government decided that my topic was to be considered. This has been achieved with the NSW government identifying the objective of achieving net-zero emissions by the year 2050. What remains is for the departments to mobilise staff and assess possible policy responses. The innovation process would broadly follow the process above leading to the possible adoption of my innovation in part of in whole.

Since beginning this research, I have used the information I have collected to further develop my practice and influence those I engage with. The challenge, as previously stated, is to create action in the public policy development domain, as opposed to creating action within the local communities I professionally interact with. In other words, I wish to empower those within the public service to further develop this public policy rather than motivate local inland community members to lobby for change. This form of action could create broader policy implementation beyond the communities I interviewed.

By undertaking this professional doctorate, my peers within the regional development agency have recognised my increased knowledge and skills. The following list highlights this:

- In 2014, I was asked to participate in an internal working group to develop the NSW Regional Economic Development Strategy.
- In 2015, I was elected Chairperson of the Northern Inland Sustainable Business Network (NISBN).
- In 2015, I designed and recommended a local external consultancy project to investigate sustainable procurement practices in local government.
- In 2015, I was selected to participate on two interdepartmental committees to consider the economic and legal consequences for two rail infrastructure projects valued at approximately AUD\$14 billion.
- In 2015, I was asked to participate on an interdepartmental committee to consider local climate change adaptation in the public service.
- In 2015, the township of Bingara held a workshop to further understand the benefits of the Circular Economy from the organisation from IfAs (Germany), the potential for community renewable energy, and the potential to better use human waste.
- In 2016, I was seconded to the position of Senior Manager Programs and Director Programs and Infrastructure. In this role I developed programs for my workplace and participated in cabinet approvals processes.

In summary, these activities demonstrate my increased practical knowledge about regional development, the environment and program design and delivery. My observations are my self-reflection-in-action based on my practical experience applied to the data collected in this portfolio.

25. Portfolio conclusion

By approaching my research problem from a user-inspired perspective based on rigor and relevance, the identification of an actionable innovation has been achieved. This innovation proposes two key transitions. First, the public service transitions to a learning organisation framework to consider the best practice-based policies in place around the world and consider the themes identified from my research. This would require a shift in how participants in public policy development consider single, double and triple-loop thinking about this issue. The second transition requires the regional development agency to adopt a strong ecological modernisation position for future regional development assistance and intervention. This would entail the creation of ecological-centric policies that use a mix of product standards, financial assistance, research and development assistance and planning to transition a low carbon place. These two activities form a link between what needs to be done and how to implement these programs in the economic system.

Both transitions would not be easy to politically achieve; however in the future, when climate change impacts become more costly, the politics may become

more conducive for this innovation. These changes will likely have an impact on billions of people and place considerable strain on areas already threatened by volatile weather, rising oceans, loss of biodiversity and food and water shortages. Changed climatic conditions may also impact infrastructure and make the economic system more volatile. The economic and social costs of such dislocation could be enormous, which further reinforces the view that action today to mitigate future climate change may save lives and money tomorrow.

My innovation indicated that government mechanisms should be used, which challenged my initial conceptions about this innovation and subsequently my practice and formal training. My practice and formal training strongly indicated to me that the market would be the best approach to mitigating climate change. In this respect, I could not see beyond the market mechanism approach that has been viewed as a least-cost method that uses the price signal and the profit motive to achieve pollution reductions (Sandor, Bettelheim, and Swingland, 2002). In other words, the market will likely trade environmental damage like a commodity, and environmental damage will likely recede if damaging the environment becomes unprofitable. By doing this, the polluter pays rather than the government, which is free to reallocate spending to other areas even though the data from my interviews did not concur with this approach.

From my practice position, I anticipate that any policy response to climate change, planned or reactionary, will likely involve trade-offs in our current economic system. Future climate change and continued natural resource

exploitation may limit or alter the supply of raw material inputs into the economic system. Future climate change may also change the climatic conditions in some areas that have been historically favourable to agricultural production. Therefore, the problem for the regional development agency is that agriculture and access to raw materials have been key determinants of economic development and growth. In the regional context, any substantial climatic change in Australia may severely limit the European-style agricultural models deployed.

Despite the opportunities to reduce emissions through policy initiatives, I remain very concerned about the ability of the natural system to sustain year-on-year compound economic growth given the predictions about future climate change. In my diary, I noted “Nature is the only system that can self-regulate”. Therefore, the challenge for my practice, and for others practicing economic development, is to embrace a more holistic approach to economic development where by self-regulation between the economy, society and nature delivers better environmental outcomes. In this respect, I have argued that in the absence of low carbon policies that regional development agencies need to lead and develop policies from within government and using other agencies and interdepartmental committees, to create these programs.

