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Planning for Green Building Design and Technology in New Zealand

A Dissertation
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by
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Green building design and technology has been developed to lower the impacts of buildings on the environment while maintaining, and in some cases improving all the functions and values of a traditional building. Although the initial costs of green buildings are higher than those of traditional buildings, increased performance and efficiency means that green buildings are more cost effective in the long-term. However, because of these higher initial costs and other barriers such as knowledge barriers, behavioural barriers, and regulatory barriers, uptake is still low in many countries, including New Zealand. Local government and the profession of planning have revealed interests in managing green building uptake. Therefore, the objective of this research is to investigate whether planning provisions in New Zealand are an effective way of increasing green building design and technology uptake. To conduct this research, a mixed methods approach was used. This included performing a plan analysis, a Section 32 report analysis, a hearing report analysis for the Proposed Auckland Unitary Plan and the Christchurch Replacement District Plan. Interviews were also carried out with representatives from these councils and the New Zealand Green Building Council. The findings of this research was that mandatory provisions written into unitary/district plans can be effective in increasing green building uptake. However, Section 18 of the Building Act prevents them from doing so. Therefore, the most effective methods at this time are incentive based schemes such as reduced resource consenting time and costs for green building consents, and the use of height and density bonuses. In conclusion, in the current regulatory environment, planners cannot effectively implement mandatory green building provisions. However, they can effectively manage non-mandatory provisions for increasing green building uptake. If in the future planners were to be able to successfully execute mandatory provisions to increase green building uptake, then Section 18 of the Building Act would need to be amended. For implementing mandatory green building provisions in the future, it is recommended that an incremental, step-by-step approach is used so as to avoid unnecessary stress on homeowners and developers.

Keywords: Green Building, Sustainable Building, Environmental Planning, New Zealand, Christchurch, Auckland. Resource Management Act, Building Act,

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Introduction

Climate change is a rapidly growing issue facing the world. In addition, many of the resources that we use in our day-to-day lives come from non-renewable sources. This may also be the case for some resources that are considered renewable. For example freshwater is generally considered a renewable resource but as a result of climate change, and increasing populations, it is becoming increasingly scarce and will therefore have to be used more wisely.

Green building design and technology have been developed to reduce the environmental footprint of humans on the planet. As Athens (2010, p. 1) states, “on a global scale, green building has been identified as a key strategy for addressing climate change.” Green buildings are those which are designed to have lower impacts on the environment than traditional buildings (Paetz, 2008). Green building technology can range from simple technologies such as insulation and double glazing, to more sophisticated technologies such as solar power and green roofing (Van Uden, 2008). The arguments for green buildings are strong. If utilised right, solar energy can provide renewable electricity which will reduce demands on the grid (Batstone & Reeve, 2014; EECA, 2001; Wood, Miller, & Claridge, 2013) and if passive housing design is also utilised, solar energy can provide a primary source of heating (Persson & Grönkvist, 2015). Green roofing (roofs designed to support grass and other plant growth) can have many benefits such as improved thermal insulation, stormwater filtration, and increased biodiversity (Curry & Larsson, 2014). Green buildings have been estimated by different sources to reduce emissions by approximately 30 % (Balaban & Puppim de Oliveira, 2016; Shi, Yan, Zuo, & Yu, 2016) to as high as 90% (Yudelson, 2009) and carbon dioxide emissions by approximately 30-40% (Balaban & Puppim de Oliveira, 2016). Overall, the consensus for green building is that they can reduce energy use which can result in lower running costs (Athens, 2010; Yudelson, 2009; Bond, 2013).

Around the world, New Zealand is advertised as being ‘clean and green’ (Buhrs & Bartlett, 1993). However, when it comes to global targets, it appears that New Zealand is falling behind. For example, on an environmental performance index for air and water quality, land use, and resource management, New Zealand dropped from being 1st place in 2006, to 14th in 2012 (NIWA, 2013). Regarding buildings in New Zealand, in 2013 the emissions from commercial buildings had increased 1.1% from 1990 levels while residential buildings have seen a 26.3% decrease from 1990 levels (Ministry of Business, Innovation, & Employment, 2014). According to Issac et al. (2010) in Christchurch residential buildings, approximately 60% of energy use goes towards space heating and hot water heating with both sitting around 30% of total energy use each. Smaller amounts then go towards other appliances, refrigeration, cooking, and lighting (Issac et al., 2010). Fuels used in the residential sector include electricity, coal, diesel, geothermal, LPG, natural gas, solar, petrol, and wood (EECA, 2012).

According to Batstone & Reeve (2014), national residential electricity demand has remained somewhat constant since 2007. However, in the future, it is likely that electricity demand in other sectors will increase, (for example when electric cars become more common (Batstone & Reeve, 2014)). Therefore, it is important that in areas such as the residential sector where demand can reduce, that they do decrease to reduce pressure on the national electricity grid.

Despite the benefits of green buildings, according to Birchfield & Howell (2008) and Ministry for the Environment (2005) green building uptake in New Zealand is still low. Although it has been recognised that the public and local government have desires to increase green building uptake, numerous barriers have been identified including cultural barriers, behavioural barriers, regulatory barriers, and cost barriers.

The profession of planning has been identified as one place where green building uptake could be facilitated. The objective of this research is to investigate whether planning provisions in New Zealand are an effective way of increasing the uptake of green building design and technology. To achieve this objective, this research will answer the following questions:

- How have New Zealand planning provisions recently incorporated green building design and technology?
- How successful could these planning provisions be in increasing green building uptake?
- Would green building uptake be better addressed at a national level through the Building Act (BA) and its subsequent codes or at a local level through the Resource Management Act (RMA) by planners?
- How effective incentives could be if mandatory provisions are not able to be put in place, and what the most effective incentive may be?

To address these questions, this dissertation will begin by examining what defines a green building. A literature review will then investigate the barriers to green building uptake, green building uptake management options, and what New Zealand's current management context is. Following this, the research methods will be outlined, which focuses on investigating the residential green building provisions that have been written into the Proposed Christchurch Replacement District Plan and the Proposed Auckland Unitary Plan as well as interviews with council representatives. The results of the research will then be presented followed by discussion which will debate the findings and answer the research questions. Lastly, a conclusion and future work will close the dissertation.

Chapter 1

Background

1.1 What Defines a Green Building?

The concept of green buildings diverges depending on who is discussing it or where it is discussed. Paetz (2008) acknowledges that the term “green building” can be defined in both broad and more precise terms. He explains that although the underlying principles of the term “green building” are generally the same, when used in practice, the application can be very broad and flexible. For example, when applying the term “green building”, some may be concerned about the energy use aspect of a building while others may be more concerned about reducing material volumes used. Paetz (2008, p. 78) provides a definition by the David and Lucile Packard Foundation for defining green buildings as "any building that has significantly lower negative environmental impacts than traditional buildings".

Yudelson (2008, p. 13) states that “while there’s no such thing as a “typical” green building, there are specific design and construction measures which are used in many green buildings.” Yudelson (2008, p. 3) uses a broad definition of a green building stating that a “green building is one that considers and reduces its impact on the green environment and human health. A green building is designed to use less energy and water and consider the life cycle of the materials used. This is achieved through better site development practices, design, construction, operation, maintenance, removal and possible reuse of materials.” Yudelson (2008) also expresses that green buildings typically go beyond Building Code measures and include features such as efficient HVAC (heating, ventilation, and air-conditioning) systems, extra insulation, high quality window glazing, solar control measures, passive solar heating and cooling design, Energy Star Appliances, high efficiency lighting, and occupancy sensors.

Van Uden (2008) examines features of green buildings including, but not limited to, generous eaves, green roofs, double-glazing, solar hot water panels, locally sourced materials, renewable building materials (such as wood), permeable paving to minimise impermeable areas, water tanks, onsite wastewater treatment and dispersal, greywater collection, photovoltaic panels for electricity generation, use of natural (or low volatile organic compound) paints, and insulation.

Paetz (2008) notes how green buildings are now often defined more precisely through green building rating tools. Similarly, Yudelson (2008) discusses how in some countries, green buildings are defined through rating systems. According to Yudelson (2008), buildings in the United States and Canada are considered green if they are certified by Leadership in Energy and Environmental Design (LEED) (90% of buildings in these countries that are regarded as green buildings are certified by LEED). In the United States this is essentially what defines green buildings and as Yudelson (2008, p. 5) states in regards to

rating systems in the commercial and institutional arena, “if a building is not rated and certified by an independent third party with an open process for creating and maintaining a rating system, it can’t really be called a green building, since there’s no other standard definition.” Pitts (2004) affirms that rating tools allow planning authorities to set targets, goals and assessment methods so that development can take place in a more systematic way and that some government agencies are using it as a benchmark for new buildings.

1.1.1 Sustainable Buildings

It is also important to note the differences between the terms “green building” and “sustainable building” as they are often discussed interchangeably. However, as Pan & Ning (2015) discuss, sustainable buildings tend to be more of a holistic term. While it has a strong focus on environmental sustainability, it also embodies aspects of social and economic sustainability. On the other hand, green buildings tend to be a subset of sustainable buildings and just focus on environmental issues (Pan & Ning, 2015).

1.1.2 Passive Housing

Yudelson (2009) states that green buildings are low energy buildings with integrated renewable energy forms and passive design techniques. Yudelson (2009) discusses passive design techniques as being central to green buildings. According to Yudelson (2009), passive housing aims to save 90 percent of energy use in a home by recovering most of the heat in outgoing air to warm incoming air and treating a house like a thermos by sealing the air inside. This is consistent with the thinking of Persson & Grönkvist (2015, p. 296) that passive housing aims to produce a house that has a “highly insulated building envelope and reuses the heat in the exhaust air with a heat exchange.” A large part of this is done through insulation and window glazing. Yudelson (2009) notes that some of the most efficient housing in the cold climates of Germany and Austria go as far as using triple glazing.

1.1.3 LEED

The rating system encountered most frequently in literature is the LEED rating system. LEED is used in a number of different countries including the United Kingdom, the United States, Germany, Italy, and Spain (Yudelson, 2009). The tool originated in the United States and initially aimed to provide green building standards and guidelines, and independent third party verification for measuring the standard of a green building (Pitts 2004).

The tool is based upon a points system where there is an initial prerequisite to meet, and then each unit of improved energy efficiency above this earns another point (Pitts, 2004). The more points that are gained, the higher the certification level. Certification levels include, silver, gold, and platinum

(Athens, 2010). Some of the factors that are taken into consideration when awarding points include (Pitts, 2004):

- Site sustainability: site selection, transportation, stormwater management
- Water efficiency: wastewater management
- Energy and atmosphere: energy performance and renewable energy use
- Materials and resources: reuse and recycling of materials, waste management
- Indoor environmental quality: air quality, comfort, lighting
- Innovation and design process.

1.1.4 GreenStar

In New Zealand, GreenStar is the primary rating system that can be used to certify how environmentally friendly non-residential buildings are. GreenStar rates buildings from 1-6. For a building with a rating of 1-3, no certification will be given (Barbour, n.d.). A rating of four qualifies as best practice, five as New Zealand excellence, and six as world leadership (Barbour, n.d.). Ratings are based upon how the following are used: energy, water, materials, indoor environment quality (IEQ), public transport proximity, land use & ecology, management, emissions, and innovation (Barbour, n.d.).

