OPPORTUNITIES AND BARRIERS TO, AND BENEFITS AND IMPACTS FROM, PAPAKĀINGA OWNED ENERGY SYSTEMS: A CASE STUDY OF PARIHAKA.

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Figure 1: Map of Parihaka Pā location

Source: (Maphill, 2011)

Abstract

The development of an onsite renewable energy system is seen as key to developing the community of Parihaka and sustaining the expected population increase. This research has assessed the potential options for such a system and the potential opportunities, barriers, impacts and benefits that could come as a result. It was evident from the very first community consultation that one of the most important aspects of this system would be the ownership model, with hui and workshop attendees strongly favouring a community-owned system and this was further emphasised in survey responses. Interestingly, however, the interviews told a different story with a concern over a lack of social cohesion and an imbalance of work ethic leading to a preference for a joint ownership model.

For the most part, the data collection phase verified much of the literature review in that Parihaka community views reflected research to date. Examples include high levels of project support when community involvement and consultation throughout the planning phase is present, expected local employment gains and a preference for at least a joint community ownership stake in the project. However, while the survey and interview respondents felt that social barriers would pose the greatest issues the literature review noted that institutional barriers could very well pose much greater difficulties.

Visual impact on the landscape from wind turbines is a major source of opposition and residents and people living in the vicinity have the right to disapprove of the aesthetics of a wind turbine. Similar opposition to the use of other RE resources can greatly impede on successful implementation levels. However, the perceived negative impacts of these RE technologies must be assessed with consideration to the fossil fuel equivalents in order to get a clearer picture.

Further research opportunities exist for assessing the next stages of the planning phase, with specific regards to papakāinga land, including the preparation of a resource consent application and the legalities and considerations that must be addressed in order to increase the chances of success. Research into the specifics of the desired ownership model is also recommended, in addition to considering the ongoing community commitments needed to maintain the system.

Acknowledgments

I would like to extend sincere thanks to several people who contributed to this thesis. To my supervisors, Dr Phil Murray and Dr Nick Roskruge, who gave up considerable amounts of their time to provide advice and steer me through the completion of this research. Without their commitment, guidance and unwavering interest in my research it would have been a much tougher journey.

I would like to express my sincere gratitude to all survey and interview participants who devoted significant time to partake in this research and to the Parihaka community for warmly welcoming me into the community from the very first visit right up to the end of the research.

I would also like to thank my fellow Taiepa Tiketike researchers for providing a collaborative and engaging environment, which made this journey challenging and thoroughly enjoyable.

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LIST OF ABBREVIATIONS

BANANA - Build absolutely nothing anywhere near anything

EECA - Energy Efficiency and Conservation Authority

EU - European Union

FIT – Feed-in-Tariff

GHG's – Greenhouse gases

GW – Gigawatt

IEA - International Energy Agency

IPCC - Intergovernmental Panel on Climate Change

MBIE - Ministry of Business, Innovation & Employment

MFAT - Ministry of Foreign Affairs and Trade

MGT - Microgeneration technologies

MWh - Megawatt hour

NIABY - Not-in-any-backyard

NIMBY - Not in My Back Yard

OECD - Organization for Economic Cooperation and Development

PPT – Parihaka Papakāinga Trust

PV – Photovoltaic

R&D - Research and development

RE – Renewable Energy

RMA - Resource Management Act

ROCs - Renewable Obligation Certificates

STDC – South Taranaki District Council

UK - United Kingdom

UN – United Nations

WDC – Whangarei District Council

GLOSSARY

Hapū - section of a large tribe, clan, secondary tribe

Hui – congregate, come together

Iwi – nation, people

Kaitiaki- guardian or steward

Kaitiakitanga – guardianship and stewardship

Mana – authority, control

Marae – enclosed space in front of a house, courtyard, village common

Maunga - mountain

Taonga – property, anything highly prized

Urupā – fence round a grave, burying place

Reo Māori – The Māori language

Wāhi tapu - sacred objects and areas

Wānanga – instruction, wise person

Whakapapa – genealogy, lineage, descent

Whānau - family group

Definitions sourced from (Moorfield, 2011; Williams, 1971)

1. Introduction

This research was conducted alongside of the Ministry of Business, Innovation & Employment (MBIE) Vision Mātauranga Capability funded project titled Taiepa Tiketike. Taiepa Tiketike is a partnership project between the Parihaka Papakāinga Trust (PPT) and the Massey University Centre for Energy Research (Ratima, 2015).

The community of Parihaka is one with significant historical relevance. Facing land confiscation by the Government in the 1870's, the Taranaki Māori adopted a passive but persistent resistance to this perceived injustice (Riseborough, 2002). The inspirational actions of the community in those difficult times has left a legacy to this day and Parihaka is currently undergoing a "renaissance" period whereby recent projections estimate an increase of 1,000 permanent residents in 300 new dwellings by 2025 (Anon, 2015). Such an increase will likely place great infrastructural demands on Parihaka and this project aims to assist the community in realising its vision of becoming self-sustaining (Anon, 2015).

The aims of the Taiepa Tiketike project are two-pronged. Vision Mātauranga allows the academic community to engage with a Māori community and vice-versa to answer a technical or scientific problem. Taiepa Tiketike aims to do just that and facilitate an increase in community knowledge around renewable energy (RE) systems and energy systems research. Equally important is the actual research around which this engagement is built. The aims are to research and produce the RE options available for Parihaka to respond to increased infrastructure pressure on their community. This thesis will come in at both Vision Mātauranga level through engagement and at project level through identifying opportunities, barriers, benefits and impacts.

This thesis builds up a body of knowledge in conjunction with current research by assessing these options specific to a papakāinga community thereby acknowledging and assessing the clear difference of views, beliefs and social structures of the Māori papakāinga community of Parihaka. This thesis provided a great opportunity to pursue an actual working project, not just purely theoretical research, with the focus on helping to address resourcing pressure and helping Parihaka facilitate an increased population and achieve the goal of sustainably developing the community. It is expected this research will encourage more thought on the expansion of RE technology within New Zealand communities, especially within the papakāinga context and ensure that community ownership of such technologies becomes a real consideration, with adequate policy support from local and central government.

1.1. Problem Statement

The context for this research topic is a prevailing interest in the importance of a global overhaul of energy sources to mitigate the threat of climate change by reducing greenhouse

gas emission levels. The dangers posed by climate change are very real and will require a major change in both energy sources and general social attitudes to energy use, in which publicised research will play a big role. Furthermore, research has shown that community ownership of wind and other RE systems increases public acceptance of the energy resource, provides local economic benefits, and can also provide an additional source of capital to further develop the industry (Barry, 2007). As community characteristics can vary greatly the suitability of a community-owned RE system needs to be assessed for communities on an individual basis. This is especially true for Parihaka due to the multiple-owned nature of the land and the large proportion of absentee land owners.

The research question which drives this thesis is:

- What are the opportunities for, barriers to, benefits and impacts from a papakāinga owned energy system?

1.2. Aims

The primary aim of the Taiepa Tiketike research is to determine if RE systems are capable of helping the community deal with infrastructural pressure and accommodate the projected population increase to preserve the Parihaka vision of being a welcoming and inclusive community. Taiepa Tiketike will provide a detailed project report to its client, the PPT, and has a very interested audience in the Parihaka community.

While the primary aim of the Taiepa Tiketike research is noted above, the aims and objectives of this specific research were manifold and despite being identified in the initial research proposal they were not established until after the first meeting with the Parihaka community. In order to develop a clear list of aims and objectives a matrix was constructed and categories established in order to guide the research. Early community consultation, along with a literature review, identified the issues most important to the community and those experienced by some established community RE systems.

When evaluating case studies a number of considerations were taken into account, such as;

- What has led to system failure in previous community systems?
- What has led to greater success?

Table 1 (page 4) shows this matrix and was used to guide the research and to develop specific information. Early categorisation revealed the different issues that could be referred back to throughout the research process. This specific research aims to;

- Identify the benefits and impacts, and barriers and opportunities that may arise from a community-owned energy system.

- Provide information that will allow an assessment by the community of whether the benefits of community-owned RE systems can outweigh the barriers enough to justify a vigorous pursuit of these technologies in the Parihaka community.
- Outline the benefits of this system, identify the impacts, indicate the barriers and present subsequent opportunities in order to show a complete picture of what is required and should be considered to implement the system in Parihaka.

Table 1: Categorized list of Opportunities, Barriers, Benefits and Impacts to guide research

	Opportunities	Barriers	Benefits	Impacts
Economic	Increased independence. Pooled resources. Economies of scale. Ecotourism	Willingness vs ability to pay. Technical expertise. Development costs. Banks loans.	Employment.	
Technical	Micro RE grids. Back-up grid connection. Individual & community systems.	Technical infrastructure. Grid competition.	Decentralize and localize energy supply.	
Social	Development knowledge. Innovation Hub. Community empowerment. Education for all involved including surrounding neighbours	Social concessions. Securing wider support of non-community members or investors.	Greater autonomy. Social connections. Energy awareness & project experience.	Environmentally conscious community. Social interaction.
Environ-mental	Reduced fossil fuel use.	Aesthetic impact concerns.	Reduced GHG's. Improved local and domestic air quality.	Bird deaths. Reduced fishing yields. Habitat displacement. Improved air quality.
Cultural	Consultants for other iwi. The legacy of Tohu and Te Whiti. Knowledge transfer.	Traditional beliefs. Non-resident Parihaka land beneficiaries and those with whakapapa associations.	Long-term relationship with the land and climate. Papakāinga development expertise. Social cohesiveness key for restoring Māori language. Kaupapa of Parihaka.	Return to innovative roots. Inspiration for other Communities.
Institutio-nal	Policy support for whānau for consenting process. Simplify regulatory processes.	Dependence on centralised energy structure. Policy incentives & support for small investors.	Easier planning process. Social acceptance. Co-operation between Parihaka and STDC.	Challenge local and national policies and law. Pave the way for other Māori communities.

1.3. Objectives

The objectives of this study are to:

- Survey the community to assess its views on small-scale RE and the different ownership options available to the community.
- Provide access to knowledge in the form of regular updates on the project, RE workshops, and focus groups, ensuring a high level of community engagement is present throughout the research process.
- Determine the benefits and opportunities that community ownership (within the papakāinga concept) of this system could bring to Parihaka.
- Present some alternative ownership options should community ownership not be the preferred option.
- Discover potential barriers and impacts of such a system that may present in future or during development of the community ownership model.
- Provide a list of benefits, barriers, opportunities and impacts this RE system can bring to Parihaka.

This research will be a valuable information tool that can advise the PPT on how best to proceed with this RE system, potential barriers they may encounter and opportunities this may afford them. Furthermore, the research will be transferable to other similar projects in the future and be of great benefit for other smaller communities in New Zealand embarking on such projects, be they papakāinga communities or otherwise.

1.4. Report Overview

An overview of the structure of the thesis along with a brief outline of each chapter is given in Figure 2.