The policies outlined as this innovation will need to overcome the current policy directions in place. In the traditional view of economic development practice, primacy has been given to strategies to increase income per capita, increase

the share of industrial production, decrease the share of agriculture in overall economic activity, and facilitate rural human migration towards urbanised cities to support the emerging services sector (Perkins, Radalet, Snodgrass, Gillis, and Roemer, 2001). Economic development strategies in advanced economies have typically involved transfer payments from central authorities and strategies to develop infrastructure, enable the movement of labour and facilitate physical and financial exchange. In Australia, three core approaches have been in evidence, including the use of investments in large-scale infrastructure construction like rail and roads, attempts to attract industry to relocate or establish in regional areas and transfer payments in order to compensate for regional economic disadvantage (Tomaney, 2010, p. 10). These strategies continue today, and form the basis of economic development policy. As Barca, McCann and Rodriguez-Pose (2012, p. 7) state:

With a few and relatively minor exceptions, traditional development policies continue to rely on 1950s growth and development theories...supply-side strategies or conversely, excessive demand-side strategies based on sector rather than a territorial dimension.

While economic development plans may be a guide for development, I have since come to understand that these plans are important signals for policy making. My experience of developing an economic development framework in the regional development agency suggests that such a document could be used to influence the overall direction of policy. The problem, as I now see it, is that the economic development plans were incorrectly positioned. It is difficult to

address the climate change issues of today by basing a regional development plan on a position of abundant natural resources with no negative impact on the environment. A future economic development framework could therefore adopt the ecological modernisation position in my innovation that replaces the old ecologically blind approach could be a first step towards the transition to a low carbon place.

As stated, the NSW Government has identified the policy objective of net-zero carbon emissions by the year 2050. This policy announcement in 2016, several years after I started this innovation portfolio, now aligns to my innovation. This alignment should make internal policy discourse and development easier than anticipated. As GHG emissions are considered a negative externality, which is a market failure, the government meets its own criteria for intervention.

The impact of this innovation on wider society is also potentially significant. By applying this innovation, a higher priority is given to mitigating future climate change through processes that support the adoption of low carbon technology and better design, as well as also restoring and preserving the natural environment, while embracing a more holistic approach to economic development. Such an approach would seek a decline in the environmental impact per unit of production, in particular greenhouse gas emissions, and use government intervention and regulation with market mechanisms and community engagement to encourage large polluters to invest in new low carbon

processes. As stated, these large polluters can be found in the agriculture, energy, and construction, manufacturing and transport sectors.

Using such an approach would also likely encourage innovation and with innovation comes disruption. As I noted on 9/2/2013:

We view our life in a temporal lens. Those employed today replaced workers in now redundant technology. New technology, particularly in energy, will replace coal and gas, and fossil fuels in time. Hopefully this will abate carbon dioxide and help stabilise the environment. It should also encourage the development of community activities and places, and might even usher in a calmer world.

I am still not convinced that all communities have realised their economic and social aspirations. Limiting carbon emissions and changing the economy might have impacts for the billions of people trying to lift themselves and their families out of poverty, or simply accumulate wealth through personal achievement. On 17 August 2013, I noted:

One of the key issues with climate change is allowing for ‘aspiration with conservation’. Environmentalists have not bridged the gap.

The consumption of earth’s natural resources has been a path to wealth and status. How the economic system in a low carbon place can accommodate this aspiration is yet to be seen, and may be in part, one of the reasons why progress to reduce emissions has been painfully slow.

The policy framework I have described would need more government leadership and community acceptance to implement and achieve scalability. My interview with the policy practitioner and other practitioners suggested that this would be a difficult task, given the influence and strength of powerful stakeholders. If more support emerged, this innovation would be quickly scalable across many countries that share similar legislative structures to Australia.

This innovation may also be controversial, especially when so many countries, like Australia, lag behind current global best practice. I was very surprised to learn that in 2015, in terms of climate protection policies, Australia ranked 59th in the world (Burck, Marten, and Bals, 2015). According to this index, the following countries have better climate protection policies than Australia: China, Belarus, India, Bulgaria, Russian Federation, Islamic Republic of Iran, Morocco and Cyprus. Only Kazakhstan and Saudi Arabia have lower rankings than Australia. On face-value, Australia could learn a lot from adopting a learning organisation approach to climate protection policy development.

This innovation is not another economic development plan. My proposal to shift the regional development agency to a learning organisation model is but one step towards creating deeper conversations and problem solving amongst decision-makers. Likewise, the suite of policies that could be adopted within a new regional economic development agency, whereby qualification and assistance is based on environment impact first, then economic benefit, would be a significant change. Despite this challenge, the practical knowledge

identified in this innovation portfolio suggests that regional development agencies are uniquely positioned to address this problem, more so than other organisations, provided they have government support.

My research has limitations. First, the sample size limits the generalisations that can be made from the data collected from practitioners in key positions in regional and metropolitan NSW and the USA. Second, the innovation has been based on the self-reflection-in-action of the researcher as a practitioner. This has been essential to identify a deliverable and scalable innovation from the wide spread of practitioner views obtained during the data collection and analysis process. Third, the innovation has not been economically modelled, and its introduction may have unforeseen effects on the economic systems. These limitations have been identified throughout my portfolio. Despite these limitations, this innovation adopts existing policies and identifies how they could be deployed as part of a comprehensive workplace approach to transition to a low carbon place.