1.1.5 Homestar

Homestar is a rating system that measures the environmental impact of residential buildings in New Zealand. The rating tool is advertised as being “an independent rating tool that certifies the health, efficiency and sustainability of New Zealand homes (Homestar, n.d.a)”. On Homestar’s scale of 1-10, a rating of 1 would mean the home has very little or no insulation, single glazed windows and would be highly susceptible to draughts and dampness (Homestar, n.d.b). A rating of ten would include extra insulation to what is required in the Building Code, sealed doors and windows, options for generating renewable energy onsite, and an onsite water tank (Homestar, n.d.b).

1.1.6 NABERSNZ

NABERSNZ is a commercial rating tool that has been established to measure and rate office buildings energy performance. The tool has three versions including the base building, tenancy, and the whole building (NABERSNZ, 2017). Ratings range from zero to six stars, with zero indicating very poor energy performance and six representing aspirational energy performance (NABERSNZ, Feb 2017).

In summary, green buildings are buildings that are designed to have lower impacts on the environment than traditional buildings. In many countries, they are defined through ratings tools which differ between countries. In New Zealand, the primary residential rating tool and focus of this research is the Homestar rating tool.

Chapter 2

Literature Review

To gain a greater understanding of previous research and the context in which this research sits, this literature review will examine what the barrier to green building uptake are, (both in a national and international sense), what management methods have been used to increase their uptake, and where New Zealand currently sits in terms of managing green building uptake. It will start by looking at the global context before narrowing in on New Zealand's position.

2.1 Barriers to Green Building Uptake

While there are many benefits to green buildings, there are also many barriers that have inhibited the uptake of green buildings. As discussed in further detail below, these include geographical barriers, cultural barriers, behavioural barriers, information and knowledge barriers, cost barriers, and regulatory barriers.

2.1.1 Geographical Barriers

Due to environmental differences, green building design and technology is not always as successful in some regions as in others. (Batstone & Reeve, 2014; Du, Zheng, Xie, & Mahalingam, 2014; EECA, 2001). For example, in countries such as Australia with high solar radiation levels (Batstone & Reeve, 2014; EECA, 2001), solar power is more cost effective than in countries such as New Zealand which have lower solar radiation levels. EECA (2001) found that solar electricity in New Zealand would almost be cost competitive with the grid although this is likely to depend on the location of its use. In some countries, these geographical barriers may lessen as prices of green technologies reduce. For example, according to Batstone & Reeve (2014), solar electricity is likely to become more cost effective as prices of solar power installations are predicted to decrease in the future. In summary green building design and technology cannot be simply translated from one place to another.

2.1.2 Cultural Barriers

According to O'Connell (2008, p. 80), in New Zealand, there is a "propensity for wealth and poor homes alike to accept cold houses and minimise expenditure on energy services". O'Connell (2008) explains that in some instances, but not all, this has also driven the rise of fuel poverty where lower income houses cannot afford to heat their homes adequately. As a result, a culture towards colder homes has developed and increasing housing warmth is not a top priority for people (O'Connell, 2008).

According to Maher (2008), the New Zealander's dream of owning a free-standing home has also resulted in sprawling towns and cities. This both reduces how green the houses are as there not only tends to be greater distances to amenities, but free standing houses also have a higher number of outside walls where heat can escape. Also noted by Maher (2008) another cultural barrier to green building uptake is New Zealand's buying and selling culture. According to Maher (2008), many New Zealanders also buy houses as renovation projects. They renovate and upgrade them and then on-sell them. As Maher (2008) explains, this results in high ownership turnover rates and means that people are less willing to invest in energy efficiency measures as they are not likely to live in the home long enough to make it worthwhile for themselves financially.

2.1.3 Behavioural Barriers

There are many theories centred on people's behaviour as to why uptake for greener technologies is low. According to Kollmuss & Agyeman (2002), even though people may have the knowledge and awareness of why they should live more sustainably, and therefore they want to live more sustainably, they will not necessarily change their behaviours to match these desires. For example, people may like the concept of biking to work every day instead of driving. However, there are also many factors such as safety, weather, distance, and time, which influence them when it comes down to physically changing their habits. A study done by Latif, Omar, Bidin, & Awang (2013) concluded that although there is a significant link between environmental knowledge and pro-environmental behaviour, it is people's environmental values that reinforce their pro-environmental behaviour. For example, although someone may have sound environmental knowledge, they may not have high environmental values, and this may reduce their pro-environmental behaviour. Similarly, Kollmuss & Agyeman (2002) conclude, it is also not only about how much a person values the environment but what they value more than the environment. For example, Curry & Larsson (2014) found that although many people like the idea of having green roofs on their homes, there were a number of barriers stopping them such as costs and risks, therefore showing that money and safety are of higher value to people than the environment.

According to Bond (2013), evidence suggests that adoption of environmentally friendly behaviours is greatest where it is convenient and where it does not require significant investments of time and/or money. Cost savings greater than \$1,000 per annum were considered the most important, followed by doing the right thing; achieving healthy indoor air quality; increased property value; decreased obsolescence, and "other" (Bond, 2011).

2.1.4 Information and Knowledge Barriers

According to Yudelson (2008), although many people are educated on the benefits of green buildings, there still seems to be a lack of understanding around their costs. In regards to green roofs, Curry & Larsson (2014) found that there is still a lack of breadth and depth of the knowledge of the benefits of green roofs in the general public. Curry & Larsson (2014, p. 10) stated that:

“Even the people who are in the favourable group have a sometimes limited knowledge, particularly of the environmental and economic benefits. This works as a barrier in two ways. First, people who have little knowledge of the benefits will naturally be more sceptical of incurring the cost of installing a green roof. Secondly, if the proponents only frame it as an aesthetic addition to a building, rather than a part of its technological and functional system, it will be very easy to continue to write it off as an unnecessary luxury. The lack of knowledge also accentuates the perception of risk. Many of our respondents have raised issues of leakages, maintenance troubles, and concerns for earthquake safety, that the international research does not list as problems at all.”

Easton (2008a) also acknowledged the lack of knowledge and capacity within councils and the construction industry. This means that councils have little ability in encouraging green buildings or dealing with an increased uptake. It also means that even if homeowners and developers wanted to use green building technologies, it would be harder for them to find someone capable of implementing their proposals.

Paetz (2008, p. 79) also asserts that "the international experience is that green building doesn't just happen. Education and incentives, as well as regulation, have been central to the growing proliferation of green building practice internationally". Birchfield & Howell (2008) suggest that the lack of resources is the most important obstacle for local authorities.

2.1.5 Cost Barriers

The initial costs of green building technology and design tends to be more than that of conventional buildings (Batstone & Reeve, 2014; New Zealand Green Building Council, 2014). This puts many people off investing in them. As observed by Batstone & Reeve (2014), if initial costs are smaller, such as with energy efficient lighting, then people tend to be more inclined to invest in these options instead of paying large upfront costs of installing a 2.5kW solar system costs approximately \$6,500. They estimate that this would have an approximate payback time of 10-12 years. As a result, Solar PV systems have not seen such a significant uptake as energy efficient lighting.

Compared to the price of the overall building, initial costs also do not need to be large. As Ministry for the Environment (2005) found for commercial buildings, the costs of building green ranges from 15%

less than conventional buildings to 11.5% more than conventional buildings with an average of 2-6% more than commercial buildings. In building a home, New Zealand Green Building Council (2014) estimated that to achieve a Homestar rating of 6, initial costs would only be an extra 2.2%. For a house that cost \$550,000, this would be approximately \$6,500 and would pay itself off in energy savings after seven years. This cost may be more or less depending on the design and technology used (New Zealand Green Building Council, 2014).

2.1.6 Regulatory Barriers

Policy and regulations can create significant change when used well, however, in some instances they can act as a barrier to change (Athens, 2010). In some cases, old policies and regulation may be restricting change. For example, according to O'Connell (2008) and Birchfield & Howell (2008), long consenting processing times and consent fees can act as a barrier to green buildings, especially if the consent is only required because of a green technology being used. As Howell (n.d., p. 1) explains, *"people don't want the added risk, time and cost associated with consent requirements and needing to prove that more sustainable solutions fit with the Council context and administrative requirements"*. According to Easton (2008), regional and district plans in New Zealand tend to focus on more traditional town planning rules such as yard setbacks and building coverage rules, and although they do identify some green building technologies, such as rainwater tanks, these tend to require resource consents.

In other instances, complete lack of policy and regulation in regards to green buildings can act as a barrier to uptake. As Howell (n.d. p. 1) explains *"Council policies, rules and especially processes have a clear influence over building choices. When rules are not written to provide for sustainable building choices, it can discourage people from making sustainable building choices."*

2.2 Measures for Increasing Green Building Uptake

To date, there have been a number of different approaches to increasing the uptake of green buildings in policy. These include provisions that make green building design and technologies mandatory, and incentives to encourage their uptake (Athens, 2010; Paetz, 2008).

2.2.1 Mandatory Measures

As suggested by the prescriptive nature of the term 'mandatory', mandatory provisions make it compulsory for people to implement the green building technology that is required by the relevant provision (Athens, 2010). There are a number of different ways that mandatory provisions in policy have been achieved. For example, under regulations of the European Union, every new building or building that is undergoing major renovations must have an energy performance certificate, and this

must be presented upon the sale or rental of buildings (Yudelson, 2009). France has recently enacted legislation that makes it mandatory for new buildings in commercial areas to have a certain amount of roof area covered by either green roofing or solar panels (Panetta, 2015). Another example is in the German city of Marburg which requires all new and major renovations to install solar hot water heating systems (Yudelson, 2009). On a more local scale, the city of Dallas (in the United States) has enacted a plan as part of an effort to reduce the city's carbon footprint of the city which requires certain types of buildings to either install cool roofs or green roofs (Dallas City Hall, 2013). Other provisions in this plan aim at reducing the water use of buildings (Dallas City Hall, 2013).

2.2.2 Non-Mandatory, Incentives-Based Measures

According to Athens (2010), 75-80% of people are influenced by incentives. Incentives can change people's behaviour as they remove barriers that discourage people from building green. For example, financial incentives can shorten payback times which can make the 'green investment' more appealing (Athens, 2010). Incentives can act as carrots for early innovation builders and tip decisions towards building green (Paetz, 2008). Financial incentives such as cash or rebates can be given in exchange for a particular outcome or course of action (Athens, 2010).

As Paetz (2008) and Paetz & Pinto-Delas (2007) note, incentives can be a good way of providing support for increasing the uptake of green building technology in planning provisions. According to Athens (2010) and Paetz (2008), there have been a number of different incentives used to date including height/density bonuses, time reductions, and financial incentives (which can include tax incentives, subsidies, fee waivers, loans, and feed-in tariffs).

According to Paetz & Pinto-Delas (2007), historically planning's role has been largely to do with providing incentives, (such as density/height bonuses) for those who use green buildings technology. Height density bonuses are an indirect way of incentivising as it allows developers to achieve greater floor levels or height in their developments, in exchange for building green. For example, for a council to get a multi-story office building to go green, the council may let the developer add on an extra floor of offices without requiring further consents. Therefore, the developer will be able to gain money from this additional office space while the council will also achieve its aim of going green. The advantage of this method is that it does not affect the council financially. However, some have criticised it as it is stretching the rules of good planning (Paetz & Pinto-Delas, 2007). According to Paetz (2008), this method has been successful in a number of places in the United States including Chicago City, Seattle, Miami, and Portland.