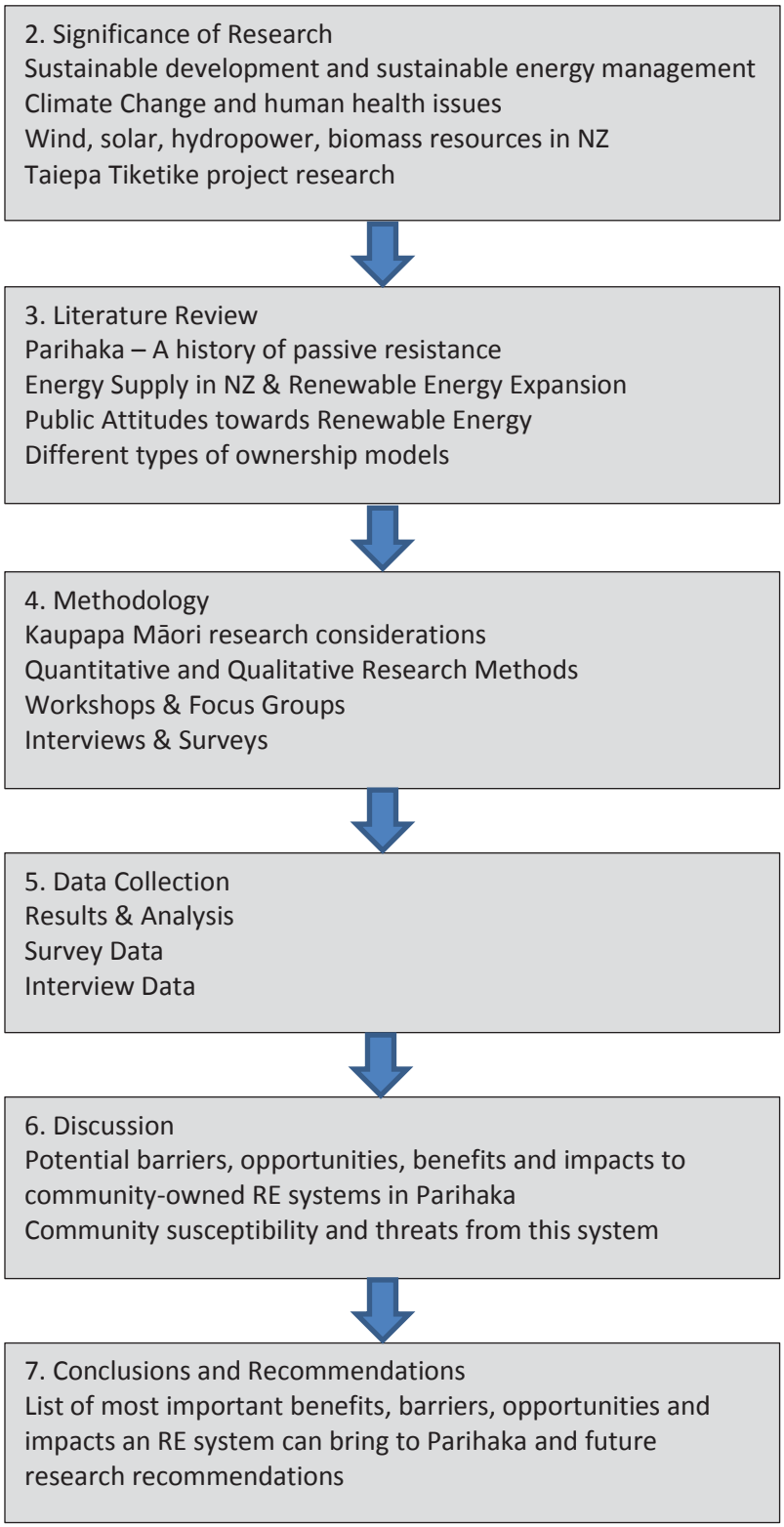

Figure 2: Outline of thesis structure

2. Significance of Research

Sustainable development and sustainable energy management are prominent concepts throughout this research. The term sustainable development gained popularity from a report published by the World Commission on Environment and Development in 1987, also known as the Brundtland Report (Drexhage & Murphy, 2010), which states that:

> "*Sustainable development is development which meets the needs of the present without compromising the ability of future generations to meet their own needs.*" (World Commission on Environment and Development, 1987, p.43).

Sustainable energy management is the concept of taking a long term view of energy management in order to ensure a reliable and resilient source of energy that does not compromise the community's social, economic, environmental or cultural needs (Armstrong, 2009). Briggs (2005) argued for the importance of social equity as the focus of developing the intelligent city. He stated that one of the biggest barriers to achieving true sustainability in this context was not environmental or economic but social. The importance Briggs attributes to social sustainability will also be a significant focus for this research and the methodology applied throughout will reflect this.

Making this approach to sustainable energy management successful will require resources, technology and community behaviour that protect environmental and human health and that meet the financial and personal needs of the community (Armstrong, 2009). To understand Taiepa Tiketike's value to Parihaka it is crucial to outline the Parihaka community's development plans. Dr Mihi Ratima's 2015 report details the overall development plans and categorizes them into political, economic, social and cultural terms. This thesis uses similar categories when assessing the benefits, impacts, barriers and opportunities of the RE system allowing for ease of assessment against the Parihaka development plans.

The Taiepa Tiketike project will evaluate the benefits against the barriers to determine the feasibility of these RE options becoming a significant source of energy in the community and help facilitate the transition to greater RE implementation. Other research in the project will be covering the technical and economic parameters while this research will assess the social, institutional, environmental and cultural benefits, impacts, barriers and opportunities in relation to what is identified as economically and technically feasible.

The social aspect will include community structures and aspirations. The institutional aspect will look at local planning, district council and regional council issues. Other environmental and cultural impacts and benefits will also be assessed. The proposed population increase will be a key consideration throughout this research and all the different dynamics this would bring to the barriers, opportunities, benefits and impacts will be evaluated. What

may be a barrier now may be an opportunity later and vice-versa for any or all of these aspects. Taiepa Tiketike aims to synergise the different research projects in order to cover all aspects of the proposed project and result in a complete and specialised package to provide an enhanced research outcome.

3. Literature Review

3.1. Parihaka – A history of passive resistance

The Māori worldview considers the past to be essential to the present and to understand the present situation in Parihaka a brief outline of the history of the community is necessary (Badham, 2011). Located in South Taranaki between Mt Taranaki and the Tasman Sea, Parihaka (location 39° 17.209'S, 173° 50.498'E) (see Figure 1) is a small isolated settlement with a troubled history (Ratima, 2015). Following the New Zealand wars of the 1860s, the Government began to undertake land confiscations and were able to do so under legislation in the form of the New Zealand Settlements Act, which had come into law on 3 December 1863 (Riseborough, 2002). These confiscations created widespread grievance amongst affected iwi and hapū (tribes) and were in direct conflict with traditional Māori beliefs regarding ancestral land.

Land was not believed to be something that could be owned or traded, but something to belong to. Individuals belonged to a whanau, which belonged to a hapū, which belonged to an iwi and this iwi was seen as belonging to the land (Shirley, 1982). Te Whiti-o-Rongomai (Te Whiti) and Tohu Kākahi (Tohu) were two such men, primarily of the Te Ātiawa iwi of North Taranaki, with grievance both from the land confiscations and war. As a result, both established themselves at Parihaka, away from Europeans and warlike Māori, with the idea of settling these differences by peaceful negotiation (Riseborough, 2002).

This relocation was to have great significance as Parihaka became a base in which many other disillusioned Māori, both from within Taranaki and other parts of New Zealand, took refuge (Smith, 2001). Led by Te Whiti and Tohu the community demanded to be allowed to live on the land of their ancestors peacefully without the threat of the government confiscating the valuable land and surveying it for sale to European settlers (Scott, 1975). Confiscations, however, continued for both loyal and rebel Māori and the government continually failed to provide previously promised reserves. Such government action only served to strengthen the following for Te Whiti and further establish Parihaka as a haven for disenchanted Māori tribes and individuals, which in turn served to increase government distrust in Te Whiti (Riseborough, 2002).

When government surveying was attempted, Parihaka resistance persisted, leading to several forced attempts to survey. As government troops established survey pegs they were quickly removed by community members, who were instructed by Te Whiti to avoid violence at all costs and allow the inevitable arrest (Riseborough, 2002). It was claimed that at the time Te Whiti saw uniqueness and significance in this tactic by stating that there had never before been a case of a leader voluntarily giving up his followers to imprisonment (Low & Smith, 1996).

Te Whiti and Tohu themselves were arrested several times often being held for long periods without any trial (Riseborough, 2002). Despite many propositions Te Whiti held his mana and resisted any attempts from the government to coerce him into backing down. This mana is evident in the comment attributed to the province's Land Purchase Commissioner Robert Reid Parris in 1872 that:

> "*the absence of all desire for money, or anything we have to offer him, renders it difficult if not hopeless to obtain any active aid from him*" (Scott, 1975, p.48).

In 1879 Parihaka residents began to peacefully plough the land that had been in the hands of European settlers following the wars of the 1860's. Māori, including some of distinguished part-European families, flocked to Parihaka to take part in this ploughing and as these men were continuously arrested they were simply replaced by the next group (Scott, 1975). Those imprisoned were also held for long periods without trial, but still the call by Te Whiti for peaceful resistance remained. Such resistance led the government to step up efforts to claim land in Parihaka and in April 1880, 550 armed men marched right to the doorstep of Parihaka with the aim of constructing a road through the Māori land. As frustrations soared, acts were introduced to restrict Māori rights further, including mandating that Māori could be arrested in Taranaki without warrant (Scott, 1975).

While the conflict continued, Parihaka remained unchanged and flourished with industry. Hunting provided vast amounts of food and plentiful timber and skilled carpenters saw many European-style houses and intricately designed marae established (Scott, 1975). Discipline was also strongly encouraged, along with hard work and physical cleanliness (Low & Smith, 1996).

The culmination of tensions, however, was to come on the morning of 5 November 1881 with an event that became known as the "March on Parihaka". The military force, comprised of 945 volunteers and 644 armed constabulary, surrounded the village and two columns of these marched in to Parihaka and were met by more than 2,000 Māori who had been sitting on the marae all night waiting for the attack (Riseborough, 2002; Scott, 1975). When ordered to disperse, by threat of imprisonment, no member of the group left, which resulted in the arrest of Te Whiti and Tohu. A standoff ensued until 2am 15 November when the armed constabulary again marched on Parihaka ransacking and subsequently destroying many buildings. Women were frequent victims of drunken troopers and by 21 November, 1,507 people had been taken under escort from Parihaka (Riseborough, 2002; Scott, 1975). As the villagers were removed, their homes and surrounding cultivations were destroyed as part of the scorched earth policy intended to diminish any attraction for villagers to return or new tribes to come to Parihaka (Riseborough, 2002).

In 1882, with Te Whiti and Tohu still in prison, the Taranaki tribes people, in an act to demonstrate to the government that they were not beaten, held an April hui at Parihaka yet it was 1883 before Te Whiti and Tohu were finally released from prison, despite no legal

trial ever taking place (Low & Smith, 1996; Riseborough, 2002). On 9 March that year, they set their sights on Taranaki again, and it was reported that within three months of this return Te Whiti remained as idolised as ever and Parihaka was again a centre of attraction for Taranaki Māori (Riseborough, 2002).

As Māori grievances failed to be resolved in New Zealand, Māori turned to England for restitution and, in 1883, the four Māori members of parliament wrote to the Aborigines Protection Society seeking to have these grievances addressed (Riseborough, 2002). As a result, further monetary offers for rental of lands were made but even into the twentieth century there were still Parihaka people who refused rent money. They maintained that any money they were to receive should be earned by their werawera, sweat of their brow, and Parihaka remained a community in passive resistance (Riseborough, 2002).