In conclusion, the design of this PhD.I has encouraged me to be more creative and to address problems by using more self-reflection. During the course of my research, I have further developed my professional critical thinking skills, which has led to the creation of this innovation, and therefore the development of new knowledge for the regional development agency. This innovation is based on policies that have been demonstrably effective in practice, are supported by the literature in practice and reflected in the views of practitioners working in

the field, which suggests that this innovation can ‘work on the ground’. My innovation also aligns to the current policy objectives of my workplace, which means that the transition of the public service to the learning organisation framework to identify best practice based on the themes identified in this study, and the development of regional ecological modernisation programs could be implemented that incorporate the themes identified in this study. These changes could then achieve the transition to the low carbon place.

26. Book three references

- Adger, W. N., Dessai, S., Goulden, M., Hulme, M., Lorenzoni, I., Nelson, D.R., Naess, L.O., Wolf, J., & Wreford, A., (2009). Are there social limits to climate change? *Climate Change*, 93 (3-4), 335-354.
- Agyris, C. (1976). Single-loop and double-loop models in research on decision making. *Administrative Science Quarterly*, 21 (3), 363-375.
- Aldy, J. E., & Stavins, R. N. (2012). The promise and problems of pricing carbon: theory and experience. *The Journal of Environment & Development*, 21 (2), 152-180.
- Andrew, B., & Thynne, Ian. (2008). Market failure, government failure and externalities in climate change mitigation: The case for a carbon tax. *Public Administration and Development*, 28(5), 393-401.
- Australian Building Code Board. (n.d.). *What is the national construction code?* Retrieved from <http://www.abcb.gov.au/NCC/About>
- Australian Bureau of Statistics. (2012, December 11). *Australian farming and farmers*. Australian Social Trends Dec 2012. Retrieved from

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/EE42391CD269634CA257B4800143EAC?opendocument>

Australian Competition & Consumer Commission. (2015). *Product safety Australia*. Australian Competition & Consumer Commission. Retrieved from www.productsafety.gov.au/context/index.phtml/itemId/970499

Australian Conservation Foundation and Australian Council of Trade Unions. (2016, October 27). *Jobs in a clean energy future*. Australian Conservation Foundation. Retrieved from https://www.acf.org.au/we_don_t_have_to_choose_between_jobs_and_clean_energy

Australian Government Department of Environment. (n.d.). *The Renewable Energy Target*. Australian Government. Retrieved from www.environment.gov.au/climate-change/renewable-energy-target-scheme

Australian Government Department of Finance. (n.d.). *Statistics on Australian Government Procurement Contracts*. Australian Government. Retrieved from <http://www.finance.gov.au/procurement/statistics-on-commonwealth-purchasing-contracts>

Australian Government. (n.d.). *Environmental Legislation*. Retrieved January 18, 2016, from Australian Government Business. Retrieved from

www.business.gov.au/business-topics/business-planning/environmental-management/Pages/environmental-legislation.aspx

Australian Government, (n.d.a). *Montreal Protocol on Substances that Deplete the Ozone Layer*. Australian Government Department of the Environment and Energy. Retrieved from <http://www.environment.gov.au/protection/ozone/montreal-protocol>

Australian Industry Group. (2013). *Ai Group Survey: Business picks up the carbon tax bill*. Australian Industry Group (AI Group). Retrieved from http://cdn.aigroup.com.au/Reports/2013/Economics/Carbon_Tax_report_FINAL.pdf

Barca, F., McCann, P., & Rodriguez-Pose, A. (2012). The case for regional development intervention: place-based versus place-neutral approaches. *Journal of Regional Science*, 52(1), 134-152.

Beer, A., & Maude, A. (2002). *Local and Regional Economic Development Agencies in Australia; Report Prepared for the Local Government Association of South Australia*. Local Government Association of South Australia.

Bodeker, G. (2012, September 13). *A science/policy success story: The world avoided by the Montreal Protocol*. Australian Government: Department of the Environment and Energy: The Montreal Protocol - 25 years of

ozone protection. Retrieved from

<http://www.environment.gov.au/system/files/pages/f0506eeb-72df-42d5-967c-08aaddf97062/files/presentation-bodeker.pdf>

Bolton, G. (2006). Narrative Writing: reflective enquiry into professional practice. *Educational Action Research, 14*(2), 203-218.

Bowen, A., and Kuralbayeva, K., 2015, Looking for green jobs: the impact of green growth on employment, Policy Brief 2015, Global Green Growth Institute and Grantham Research Institute, March 2015, London School of Economics. Retrieved from http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2015/03/Looking-for-green-jobs_the-impact-of-green-growth-on-employment.pdf

Brammer, S., & Walker, H. (2011). *Sustainable Procurement in the public sector: an international comparative study*. University of Bath School of Management, Working Paper Series 2007.17. Retrieved from <http://www.bath.ac.uk/management/research/pdf/2007-16.pdf>

Bridgman, P., & Davis, G. (2004). *The Australian policy handbook*, 3rd ed., Crows Nest, Australia: Allen & Unwin.