According to Athens (2010), time reduction incentives are typically provided by either prioritising green building developments in the consenting process above conventional buildings so that consenting

times of a development are reduced or via fast tracking consenting times for the use of green technologies. This works by reducing the timing barrier that can often deter people when planning to build green. It also works to incentivise people to build green rather than simply resorting to conventional building methods as a more simplified option (Athens, 2010).

A range of financial incentives can be used to reduce the cost barrier of green building design and technology, reducing the payback time. Firstly, tax reduction incentives can be used for developers that build green (Athens, 2010). For example, in Italy, tax discounts have been applied as well as rebates on property taxes and increases in floor area ratios for low-emission buildings (Yudelson, 2009). Secondly, subsidies can be used to either fully or partially cover the cost of installing green building technology. For example, in Victoria Australia, applications for solar hot water and photovoltaic systems can obtain a subsidy of over \$8,000 (Easton, 2008a).

As Athens (2010) suggests, financial incentives can be enforced a couple of ways. One possible method of dealing with this situation is for a bond to be paid by the developer which is only released when the project obtains an independent certification from a body such as the US Green Building Council (Athens, 2010). Another method is to have a written contract in which a developer must produce a green building to receive or keep the financial incentive (Athens, 2010).

2.2.3 Other Keys to Implementation- Mandatory Versus Incentives Consideration

Although mandatory requirements can appear to be the most effective way of achieving their goal, Athens (2010) suggests, they can also create a lot of strife and stress which can result in loss of support. For example, if a policy or plan is suddenly implemented one day that makes it mandatory for all houses to install solar panels and rainwater tanks, but provides no way of supporting people in doing this, then it is likely that many people would be displeased with the government because of these barriers. This is where things can become highly political, and people may call for a change in government which then makes governments reluctant to make such policies (Ascher, W., Steelman, T. and Healy, R., 2010). To avoid this, Moran, Rein, & Goodin (2006) suggest that an effective and supported policy must use a “*Steering*” approach rather than a “*Rowing*” approach via persuasion and encouragement rather than prescription. This provides incentives and support for the entities acting under the policy so that they feel like they want to change rather than having to do so because regulations forced this change (Moran, Rein, & Goodin, 2006).

Athens (2010) also discusses that although mandatory provisions can, in theory, be effective in achieving their goals, an approach that has success has been an incremental, step-by-step approach. Here Athens (2010) argues that the first step to successful implementation is knowing where the local market sits in relation to adoption and knowledge and that easy policy should start with easy steps

and advance to more stringent actions as market acceptance grows. Initially, any barriers to uptake such as knowledge barriers should be removed so that there are not consequences for not doing it and that there is support for early adopters. Following this step, incentives must be created to entice sceptics. Lastly, once a solid market foundation has been established, the final phase adopts mandatory requirements. These steps can then be repeated to achieve greater levels of green building technology integration. For example, the first phase may just focus on increasing double glazing adoption, while the second phase focuses on improving solar hot water systems and so on. As Athens (2010) notes, it is important to do this in the given sequence and give an appropriate amount of time between steps to allow for sector changes, such as allowing for the building industry to develop green expertise.

Athens (2010) also notes that a key to successful implantation of these changes lies in marketing and campaigning for technologies and educating people and organizations through collaborative planning methods. This will allow people to understand the barriers and benefits to the technology.

This approach of using a mixture of incentives and mandatory measures has also been supported by Paetz & Pinto-Delas (2007) and Paetz (2008) who note that although incentives can be very successful, in some scenarios a mixture of mandatory standards and incentives may be the most appropriate.

2.2.4 National Versus Local Level Management

Green building provisions have been implemented at different levels of government in different countries, with advantages and disadvantages being found at each level (Paetz, 2008; Yudelson, 2009)). The advantage of national level management is that with good integration and coordination, it can provide good guidance to lower levels of government (Moran, Rein, & Goodin, 2006). It can also reduce regional inequalities through providing benchmarks for the whole country, therefore encouraging the entire country to act rather than just a local district. However, this can also result in interpretation and implementation issues as national level guidance tends to be quite broad and does not always allow for specific conditions that may occur at a local level (Moran, Rein, & Goodin, 2006).

As Shaw and Eichbaum (2005) argue, providing for good policy implementation is perhaps one of the most important parts of establishing an effective policy. In addition, Athens (2010) notes, many policy issues are geographically, bioregionally, or politically orientated. Here Athens (2010, p. 34) gives an example that "the desert southwest region of the United States is facing pressing water issues. This may justify and inform special LEED credits and a green building program that emphasises water conservation." This is an example of where having local provisions can have an advantage as they can be better moulded to the geographical area to which they apply. For example, having solar power

requirements in a place that has low levels of sun will not be as effective as compared to other less climate/weather dependent green technologies.

Providing provisions at a local level can also provide for greater levels of public participation and community input which can provide valuable insights and resources and is becoming increasingly recognised as important in planning and policy making (Ascher, W., Steelman, T. and Healy, R., 2010; Athens, 2010). In addition to this, Athens (2010) argues that top-down support if good for policy mobilisation and stakeholder support is also important as without it, often elected officials are reluctant to endorse such policies. As Athens (2010) argues, one of the main incentives for local authorities in providing for green buildings in their policy provisions is driven by being regarded as a competitive, sustainable city acting to address climate change. Athens (2010) also noted that cities might also like to encourage green buildings to improve the identity and vitality of the local territory. Athens (2010) and Birchfield & Howell (2010) also argue that it is more appropriate for city governments to manage green buildings as they have considerable power over the urban environment; being responsible for issuing building permits and consents, provide critical infrastructure and services, and being a considerable owner of property themselves.

Birchfield & Howell (2008) undertook research to identify how local government in New Zealand could act to overcome barriers and encourage the uptake of sustainable homes. In doing this, they examined all of the functions and responsibilities of councils under the Local Government Act 2002 (LGA), the Resource Management Act 1991 (RMA), and the Building Act 2004 (BA). The research found that while there is strong interest from councils in regards to sustainable buildings, there is limited resources, knowledge and the approach to initiatives was slow and fragmented. Due to the conflict between the RMA and the BA, there was also uncertainty in regards to how to go about making changes. As a result of the research, a resource manual was developed to guide councils in improving green building uptake. Potential changes that could be made under the RMA included removing potential barriers such as “consenting barriers for rainwater tanks, solar water heating and small scale energy generation, and in limited circumstances to require installation of specific features (Birchfield & Howell, 2010, p. 47)”. They also found that the councils had good controls in regards to the sustainability of subdivisions in regards to solar orientation, on-site water management and site density. However, the council's abilities to increase green building uptake are largely constrained by Section 18 of the BA which effectively prohibits high building performance standards to be imposed (see section “The Building Act 2004” for details).

Putting aside the current legislative environment of New Zealand, the profession of planning sits in a good position to facilitate green building regulation as in addition to making plans and regulatory mechanisms, New Zealand planners can help promotion in areas of process and attitude (Howell,

2008). Howell (2008, p. 139) explains that planners are in a good position of influence as they are “positioned at point-of-contact between prospective sustainable builders and council”. In addition “Planners work as good integrators, bringing together the various disciplines and stakeholders, and using their own professional skills to promote sustainable solutions” (Howell, 2008, p. 139). Howell argues that “Planners working in consent process can act to support and encourage applicants to make sustainable building choices (Howell, 2008, p. 139)”.

Paetz & Pinto-Delas (2007) also state that using local planning provisions as a way of increasing green building uptake has been very successful and in looking towards the future, it is a necessity for improving energy efficiency. Athens (2010, p. 80) has similar views stating that “one of the most important tools for the green building change agent is policy for the development of green building”.

2.3 Green Building Adoption in New Zealand

A number of national level policies and regulations in New Zealand have provisions that relate to green buildings. The main national level legislative pieces that govern green building design and technology in New Zealand are the Local Government Act (LGA), the RMA, and the BA (Birchfield & Howell, 2010). In addition to these, the New Zealand Energy Efficiency and Conservation Strategy also has provisions that can relate to green buildings. The requirements of these are outlined in further detail below:

2.3.1 Local Government Act 2002

The LGA sets out the responsibilities of councils. In relation to green building the LGA states the following (Local Government Act 2002, 2017):

“s. 3 Purpose. The purpose of this Act is to provide for democratic and effective local government that recognises the diversity of New Zealand communities; and, to that end, this Act—

d) provides for local authorities to play a broad role in meeting the current and future needs of their communities for good-quality local infrastructure, local public services, and performance of regulatory functions

s. 10 Purpose of local government. The purpose of local government is—

a) to enable democratic local decision-making and action by, and on behalf of, communities; and

b) to meet the current and future needs of communities for good-quality local infrastructure, local public services, and performance of regulatory functions in a way that is most cost-effective for households and businesses..

s. 14 Principles relating to local authorities.

- 1) *In performing its role, a local authority must act in accordance with the following principles:*
- h) in taking a sustainable development approach, a local authority should take into account —*
 - i) the social, economic, and cultural interests of people and communities; and*
 - ii) the need to maintain and enhance the quality of the environment; and*
 - iii) the reasonably foreseeable needs of future generations.”*

2.3.2 Resource Management Act 1991

The RMA is New Zealand’s primary piece of legislation that manages the effects of activities on the environment. The purpose of the RMA is (Frieder, 1997, p. 5; Resource Management Act (1991):

“s. 5 Purpose. to promote the sustainable management of New Zealand’s natural and physical resources”.

In operating under the RMA, there are a number of principles that relate to green building design and technology that must be taken into regard (Paetz, 2008). These include (Resource Management Act 1991, 1991):

“s. 7 Other matters

(b) The efficient use and development of natural and physical resources:

(ba) the efficiency of the end use of energy”

(i) the effects of climate change:

(j) the benefits to be derived from the use and development of renewable energy”

While these principles are included in the RMA, they are only matters which people must have particular regard for which means that although they must be considered, they do not strictly have to be met (Boffa Miskell, n.d.).

The RMA manages the effects of activities on the environment by using a hierarchical structure which devolves responsibilities down to local government level. Under the RMA the environment includes (Resource Management Act 1991, 1991):

s. 2. Interpretation

environment includes—

(a) ecosystems and their constituent parts, including people and communities; and

- (b) all natural and physical resources; and*
- (c) amenity values; and*
- (d) the social, economic, aesthetic, and cultural conditions which affect the matters stated in paragraphs (a) to (c) or which are affected by those matters”*

Therefore, aligning with the values of both green and sustainable buildings.

2.3.3 The Building Act 2004

The BA sets out regulations for buildings in New Zealand. The purpose of the BA is (Birchfield & Howell, 2010, p. 22, Building Act 2004, 2004):

“s. 3 Purposes to provide for the regulation of building work, the establishment of a licensing regime for building practitioners, and the setting of performance standards for buildings, to ensure that –

- c) buildings are designed, constructed, and able to be used in ways that promote sustainable development”*

The Building Code sits under the BA and sets out New Zealand Building Standards. Territorial authorities are responsible for administering the BA and its subsequent codes (Birchfield & Howell, 2010). The most significant section of the BA that relates to the uptake of green buildings is Section 18 which prevents local government from enforcing stricter building standards. Section 18 states the following (Building Act 2004, 2004):

“s 18 Building work not required to achieve performance criteria additional to or more restrictive than building code

- 1) A person who carries out any building work is not required by this Act to—*
 - a. achieve performance criteria that are additional to, or more restrictive than, the performance criteria prescribed in the building code in relation to that building work; or*
 - b. take any action in respect of that building work if it complies with the building code.*
- 2) Subsection (1) is subject to any express provision to the contrary in any Act.”*

For residential buildings, the Building Code currently requires insulation to be installed in new houses, or in houses undergoing additions or alterations. The amount depends on what kind of house it is and its location (Bond, 2013). The Building Code also states that buildings must be constructed to ensure that their building performance index does not exceed 1.55 which means that although double glazing is not mandatory, it may be needed for a house to meet this requirement (Bond, 2013)

When a home is built to the Building Code standards, it will achieve a Homestar rating of 3-4 (New Zealand Green Building Council, 2014). However, older homes that were built before the current standards were implemented may only achieve a rating of 2-3 (Homestar, n.d.a). According to New Zealand Green Building Council (2014) if homes were to be significantly warmer, then they would have to be built to a Homestar rating of six or more.