The influence of Te Whiti and Tohu in Parihaka remains strong to this day and on 5 November 1981, 100 years after the March on Parihaka, many thousands of people gathered on the marae at Parihaka to celebrate their identity and beloved chiefs. Faced with numerous government threats and hardships Te Whiti had maintained the mana the government sought to destroy. Furthermore, he was never concerned with his mana tangata (his own standing) but instead solely with mana whenua, which was promoting the wellbeing of his community (Riseborough, 2002).

Today, Parihaka is a unique papakāinga in that it is not an iwi settlement, but rather a representation of the eight iwi who whakapapa to the Maunga Taranaki (mountain). Parihaka has remained a destination for hui, wānanga and other events. The Rā (days), on the 18th and 19th of each month, demonstrate the commitment from the immediate community and visitors to an ongoing remembrance of the history of Parihaka (Anon, 2015). A distinctive body of songs telling of the grievances of the Māori during the confiscation campaigns and the tragedy of war remain an important part of this ongoing remembrance (Smith, 2001). The Rā also provides a platform to oversee the relevant kaupapa associated with Parihaka and ensure a communal input to the progress of the community (Anon, 2015).

Present day Parihaka is very much a forward thinking place with plans to increase reliable broadband connection, a commitment to increase education levels, and adopt sustainable business practices to strengthen the local economy (Anon, 2015). Taiepa Tiketike, by coincidence and involvement, has become a part of this movement and aims to help the community facilitate the expected population increase and strengthen local infrastructure in a sustainable manner.

3.2. Papakāinga settlements in New Zealand

The word ‘papakāinga’ comes from two separate words, ‘papa’ which refers to the ancestral earth mother, and ‘kāinga’ referring to the communal living environment of the village, and

is acknowledged in the Maori Land court and associated legislation (Kake, 2015). Prior to European settlement, papakāinga was considered to represent the centre of life, where mana whenua lived, worked, and raised their families and kāinga (unfortified villages) were the primary form of settlement and the main centre of economic activities (Kake, 2015). Today papakāinga is a type of housing development which occupies Māori or ancestral land that has multiple owners and is seen to be a place of nurture which one can return to. These developments are increasing in number throughout New Zealand and many council's now have specific housing policies to accommodate such developments in the district (Badham, 2011). Furthermore, this form of housing development is focused on establishing communities as opposed to merely building houses (Whangarei District Council [WDC], n.d.).

Māori identify strongly with the land and it is very important for Māori to reside close to whanau, both for cultural reasons and due to the fact that Māori land often has multiple owners (WDC, n.d.). Māori consider themselves caretakers and protectors of land and of the resources contained on the land. They feel it is their responsibility to conserve the land for the current generation and to safeguard it for the future generations, through respect and actively managing the environment in a sustainable manner (Rolleston & Awatere, 2009). With strong interest in making the housing and communities sustainable, infrastructure must allow for the fact that larger families are often accommodated with other whānau members also often staying for varying periods of time (Badham, 2011).

There are currently only 23 households on the Parihaka papakāinga, with 17 of these being the primary residence (Ratima, 2015). However, with three active marae (Te niho o te Ātiawa, Te paepae o te Raukura, and Toroānui) and three urupā, there is a steady and significant flow of visitors to the papakāinga for various occasions (Ratima, 2015). There is the added infrastructural and resource demands for the Rā (days) and other large events that are held in the community, and energy use data collected in the monitoring stage of other research in the Taiepa Tiketike project shows the significant spike in energy use over these days.

Māori development has many diverse considerations that separate it from western centric development, all which must be considered throughout this project. It is centred on unique aspects such as Mātauranga (knowledge), te reo (Māori language), and also customs, historical experience and a will for self-determination (Badham, 2011).

3.3. Energy Supply in New Zealand

Throughout the 1990's and through the turn of the century geothermal, hydropower and small scale wind farms made up roughly 65% of the net electricity generated, showing that New Zealand has for some time taken advantage of its significant RE potential (Becken, Frampton, & Simmons, 2001; Krumdieck, 2009). In 2010, the IEA noted that New Zealand's

total primary energy supply (TPES) was relatively diversified but was still dominated by oil and natural gas, which between them provided 57% of supply, and about 3.4 billion litres and 2.9 billion litres of petrol and diesel, respectively, was consumed every year (IEA, 2010; Packer, 2009). However, in comparison to other OECD countries the share of renewables is commendable, with geothermal and hydro sources providing 15% and 11.3% respectively, while coal provides 10%. In fact, New Zealand's share of geothermal energy in TPES was, in 2010, second only to Iceland among OECD countries and was the highest of the IEA member countries (IEA, 2010). New Zealand also has significant wind, wave and tidal potential and in 2008 had the third highest percentage of electricity generation from RE out of all IEA members (IEA, 2010; IPCC, 2011).

Despite already having one of the highest levels of RE input to the national electricity supply in the world, New Zealand has committed to a steady increase in RE generation. The government has set itself the lofty goal of having 90% of national electricity generation coming from RE sources by 2025, provided it does not affect security of supply (MBIE, 2013). This is clearly progressing well with renewables making up 80% of electricity generation in 2014 (MBIE, 2015a). Furthermore, the success of RE sources does show that New Zealand has a policy and social environment amenable to RE. As Figure 3 shows, the percentage of electricity supply by RE, in New Zealand, is expected to continue to grow, which could reduce the overall costs of each RE source due to economies of scale (Barry, 2007).

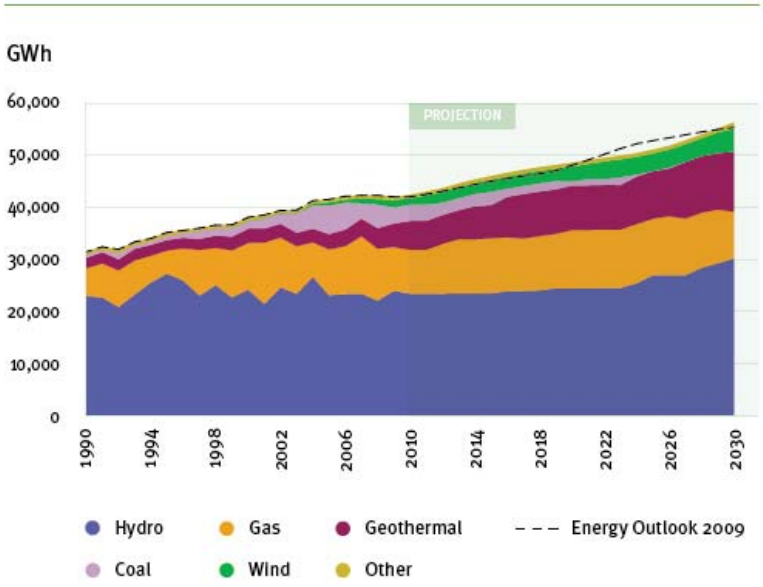

Figure 3: Electricity Generation by resource

Source: (Ministry of Economic Development, 2010, p. 6)

3.4. Renewable Energy Expansion for Residential Systems

Renewable energy use is clearly expanding rapidly on a global scale evident in the fact that renewables, excluding large hydro, made up the majority (53.6%) of gigawatt (GW) capacity of all technologies installed for the first time in 2015, at 134 GW. Of these instalments wind and solar made up the largest share with 62 GW and 56 GW, respectively, showing that these will likely be the main sources leading the energy transition (McCrone et al., 2016).

The overall investment for renewables in 2015 totalled $265.8 billion; more than double that of coal and gas generation. This is even more significant considering the dramatic drop in price for many fossil fuels in 2015, with Brent Crude oil falling 76%, from $115.71 a barrel on 19 June 2014 to $27.20 on 20 January 2016 and significant price drops in ARA coal and natural gas also (McCrone et al., 2016). However, due to longstanding fossil fuel infrastructure clean energy sources still only made up 10% of the world's electricity supply showing there is much work to be done (McCrone et al., 2016).

The future for New Zealand emission reductions and energy supply looks positive. With a high level of RE infrastructure already in place, ambitious government targets look set to expand this further. A great deal of the motivation for this pursuit comes from the national marketing of "Clean, Green New Zealand", and a reputation for high quality agricultural products (Becken et al., 2001). Furthermore, Auckland's vision to be the world's most liveable city greatly relies on superior air quality and being an environmentally responsible city (Auckland Council, 2015).

This love for the environment and countryside is ironically also a barrier to RE infrastructure expansion. Rural residents don't want to trade off scenery for the erection of large scale wind farms to feed growing cities' energy requirements, an attitude known as NIMBY (Not in My Back Yard) (Devine-Wright, 2005; Krumdieck, 2009). This attitude can be characterised as when a development is theoretically considered as beneficial to the wider population yet meets firm opposition from local residents (Pearce, 2008). If this attitude does exist in the community of a proposed development then it is important to look at the factors resulting in this, for instance were individual opinions subject to influences from friends' opinions or the area of residence? It must also be assessed if the level of influence, or lack thereof, the community has in the development of the project influenced individual or collective opinion (Pearce, 2008).

In addition to these factors, the Parihaka status as a papakāinga, and potential barriers or opportunities this status may bring, must also be considered. The Māori relationship with land and ownership of the land often opposes western centric ideas of land ownership, which can sometimes cause conflict (Badham, 2011; Shirley, 1982). The papakāinga platform does, however, provide residents with a distinctly Māori way of living within a holistic, inclusive and communal community and may actually increase the chances of success for a community-owned energy system (Badham, 2011). As shared ownership is often the norm

in these communities it could increase the chances of public acceptance of a community-owned energy system.

If the use of wind turbines is found to be acceptable to the Parihaka community it could become a very viable source of residential energy supply. Furthermore, as affordability of solar photovoltaic (PV) has dramatically increased for residential systems in the past two decades, with reported system prices of both residential and commercial PV systems falling between 6%-12% per year from 1998-2014 and by 9%-21% from 2013-2014, the potential for a mixed system for Parihaka is high (Feldman et al., 2015).

3.5. Renewable Energy as a source of electricity in Parihaka

At present, Parihaka has inadequate physical infrastructure to cater for the projected future growth. Ratima (2015) noted that energy supply, water supply and wastewater management are just some of the key issues that must be overcome. She also found that the current power supply network is old, dating back to the 1970's, and the present supply does not have the capacity to support further growth. With a desire to accommodate a projected population growth it is accepted that the system needs to be upgraded which will mean substantial upgrade costs, namely the installation of new lines and transformer capacity. Ratima highlighted the fact that this is seen as an opportunity to replace the system with one more aligned to Parihaka aspirations, by investing in energy efficiency and producing locally generated RE where possible. Assessment of RE resources and subsequent installation of RE technology is seen as a very high priority for Parihaka due to the urgent need to secure sufficient electricity supply to support future growth (Ratima, 2015).

Ratima outlines the focus areas for Parihaka as follows:

- Influence energy use behaviour of the community and visitors towards greater efficiency
- Provide access to reliable locally generated RE
- Sustainable use of resources
- Enhanced self-sufficiency
- Education and training
- Enhancement of the Parihaka knowledge base and capacity (Ratima, 2015, p.63).

The PPT envisage the installation of a local RE system as benefitting the community by enabling access to reliable RE and highlighting how individual consumer practices can contribute to the sustainability of Parihaka. The PPT also see the knowledge gained for the implementation of this system as benefitting other communities, including Parihaka neighbours, academics, businesses and individuals with an interest in RE and sustainable communities (Ratima, 2015).