Brown, L. M., Hanafi, A., & Petsonk, A. (2012). *The EU emission trading system results and lessons learned*. Environmental Defense Fund. Retrieved from

https://www.edf.org/sites/default/files/EU_ETS_Lessons_Learned_Report_EDF.pdf

Burck, J., Marten, F., & Bals, C. (2015). *The climate change index performance report: results 2016*. Germanwatch and Climate Action Network Europe, Germany. Retrieved from <https://germanwatch.org/en/download/13626.pdf>

Burtraw, D., McLaughlin, D., & Szambelan, S. (2012). *California's new gold: a primer on the use of allowance value created under the CO2 cap-and-trade program*, May 2012, RFF DP 12-23, Resources for the Future, Washington, USA. Retrieved from <http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-12-23.pdf>

California Air Services Board. (2014), *Assembly Bill 32 Overview*, Retrieved from <https://www.arb.ca.gov/cc/ab32/ab32.htm>

Cavana, R. Y., Delahaye, B. L., & Sekarin, U. (2001). *Applied business research: qualitative and quantitative methods*. Milton, Australia: John Wiley & Sons.

Climate Bonds Initiative. (2014). *Bonds and climate change: the state of the market in 2014*. Climate Bonds Initiative. Retrieved from

<https://www.climatebonds.net/files/post/files/cb-hsbc-15july2014-a3-final.pdf>

ClimateWorks. (2010). *Low carbon growth plan for Australia*, ClimateWorks Australia, Retrieved March from <http://climateworks.com.au/project/national-projects/low-carbon-growth-plan-australia>

Coady, D., Parry, I., Sears, L., & Shang, B. (2015). *IMF working paper: How large are global energy subsidies?* International Monetary Fund, WP/15/105. Retrieved from <https://www.imf.org/external/pubs/ft/wp/2015/wp15105.pdf>

Cone, J., Rowe, S., Borberg, J., & Goodwin, B. (2012). Community planning for climate change: Visible thinking tools facilitate shared understanding. *Journal of Community Engagement and Scholarship*, 5(2), 7-19.

Cornell University, INSEAD, & WIPO. (2015). *The global innovation index 2015: effective innovation policies for development*. Fontainebleau, Ithaca, and Geneva. Retrieved from <https://www.globalinnovationindex.org/userfiles/file/reportpdf/GII-2015-v5.pdf>

CSIRO. (2015). *New climate change projections for Australia*. Commonwealth Science and Industrial Research Organisation (CSIRO), Australia.

Retrieved from <https://www.csiro.au/en/News/News-releases/2015/New-climate-change-projections-for-Australia>

Dairying for Tomorrow. (n.d.). *Australian dairy carbon calculator – DGAS*.

Retrieved from <http://www.dairyingfortomorrow.com.au/tools-and-guidelines/dairy-greenhouse-gas-abatement-calculator/>

Delloitte. (2013). *Dynamics of the Australian superannuation system: The next 20 years 2013-2033*. Delloitte Actuaries & Consultants. Retrieved from <https://www2.deloitte.com/content/dam/Deloitte/au/Documents/financial-services/deloitte-au-fs-dynamics-australian-superannuation-system-0913.pdf>

Environmental Audit Committee. (2012). *Ch 3, The government's approach;*

Enabling the Transition to a Green Economy. Parliament UK. Retrieved from

<https://www.publications.parliament.uk/pa/cm201012/cmselect/cmenvaud/1025/102506.htm>

European Commission. (n.d.). *Renewable energy directive: Overview*. European Commission. Retrieved from

www.ec.europa.eu/energy/en/topics/renewable-energy/renewable-energy-directive

Finance, A. G. (n.d.). *Statistics on Australian government procurement contracts*.

Australian Department of Finance, Commonwealth Government of Australia, <https://www.finance.gov.au/procurement/statistics-on-commonwealth-purchasing-contracts/>

Flannery, T., Beale, R., & Hueston, G. (2012). *The critical decade: International action on climate change*. Commonwealth of Australia (Department of Climate Change and Energy Efficiency). The Climate Commission.

Retrieved from

<http://www.climatecouncil.org.au/uploads/4507ece9565ddd9b1d5bee32d462e0e2.pdf>

Grubb, M., Brewer, T. L., Sato, M., Heilmayr, R., & Fazekas, D. (2009). *Climate policy and industrial competitiveness: Ten insights from Europe on the EU emissions trading system*. Climate & Energy Paper Series 09, Climate and Energy Series, The German Marshall Fund of the United States, Washington: USA. Retrieved from <http://www.accc.gov.au/pdf/FINALCS-GMFpaper5Aug09.pdf>

Harvey, D. (2015). *Seventeen contradictions and the end of capitalism*. London: Profile Books.