2.3.4 New Zealand Energy Efficiency and Conservation Strategy

The aim of this strategy is “to make the most of our abundant energy potential, for the benefit of all New Zealanders (EECA, 2015)” According to Bond, (2013) one contribution of the strategy is the development of the Energy Wise Home/Warm-up scheme by Central Government. This scheme provided different funding methods to encourage people to increase insulation in their homes. By improving the energy efficiency of homes, the government expects to save millions of dollars on energy and health per year (Bond, 2013).

Despite this legislation, current uptake of green building design and technology for more complex systems such as solar power is still low. On the other hand, cheaper and more easily installed technologies such as energy efficient lighting and refrigeration are much more integrated (Batstone & Reeve, 2014). According to Batstone & Reeve (2014) as of 2014, there were only 2,500 residential solar panel installations in New Zealand. They also estimated that in 2010, only 15% of residential housing would use solar hot water. According to New Zealand Green Building Council (2014), this is because in New Zealand housing is market cost driven rather than value driven. Therefore, people are willing to buy minimum performance housing as it costs them less initially.

In regards to regulations and policy, the overall consensus in literature is that it is lacking (Paetz & Pinto-Delas, 2007; Paetz, 2008; Birchfield & Howell, 2008). Howell (2008a) argues that there is a need for better national regulations so as to create greater guidance for local authorities. In addition, Bernhardt (2008) suggests that there is a need for territorial authorities to better provide for sustainable buildings in their plans with particular regards to site orientation, solar access, passive solar design, renewable energy generation, water collection and treatment, and waste disposal. Easton (2008a) also suggests that territorial councils should remove time and cost barriers of consents that come with installing green building technologies, as they considered this a major obstacle to green building uptake.

Along with these policy barriers, there is also a lack of incentives to increase the uptake of green building technologies. Easton (2008a) suggested that there should be better ties to incentives such as development contributions, direct subsidies, and rates remissions and that these need to be widely promoted. As Howell (2008, p. 139) states “revisions to council policies, including district plans, and

development contribution policies, in particular, are also important signals of support for sustainable building choices.”

According to Easton (2008a), there is a EECA subsidy of \$500 for solar hot water heating but nothing for photovoltaic energy generation. This is little when compared to Victoria Australia, where the subsidy is \$8,000+ as mentioned above. Under the Warm Up NZ - Heat Smart Programme, subsidies have also been given for insulation (Bond, 2013).

2.3.5 Local Level Planning Provisions

Auckland and Christchurch are New Zealand’s two biggest cities, and are both currently replacing their unitary and district plans respectively. This will give both cities the opportunity to help encourage the uptake of green building design and technology. In 2010 and 2011, Christchurch was struck by a series of destructive earthquakes. In developing earthquake recovery plans, a new rating tool called BASE to be used for new buildings in the Christchurch City Centre was developed. The tool was designed to provide buildings with higher standards than the current building code and to get developers thinking about green building design and technology (Clarke, 2012). However, as Clarke (2012) noted, it was designed to make incremental rather than drastic changes to the uptake of green building design and technology in the city. It is also unclear as to whether the BASE tool has been written into the new Christchurch City Council Replacement District Plan.

2.4 Research Objective and Questions

As identified in the literature review, previous research focuses on barriers to green building uptake and some green building management options for increasing uptake. Birchfield & Howell (2008) and Birchfield and Howell (2010) have examined a number of available ways that councils can facilitate green building uptake however little research has been conducted on how the particular profession of planning can increase green building uptake in New Zealand. Therefore, the objective of the research is to investigate whether planning provisions in New Zealand are an effective way of increasing the uptake of green building design and technology.

This objective has been further refined into the follow research questions:

- How have New Zealand planning provisions recently incorporated green building design and technology?
- How successful could these planning provisions be in increasing green building uptake?
- Would green building uptake be better addressed at a national level through the BA and its subsequent codes or at a local level through the RMA by planners?

- How effective could incentives be if mandatory provisions are not able to be put in place, and what would be the most effective incentive may be?

This research will examine whether planners are encouraging or inhibiting the growth of green buildings and how planning can help overcome barriers and increase the uptake of green buildings. It will compare the provisions with similar provisions overseas to see the potential success of the provisions.

Chapter 3

Methods

To conduct this research, a mixed methods case study approach was used. The approach took advantage of the fact that two major New Zealand cities, Christchurch and Auckland, are undergoing plan replacements with new green building provisions being suggested. The mixed methods included:

- Plan analysis
- Section 32 report analysis
- Hearing report analysis
- Interviews

The plan analysis, Section 32 report analysis, and hearing report analysis was undertaken between 25th June 2016 and 30th July 2016. These methods are explained in the following sections.

3.1 Plan Analysis

A content analysis was undertaken for both the Christchurch Replacement District Plan (CRDP) and the Auckland Unitary Plan (AUP). This was performed to identify the extent and form of green building provisions in the plans. Although it is important to increase the integration of commercial green building design and technology in New Zealand, to restrict the scope of this study, only residential provisions have been examined in this study. However, it is important to note that this still includes rental properties.

The plans were analysed against a collective definition of green buildings as found in literature and articulated in Chapter 1. Although one single green building feature does not make a building 'green' as such, as indicated by the different rankings in rating schemes, there can be varying levels of green buildings. To integrate green buildings into society, it is likely that just one or two features are likely to be used to start with before more features are added as a way of avoiding significant initial expense. Therefore, the plans were analysed for numerous individual green building features (as found from literature) as well as collective green building features. The use of rating schemes was looked for in particular because, in many countries, this has what has been used to define a green building. The building features that were examined in particular included:

- Insulation

- Photovoltaic power
- Solar hot water power
- On-site greywater and rainwater collection systems

Although many definitions of green buildings include the proximity of buildings to where people work and their ability to access public transport, this was not included in this research as it is considered too variable and subjective. Therefore, the definition that was used to analyse the plans was based upon provisions that could be controlled from within the property rather than things beyond the control of the property owner. However, it is acknowledged that the plans did have provisions in regards to the likes of the proximity of public transport to housing and housing density.

3.2 Section 32 Analysis

To gain a greater understanding of why or why not these provisions had been included, the Section 32 reports for each plan were also reviewed. Some provisions did not appear in the Section 32 reports, and consequently, the reasoning for the councils including these provisions could not be reported in the Results section below.

3.3 Hearing Report Analysis

Although the literature on the topic found numerous ways in which planning can be an effective way of increasing green building uptake, there was a lack of literature in regards to New Zealand. Since New Zealand's legislation and regulatory system is different to those found in literature, it cannot be assumed that what has worked overseas would automatically work in New Zealand. Therefore, the hearing reports for the plans were analysed to see whether the provisions would remain in the final version of the plans and to understand why the hearing panel deemed the provisions appropriate or inappropriate. It is important to note that at the time that the research took place, decisions had not been made by the hearing panel for all provisions and therefore only the provisions that had been heard are reported in the results below.

3.4 Interviews

Interviews were then conducted to gain a more in-depth understanding of the findings of the content analysis as well as to answer any questions that had not been answered through the content analysis.

A list of interviewees was developed consisting of people from councils and the NZGBC. These people were then contacted and the ones that responded (Tony Moore of the Christchurch City Council, and Anthony Traub of Auckland Council) were presented with a number of questions. Interview questions

were tailored to where the person worked and what knowledge gaps were present. Interviews took place in person or via phone. Additional questions were also answered via email. Interviews were conducted with individuals in their professional capacity on matters of technical/compliance issues, and process issues around green building provisions. Therefore, no ethics approval was required.

The following questions were presented in interviews:

Christchurch City Council interview questions

1. What are the greatest barriers to green building uptake?
2. What are some methods that have been used in the past in Christchurch to overcome these barriers?
3. The hearing panel recommended the removal of Homestar from planning provisions but still encouraged looking into incentive-based options. Is this something that you will continue pursuing and if so what kind of incentives would you be thinking about?
4. What are some of the advantages and disadvantages of using local planning provisions to increase the uptake of green buildings?
5. What would be some of the advantages and disadvantages of managing green building uptake at a national level?
6. Do you think that the Building Act and its subsequent codes would be more effective or less effective than local planning provisions at increasing the uptake of green building technologies? Why?
7. One of the arguments of the hearing panel was that the Homestar provisions do not align with Section 18 of the Building Act, how do subdivision developers get around this rule?
8. Do you think the Building Act is restricting the council's abilities to improve the uptake of green buildings? Why?
9. One of the reasons given by the hearing panel for removing the Homestar provisions in the AUP was that land-use planners should deal with the effects of buildings on the environment rather than how the building functions and the panel considered Homestar to be more concerned with effecting the functions of the building. What do you think about this argument?
10. The NZGBC saw a great increase in registrations for Homestar since it was added into the AUP, to your knowledge, have you seen a similar situation in Christchurch? If so, to what extent?
11. So far proposed planning provisions have only provided for new housing, have there been any thoughts around provisions for existing housing? If so, what?
12. What happened to the BASE tool?
13. Have you got any other comments on the topic?

Auckland Council interview questions

1. What are the greatest barriers to green building uptake?
2. What are some methods that have been used in the past in Auckland to overcome these barriers?
3. The hearing panel recommended the removal of Homestar from planning provisions but still encouraged looking into incentive-based options. Is this something that you will continue pursuing and if so what kind of incentives would you be thinking about?
4. The Queenstown District Council have proposed the use of density bonuses in their plan for new residential developments, what do you think are some of the advantages and disadvantages of using height and density bonuses?
5. What are some of the advantages and disadvantages of using local planning provisions to increase the uptake of green buildings?
6. What would be some of the advantages and disadvantages of managing green building uptake at a national level?
7. Do you think that the Building Act and its subsequent codes would be more effective or less effective than local planning provisions at increasing the uptake of green building technologies? Why?
8. One of the arguments of the hearing panel was that the Homestar provisions do not align with Section 18 of the Building Act, how do subdivision developers get around this rule to place greater restrictions on their subdivisions?
9. Do you think the Building Act is restricting the council's abilities to improve the uptake of green buildings? Why?
10. One of the reasons given by the hearing panel for removing the Homestar provisions in the AUP was that land-use planners should deal with the effects of buildings on the environment rather than how the building functions and the panel considered Homestar to be more concerned with effecting the functions of the building. What do you think about this argument?
11. So far proposed planning provisions have only provided for new housing, have there been any thoughts around provisions for existing housing? If so, what?
12. Have you got any other comments on the topic?