Key markers for project success include:

- Gaining full community buy-in
- Continued research of innovative technology, energy use patterns, and support for innovation and development
- Supportive relationships between the community and local power and RE companies
- Development of a community education programme and school curriculum (Ratima, 2015).

3.6. Public Attitudes towards Renewable Energy

Attitudes have been described as being the most indispensable construct of social psychology as they can directly predict behaviour (Wegener & Kelly, 2008). An assessment of public attitudes towards RE implementation can help project planners assess likely behaviours of the public in the immediate area, and therefore, help predict acceptance levels.

A 2009 research showed that 69.75% of the New Zealand public were very supportive of RE, compared to only 21.75% for non-renewable energy technologies (Stephenson & Ioannnou, 2013). International research has also suggested a great deal of support with a number of "willingness to pay" surveys showing a significant desire from consumers' to pay a premium for buying RE (Kaldellis, Kapsali, Kaldelli, & Katsanou, 2013). One such survey, conducted in the United Kingdom (UK) revealed that the majority of survey participants supported renewables, with 34% of those stating that they were willing to pay more for electricity generated from RE sources (Kaldellis et al., 2013). Other studies also suggest that the majority of the American public would be prepared to pay more for clean energy production as a replacement for energy produced from fossil fuels (Carlisle, Kane, Solan, Bowman, & Joe, 2015).

3.6.1. Public approval rates of wind energy

Public attitudes to RE, however, tend to vary depending on the specific source of energy and are not formed on RE as a collective term, with solar receiving the greatest support and wind causing the most controversy and polarizing public opinion (Carlisle et al., 2015; Karlstrøm & Ryghaug, 2014). This is interesting considering wind energy tends to have high approval rates internationally, and a 2004 study in New Zealand determined that wind power had the highest approval rate of any source of electricity with an overall approval rate of 82% (Graham, Stephenson, & Smith, 2009).

On an international scale, social resistance is seen as a major barrier to increased wind energy implementation (Graham et al., 2009). While New Zealand has long had high levels of RE generation and has seen a rapidly expanding wind energy sector over recent years,

public opposition has also seen a major increase with one particular recent project having objections from 49% of overall submissions (Graham et al., 2009).

This contrast of high approval rates in opinion surveys and low success rates in project implementation has been identified by Bell, Gray and Haggett (2005) as a "social gap". They further identified an individual gap whereby an individual has a positive attitude to wind power generation yet opposes specific wind power projects, often explained as a NIMBY attitude. One possible explanation given for the existence of such gaps is that supporters generally are not vocal in the permitting process, while the decide-announce-defend decision model (discussed further in section 3.7) usually invokes a response from public opponents not supporters (Bell et al., 2005). However, it has since been determined that the existence of such gaps cannot be justified by any one explanation and can be the result of a combination of issues affecting public opinion and action (Bell, Gray, Haggett & Swaffield, 2013).

3.6.2. Public approval rates of solar energy

Such gaps are not as apparent for solar energy implementation but still exist. The aforementioned high support levels for solar energy are further evident from studies undertaken in America which suggest strong public support for large-scale solar energy projects in a general sense, and also when the project was proposed for their specific county (Carlisle et al., 2015). Despite such clear support in principle, and recognition of the benefits clean energy can bring, there are still various concerns that cause opposition to proposed projects. For example, while the San Luis Valley of Colorado possesses great solar power potential, local residents joined with environmental groups to publicize their opposition to a concentrated solar power (CSP) project, citing concerns over the effect it would have on the local ecosystem (Carlisle et al., 2015).

There are no apparent examples of active opposition to specific solar projects in New Zealand but this is likely because the industry is still in its infancy. A survey conducted in 2008, with the results shown below in Table 2, revealed solar to be the second preferred energy source behind wind, for electricity generation in New Zealand, for the following ten years, with 69% of respondents showing strong support (NZWEA, 2011). Despite this high level of public support, the use of solar PV and thermal to generate electricity in New Zealand remains small, contributing just 0.1% of total RE supply in 2014 (MBIE, 2015a).

Table 2: Support for electricity generation in New Zealand

Source	% of support
Wind	77
Solar	69
Geothermal	47
Wave	40
Large scale hydro	35
Small scale hydro	34
Nuclear	19
Gas fired	10
Coal	7

Source: (NZWEA, 2011, pg. 1)

However, there is increasing and substantial growth in the number of installed grid connected PV solar systems even though the economic viability of PV systems to individual households in New Zealand is uncertain, with no set feed-in-tariff (FIT) in place (Schwartfeger & Miller, 2015). Interestingly, concern for the environment was not one of the main reasons cited for installing these systems. The most cited reasons for early adoption were a desire for independence from electricity suppliers, protection from power price increases and a desire to sample an innovative technology (Schwartfeger & Miller, 2015).

As PV technology is constantly evolving it is expected that higher efficiency panels will become readily available in the coming decade and should make PV even more attractive to households and businesses, suggesting a greater conversion of public support to direct installations (Schwartfeger & Miller, 2015). This is reflected in the fact that the U.S. Energy Information Administration has revealed that planned utility-scale solar additions for 2016 will be 9.5 GW, which will be more than any other single energy source, and more than the total solar additions for the previous three years combined (Shear & Hoff, 2016). Moreover, solar PVs are seeing continued cost declines with the global average levelised cost of electricity for crystalline PV dropping from $143 per megawatt hour (MWh) in 2014 to $122 in 2015 (McCrone et al., 2016).

3.6.3. Public approval rates of hydropower

A European Commission study asked European Union (EU) citizens what they expected to be the most used energy sources for the following three decades with hydroelectric energy receiving the third highest percentage of responses with 65%, behind solar and wind energy with 80% and 71%, respectively (Kaldellis et al., 2013). Similar positive attitudes towards hydropower were found in a survey involving Swedish households, with 93% of respondents

considering hydropower and solar power environmentally benign electricity sources, with wind receiving a slightly lower rate of 88% (Kaldellis et al., 2013).

Hydropower has been used for electricity generation in New Zealand for more than 100 years, with the first large power station at Lake Coleridge in the South Island first generating power in 1914 (Martin, 2010). Ever since then, hydroelectricity has long been established as the backbone of New Zealand's electricity system generating more than half of its electricity supply (Energy Efficiency and Conservation Authority, 2015). In 1990 hydropower provided 72.9% of electrical energy in New Zealand, however, as seen in Table 3, this figure dropped to 54.9% by 2007, due to substantial increases in the use of gas and coal (Martin, 2010).

Table 3: Consumer Electricity by source, 2007

Source	% of Consumer Electricity
Hydroelectricity	54.9
Gas	26.4
Geothermal	7.7
Coal	6.9
Other	4

Source: (Martin, 2010, pg. 5)

Despite a long standing prominent role in electricity generation, hydropower was still subject to significant public concern regarding potentially negative environmental and social impacts (Martin, 2010). A large dam can have a major impact on the surrounding environment, local landowners and communities. The Clyde dam in Central Otago provided a prime example of such threat when the dam raised the water level around the town and subsequently flooded the main street and surrounding fruit orchards (Martin, 2010). There had been a steadily increasing level of apprehension over hydropower developments already at that time and the controversy over this dam served to further public concern in New Zealand (Martin, 2010).

A potential solution to overcoming this controversy is through microgeneration, with households generating their own electricity using microgeneration technologies (MGT), thereby avoiding large scale environmental and social impacts (Baskaran, Managi, & Bendig, 2013). Initial research by Baskaran et al. (2013) in the Canterbury and Central Otago regions has revealed that, while information on microgeneration technology is not widely distributed to the public, a significant proportion of the respondents were willing to adopt these technologies, with 83% agreeing that MGT projects in their regions would increase RE awareness and make a positive impact.

3.6.4. Public approval rates of biomass energy

Globally, biomass is the largest contributor of RE accounting for roughly 10% of global annual energy consumption (Halder et al., 2012). Despite such large scale use and recognised benefits over fossil fuels bioenergy has been at the centre of some recent controversies which has questioned its effects on the environment (Halder et al., 2012). As the majority of bioenergy is forestry, agricultural and wastes biomass it has been blamed for variances in food prices and food scarcity in developing countries, along with water scarcity, and increasing levels of deforestation (Halder et al., 2012).

Research has shown that European public perceptions of bioenergy greatly differ depending on the source. For example, respondents in The Netherlands were quite positive about bioenergy produced from organic household waste or manure but much less positive toward bioenergy produced from crops or farmed wood (Wegener & Kelly, 2008). Overall, however, Wegener and Kelly (2008) found that public approval towards bioenergy was high, notably higher than coal and oil. Furthermore, while the study did acknowledge that there were inevitable barriers to further development of this source it highlighted the opportunity arising from this initial positive reaction as strengthening existing positive attitudes is easier than transforming a negative attitude to a positive one.

3.7. NIMBY and overcoming this opposition

As previously noted, in sections 3.4 and 3.6.1, NIMBY is an attitude that is in support of RE in general but subject to some opposition from local residents in the area housing the development. There are also some other more extreme opposition groups such as NIABY (Not-in-any-backyard), which is an attitude that does reject certain RE sources in general not just in the nearby area, notably wind power (Berg, 2003). Even more extreme is BANANA (build absolutely nothing anywhere near anything), which can be far more vocal and unwilling to compromise (Berg, 2003; Pearce, 2008).

While seemingly more accepting than NIABY and BANANA, the NIMBY effect can pose a substantial barrier to the establishment of RE facilities by creating delays, which can significantly increase project costs. NIMBY opposition produces certain common characteristics which include; the formation of a lobby group based on a fear of change, disruptions of public meetings, highly emotional discussions and exploitation of communities by local politicians (Berg, 2003). These characteristics have been blamed for long delays in attaining planning permission for many projects and increases costs for developers (Martin & Rice, 2015). In retaliation, the term NIMBY is also being used as a way of discrediting project opponents and attributing less importance to the views of community members (Van Der Horst, 2007).

While this effect is often simplified to be principled support for a development that diminishes once the development is formally proposed, it is important to assess the variables that contribute to this effect (Pearce, 2008). Van Der Horst (2007) noted that interviewees' opinion can be influenced by variations in the level of local knowledge, access to information and subsequent knowledge gained as a result of this access. Such variation can make it harder to measure personal attitudes and values and how the specifics of the project, such as location and size, impact on these attitudes (Van Der Horst, 2007). Furthermore, research must be carefully constructed and avoid the use of assumptions to structure specific interview questions. For example, researchers often assumed that the physical proximity of a person's home to a wind farm would determine their psychological reaction to it and, therefore, tailored their questions based on this assumption (Devine-Wright, 2005).

A similar assumption has been that negative perceptions of specific physical characteristics of wind turbines drove public opposition to these structures (Devine-Wright, 2005). Research in both the Netherlands and New Zealand has found no reliable or definitive link between proximity to a site and opposition, with some studies actually showing that people living nearby wind turbines were more likely to have a positive attitude toward wind energy (Stephenson & Ioannnou, 2013).

To get a more representative view of public attitudes research must include greater recognition of the socially constructed nature of public perceptions and consider all aspects that shape these, including the contextual, political, socio-economic, and personal aspects (Devine-Wright, 2005). More specifically, research should assess the relationship between support and opposition based on levels of knowledge of the project and environmental and political views and the survey and interview schedules for this research were constructed with this firmly in mind (Carlisle et al., 2015).