Howes, M., McKenzie, M., Gleeson, B., Gray, R., Byrne, J. & Daniels, P. (2010) Adapting ecological modernisation to the Australian context. *Journal of*

International Carbon Action Partnership (ICAP). (2015). *Emissions trading worldwide: International carbon action partnership (ICAP) Status Report 2015*. ICAP. Retrieved from <https://icapcarbonaction.com/en/status-report-2015>

International Council on Mining and Metals (ICMM). (2013). *Options in recycling revenues generated through carbon pricing: How 16 Governments invest their carbon revenue*. International Council on Mining and Metals. Retrieved from https://www.eurometaux.eu/media/1505/icmm-_options-in-recycling-revenues-generated-through-carbon-pricing.pdf

International Monetary Fund. (n.d.). *World Economic Outlook 2014*. International Monetary Fund, Washington. Retrieved from <http://www.imf.org/external/pubs/ft/weo/2014/02/>

Jotzo, F., Pickering, J., & Wood, P. J. (2011). *Fulfilling Australia's international climate finance commitments: Which sources of financing are promising and how much could they raise?* CCEP Working Paper 1115, October 2011, Australian National University, Centre for Climate Economics & Policy, Crawford School of Economics and Government. Retrieved from http://www.climateinstitute.org.au/verve/_resources/anu_financingoptions

paper_october2011.pdf

KPMG International. (2013). *Future State 2030; The global megatrends shaping governments*. KPMG International Cooperative. Retrieved from <https://assets.kpmg.com/content/dam/kpmg/pdf/2014/02/future-state-2030-v3.pdf>

Local Government NSW. (n.d). *Sustainable choices*. Retrieved August 2, 2015, from Local Government NSW. Retrieved from <http://www.lgnsw.org.au/member-services/sustainable-choice>

Low Carbon Living CRC. (2015). *Annual Report Highlights 2014-15*. CRC for Low Carbon Living Ltd. Retrieved from <http://www.lowcarbonlivingcrc.com.au/resources/crc-publications/crclcl-annual-reports/annual-report-highlights-2014-15>

Lutsey, N., & Sperling, D. (2008). America's bottom up climate change mitigation policy. *Energy Policy*, 36(2), pp.673-685.

McNamara, J., Cockburn, T., & Campbell, C. (2013). *Good Practice Guide (Bachelor of Laws) - Reflective Practice*. Australian Learning and Teaching Council, Queensland University of Technology. Retrieved from <http://www.lawteachnetwork.org/resources/gpg-reflection.pdf>

- Meckling, J. (2014). The future of emissions trading. *Wiley Interdisciplinary Reviews.*, 5(5), 569-576.
- Molina, M., Zaelke, D., Sarma, K. M., Anderson, S. O., Ramanathan, V., & Kaniaru, D. (2009). Reducing abrupt climate change risk using the Montreal Protocol and other regulatory actions to complement cuts in CO2 emissions. *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*, 106(49), 20616-20621.
- Montoya, D. (2013). *NSW planning reforms: sustainable development*. NSW Parliamentary Research Service, Sydney. Retrieved from <https://www.parliament.nsw.gov.au/researchpapers/Documents/nsw-planning-reforms-sustainable-development/NSW%20planning%20reforms%20-%20sustainable%20development.pdf>
- Morris-Suzuki, T. (2000). The Japanese model of economic growth. In C. Mackerras, *Eastern Asia; An introductory history*, 3rd ed. pp. 299-314. Pearson Australia.
- NASA. (2016). How do we know? *National Aeronautical Space Administration*. Retrieved from <http://www.climate.nasa.gov/evidence>
- National Oceanic and Atmospheric Administration. (2015, May 7). *Greenhouse*

gas benchmark reached. Retrieved from Press Releases.

National Oceanic and Atmospheric Administration (NASA). (2017, January).

Global Climate Change; Vital Signs of the Planet; Carbon Dioxide.

NASA. Retrieved from <https://climate.nasa.gov.au/vital-signs/carbon-dioxide/>

NSW Department of Trade and Investment. (n.d.). *Regional Industries Investment*

Fund, NSW Government. Retrieved from:

http://rdahunter.org.au/_literature_1935/Regional_Industries_Investment_Fund_Brochure.

NSW Government. (2015). *Regional Development Act 2004 No. 58*. New South

Wales (NSW) Government Legislation. Retrieved from

<https://www.legislation.nsw.gov.au/#/view/act/2004/58>

Oliver, F., & Van der Veldt, D. (2004). *Consumers' Willingness to Pay for*

Climate Change: Final Report. March 2004, Consumers Council of

Canada. Retrieved from

http://www.consumerscouncil.com/site/consumers_council_of_canada/assets/pdf/Consumers_WTP_for_CC_March_24_final.pdf

Organisation for Economic Co-operation and Development. (n.d.). *Public*

procurement for sustainable and inclusive growth; Enabling reform

through evidence and peer reviews. OECD, Paris: France. Retrieved from www.oecd.org/gov/ethics/publicprocurementrev9.pdf

Pahl-Wostl, C. (2009). A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change*, (19), 354-365.