New Zealand Green Building Council Interview

The interview with the NZGBC was an introductory interview working out the context of green building uptake in New Zealand. They were presented with the same set of questions as Anthony from the Auckland Council, however they felt that representatives from the Auckland Council could answer the

questions better so therefore did not give responses. To add to the findings of the research the NZGBC were asked:

- Do you have any data on Homestar registrations and certifications for Auckland and Christchurch?

Overall the analysis of provisions in the plans, and their Section 32 and hearing reports was completed with the objective to investigate whether planning provisions in New Zealand are an effective way of increasing the uptake of green building design and technology

Chapter 4

Results

Research results have been presented in the following order:

- CRDP Plan, Section 32 report, and Hearing Report Analysis
- AUP Plan, Section 32 report, and Hearing Report Analysis
- Interviews.

Interview results have been grouped according to topic theme.

4.1 Proposed Christchurch Replacement District Plan

The CRDP included a number of different objectives, policies, and rules in relation to green buildings. These are outlined as below (Christchurch City Council, 2016).

4.1.1 Objectives

8.1.2 Objective – Design and Amenity

“1. An integrated pattern of development and urban form through subdivision and comprehensive development that:

- 4. improves energy efficiency and provides for renewable energy and use; and*
- 5. enables the recovery of the district (Christchurch City Council, 2016).”*

14.1.14 Objective – High quality residential environments

“1. High quality, sustainable, residential neighbourhoods which are well designed, have a high level of amenity, enhance local character and reflect the Ngai Tahu of Otautahi (Christchurch City Council, 2016).”

11.1.1 Objective: Provisions of Utilities

“1. Effective and efficient provision of utilities in a manner that is integrated with land use and development in the District (Christchurch City Council, 2016).”

“3. An increase in appropriate renewable electricity generation activities (Christchurch City Council, 2016).”

4.1.2 Policies

8.1.2.5 Policy – Sustainable design

“1. Enable resource efficiency, use of renewable energy, and community safety and development, by:

- 1. Ensuring that the blocks maximise solar gain, including through orientation and dimension;*

2. *Providing a development pattern that supports walking, cycling and public transport; and*
3. *Ensuring visibility and interaction between private and public spaces, and providing well-lit public spaces (Christchurch City Council, 2016)."*

"11. Encourage on-site rainwater collection for non-potable use (Christchurch City Council, 2016)."

14.1.4.8 Policy – Best practice for health, building, energy and water efficiency

"1 Promote new residential buildings that:

1. *Provide for occupants' health, changing physical needs, and life stages; and*
2. *Are energy and water efficient;*
3. *Through non-regulatory methods including incentives (Christchurch City Council, 2016)."*

11.1.1.1 Policy: Sustainable water supply

"1. To achieve sustainability and resilience of the districts water supply by encouraging water conservation and the re-use and recycling of water (Christchurch City Council, 2016)."

11.1.1.3 Policy: Renewable energy generation

"Provide for the establishment and operation of utilities that derive or generate through renewable sources by:

1. *Recognising the benefits to people and communities of renewable energy generation;*
2. *Acknowledging the implications and constraints associated with renewable generation activities, including locational, operational and technical matters;*
3. *Avoiding reverse sensitivity effects;*
4. *Promoting in particular small and community scale renewable electricity generation activities such as from solar and wind energy; and*
5. *Reducing the use of finite resources for the generation of electricity (Christchurch City Council, 2016)."*

4.1.3 Rules

Rules in relation to green buildings in the CRDP are split into the categories of energy and water efficiency, solar powered systems, and grey/rainwater systems. These are outlined below.

Energy and water efficiency.

Rules set aside for energy and water efficiency required that either new houses meet a Homestar rating of 6 or alternative equivalent councils'. An example of this is rule 14.12.11 which states (Christchurch City Council, 2016):

“All new residential units shall incorporate the following minimum energy and water efficiency standards or features. Residential unit building projects that have been registered with Homestar™ for a minimum 6 Homestar™ rating shall be deemed to have complied with this rule.

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Solar powered systems

Under Rule 11.3.3.1 (P2) the "installation and operation of a solar cell or array of cells for small or community scale renewable electricity generation where ancillary to the principal use of the site (Christchurch City Council, 2016)" is a permitted activity as long as the following standards are met:

1. *“The cell or cells shall be either incorporated into the roof or roof-mounted with at least one long side of the cell or cells within 20mm of the roof.*
2. *The cell or cells shall be mounted at an angle less than 55° from horizontal.*
3. *The utility is not a solar concentrator (Christchurch City Council, 2016).”*

Under Rule 11.3.5.1 (P5) solar hot water systems are also permitted activities however like greywater and rainwater collection systems, a building consent may be required for their installation (Christchurch City Council, 2016).

Grey/rain water collection systems

Under Rule 11.3.5.1 (P4) the use of greywater or rainwater collection systems are permitted activities. However, water tanks must comply with zone provisions for height and boundary setbacks. A building consent may also be required for their installation. A resource consent may also be required by the regional council for the use of greywater (Christchurch City Council, 2016).

4.1.4 Section 32 Report Analysis

The Section 32 Report of the CRDP was examined to uncover the reasons as to why the council had included the provisions for Homestar. In the Section 32 Report, the council argued that the reason that they had made the provisions for Homestar standards or equivalents is because the non-mandatory methods that they had used in the past, had not worked, and that the only thing that they saw as going to working in the future was making the standards mandatory (Christchurch City Council, 2014). The Section 32 Report also argued that if provisions for Homestar and equivalent standards were not put in plans, then the benefits would be lost and housing would not meet the needs of Christchurch's aging and disabled population. The report also outlined the potential costs of the provisions such as the need to expand industry capacity and the slightly higher initial costs of construction. However, it was argued that the risks of not acting would be greater and that slightly higher initial costs would be offset by operational savings (Christchurch City Council, 2014).

At the time of research, explanations for rules in relation to solar powered systems or grey/rain water collection systems were absent from the Councils Section 32 reports.

4.1.5 Hearing Report Analysis

In the Hearing Report, Homestar was discussed (as was with the Section 32 report) in conjunction with LifeStage (a tool to improve the accessibility of homes) provisions (Hansen, Hassan , Mitchell, & Dawson, 2015). In the hearing report, the health benefits of Homestar and its equivalent standards were the centre of the argument. The hearing panel outlined the case for Homestar and LifeStage from Dr Humphry being that the ageing population in Christchurch will need healthy, warm and energy efficiency houses. However, the hearing panel had the concern that the benefits of the additional standards would not outweigh the costs. The hearing panel was also concerned that these kind of provisions should not be a concern of district plans and should instead be dealt with under the BA and its equivalent codes as the matter of having healthy, energy efficient and safe homes was a national issue that was not just unique to Christchurch. The hearing panel have concluded their argument by

supporting the ideas of the council and recommending that rather than using mandatory methods for the matter, they should look to use non-mandatory methods such as incentives (Hansen et al., 2015).

4.2 Proposed Auckland Unitary Plan

The AUP had the following sustainable design objectives, policies and rules that related to green buildings (Auckland Council, 2014).

4.2.1 Objective

7.7. 1 . “Buildings are designed to minimise adverse environmental effects, maximise efficiency and provide healthy and comfortable indoor environments (Auckland Council, 2014).”

4.2.2 Policies

7.7.3. “Promote development to be designed to maximise sustainable design outcomes through measures such as:

- a. orientation of the building, its windows, habitable rooms and private outdoor space to derive maximum benefit from solar gain*
- b. thermal insulation that will reduce heating costs and improve indoor environmental quality*
- c. natural, non-mechanical techniques for cooling and venting along with heat transfer and heat recovery systems*
- d. renewable energy generation*
- e. the use of recycled, low embodied energy and volatile organic compound free materials*
- f. retro fitting and redevelopment of existing buildings to improve their energy and water efficiency buildings (Auckland Council, 2014).”*

4.2.3 Rules

The proposed AUP had the following residential green building provisions.

7.7.2.1 Dwellings

1.”In new developments containing five or more dwellings, each dwelling must be designed and constructed to achieve:

- a. a minimum 6-star level from the New Zealand Green Building Council Homestar Tool (2013),*
or
- b. certification under the Living Building Challenge (2013).*

2.This control does not apply to:

- a. extensions and alterations to existing dwellings*
- b. converting an existing building to a dwelling*

- c. *new developments containing four or fewer dwellings buildings* (Auckland Council, 2014).”

4.2.4 Section 32 Report Analysis

The argument that the Auckland Council made in their Section 32 report for these provisions was slightly different to that of the Christchurch City Council. In their Section 32 report, the Auckland Council argued that the provisions were in response to climate change as they would minimise the impact of buildings on the environment and that the council was expected to make this response by the public (Auckland Council, 2013).

The council also argued that the purpose of the rule was to “reduce the environmental impact of new buildings (Auckland Council, 2013, P. 10)” and “improve the efficiency, the health and the comfort of new buildings (Auckland Council, 2013, P. 10).” Therefore, they will align with Part 2 of the RMA. By improving energy efficiency, the rule will also reduce greenhouse gases, therefore aligning with section 7 of the RMA (Auckland Council, 2013).

The council argues that Homestar is appropriate for use as it provides a simple and consistent framework, while its credit-based system allows for the flexibility that is necessary to adapt to different contexts (Auckland Council, 2013).

Lastly, the council examines how the provisions will fit into the regulatory context. They reason that the provisions are necessary as with the exception of insulation standards, the BA addresses health and safety rather than the environmental performance of buildings. Therefore, since Homestar measures tend to address the environmental performance of building rather than the health and safety aspects of buildings and provide no conflict with the requirements of the BA, the provisions can be better linked with the RMA which addresses the effects of activities on the environment (Auckland Council, 2013).

4.2.5 Hearing Report Analysis

The AUP hearing report recommended that all the objectives, policies, and rules for sustainable design be deleted (Auckland Unitary Plan Independent Hearing Panel, 2016). The hearing report had a number of arguments for this. The first being that under the BA the council could not impose more restrictive standards than the Building Code. There was also concern over the practicalities of enforcing the requirements especially in regards to the rating tool being continually updated. The hearing panel also argued that under the RMA and BA, the plan could address the adverse effects of location and height of a building on the environment however it should not be controlling the way a building is constructed. As part of their argument, the hearing panel argues that the provisions would control the

functions of a building instead of the effects of the building on the surrounding environment and that this should not be the concern of land-use planning (Auckland Unitary Plan Independent Hearing Panel, 2016).

4.3 Interviews

This section will present the results from the interviews. These results will be presented in topic themes. Notes from interviews are presented in Appendix A.

4.3.1 Current Homestar Uptake

From the interview with the NZGBC (Personal Communication, July 20, 2016) the main finding was that there had been what they considered a great increase in registrations for Homestar in Auckland since the introductions of the Homestar provisions in the AUP. They did not think that such an increase was likely to be seen in other cities as other cities are not expanding at the same rate that Auckland is and its unique situation where the AUP rules applied immediately. T. Moore (Personal Communication, Aug 5, 2016) also gave further insight in the unique situation in Auckland explaining that in Auckland, central government wanted to set up Special Housing Areas (SHA) to enable development while the Auckland council were concerned about the quality of the housing that may be built under the fast-tracked conditions of SHA. Therefore, a deal was made between central government and the Auckland Council that the AUP rules would apply immediately to SHA. As a result, the Homestar provisions became effective immediately and developers had to register for Homestar 6. According to the NZGBC approximately 69% of dwellings registered for Homestar are in SHA. According NZGBC (Personal Communication, July 20, 2016) there were 371 dwellings registers for Homestar in Oct 2014 and this had increased to approximately 3000 by the beginning of 2016 as SHA areas became more developed. NZGBC (Personal Communication, July 20, 2016) also noted that although a great increase in registrations for Homestar was seen, actual certified dwellings remain low due to the lag time between registrations and completion of design.