Moreover, to successfully implement a project it is crucial to avoid assuming that information campaigns that emphasise the environmental benefits of RE will automatically increase support for the project, or that opposition to such schemes is automatically a result of a selfish NIMBY attitude (Wolsink, 2007b). In order to gather a more refined understanding of public opinion NIMBY must be acknowledged as a label that can obscure the true motivations for public opposition and even hinder the search for solutions, as opposed to an explanation for opposition (Stephenson & Ioannnou, 2013).

Interestingly, Wolsink (2000), actually questions the significance of NIMBY and other public attitudes toward implementation of RE developments. He argued that institutional constraints have more of an impact on implementation rates than public attitudes and is where developers and supporters of proposed projects should focus their attentions. Increased focus on enhancing institutional capital was recommended, namely through a

collaborative planning approach, in which the concerns of communities are adequately addressed as opposed to labelling them irrational NIMBY attitudes (Wolsink, 1989). Commitment should be made to an equal and open decision making process, encouraging local involvement from all communities surrounding Parihaka (Wolsink, 2007a).

While a great deal of wind turbine opposition is focused on visual and audio impacts other RE sources, such as biomass and solar, will invoke different concerns and blaming public attitudes for delays will not increase implementation rates. Instead a focus on social capital and a collaborative and transparent decision making process can greatly enhance the development rates of these energy sources (Wolsink, 2007a).

The RMA uses a consult-decide-defend-litigate (CDDL) decision making model which differs in some ways from the decide-announce-defend (DAD) model (Sinner, Newton, & Duncan, 2015). Under the CDDL model regional councils consult with stakeholders, propose a plan, and then defend that plan through a process of submissions, hearings and appeals and if issues cannot be resolved through council hearings it may result in litigation (Sinner et al., 2015). While CDDL involves councils consulting with interest groups and, at times, with the wider public prior to the announcement of a proposed plan, there are key similarities between CDDL and DAD. Both models presume that formally-elected representatives are the most appropriate decision makers and even when consultation occurs it is generally just to collect stakeholder views as opposed to engaging in dialogue (Sinner et al., 2015).

3.8. Different types of ownership models

This research is primarily focused on assessing the potential for community ownership of the proposed RE system and, although there are many different understandings of the term "community energy", it can be narrowed down to five categories (Hicks & Ison, 2011). These categories, as noted by Hicks and Ison (2011), are as follows;

- Legal – whereby the institutional arrangement of the project is without commercial interests.
- Physical – involves the use of community buildings or spaces.
- Process – involves local people in decision making.
- Economic – local people have a financial stake in the project.
- Technical – refers to the scale of the RE system, with the supply designed to match a community's energy demand.

Further to this point, Ison (2009) outlines three meta-benefits of community-owned RE projects as being;

- Environmental – using RE and other low carbon technologies to decarbonise.
- Technical – decentralize and localize energy supply.

- Socio-political – community ownership and participation democratises energy governance.

This research supports these three meta-benefits along with a fourth meta-benefit in the form of cultural outputs and these will all be discussed in detail in Chapter 7.

The Blueskin Wind Project provides an excellent example of a community driven project aiming for community ownership. This project originated with informal discussions in a community meeting that subsequently led to a big vision and an active project (Blueskin Resilient Communities Trust, n.d.). The project is aiming to generate clean local electricity to contribute to the goal of sustainable development and to generate income that can be reinvested into further local development. The proposal for the Blueskin Bay project is to have three small wind turbines located on Porteous Hill, each measuring roughly 90 metres to the blade tip (Blueskin Resilient Communities Trust, n.d.). The small wind farm is expected to generate enough power to supply the entire annual electricity demand for the Blueskin community.

It has been ten years since the initial idea began and a Resource Consent application was formally lodged in 2015 (Blueskin Resilient Communities Trust, n.d.). Assessing the application, Ministry for the Environment-approved independent Commissioner Colin Weatherall declared that the turbines would have no more than a minor effect in terms of: noise, shadow flicker, lighting effects and ecological effects. He did, however, decline the application based on the visual impact of the northern most wind turbine showing just how rigorous the resource consent process can be (Blueskin Resilient Communities Trust, n.d.). Despite this setback an appeal has been lodged and Blueskin Energy Limited will now go in to mediation with Dunedin City Council (Blueskin Resilient Communities Trust, n.d.).

A good example of the social benefits that can be gained from community-owned RE projects can be seen in the Minwind Energy developments. This is a collection of nine separate farmer-owned wind farm companies in south west Minnesota, USA that have devised an effective model for bringing benefits to farming families and their communities (Hicks & Ison, 2011). Throughout the development stage Minwind organisers focused on processes that directly contributed to the community by involving community members in learning new skills, such as, group organisation, project management and communication (Hicks & Ison, 2011). Minwind also contracted local business and tradesmen building strong networks and delivering a successful project that brought community pride and a sense of empowerment. This concerted community effort is visible every day in the wind turbines and the skills learnt can be applied to other projects (Hicks & Ison, 2011).

Despite the focus on community ownership it is also beneficial to briefly discuss potential alternative forms of ownerships should the PPT and the residents decide that they do not want to own the system. The following is a brief discussion of a small range of different models such as Public Private Partnerships in the form of a partnership between a utility and

the community. As this research can help inform the PPT and community on the viability of this project and the different ways it can progress it is critical to remain open to various options.

3.8.1. Different equity structures

The IEA-RETD (2016) report on financing community RE projects outlines the main types of community ownership models as follows;

Split ownership
- The community and commercial developer own different assets.
- The grid connection may be shared.
- The commercial developer will generally cover the majority of the development phase costs.

Joint Venture
- The community and commercial developer both own a percentage of the assets.
- The grid connection may be shared.
- The commercial developer will generally cover the majority of the development phase costs.

Shared Venture
- The commercial developer will own all of the assets and the community will have a right to a share of the revenue.
- The commercial developer will fully own the grid connection.
- The commercial developer will generally cover the majority of the development phase costs (IEA-RETD, 2016).

There are many ways to raise the equity for an RE project such as; the utility covering the full cost, a developer or utility covering a fraction of the cost with the remainder coming from a sole investor or group of investors, or even initially financed by a utility and subsequently refinanced to change ownership (McCrone et al., 2016). Having an external party cover the pre-construction costs of the project would see them assume financial responsibility for the more unpredictable phase of the project and it is common then for other more risk-averse investors to become interested at the post-construction phase where it is more predictable (McCrone et al., 2016).

Māori tend to be risk averse in business especially when it comes to intergenerational assets, such as land development, as these have been passed down through generations (Ministry of Education, 2013). Māori businesses or organisations responsible for intergenerational assets will usually target asset growth in a risk-averse manner as opposed to engaging in high-risk investments and the intergenerational nature of Māori business and

assets encourages a guardianship view, where long-term stability is favoured over short-term gain (Ministry of Education, 2013).

An example of this is the hybrid form of community ownership noted by Toke (2005), whereby two mainstream wind developers, in the UK, sold off part of their projects in the form of shares to the general public, with preference given to local residents. Such ownership models benefit both the developer by improving personal relations with the local population and therefore eliminating some planning barriers, and also the local population as it offers returns from the project for them and not just the institutional investors (Toke, 2005).

How these shares are issued can vary and can include bonds issued by the major investor. These have been used as an alternative method of finance to that from a bank for years but have never become a mainstay (McCrone et al., 2016). Goldman Sachs has arranged bonds for several solar projects in Japan and bonds have also become a source of finance for many projects in Brazil and Mexico (McCrone et al., 2016). There are different types of bonds and the world "green bond" market is made up of climate-friendly bonds, the less common project bonds and others, with total green bond issuance in 2015 28% higher than the previous year, suggesting a more prominent role in the near future (McCrone et al., 2016).

Another interesting example from the UK is the Westmill Farm project in Oxfordshire, which was initiated by a local farmer and overcame initial anti-windfarm protests by using a grass-roots support campaign to convince the majority of local councillors of the benefits of the project (Toke, 2005). This project was mostly financed through a co-operative share offer with preference given to local people, allowing investments ranging from £250 and £20,000. A board of local people was then appointed to run the co-operative and the financial aspect managed by another co-operative with project experience (Toke, 2005). A lot of heart can be taken from this project as it overcame various institutional and financial barriers through a collaborative community effort and maintained ongoing significant local control of the project.

4. Methodology

4.1. Kaupapa Māori Research Considerations

The true Māori meaning of Mātauranga is complex and actually challenges western learning. Kaupapa Māori research also questions western research methods and has been used as both a form of resistance and a methodological strategy (Walker, Eketone, & Gibbs, 2006). When the word research is mentioned in many indigenous contexts, it can evoke bad memories and distrust. As indigenous people have tended to be the passive subjects on whom the research is done, an unequal power relationship can develop between the researcher and participants, conjuring up memories of colonisation (Gibbs, 2001). Furthermore, Māori cynicism for research can be due to the fact that little has changed for Māori as a result of continued research into their lives, despite what promise such research might have implied (Gibbs, 2001).

Specific to Parihaka, Tohu and Te Whiti actively discouraged written documentation of their ideas in order to avoid manipulation of their views (Ratima, 2015). Similar distrust has been seen in some hui's at Parihaka with one resident commenting that journalists often come into the community to write their stories, which are not often accurate, and do not benefit or even always respect the community traditions.

In contrast, both Mātauranga and kaupapa Māori research believe learning and research should be a natural understanding and learning process carried out with and by Māori, with the end outcome benefitting Māori (Walker et al., 2006). The methodology applied to this research, therefore, is crucial and kaupapa Māori methodology in principle will overlay the research.

Early consultation was undertaken with the community to determine their input to the project methodology thus ensuring a cooperative, interactive process is in place. It was proposed that a review of existing literature and case studies of similar projects would form a major part of the research, establishing examples of the barriers, impacts, opportunities and benefits these projects experienced. Table 4, below provides a list of all the case studies used in this research along with a short description and a list of the sections in which each case study is discussed. Local and national policy would also be reviewed in order to determine what institutional considerations would apply to Parihaka.

In terms of local data collection it was proposed at a hui that this would comprise of discussions at regular workshops and focus groups, surveys distributed amongst the community and interviews with six community members. The feedback was very positive from the beginning with many attendees at the hui expressing a desire to participate. A

decision was then made to proceed with these methods of data collection resulting in the use of both quantitative and qualitative research methods.