Parliament of Australia. (2010, 15 November). *Human contribution to climate change*. Parliament of Australia Parliamentary Library. Retrieved from http://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/Browse_by_Topic/ClimateChangeold/whyClimate/human/human

Patton, M. Q. (2011). *Developmental Evaluation; Applying complexity concepts to enhance innovation and use*. The Guildford Press.

Pearce, D. W., & Turner, R. K. (1990). *Economics of Natural Resources and the Environment*. Prentice Hall.

Perkins, D., Radalet, S., Snodgrass, D., Gillis, M., & Roemer, M. (2001). *Economics of Development* (5th ed.). Norton & Company.

Planning Institute of Australia. (n.d.). *Planning in a Changing Climate (08/15)*. Planning Institute of Australia Policy. Retrieved from

<https://www.planning.org.au/policy/climate-change-0510>

- Porter, M., & van der Linde, C. (1995). Toward a new conception of the environment-competitiveness relationship. *Journal of Economic Perspectives*, 9(4), 97-118
- Pye, S., Watkiss, P., Savage, M., & Blyth, W. (2010). *The economics of low carbon, climate resilient patterns of growth in developing countries: A review of the evidence*. Final Report Submission to DFID April 2010, Department of International Development and Stockholm Environment Institute. Retrieved from https://www.sei-international.org/mediamanager/documents/Publications/Climate/economics_low_carbon_growth_report.pdf
- Raciti, S. M., Fahey, T. J., Thomas, R. Q., Woodbury, P. B., Driscoll, C. T., Carranti, F. J., Foster, D.R., Gwyther, P.S., Hall, B.R., Hamburg, S.P., Jenkins, J.C., Neill, C., Peery, B.W., Quigley, E.E., Sherman, R., Vadeboncoeur, M.A., Weinstein, D.A., & Wilson, G. (2012). Local-scale carbon budgets and mitigation opportunities for the northeastern United States. *BioScience*, 62(1), 23-38.
- Reed, M. (2008). Stakeholder participation for environmental management: a literature review. *Biological Conservation*, 141(10), 2417-2431.

Reed, M. S., Graves, A., Dandy, N., Posthumus, H., Hubacek, K., Morris, J., Prell, C., Quinn, C.H., & Stringer, L.C. (2009). Who's in and why? A typology of stakeholder analysis methods for natural resource management. *Journal of Environmental Management*, 90(5), 1933-1949.

RGGI. (2013). *RGGI benefits*. Regional Greenhouse Gas Initiative (RGGI). Retrieved from http://www.rggi.org/rggi_benefits

Rosewarne, D., (2010). Meeting the Challenge of Climate Change: The Poverty of the Dominant Economic Narrative and Market Solutions as Subterfuge. *The Journal of Australian Political Economy*, (66), 17-50.

Sanders, E. B., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. *CoDesign*, 4(1), 5-18.

Sandor, R. L., Bettelheim, E. C., & Swingland, I. R. (2002). An over view of the free-market approach to climate change and conservation. *Mathematical, Physical, and Engineering Sciences*, 360(1797), 1607-1620.

Schon, D. (1987). *Educating the reflective practitioner*. (Jossey-Bass higher education series). San Fransisco: Jossey-Bass.

Stiglitz, J. (1998). Private uses of public interests: Incentives and institutions. *Journal of Economic Perspectives*, 12(2), 3-22.

Stilwell, F. (2006). *Political economy; the contest of economic ideas* (2nd ed.). South Melbourne, Vic: Oxford University Press.

Swinney, P., & Wilcox, Z. (2013). *Developing interest: The future of urban development funds in the UK*. The Centre for Cities. Retrieved from <http://www.centreforcities.org/publication/developing-interest-the-future-of-urban-development-funds-in-the-uk/>

The Treasury. (2017). *NSW Government guide to cost-benefit analysis*. Policy and guidelines paper. NSW Government. Retrieved from <https://www.treasury.nsw.gov.au/sites/default/files/2017-03/TPP17-03%20NSW%20Government%20Guide%20to%20Cost-Benefit%20Analysis%20-%20pdf.pdf>

Thompson, N., & Pascal, J. (2012). Developing critically reflective practice. *Reflective Practice*, 13(2), 311-325.