4.3.2 Barriers

From the interviews, a number of obstacles to the uptake of green buildings were identified. In particular, that becoming green costs more and is hard to achieve which acts as a disincentive to people (T. Moore, Personal Communication, Aug 5, 2016). Product availability in New Zealand is also lower than in other countries which reinforces this first barrier (A. Traub, Personal Communication, Sep 8, 2018).

The view that the Building Code provides an adequate standard for building performance is also seen as a major barrier as it results in lack of motivation, guidance and mandate at a national level which

then filters down to local government resulting in lower levels of local guidance and mandate (T. Moore, Personal Communication, Aug 5, 2016). This lack of mandate was seen as a substantial barrier as without it, those building homes are more than happy to build to the minimum requirements of the Building Code (T. Moore, Personal Communication, Aug 5, 2016). For example, when coming up with the idea of the BASE rating tool in Christchurch, the Christchurch City Council consulted with industry leaders who said that they would have no problem building to higher standards as long as there was an even playing field and everyone had to build to the same criteria. However, as these higher standards never became mandatory (due to central government wanting to enable easier and faster development and the rating was seen as conflicting with this) developers have kept building to the standards of the Building Code (T. Moore, Personal Communication, Aug 5, 2016).

Lack of requirements to publicly disclose a building's performance information (such as electricity costs per year or energy performance) reduces the ability of buyers to make fully informed choices when buying a dwelling or renting (T. Moore, Personal Communication, Aug 5, 2016). This also results in buyers putting more emphasis on appearances when searching for a home and does not motivate developers to build to higher standards as dwellings will sell for these standards anyway (T. Moore, Personal Communication, Aug 5, 2016).

Lack of public knowledge of green buildings was also identified as a barrier. This then results on dwellings selling for these lower standards due to lack of awareness about the advantages of green buildings and/or about customers not knowing what to ask for and how to go about asking for what they want (A. Traub, Personal Communication, Sep 8, 2018).

Industry capacity was also seen as a barrier to increasing the uptake of green buildings (A. Traub, Personal Communication, Sep 8, 2018), however this was not considered a significant barrier as for example, the Christchurch City Council was happy to (and in part, already has) provide training where necessary (including to builders).

4.3.3 Overcoming These Barriers

The interviews identified numerous measures that have been used to overcome barriers in Auckland and Christchurch in the past. These have included a number of education, awareness, and incentive based schemes such as public show homes and advice services (e.g. Build Back Smarter, Eco-adviser) (T. Moore, Personal Communication, Aug 5, 2016; A. Traub, Personal Communication, Sep 8, 2018). According to T. Moore (Personal Communication, Aug 5, 2016) the Christchurch City Council have acted as leaders by making many of their own buildings green and have tried to encourage industry leaders to do the same through design competitions, and promoting champions. The Christchurch City Council

has worked to increase industry capacity by providing industry workshops and discussions, training the staff of some of the bigger construction companies to build to Homestar standards.

4.3.4 Use of Incentives

In the hearing reports for the CRDP, the hearing panel recommended using incentives to encourage the uptake of green buildings (Hansen et al. 2015). As a result, the interviewees were asked if incentives were something they would further pursue and if so what kind of incentives these would be. The results from this question included the use of incentives that have already been utilised in the past such as champions, and staff education for leading building groups (T. Moore, Personal Communication, Aug 5, 2016) while A. Traub, (Personal Communication, Sep 8, 2018) also noted that in some AUP zones there are already no density limits, however these zones are subject to meeting other standards. A. Traub, (Personal Communication, Sep 8, 2018) also pointed out that green buildings already have their own incentives such as lower operational costs, and that the implications of any incentives must be considered such as height bonuses conflicting with built form character outcomes.

Other incentives that have been looked into in Christchurch have included development contribution rebates (T. Moore, Personal Communication, Aug 5, 2016). However, the council have not gone ahead with this option as although it makes housing development cheaper for developers, the developers then put a premium on the home for being of higher quality and having a rating which therefore results in the house being no cheaper for the homebuyer and the extra money going to the developer. It is considered that the same would happen with the likes of height and density bonus based incentives (T. Moore, Personal Communication, Aug 5, 2016).

4.3.5 Advantages of National Level Standards/Building Code

The main advantages were identified that a level playing field would be created throughout the country, and that it would create consistency and simplicity for those managing green building uptake throughout the country (T. Moore, Personal Communication, Aug 5, 2016; A. Traub, Personal Communication, Sep 8, 2018). This would as a result also provide ease of compliance for companies that work nationwide. It was also noted that at the same time as creating national consistency, national level standards can still provide different performance standards based on various climate zones (T. Moore, Personal Communication, Aug 5, 2016).

Other advantages of national level standards and management were that it would provide for better coordination of supporting education initiatives, and a more efficient product supply chain. More specifically to the Building Code, as the Building Code already addresses building design detail, it is

the primary document that people use to identify standards (A. Traub, Personal Communication, Sep 8, 2018).

4.3.6 Disadvantages of National Level Standards/Building Code

The first disadvantage identified is that the Building Code only addresses the lowest level of performance (T. Moore, Personal Communication, Aug 5, 2016). The second disadvantage identified is that green buildings are not always just about building design, but they are also linked to aspects of planning such as allotment shape, house orientation, proximity to public transport, and stormwater management. The Building Code does not address all of these aspects as well as rating tools such as Homestar can, and would therefore lack the ability to deliver and maximise the potential of green buildings (A. Traub, Personal Communication, Sep 8, 2018).

4.3.7 Advantages of Planning Rules

The advantages of using planning rules for managing green building uptake were firstly that it would allow councils to deliver design solutions and standards above the minimum of the Building Code that are suited to the needs and expectations of the people in their districts (A. Traub, Personal Communication, Sep 8, 2018). For example, through consultation, the Christchurch public said that they want a green, vibrant, distinctive city (T. Moore, Personal Communication, Aug 5, 2016).

Secondly, planners work under the RMA which concerns the efficient use of resources and reducing adverse effects on the environment. The functionality of a building is intrinsically linked to the effects of a building on the environment and one of the primary aims of green buildings is to increase the efficient use of resources and reduce the adverse effects of buildings on the environment through better building design and functionality (A. Traub, Personal Communication, Sep 8, 2018; T. Moore, Personal Communication, Aug 5, 2016).

Thirdly addressing and integrating, and maximising all aspects of rating tools such as Homestar is easier under planning rules than the Building Code due to planning taking into account not just buildings but also proximity to amenities and transport links (T. Moore, Personal Communication, Aug 5, 2016).

4.3.8 Disadvantages of Planning Rules

The disadvantages of managing green building uptake were that there may be a lack of national consistency and that planning rules may clash with rules under the BA which may add confusion for those working across different councils (A. Traub, Personal Communication, Sep 8, 2018).

Chapter 5

Discussion

This chapter will debate compare and contrast the findings of this research with previous research. It is framed around the following research questions:

- How have New Zealand planning provisions recently incorporated green building design and technology?
- How successful could these planning provisions be in increasing green building uptake?
- Would green building uptake be better addressed at a national level through the BA and its subsequent codes or at a local level through the RMA by planners?
- How effective incentives could be if mandatory provisions are not able to be put in place, and what the most effective incentive may be?

5.1 How Have New Zealand Planning Provisions Recently Incorporated Green Building Design and Technology?

Both the CRDP and AUP have green building provisions incorporated into them (Auckland Council, 2016; Christchurch City Council, 2016). Within the proposed CRDP and the proposed AUP a number of green building policies and rules can be observed. As seen in the results, broad objectives and policies can be observed in relation to design and amenity values, provision of utilities, high quality residential environments, sustainable design, stormwater disposal, best practice, building, energy and water efficiency, sustainable water supply, and renewable energy generation. It can be seen from these policies that the councils are trying to encourage the uptake of green buildings and promote sustainable development. This can especially be seen in the CRDP policies 8.1.2.5 (sustainable design) and 14.1.4.8 (best practice for health, building, energy and water efficiency) and the AUP policy 7.7.3 (sustainable design) (Auckland Council, 2016; Christchurch City Council, 2016). As Birchfield & Howell (2008) found, many councils showed great interest in green buildings and wanted to promote them, however they did not know how to do so and/or had limited knowledge and capacity of how to do so. These objectives and policies are then reinforced by further rules in the plan, again showing that the councils want to increase green building uptake. This is especially shown in CRDP rule 14.12.11 (energy and water efficiency) and AUP rule 7.7.2.1 (sustainable design- dwellings) which make it mandatory for new housing in the area to be built to higher standards (Auckland Council, 2016; Christchurch City Council, 2016).

In summary, the AUP and CRDP had objectives that aimed to increase green building uptake, and they have reinforced these objectives with mandatory provisions for new residential buildings to build to a Homestar rating of six or an equivalent standard. This supports Birchfield & Howell's (2008) findings that councils have interests in improving green building uptake.

5.2 How successful could these planning provisions be in increasing green building uptake?

As Athens (2010) discuss, mandatory provisions can be effective in some ways while not in others as, while they can be effective at achieving a goal as they give people no other option, they can create a lot of stress in doing so if the changes called for create a financial burden on people. Therefore, as Athens (2010) argues, if mandatory provisions are to be put in place, they must provide the necessary support for them to be implemented or they must take an incremental step-by-step approach.

The first step is to know where the market sits in relation to adoption and knowledge. As discussed with T. Moore (Personal Communication, Aug 5, 2016), in Christchurch the council have gained this knowledge through the likes of the share an idea campaign where the council found that the public wanted a green city.

The second step is to remove any barriers to uptake. As identified through interviews, both Auckland and Christchurch councils have tried to overcome the knowledge barrier through providing education with the hope that it will change peoples' behaviour. To do this they have offered community level education programmes and advice services such as Build Back Smarter, and Eco-adviser (T. Moore, Personal Communication, Aug 5, 2016; A. Traub, Personal Communication, Sep 8, 2018). The Christchurch City Council also supported green show homes and built some of their own buildings green to try to act as leaders. In addition, the Christchurch City Council provided education to the construction industry to try to increase the capacity of developers and builders building Homestar (T. Moore, Personal Communication, Aug 5, 2016).

As O'Connell (2008), Birchfield & Howell (2008), & Howell (n.d.) discuss, some polices and regulations in New Zealand can unintentionally act as barriers to green building uptake by requiring consents for certain activities. Therefore, while the CRDP plan does remove some barriers to building more green, it is only to a certain extent. For example, under proposed rules 11.3.3.1(P2), 11.3.5.1(P4), and 11.3.5.1 (P5) small or community scale solar cells, greywater or rainwater collection systems and solar hot water systems are permitted activities as long as they comply with the conditions in the rules (Christchurch City Council, 2016). However, the problem comes if a person wanted to install a system that did not comply with the conditions in these rules, as installing them would no longer be a

permitted activity so the person would then have to apply for a resource consent which can be a costly and timely process, therefore acting as a barrier.