Table 4: List of Case Studies used in this research

Case Study	Location	Description	Discussed in section(s)
Blueskin Wind Project	Blueskin Bay, Otago	3 small wind turbines located on Porteous Hill. Expected to generate enough power to supply the entire annual electricity demand for the Blueskin community. Resource Consent application declined due to visual impact of 1 wind turbine. Appeal is underway.	3.8 7.2 7.3.1 8.2
Westmill Farm Project	Oxfordshire, UK	Initiated by a local farmer and overcame initial anti-windfarm protests. Financed through co-operative share offer with preference given to local people. Board of local people appointed to run the co-operative with financial aspect managed by another co-operative with project experience.	3.8.1
Minwind Energy developments	Minnesota, USA	Collection of 9 separate farmer-owned wind farm companies. Throughout the development stage organisers focused on processes that directly contributed to the community and also contracted local business and tradesmen bringing community pride and a sense of empowerment.	3.8 7.5.2

Case Study	Location	Description	Discussed in section(s)
Horns Rev	Denmark	One of the world's largest wind farms, located up to 20km from the nearest beach. Initial concerns about a negative impact on tourism were overcome and the wind farm became a tourist attraction in itself, boosting the local economy (Prinsloo, 2013).	7.4.1
Scroby Sands	UK	First wind farm in the area that was located near the sea. Educational sites were established around at the site and within 6 months of opening an estimated 30,000 people had visited, boosting the local economy as Horns Rev has done (Prinsloo, 2013).	7.4.1

4.2. Quantitative and Qualitative Research Methods

Quantitative research is based on the belief that there is only one truth and has the goal of measuring and analysing causal relationships between variables. The investigator and investigated are treated as independent bodies with the investigator studying a phenomenon without having an influence on it (Sale, Lohfeld, & Brazil, 2002). To ensure there is no influence by the investigator techniques such as; randomization, highly structured protocols, and written or orally administered questionnaires with a limited range of predetermined responses, are adopted. Due to these characteristics sample sizes can be significantly larger than those used in qualitative research, which can ensure that samples are sufficiently representative (Sale et al., 2002).

By comparison, Qualitative research generally begins with identifying an issue, followed by a review of the literature already produced on the topic. From this, a series of questions are developed and data is gathered on these questions that is subsequently analysed and recorded (Creswell, 2007). The issue identified in this research is the expected population

increase in Parihaka and the role community-owned RE systems may play in accommodating this increase. While there can be various different types of qualitative data there remain four basic types, which are; observations, interviews, documents, and audio-visual materials (Creswell, 2007).

In terms of observations for this research, forms include field notes as an outsider from hui and other visits to Parihaka and subsequently becoming an insider to the community once the interviews began. Workshops with the community were held at regular intervals throughout the research, in order to ensure there was ongoing community engagement, and details of these workshops are outlined in the next section. Focus groups were scheduled at the end of the workshops and these sessions allowed for detailed discussions on various issues and topics of this research. The next type of qualitative data contains all data gathered relating to the interviews before, during and after. As this project was undertaken in the community eye and is an issue of high importance for many in Parihaka and surrounding areas, regular feedback and contact was sought.

Advocates of quantitative and qualitative research have long disputed over the most effective method and many, from both sides, agree that both methods should not be used in the same research (Johnson & Onwuegbuzie, 2004). However, as argued by Johnson and Onwuegbuzie (2004) mixed methods can work as a third research paradigm and does not aim to replace either quantitative or qualitative research but utilise the strengths of both and reduce the weaknesses of only using one method.

4.3. Workshops

This project is funded by the MBIE Vision Mātauranga policy and while the true extent of the meaning of Mātauranga to Māori is very complex, the policy definition can be interpreted as being a relationship and interaction between the community and researchers and working together towards a solution (N. Roskruge, personal communication, December 3, 2015; MBIE, 2015c). In-keeping with this vision, a vital part of the project included holding workshops with the community to facilitate knowledge transfer, in order to build capability within Parihaka. This was a direct attempt to encourage the community to actively participate in the research process and beyond and as stated by Lind and Tyler (1988):

> *"One of the most potent determinants of the procedural fairness of a social decision-making procedure is the extent to which those affected by the decision are allowed to participate in the decision-making process through the exercise of process control or voice"* (p. 176).

Facilitated workshops can also create an environment where ideas can be explored and can help to build community consensus on how to progress (Kake, 2015). While research has suggested a group of eight to twelve people would be ideal, to keep within kaupapa

methods numbers were not restricted and the workshops were open to all who wished to attend (Kake, 2015). In total, six workshops were held with the location purposefully varied in order to ensure each marae on the papakāinga held the same amount of workshops. Listed below are the dates, location and topic of each workshop.

Workshop 1. Te Paepae o Te Raukura – March 20th – Project summary and status of the research.

Workshop 2. Toroānui – April 10th - Renewable energy introduction; Solar data; Solar electric and solar water heating systems.

Workshop 3. Te Niho o Te Ātiawa – May 15th – Wind data; wind modelling, and wind energy systems; Research focus group consultation.

Workshop 4. Te Paepae o Te Raukura – August 21st – Hydro data & micro hydro systems; Energy efficiency; Research focus group consultation.

Workshop 5. Toroānui – September 11th – Bioenergy; Electric vehicles; Research focus group consultation.

Workshop 6. Te Niho o Te Ātiawa – November 20th – Taiepa Tiketike Energy Research details.

4.4. Focus Groups

Focus groups have been used as a research methodology since the 1940's, where the researchers provided participants with questions and asked them to discuss the questions amongst themselves (Silverman, 2013). The premise of a focus group is that the researcher does not expect individual responses to questions, but instead encourages the group to talk to each other, exchange stories or experiences and ask each other questions to form a discussion (Kitzinger, 1995). Kitzinger (1995) highlights the effectiveness of these groups as a research method by noting that:

> *"The method is particularly useful for exploring people's knowledge and experiences and can be used to examine not only what people think but how they think and why they think that way"* (p. 299).

When the researcher has various open ended questions and would like to assess the importance participants attribute to the issues raised focus groups can encourage these to be discussed openly and pave the way for questions back and forth. Visible emotions are another important benefit that can be derived from this research methodology as jokes and arguments can be part of the conversations and show deeper feelings than may be drawn from answers to direct questions (Kitzinger, 1995). These conversations can also lead the discussion on to different paths, not necessarily planned by the researcher but that can elicit

very valuable findings and also include more people, some who may be reluctant to be interviewed alone (Kitzinger, 1995). This point is particularly important for this research as to respect the principles of Mātauranga and kaupapa Māori research it is vital to ensure the community and participants have control over the research process and ensure the end result is what is important to them.

Focus groups are not without their disadvantages and it has been found that as there is no confidentiality some participants may hold back on views they may fear controversial. There is also the possibility of the discussion being controlled by more dominant members of the group, and it is important to be aware of hierarchy when selecting your group (Kitzinger, 1995). Overall, however, there are clearly benefits to be derived from holding these focus groups both for the community and also to enhance the quality of the research. When used in conjunction with the interviews, surveys and informal discussions it was expected that the overall data collection process would produce a high quality representation of the community views.

There are a variety of ways in which focus groups can be worked into the overall methodology with some studies solely using focus groups and others using focus groups to precede interviews. For this research focus groups were held during the scheduled workshops. The first three focus groups were held before the interview process and were not used to solely accommodate the interviews or even to precede them. The focus groups were instead intended to gauge community perceptions throughout the life-cycle of the project and to work in conjunction with the other research and methodologies being employed for the overall Taiepa Tiketike project.

As noted by Silverman (2013), the first issue that can arise when using focus groups is difficulty in accessing people to engage in a focus group discussion. These focus groups took place within the already active workshops with regular attendees of the workshop already gathered as a group to learn and discuss the project. These attendees made up the core of the focus group ensuring that difficulty accessing people was not an issue. Another important issue to avoid is “leading” the discussion. The researchers were conscious of this and while at times helped guide the discussion, the focus group had a natural flow that could run in any direction the group chose to take it. Enabling this helped produce the most organic data and give a true, uninfluenced discussion on the project.

Initial discussion brought up a number of questions as to how these focus groups should be run. It is evident from a literature search that researchers regularly seek recommendations on this, for example, questioning whether to have participants answer set questions or whether to just involve informal dialogue and exploration. It was however stressed, in Silverman (2013), that running a focus group is actually relatively simple and with that in mind the researcher can relax and let the discussion just happen naturally. Useful recommendations that were adopted include the following and kept the process simple and flexible;

- Recruit a small group of people, between 6 and 8 should suffice, with similar characteristics (Kitzinger, 1995). In this case it was simply that they were affiliated with Parihaka and had an interest in the Taiepa Tiketike project.
- Encourage an informal discussion based around a particular topic (Kitzinger, 1995). This generally involved topics discussed in the workshop. As the focus group immediately followed the workshop and gave the members a good understanding of the topic it produced well-informed, productive discussions.
- The discussion is usually recorded, however, this would have to be explicitly approved by the focus group (Kitzinger, 1995). Permission was sought to record the discussion before each focus group as there were often new members present. Consent was always granted as the group members felt it would strengthen the research data and ensure their views were available to the researchers.

4.5. Literature Review

A comprehensive literature review can have several purposes in qualitative research including providing secondary sources of data to test the researchers own concepts and to also stimulate questions during the data gathering and analysis phases (Silverman, 2013). Furthermore, a literature review can be used to explain why the researchers' findings either support or contradict existing literature (Silverman, 2013). An extensive literature review was undertaken to outline the common barriers to community-owned RE systems, including case studies from Blueskin Bay in Dunedin and international projects (a list of all case studies discussed can be found in Table 4, section 4.1).

The literature review used various secondary data sources including but not limited to; peer-reviewed journal articles, government documents and reports, government and lobby group websites, and newspaper articles. As noted by Pearce (2008), secondary sources such as government reports can be objective and factual but can also reflect the interests of specific dominant groups. If, however, these documents are used for information and in a critical manner, and if limitations are acknowledged, then they can be of great use to the research (Pearce, 2008). Case studies have been discussed from other countries that have adopted similar models that are already firmly in place. Case studies can be greatly beneficial as they allow the researcher to capture multiple perspectives within specific settings, and provide a holistic, detailed understanding of an issue (Pearce, 2008).

The literature review was also used to detail the many advantages that these RE technologies offer in comparison to other sources and examples of countries that have already implemented these. Key issues, researched in-depth, include an assessment of the different ownership models such as western centric with individual titles, and multiple-ownership models.

4.6. Interviews and Surveys

In addition to the information gathered from the workshop, focus groups, and literature review, interviews were conducted and surveys were distributed. Adopting this multiple method strategy of data collection can ensure that information is obtained more effectively and will be more representative of the issue (Silverman, 2013). Creswell (2007) sees data collection as:

> "...*a series of interrelated activities aimed at gathering good information to answer emerging research questions"* (p. 118).

He noted that although he starts the process by selecting a site or individuals, there can be multiple entry points that a researcher begins this process with (Creswell, 2007).

Due to the inclusion of kaupapa Māori on this research, gaining access and building a rapport with the community as the entry point for data collection was imperative. Interactive hui, mainly the monthly Rā (days), and the regular workshops provided a good discussion base to update the community on the progress of the research and also field questions, and the focus groups helped elicit a more detailed discussion and brainstorm of ideas. This helped to maintain public participation, and follow the principles of a kaupapa Māori research related project, thereby, enhancing trust and increasing local support for the research (Pearce, 2008; Walker et al., 2006).

To build on this base, interviews were conducted with members of the community. Anonymity for participants was ensured as it is such a small community where people know each other closely, and it was therefore crucial to protect the identity of the research participants to avoid potential grievances (Moosa, 2013). This research did attempt to take into account individual participants' preference with each given the option of anonymity or having comments attributed to them. However, as only one interviewee asked to remain anonymous, no names could be attributed to specific comments as it would in effect identify comments made by the participant seeking anonymity.

It was considered unlikely that all community members would feel exactly the same about how to progress with the vision of being sustainable and energy efficient. Interviews provided a deep insight into individuals' opinions, views and experiences and these interviews allowed for a good analysis of the general views within Parihaka (May, 2001).