Tomaney, J. (2010). *Place-based approaches to regional development: global trends and Australian implications. A report for the Australian Business Foundation November 2010*. Australian Business Foundation. Retrieved from http://alstonvillewollongbar.com.au/members/Library/Documentation/2014/Place_based_competitiveness_australia.pdf

Tomkinson, E. (2012). *An Australian snapshot: Social impact bonds, November 2012. Perspectives from the Social Finance Forum 2012*, The Centre for Social Impact. Retrieved from http://www.csi.edu.au/media/uploads/Social_Impact_Bonds_-_An_Australian_Snapshot_-_November_2012.pdf

United Nations Environment Programme. (n.d.). *Montreal Protocol - achievements to date and challenges ahead*. United Nations Environment Programme (UNEP) Ozone Secretariat 2017. Retrieved from www.ozone.unep.org/node/5710/

United States Environmental Protection Agency (USEPA). (n.d.). *Overview of the clean air act: The clean air act: Celebrating the clean air act amendments of 1990*. United States Environmental Protection Agency (USEPA). Retrieved from <https://www.epa.gov/clean-air-act-overview>

Walker, H., & Brammer, S. (2009). Sustainable procurement in the United Kingdom public sector, *Supply Chain Management: An International Journal*, 14 (2), 128-137.

Whitehouse, S., Lacy, P., Veillard, X., Keeble, J., & Richardson, S. (2011). *Carbon capital; Financing the low carbon economy*. Accenture/Barclays. Retrieved from <https://www.home.barclays/content/dam/barclayspublic/docs/Citizenship/>

Reports-Publications/carbon-capital.pdf

Wilson, J. P. (2008). Reflecting on the future; a chronological consideration of reflective practice. *Reflective Practice*, 9(2), 177-184.

World Bank, (n.d.). *Global outlook: disappointments, divergences, and expectations*. Global Economic Prospects, January 2015: Having Fiscal Space and Using It. January 2015, 1-38. The World Bank. Retrieved from https://elibrary.worldbank.org/action/showCitFormats?doi=10.1596%2F978-1-4648-0444-1_ch1

Appendices

Appendix A – Ethics approval



Ethics Office
Research Development & Integrity
Research Division
Armidale NSW 2351
Australia
Phone 02 6773 3449
Fax 02 6773 3543
jo-ann.sozou@une.edu.au
www.une.edu.au/research-services

HUMAN RESEARCH ETHICS COMMITTEE

MEMORANDUM TO: A/Prof Philip Thomas, Prof Ted Alter & Mr Darren Keegan
School of Law

This is to advise you that the Human Research Ethics Committee has approved the following:

PROJECT TITLE: A new public policy to create a low carbon place.

APPROVAL No.: HE13-246

COMMENCEMENT DATE: 10 October, 2013

APPROVAL VALID 10 October, 2015

COMMENTS: Nil. Conditions met in full

The Human Research Ethics Committee may grant approval for up to a maximum of three years. For approval periods greater than 12 months, researchers are required to submit an application for renewal at each twelve-month period. All researchers are required to submit a Final Report at the completion of their project. The Progress/Final Report Form is available at the following web address:
<http://www.une.edu.au/research/research-services/rdi/ethics/hre/hrec-forms>

The NHMRC National Statement on Ethical Conduct in Research Involving Humans requires that researchers must report immediately to the Human Research Ethics Committee anything that might affect ethical acceptance of the protocol. This includes adverse reactions of participants, proposed changes in the protocol, and any other unforeseen events that might affect the continued ethical acceptability of the project.

In issuing this approval number, it is required that all data and consent forms are stored in a secure location for a minimum period of five years. These documents may be required for compliance audit processes during that time. If the location at which data and documentation are retained is changed within that five year period, the Research Ethics Officer should be advised of the new location.

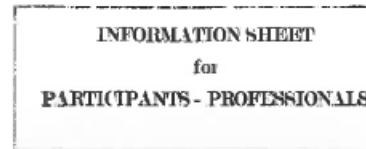


Jo-Ann Sozou
Secretary/Research Ethics

Appendix B – Example invitation to participants



University of New England
Professional Doctorate Candidate
Darren Keegan
Phone 02 6766 1360
Fax 02 6766 1381
dkeegan@myune.edu.au



I wish to invite you to participate in my research project, described below.

My name is Darren Keegan and I am conducting this research as part of my Professional Doctorate (ProfD) in the School of Professions at the University of New England. My supervisors are A/Prof Philip Thomas (UNE) and Prof Ted Alter (Penn State University).

Research Project	A new public policy to create a low carbon place
Aim of the research	<p>A gap in knowledge exists in understanding how current disparate climate change policy can jointly deliver GHG emission mitigation and climate change adaptation projects over the coming decades. In light of this the current research will addressing the following questions:</p> <ol style="list-style-type: none">1. How can community based GHG emissions mitigation and climate change adaptation be financed with an emphasis on positive benefits as opposed to punitive measures.2. How can place-based solutions be created and agreed by the community?3. How can community solutions be assessed, improved and selected by professionals/experts for deployment?
Interview	<p>I would like you to participate in an one-on-one interview for 60 minutes by face-to-face or telephone/skype interview. With your permission, I will make an audio recording of the interview to ensure that I accurately recall the information you provide. Following the interview, a transcript will be provided to you if you wish to see one.</p>
Confidentiality	<p>Any information or personal details gathered in the course of the study will remain confidential. No individual will be identified by name in any publication of the results. All names will be replaced by pseudonyms; this will ensure that you are not identifiable.</p>
Participation is Voluntary	<p>Please understand that your involvement in this study is voluntary and I respect your right to withdraw from the study at any time. You may discontinue the interview at any time without consequence and you do not need to provide any explanation if you decide not to participate or withdraw at any time.</p>