The third step in Athens' (2010) incremental step-by-step approach is to provide incentives which will act to entice any sceptics. As mentioned above, incentives that Auckland and Christchurch councils have used have primarily been based on the education programmes and services. It was also hoped that providing people with these experiences and education would help inspire and incentivise people to build green (T. Moore, Personal Communication, Aug 5, 2016). According to A. Traub (Personal Communication, Sep 8, 2018) the Auckland Council tried to incentivise people to build green by removing some of the density limits in some zones of Auckland as long they met other higher building standards. This can act as an indirect financial incentive, however direct financial incentives have been lacking.

However, it still seems that uptake to green building design and technology is low (Batstone & Reeve, 2014). This is likely to be because, as literature reinforces, education does not always change peoples' behaviour (Kollmuss & Agyeman, 2002). As Kollmuss & Agyeman (2002) discuss, even when people know the reasoning behind things and want to change their behaviour to align with what they know, they will not necessarily change their physical behaviour as there are also many other things in their lives which influence their behaviour which then override what people have been educated on. Latif et al., (2013) goes on to extend this argument, arguing that although people may be educated on a certain matter such as green building, it is their values that will determine their behaviour. Therefore, when looking to reduce barriers and increase green building uptake it is best to look at what people value. In this instance and as literature has emphasised, one of the biggest barriers to green building uptake are the initial costs. Therefore, this would indicate that what people really value is money. This can be further supported by Bond's (2011) argument that peoples' behaviour will change where it is most convenient to them and where it does not require large amounts of time and money to be spent.

Only after these three steps have been completed does Athens (2010) then recommend adopting mandatory provisions. In this case, it appears that mandatory provisions may be one of the only effective ways of changing peoples' behaviour through planning provisions and without having to offer direct financial incentives which have yet to be thoroughly tested.

From the results of the interviews, the regulatory context in which the AUP was to be implemented was slightly different. While in Christchurch the proposed rules were not immediately operative, an agreement between Central Government and the Auckland Council which was intended to provide higher quality housing in shorter timeframes, meant that in special housing areas the rules making it mandatory to build to a Homestar 6 standard were effective immediately (NZGBC, Personal Communication, July 20, 2016; T. Moore, Personal Communication, Aug 5, 2016). As found by data

from the NZGBC (Personal Communication, July 20, 2016), Homestar registrations in SHA's increased substantially from 371 in 2014 to 3000 by the beginning of 2016 after the proposed Homestar rules in the AUP came into place. This therefore illustrates that mandatory provisions can be effective.

However, Birchfield & Howell (2008) conducted research into what councils could do to increase the uptake of green building. They found that within councils there is confusion and uncertainty about how or what they can do and what they can include in plans to increase green building uptake due to the relationship between the RMA and the BA, since Section 18 of the BA states that no one may enforce stricter regulations than those in the Building Code. Therefore, by including these mandatory provisions in the proposed plan, both Auckland and Christchurch councils have illustrated the findings of Birchfield & Howell (2008). Both councils however, were pointed in the right direction when their proposed rules were reviewed by the hearing panel. In both cases, the hearing panel ordered the removal of the mandatory Homestar provisions from the proposed plans. The arguments from the hearing panel covered slightly different reasoning because of the slightly different reasons that the separate councils made in their Section 32 reports (Auckland Unitary Plan Independent Hearing Panel, 2016; Hansen et al. 2015).

The Christchurch City Council argued in their Section 32 report that the mandatory provisions for Homestar were needed as non-mandatory methods used in the past had not worked (Christchurch City Council, 2014). They argued that without the provisions the opportunity to build green would be lost and housing would not meet the needs of Christchurch's ageing and disabled population. They acknowledged the higher initial costs of construction and the potential costs that come with expanding the industry capacity, however they argued that the risk of not acting would be greater than acting and that initial costs would be offset by operational savings (Christchurch City Council, 2014).

In the hearing report, it was argued by Dr Humphreys that the ageing population in Christchurch will need warm, healthy, energy efficient homes (Hansen et al., 2015). The hearing panel however, were not convinced that these benefits would outweigh the costs. The hearing panel were also concerned that these kinds of provisions should not be dealt with in district plans under the RMA but under the BA and its equivalent codes as it was a national matter and not just unique to Christchurch. Lastly the hearing panel recommended that the council focus on incentives rather than mandatory measures (Hansen et al., 2015).

In the AUP Section 32 report, the council argued that the provisions were a response to climate change and would reduce the impacts of buildings on the environment and meet the public's expectations of the council (Auckland Council, 2013). They also argued that the purpose of the rule was to "reduce the environmental impact of new buildings (Auckland Council, 2013, P. 10)" and "improve the efficiency, the health and the comfort of new buildings (Auckland Council, 2013, P. 10)." aligning with

Part 2 of the RMA. By improving energy efficiency, the rule will also reduce greenhouse gases, aligning with Section 7 of the RMA. The council argued that with the exception of insulation standards, the BA addresses health and safety rather than the environmental performance of buildings. Therefore, since one of the aims of Homestar is to address the environmental performance of a building, there should be no conflicts with the BA and that the provisions were better linked to the RMA which addresses the effects of activities on the environment (Auckland Council, 2013).

The response from the hearing panel to this argument was that all the sustainable design provisions be deleted from the plan (Auckland Unitary Plan Independent Hearing Panel, 2016). Their first reasoning was that under Section 18 of BA, the council could not impose more restrictive standards than the Building Code. There was also concern over the practicalities of enforcing the requirements, especially in regards to the rating tool being continually updated. The hearing panel also argued that under the RMA and the BA, the plan could address the adverse effects of location and height of a building on the environment, however the council should not be controlling the way a building is constructed. The hearing panel argued that the provisions would control the functions of a building instead of the effects of the building on the surrounding environment and that this should not be the concern of land-use planning (Auckland Unitary Plan Independent Hearing Panel, 2016).

From these arguments it is possible to see that the implementation of Athens' (2010) incremental step-by-step approach is not simple and that there is great complexity in implementing mandatory provisions to increase green building uptake due to New Zealand's existing regulatory framework. While it was illustrated in Auckland that mandatory provisions can be effective under special circumstances, due to Section 18 of the BA, without these special circumstances, implementing mandatory provisions to increase green building uptake through planning is not possible.

5.3 Future management of green building uptake

There are two core questions that have come through that need to be discussed further. Firstly, there is that question of whether green building uptake would be better addressed at a national level through the BA and its subsequent codes or at a local level through the RMA by planners. Secondly there is the question of how effective incentives could be if mandatory provisions are not able to be put in place, and what the most effective incentive may be.

5.3.1 Would green building uptake be better addressed at a national level through the BA and its subsequent codes or at a local level through the RMA by planners?

As Moran et al., (2006) argue, the advantage of national level management is that it is good with integration and coordination and can provide good guidance to lower levels of government. It can

provide national consistency and reduce regional inequalities by providing benchmarks for the whole country (Moran, Rein, & Goodin, 2006). In this case, it is assumed national level management of green buildings would occur via the BA and its subsequent codes. These advantages were acknowledged by T. Moore (Personal Communication, Aug 5, 2016) and A. Traub (Personal Communication, Sep 8, 2018) who identified that by managing green building uptake through the BA, a level playing field would be created throughout the country, creating consistency and simplicity for those managing green building uptake around the country. T. Moore (Personal Communication, Aug 5, 2016) and A. Traub (Personal Communication, Sep 8, 2018) also acknowledged that having national level management would also provide for better coordination of supporting education initiatives and a more efficient product supply chain and more specifically, the Building Code is currently the primary document for building design standards so it would appear to be the logical place for it to be managed.

However as Moran et al., (2006) discuss, national level management can often be quite broad and open to interpretation, therefore there can be interpretation and implementation issues. It can also mean that specific conditions that only occur at a local level in certain locations are not provided for (Moran et al., (2006). As Athens (2010) discuss, when it comes to green buildings policy issues are often geographically, bioregionally or politically orientated, therefore making provisions moulded at a local level beneficial. However, this can be somewhat addressed because, as identified by T. Moore (Personal Communication, Aug 5, 2016) the Building Code can provide different performance standards based on individual climatic zones. Although, one of the main problems that T. Moore (Personal Communication, Aug 5, 2016) identified with using the Building Code is that it only promotes the minimum performance standard for buildings and does not encourage people to aim any higher. It also reduces the ability of councils to increase/decrease standards in their district which conflicts with the devolved hierarchy structure of the RMA.

According to Ascher et al., (2010) local level provisions can also provide for more successful public participation and input which can provide valuable insights and resources and although top-down support and management is good for policy mobilisation, stakeholder support is important politically as without it, elected officials are often reluctant to endorse it (Athens, 2010). Local level provisions can also act as a way of making a city stand out and give it a sense of identity which is what the Christchurch City Council found people wanted through the Share an Idea campaign. As Athens (2010) and Birchfield & Howell (2010) found, territorial authorities are more appropriate for managing green building uptake as they are already responsible for so many stages of the building process, such as issuing building permits, resource consents, providing critical infrastructure, and they also own large amounts of urban property giving them large amounts of authority to make change.

Although the hearing panel has argued that planning in particular should not be the profession to manage green building uptake, as Howell (2008,) explains, planners in particular sit in a good place to make change as they are “positioned at point-of-contact between prospective sustainable builders and council” (Howell,2008, p. 139). In addition, “planners work as good integrators, bringing together the various disciplines and stakeholders, and using their own professional skills to promote sustainable solutions Howell” (2008, p. 139) and “Planners working in the consent process can act to support and encourage applicants to make sustainable building choices Howell” 2008, p. 139). The idea has also been supported by Paetz & Pinto-Delas (2007) who state that local planning provisions have been seen to be successful in the past. However, this view is mostly based on the use of planning incentives such as height/density bonuses rather than mandatory provisions. Athens (2010, p. 80) also supports the use of policy in promoting green building uptake stating "one of the most important tools for the green building change agent is policy for the development of green building."

As discussed with T. Moore (Personal Communication, Aug 5, 2016), green buildings are not always just about the building design, they are also linked to planning aspects such as allotment size and orientation, house orientation, proximity to public transport and stormwater management. These are all things that are currently managed under the RMA by planners and that could not be managed under the BA and its subsequent codes. Therefore, in this instance if green building uptake was to be managed under the RMA, there would be better coordination and integration of these aspects. In addition to this, the Building Code does not address all aspects of rating tools such as Homestar and would therefore lack the ability to deliver and maximise the potential of green building T. Moore (Personal Communication, Aug 5, 2016).

In addition to this, as mentioned above, the hearing panel for the AUP were concerned that the Homestar provisions would control the functions of a building instead of the effects of the building on the surrounding environment and that this should not be the concern of land-use planning. However, as T. Moore (Personal Communication, Aug 5, 2016) argues, the RMA is concerned with the efficient use of resources and reducing adverse effects on the environment. The functionality of a building is intrinsically linked to the effects of a building on the environment and one of the primary aims of green buildings is to increase the efficient use of resources and reduce the adverse effects of buildings on the environment through better design and functionality. Therefore, there will always be a link between managing the functionality of a building and managing the effects of a building on the environment and if green buildings were to be purely managed under the BA, which as argued by Auckland Council (2013) has more of a focus on health and safety, then the effects of the building on the environment would be set aside. On the other hand, under the RMA the environment includes (RMA 1991, 1991)—

- *“(a)ecosystems and their constituent parts, including people and communities; and*
- *(b)all natural and physical resources; and*
- *(c)amenity values; and*
- *(d)the social, economic, aesthetic, and cultural conditions which affect the matters stated in paragraphs (a) to (c) or which are affected by those matters”*

Therefore encompassing all aspects of concern when building a green building, so in that respect it would make more sense to manage green buildings under the RMA.