As it would not be feasible to interview every person in Parihaka, a sample was chosen from each marae. A sample as defined by Bordens and Abbott (2011) is:

> "...*a small subgroup chosen from the larger population"* (p. 163).

Literature on sample size varies greatly with little consensus on exact sample numbers (Guest, Bunce, & Johnson, 2006). In-keeping with Mātauranga and kaupapa principles, consultation was taken with a representative of the PPT. Time constraints for both the researcher and community members was considered and it was decided that two representatives of each of the three marae in Parihaka would be a suitable number of interviewees, and represented 12% of the permanent population of Parihaka, estimated at fifty people. It was decided to interview the kaitiaki (guardian) of each marae and also one resident from each, in order to ensure each marae had an equal part of the process.

This specific type of sampling, whereby sites and participants are expected to be quite different is known as maximum variation and this is a popular approach as it can increase the likelihood of producing findings that display different perspectives (Creswell, 2007). Data that reflects diverse perspectives can be more representative of the research issue on the whole, which is ideal for qualitative research (Creswell, 2007). An effort was made to keep interviews to within one hour due to time constraints and locations and methods of interviews were left to the participants' choice in order to follow Mātauranga and kaupapa Māori research beliefs (N. Roskruge, personal communication, December 3, 2015; MBIE, 2015c; Walker et al., 2006).

4.7. Interview and Survey Design

The interviews contained both structured and open-ended questions and surveys were used to record data from participants also. This semi-structured approach can maintain order to the questioning while also ensuring sufficient flexibility to maximise content (Hay, 2010). This method produced both qualitative and quantitative data in order to maximise the understanding of the views in Parihaka toward these technologies and determine if community acceptance is actually a barrier or just a perceived one.

It is important to note, however, that the research design was left open for review well in to the research process. As noted by Lewis (2003), the qualitative research design approach should be a process open to continual review and not concluded at the beginning of the research process. Therefore, ample time was provided to complete surveys in order to ensure there was an opportunity for other participants after the initial round of survey collections.

Creswell (2007) recommends a structure of having one central question followed by several sub questions. The content of each question must be answerable through scientific means and any variables must be carefully defined so that the researcher is working with precise definitions (Bordens & Abbott, 2011). Furthermore, due to the time constraints involved in this research it was vital that each question was important enough to elicit valuable data and time and financial resources were not spent on asking trivial questions (Bordens & Abbott, 2011). While it is often difficult to establish what exactly is an important question it

is recommended to avoid questions that produce answers that are already firmly established, or if the variables from the answer would have little effect on the participants' behaviour or the research questions (Bordens & Abbott, 2011).

The interview and survey stages were delayed due to an extended refining process of the questions and structures. Initially, the surveys were going to be quite brief but after discussions with the wider research team and the community, who advised that they were happy to dedicate the time needed to complete in-depth surveys, the content was expanded. It took considerable time to produce the final survey with a need to; create and review each question to ensure maximum efficacy; edit photos of the Parihaka landscape to include a projected wind turbine; find suitable hydro systems and seek approval for the use of the photo; seek feedback from our client (PPT) to ensure they were happy with the hypothetical scenarios in the questions; ensure all questions were up to standard, ethically, socially and culturally. The surveys were printed and posted to the Research Assistant who disseminated to the community and it was three weeks before the completed surveys were returned.

Once the interview question schedule was finalised pilot interviews were completed with the projects' Research Assistant and another research team member. Pilot tests can help the researcher refine data collection plans and address any issues that may become apparent in this trial run (Creswell, 2007). Both pilot tests were successful and determined that the questions in the initial schedule were capable of eliciting high quality data. Only minor changes were needed and this was primarily to do with allocating enough time to explain some of the more technical terms to the participant. Once university ethics was gained the data collection phase could be begin and a copy of the ethics approval has been included in the appendices.

5. Data Collection

At the March Rā, the projects' Research Assistant announced that we would be looking for interview participants as part of this research and I explained further details of the data collection process at the first workshop, held on 20th March 2016. The announcement of the progression of the research stage was well received by the workshop attendees with many excited by the opportunity to get involved in this process along with the ongoing workshops and focus groups. This highlights the benefit of community engagement before the actual data collection process of a project begins as it allowed for a full briefing of the community on the project and fielding of questions from an early stage, eliciting a certain level of trust.

The interviews contained certain specific questions so that I could analyse them against the responses from the other participants and generate conclusions, but the interviews were flexible and anything that participants felt relevant, would like to speak about or felt would enhance the research was welcomed. A consent-to-participate form was distributed to all interviewees which outlined the following; purpose of this research, the methods of data collection, anonymity, right to decline to participate or withdraw at any time and opportunity to ask questions at any stage. This information was intended to make interviewees more comfortable with participating (Creswell, 2007). A brief overview of the research project was provided on an information sheet and an emphasis was placed on the important role each respondent would have in contributing to the research (Bordens & Abbott, 2011).

Surveys were left with participants so as to allow sufficient time to consider the questions before responding. Notice was given to all respondents at several hui that these surveys would soon be distributed and reminders were given to each respondent after they were given the survey. Making contact multiple times before and after the survey can help to increase participation rates, as opposed to just emailing the survey and expecting a return (Bordens & Abbott, 2011). This technique was successful as there was a 100% response rate with all 30 surveys distributed being completed and returned.

The interview schedules were emailed or handed to each participant two weeks before the interview date so that they could prepare responses and think in-depth about how they felt about the questions and the project in general. In-keeping with kaupapa methodology, interviews were scheduled at a time, method and place of the participants' choosing with participants given the option of completing the interview face to face, over the phone, or by email. Four of the interviewees chose face to face and these were incorporated into an extended stay in Parihaka after workshop five. The other two interviewees indicated that they would prefer to complete the interview via email, and they were sent the interview schedule at the same time as the face to face interviews were held. These two interviewees were given two weeks and were then contacted again as a reminder. One participant

informed me that they were unable to complete the interview due to time constraints so only five interviews were included in the final analysis.

6. Results/Analysis

This chapter presents the results of the empirical component of the data collection for this research. A copy of the survey and interview schedules, along with the participant consent form and information sheet has been included in the appendices. The analysis of the 30 completed surveys is discussed in section 6.1 and the results of the five in-depth interviews with community members, representing each of the three marae, are discussed in section 6.2.

6.1. Survey Data

With the help of our Research Assistant based in Parihaka surveys were distributed amongst the community, including members whose normal residence is on the papakāinga and also those who just have a second home on the papakāinga. Overall, 30 surveys were completed and returned to me by mail. Considering there are only 23 houses on the papakāinga this was a strong number of responses and signifies the high level of community interest in this research. There were a number of respondents who indicated that they required further information in order to give a fully informed response to certain questions and a list has been included below of the areas requiring additional details.

- Specifics on the size of the wind turbine that would be required for Parihaka
- Specific details on what a joint-ownership model between the papakāinga and a private company for a renewable energy system would look like
- Specific details on what a renewable energy system fully owned by a private company would look like
- The level and reach of noise emitted from a wind turbine located on or near the papakāinga
- Specific details on how a community business providing locally produced firewood would operate

Q1. What are your views on small scale[i] renewable energy technologies [solar, wind, biomass (firewood and fuel crops), hydro] as a source of energy production?

Solar electric[ii]

1. Strongly Support
2. Support
3. Neutral
4. Oppose
5. Strongly Oppose

Solar water heating[iii]

1. Strongly Support
2. Support
3. Neutral
4. Oppose
5. Strongly Oppose

Wind turbines

1. Strongly Support
2. Support
3. Neutral
4. Oppose
5. Strongly Oppose

Biomass (firewood and fuel crops) for heating

1. Strongly Support
2. Support
3. Neutral
4. Oppose
5. Strongly Oppose

Hydro power

1. Strongly Support
2. Support
3. Neutral
4. Oppose
5. Strongly Oppose

It was clear from the first question, shown above, that there is strong support for RE resources in Parihaka. Figure 4 shows that "Strongly Support" accounted for the largest amount of responses in each of the five categories, with 70% of respondents strongly supporting both solar electric and solar water heating. Support for solar energy is further evident with a large majority choosing this as their preferred RE resource, with 72% ranking it as their number one preferred resource, ahead of Biomass with 28%. It is also the preferred source of heating for any new homes built on the papakāinga, with 70% of respondents choosing passive solar heating as their preferred method of heating. This is significant as it shows that the community see these RE technologies as part of future Parihaka and playing a role in the new buildings to accommodate the projected population increase, which is a key factor in this research.

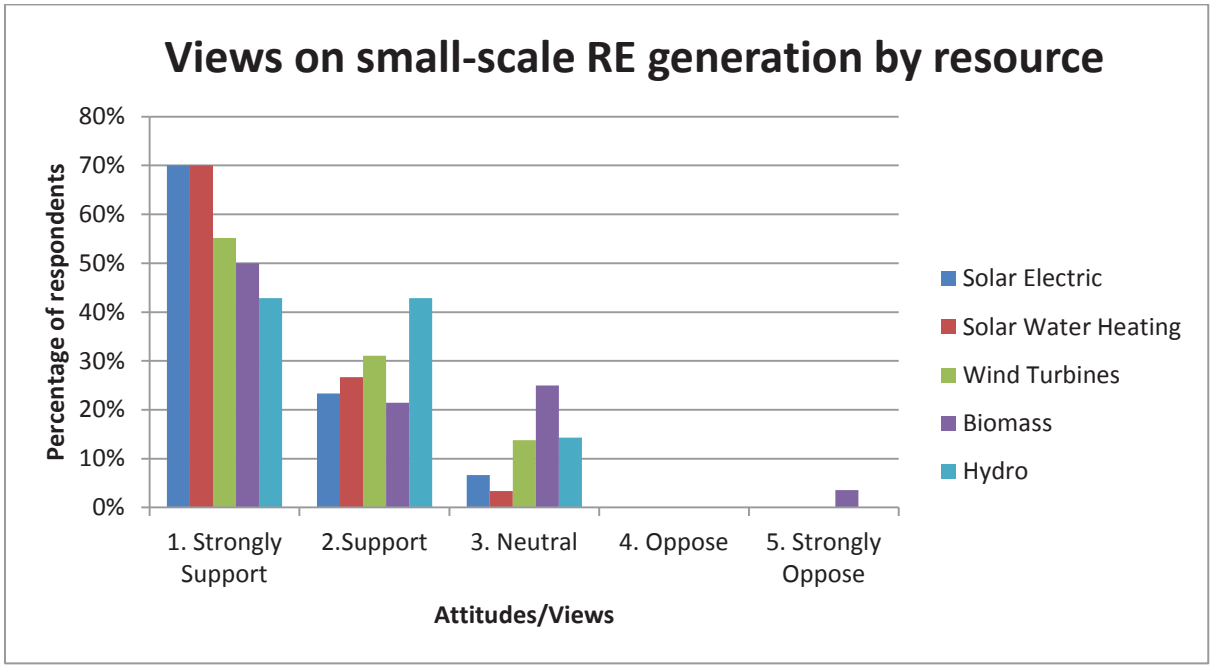

Figure 4: Community views on small-scale RE generation by resource

Q3. The following are four photos of a potential wind turbine site with a turbine added in. Please indicate how you rate the aesthetics of the landscape in each photo, with the addition of such a wind turbine?

Photo 1.

1. Very Positive 2. Positive 3. Neutral 4. Negative 5. Very Negative

Photo 2.