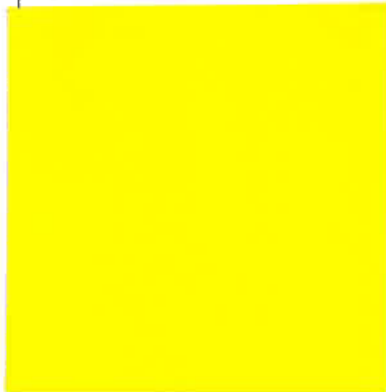
University of New England
Professional Doctorate Candidate
Darren Keegan
Phone 02 6766 1360
Fax 02 6766 1381
dkeegan@myune.edu.au

INFORMATION SHEET
for
PARTICIPANTS - PROFESSIONALS

Armidale, NSW 2351
Tel: (02) 6773 3449 Fax: (02) 6773 3543
Email: ethics@une.edu.au

Thank you for considering this request and I look forward to further contact with you.

regards,



Appendix C – Interview questions

Town Planning Interview

- Q1 Are low carbon living designs implementable from a planning viewpoint?
- Q2. Are there any policy documents to support planning approvals (in respect to low carbon designs)?
- Q3. We talk about macro and micro.
- Q4 The macro impact is a healthier plant
- Q6 Economics is the key to turning on the low carbon economy.

Q7 The Local Government Act is an instrument of the NSW Parliament. Local government assesses development applications and complete Local Planning strategies. Local Government is required to consult with the Community

Group session Bingara

Q1 What are your views about climate change?

Q2 Let's talk about how climate change as you witness is impacting your lifestyles?

Q3 What are the low carbon options for your town?

Q4: Is low carbon costly?

Q5 What do you think about community decision-making?

Q6. Would you be happy if under 30 years decided to take you off the electricity grid?

Q7. What are the barriers (quickly we have run over time

Community researcher-practitioner interview

Q1: How is climate change viewed in Texas?

Q2: So what do they fear from climate change?

Q3: whether climate change would be high or low on the list of priorities of an average USA family?

Q.4: views about discrediting environmentalists

Q.5: views in the USA about personal self-responsibility and government control

Q.6: I explained to P2 the finance option available under the EUA. What did P2 think about it in reference to applying it in his locale?

Q7: Do you think these sort of programs can make meaningful reductions in carbon emissions?

Q8: public lands - can people come together and working say on their street?

Group session Armidale

Imagine you are who you are now, in your current space/lifestyle/home/job/income/family. Now, imagine this same point in time is a few years from now. The climate has become considerably worse; noticeably worse. All of a sudden, this morning actually, you hear a major announcement by all levels of government – we need to take urgent and drastic action now. All levels of government are in agreement and it has bipartisan political support. What happens next?

Group session Tamworth

Imagine you are who you are now, in your current space/lifestyle/home/job/income/family. Now, imagine this same point in time is a few years from now. The climate has become considerably worse; noticeably worse. All of a sudden, this morning actually, you hear a major announcement by all levels of government – we need to take urgent and drastic action now. All levels of government are in agreement and it has bipartisan political support. What happens next?

Low carbon research and development

- Q1. What are the main barriers facing low carbon living?
- Q2. How these barriers could be overcome?
- Q3. What is the role of communities in designing low carbon living solutions?
- Q4. What power should be given to communities?
- Q5. What are the main benefits of low carbon living?
- Q6. What are the costs of low carbon lifestyles?

Australian community practitioner

Imagine you are who you are now, in your current space/lifestyle/home/job/income/family. Now, imagine this same point in time is a

few years from now. The climate has become considerably worse; noticeably worse. All of a sudden, this morning actually, you hear a major announcement by all levels of government – we need to take urgent and drastic action now. All levels of government are in agreement and it has bipartisan political support. What happens next?

Environmental upgrade agreement

- Q1. Observations about local climate change views
- Q2. Describe the EUA
- Q3. What are the advantages or disadvantages of the EUA?
- Q4. Identify any impacts from any projects underway
- Q5. Are environmental benefits were likely
- Q6. How is the relationship between the parties to an EUA. Has it been good or bad?
- Q7. Is there was any chance of widening the scope of the EUA to say residential properties?
- Q8. Can you briefly summarise the key elements of success for EUA's?

Public policy interview

- Q1. What makes good public policy? Any examples?
- Q2. What makes bad public policy? Any examples?
- Q3. Who are the typical stakeholders in public policy formation and how are they involved?
- Q4. Can you rank this stakeholder importance?
- Q5. When "selling" a public policy is a simple message or simple program information important?
- Q6. How important is the budget versus the outcome?