In summary, it would appear that the profession of planning sits in a good position for facilitating green building uptake. The RMA in which planners work under, aims to reduce the effects of activities on the environment therefore aligning with one of the primary principles of green buildings which is to reduce impacts on the environment. As A. Traub, (Personal Communication, Sep 8, 2018) argues, managing green buildings through planners would also allow rules to be adjusted to local contexts more easily. Managing green building uptake under the RMA would also align with the devolved nature of the RMA and would allow for better public engagement in policy making. On the other hand, the BA and its subsequent codes focus more on the health and safety side of buildings, therefore overlooking the effects of buildings on the environment. While management under the BA would allow for good national level guidance, this could also be achieved through the hierarchical structure of the RMA. Managing green building uptake through planners would also get around the lack of national level motivation as they have already illustrated desires for managing uptake.

If green building uptake was managed under the BA in the future, then the BA may need to be adjusted to align with the values of the RMA more and take the effects of buildings on the environment into greater consideration. However, if managed under the RMA, then the values would already align so no great changes would need to be made.

However, if mandatory measures are to be put in place in the future under either the RMA or the BA, then it is recommended Athens’ (2010) incremental step-by-step approach should be used. For example, for managing existing housing this would mean that higher insulation standards are first introduced, then solar hot water systems are made mandatory, then rainwater collection systems are mandatory and so on. For new houses this may mean first requiring all new buildings to be constructed to a Homestar rating of six or equivalent standard, and then increasing this requirement to a Homestar rating of seven as green technologies become more cost competitive and mainstream.

5.3.2 How effective incentives could be if mandatory provisions are not able to be put in place, and what the most effective incentive may be?

Unless Section 18 of the BA is removed, then making mandatory provisions to increase buildings under the RMA cannot be an option. Therefore, the effectiveness of non-mandatory policy provisions have to be examined. As discussed in Chapter two, one of the greatest barriers to increasing green building uptake are the initial costs. Therefore, it makes sense to try to remove these barriers. Although direct financial incentives can be effective as illustrated in Australia, if managed in New Zealand, it is unlikely that these would be managed by planners. The incentive that is in the most control of planners is height/density bonuses and the reduction of times/costs for consenting green building technologies. The advantage of this method is that it does not affect the council financially, however, some have criticised it as it is stretching the rules of good planning (Paetz & Pinto-Delas, 2007). However, this could be got around by putting limits on these bonuses (such as only being able to increase density or height to a certain amount) and making different bonuses for different land-use zones. According to Paetz (2008), this method has been successful in a number of places in the United States including Chicago City, Seattle, Miami, and Portland.

As Paetz (2008) states, incentives can be the tipping point for people, therefore, as it is not possible to put in place mandatory planning provisions in New Zealand, height/density bonus provisions and reduced consenting times/costs could be the best way for planners to encourage the uptake of green buildings. The use of these kind of incentives would also align with Moran et al.'s, (2006) argument that good policy should “steer” rather than “row”.

Chapter 6

Conclusion, Limitations, and Future Research

6.1 Conclusion

The Auckland Council and the Christchurch City Council have shown great interest in increasing green building uptake by including mandatory green building standards in their plans. This has been shown by using the rating tool Homestar to set standards for new buildings. The CRDP also illustrated rules, such as those in relation to the use of rainwater which allowed installations to go ahead if they remain within height and boundary setback rules, therefore removing what could have been a potential consenting barrier. When the rules of the AUP became immediately effective under special circumstances, the NZGBC recorded a great increase in the number of Homestar registrations in Auckland. This illustrated that mandatory green building standards can be potentially effective in New Zealand. However, without the special circumstances that were present in Auckland, Section 18 of the BA will prevent this from happening again. Therefore, to get around Section 18 of the BA, the most effective methods that planners could use include the use of height and density bonuses, and reduced consenting timeframes and costs for consents that specifically provide for green building design and technology. In other words, in the current regulatory environment, planners cannot effectively implement mandatory green building provisions, however they can effectively manage non-mandatory provisions for increasing green building uptake.

Therefore, the question arises as to whether green buildings should be managed under the BA in the future or by planners under the RMA. From assessing the advantages and disadvantages of either option, it would appear that the profession of planning sits in a good position for managing green building uptake. The RMA under which planners work, aims to reduce the effects of activities on the environment therefore aligning with one of the primary principles of green buildings which is to reduce impacts on the environment. Managing green building uptake under the RMA would also align with the devolved nature of the RMA and would allow for better public engagement in policy making. On the other hand, while the BA and its subsequent codes currently manage building standards, they focus more on the health and safety, therefore placing less emphasis on reducing the effects of buildings on the environment. While management under the BA would allow for good national level guidance, this could also be achieved through the hierarchical structure of the RMA. Managing green building uptake through planners would also get around the lack of central government motivation as they have already illustrated desires for managing uptake.

If in the future planners were to be able to successfully execute mandatory provisions to increase green building uptake, then Section 18 of the BA would need to be amended. For implementing mandatory green building provisions in the future, whether under the RMA or the BA, it is recommended that an incremental, step-by-step approach is used so as to avoid unnecessary stress on homeowners and developers.

6.2 Limitations

This research was limited by time and resources which impacted the ability of plans to be analysed until they had been completely reviewed and become operative. Time constraints also limited the ability to fully investigate the effectiveness of height/ density bonuses. They also limited the ability to investigate the effectiveness of covenants in increasing green building uptake.

6.3 Future Research

Future research may examine how effective the use of covenants could be to increase and enforce green building uptake. Further research may also examine the effectiveness of the proposed height/density bonus provisions in the Proposed Queenstown District Plan.

Appendix A

Notes from Interviews

Barriers:

- T. Moore (Personal Communication, Aug 5, 2016): perception that green costs and are hard to achieve (when in fact great advances can be made with very few costs). Lack of mandate and motivation because building code is perceived as being fine. Buyers based emphasis on looks not performances and there are not requirements to publicly disclose performance. No motivation for developers as standard buildings sell anyway. Most designed by sales people and customers do not know what to ask for.
- A. Traub (Personal Communication, Sep 8, 2018): product availability, low level of awareness, industry capacity, lack of national guidance or standards.

Measures to overcome barriers:

- T. Moore (Personal Communication, Aug 5, 2016): The council have tried a number of educational, awareness and incentive-based schemes in the pasts. They have tried to increase the capacity of industry to by training the staff of some of the bigger construction companies to build to Homestar standards. They have presented show homes that have been advertised and open to the public. Industry workshops and discussions. Pilot projects/leadership. Build Back Smarter programme.
- A. Traub (Personal Communication, Sep 8, 2018): education and awareness programmes. Eco-adviser provides information to consumers and practitioners

Height/density incentives:

- A. Traub (Personal Communication, Sep 8, 2018): . Green buildings incentive on their own. any added incentives need to consider the wider implications such as built form character outcomes. The success of density bonuses also depends on what the underlying zones provide for. For example, in some zones the AUP does not provide density limits (subject to meeting certain standards), therefore a density bonus would only be effective in suburban zones.
- T. Moore (Personal Communication, Aug 5, 2016) The council has looked into development contribution rebates as an incentive as in theory, if the developer does not have to pay a development contribution then the housing will cost less and the outcome will be higher quality homes and also more affordable homes. However, the council have not gone ahead with the incentive as if developers are given development contributions then although the house is cheaper to cost, the developer will out a premium on the home for having the Homestar brand. Therefore, the home itself it's still no cheaper to the homebuyer. Therefore,

the council discounted that idea as although it means that houses may get built to a Homestar standard the money just ends up with the developers. It is thought that the same would happen with the likes of height and density bonus based incentives.

Advantages of national level rules and building code:

- T. Moore (Personal Communication, Aug 5, 2016) level playing field, ease of compliance for companies that work throughout the country. National level can still mandate differing performance standards based on climate zones.
- A. Traub (Personal Communication, Sep 8, 2018): Creates consistency and simplicity, easier management of standards. Ease of compliance for companies that work throughout the country. Better coordination for supporting education initiative. Would drive a more efficient product supply chain and knowledge base if everyone was working to the same standard. Building code already addresses building design detail and is the primary document the people use to identify standards.

Disadvantages of national level and building code:

- T. Moore (Personal Communication, Aug 5, 2016) building code only address lowest level of performance. The Building Act would need to be rewritten to include wider concerns. Building code does not cover everything that Homestar standards cover.
- A. Traub (Personal Communication, Sep 8, 2018): removes ability for councils to increase or decrease standards to suit their district. A successful green building is not just about the buildings detail of design, but is also about elements which are linked to planning such as allotment shape and orientation, house orientation to sun, proximity to public transport, stormwater management etc. The building act does not comprehensively address all sustainable design principles available to deliver effective green building and it may lack flexibility to account for innovative technology etc.

Advantages of planning rules:

- A. Traub (Personal Communication, Sep 8, 2018): allows councils to deliver design solutions suited to the needs and expectations of people in their districts. The functionality of a building is intrinsically linked to the effects of a building on the environment. Therefore, through better building design and functionality, the environmental effects of a building can be reduced. Homestar addresses functionality and effects.
- T. Moore (Personal Communication, Aug 5, 2016) building code only addresses minimum standards but houses need to be built above this standard. This can be done through councils. Planners work under the RMA which concerns the efficient use of resources which is one of the primary aims of green buildings. Maximising all aspects of rating tools such as Homestar is

easier under planning rules than the Building Code due to planning taking amenities and transport links.

Disadvantages of planning rules:

- A. Traub (Personal Communication, Sep 8, 2018): clashes with building Act and adds confusion for those working across different councils.
- T. Moore (Personal Communication, Aug 5, 2016) New Zealanders do not like rules and this may discourage them to renovate etc

Additional comments from T. Moore (Personal Communication, Aug 5, 2016)

- Auckland council deal with the government- government keen to set up SHA in Auckland to enable to development. Auckland council concerned for quality of housing so they agreed for the rules of the AUP to apply to the SHA to apply immediately. Therefore, developers had to register for Homestar 6. Industry was happy with this. Then hearing panel dismissed all of these rules saying it illegal. Now industry is no longer building to Homestar standard.
- Christchurch consulted public on what they wanted. The public said they wanted a green vibrant, distinctive city. CCC wrote the central city recovery plan in collaboration with industry. Industry asked for mandated, Even playing field that will be economical however they did not want Homestar or GreenStar as it was seen as too complex. As a result, CCC came up the BASE tool for commercial buildings as a simpler version of the tools that was easily enforceable. However, in developing the new plan, the government asked for a plan that would enable development and make it easier and faster, therefore the commissioners saw the council's ideas as a barrier to development and the MBIE claimed that the provisions would not meet align with eh building ACT. Therefore, the provisions for base were dropped. As a result, the BASE tool became voluntary however since then it has been more or less dropped by industry.
- Energy certificates- public disclosure of performance- electricity cost per year, energy performance etc. selling or renting homes. Gives people the information to make an informed choice.
- Building code is the minimum but people need to change standards. People would not want to buy a car that is only just passing their WOF. Reductionist thinking. Biggest benefit to Homestar standards are on health. Could reduce costs to District Health Boards.
- Building code does not cover everything that Homestar standards cover.
- Subdivisions: council approves subdivisions; developer then imposes standards on covenants.

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