1. Very Positive 2. Positive 3. Neutral 4. Negative 5. Very Negative

Photo 3.

1. Very Positive 2. Positive 3. Neutral 4. Negative 5. Very Negative

Photo 4.

1. Very Positive 2. Positive 3. Neutral 4. Negative 5. Very Negative

Question three, shown above, asked respondents to rate the aesthetics of the landscape in four photographs each with a wind turbine photoshopped in. The photographs were of the same location but from different angles with a significant structure in each; a monument to Te Whiti, and one for each of the three marae. Significantly, while most respondents were positive about the photos, the number of those who selected “Very Positive” differed by photograph, despite the fact that they were all of the same location and turbine design and these results are outlined below in Figure 5. The least favourable response was for photo two, shown above, showing Te niho o te Ātiawa, with the most common response being “Neutral”.

The picture of an existing hydro system (Question four) also received a favourable response with 86% either strongly supporting or supporting a similar structure being established in Parihaka, and the full results are outlined in Figure 6.

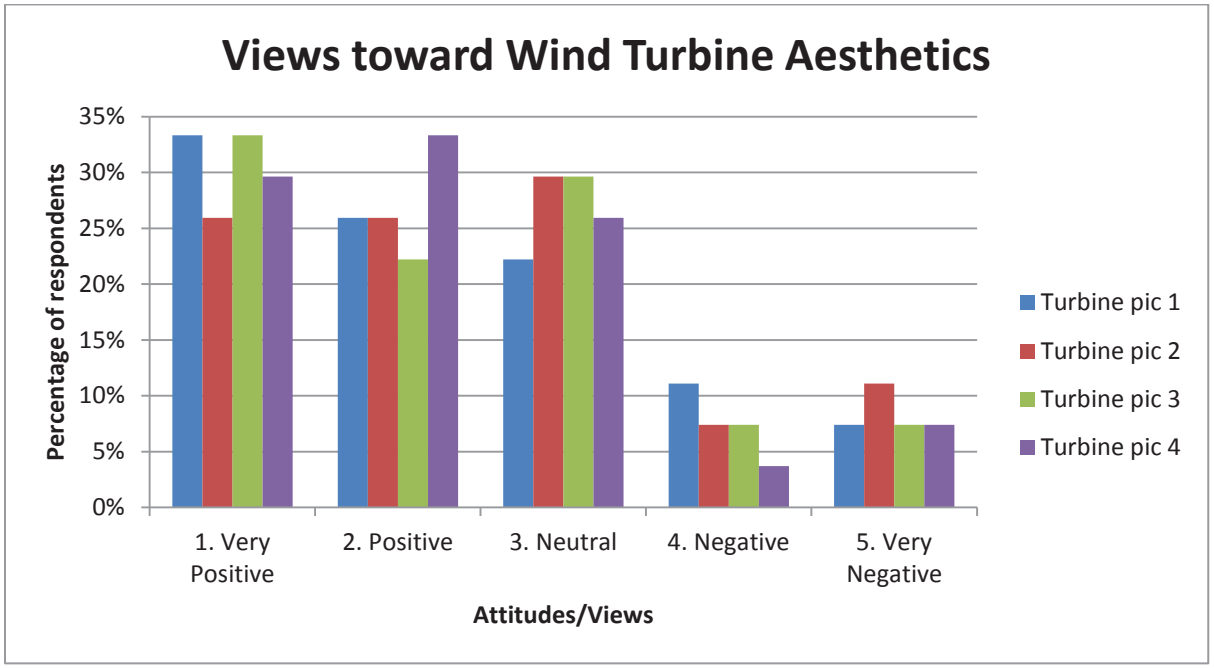

Figure 5: Community views on wind turbine aesthetics

Q4. The following photo is of an existing hydro system in Scotland. What are your views on having a similar structure installed in Parihaka?

This picture was retrieved from **http://www.powerspout.com/powerspout-plt-gallery/** [1]

1. Strongly Support **2.** Support **3.** Neutral **4.** Oppose **5.** Strongly Oppose

[1] Permission to reproduce this picture was granted by Michael Lawley, from EcoInnovation, on 8th August 2016.

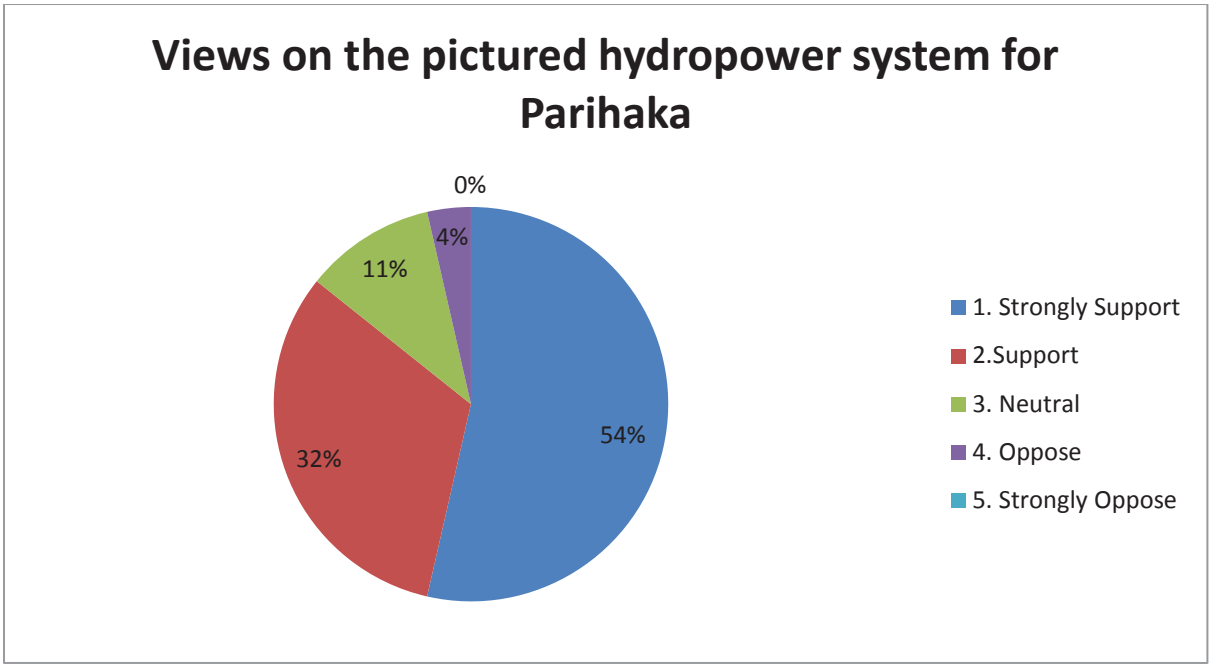

Figure 6: Community views on having a similar hydropower system to the example pictured in Parihaka

Q5. How would you feel about individually-owning[iv] a renewable energy system, for example, solar PV panels on your roof?

1. Very Positive 2. Positive 3. Neutral 4. Negative 5. Very Negative

Q6. How would you feel about the papakāinga owning[v] the renewable energy systems if they were installed in Parihaka?

1. Very Positive 2. Positive 3. Neutral 4. Negative 5. Very Negative

Q7. How would you feel about a joint ownership model, between the papakāinga and a private company[vi], for the renewable energy systems if they were installed in Parihaka?

1. Very Positive **2.** Positive **3.** Neutral **4.** Negative **5.** Very Negative

Q8. How would you feel about a private company fully owning[vii] the renewable energy systems if they were installed in Parihaka?

1. Very Positive **2.** Positive **3.** Neutral **4.** Negative **5.** Very Negative

In questions five, six, seven and eight, the respondents were asked to provide their views on certain ownership models and this has been a key topic of conversation in the workshops and focus groups so far. While some respondents noted that they would like further details of how each ownership model would look, the results were quite striking. The results of these four questions have been combined in Figure 7 and show that 66% and 62% of respondents were "Very Positive" or "Positive" about individually owning and the papakāinga owning RE systems, respectively. However, only 14% were similarly positive about a joint ownership model with a private company and not one respondent noted that they were "Very Positive" about a private company fully owning a RE system in Parihaka. In fact, the response was so strongly against a private company fully owning this that 57% of respondents claimed to feel "Very Negative" about this ownership option.

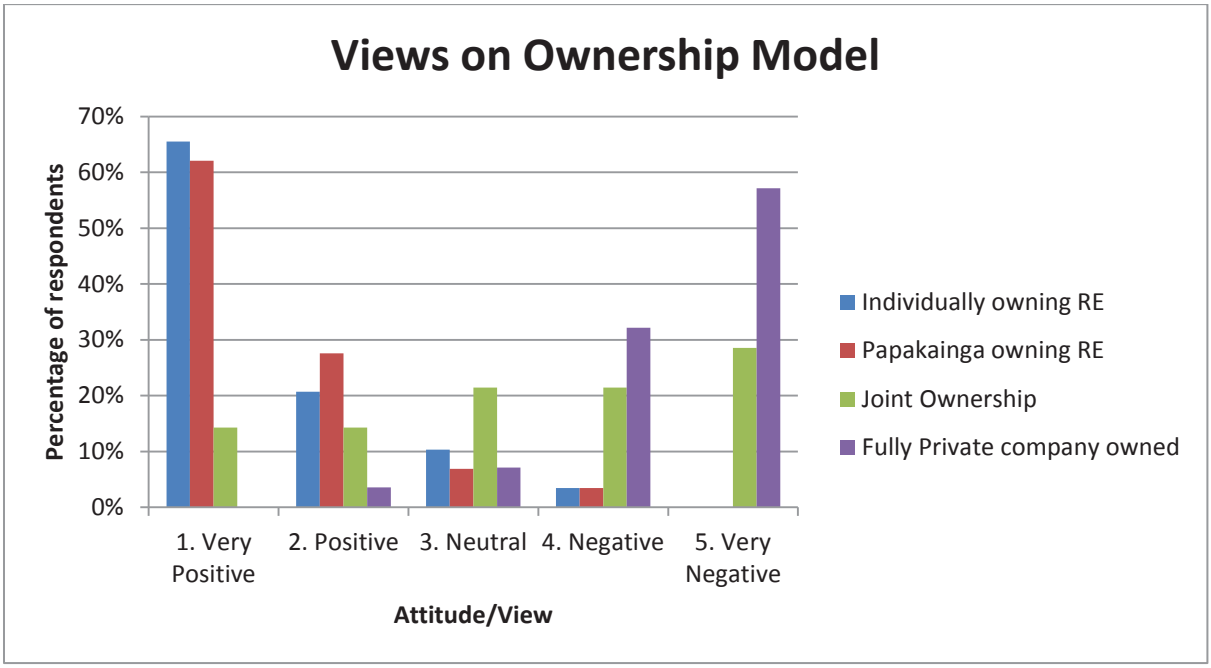

Figure 7: Community views on ownership models

Q14. What do you see as the <u>opportunities</u> arising from the knowledge from the Taiepa Tiketike Research and implementation of the renewable energy system? Please write 1 in the box to indicate the greatest opportunity and so on. If you do not believe any of these options could be an opportunity for Parihaka please write N/A.

Increased independence from external electricity suppliers and reduced vulnerability to market prices[viii] ☐

Chance to sample an innovative technology ☐

Further increase in community awareness of and involvement in sustainable practices ☐

Increased collaboration between community and councils to achieve sustainable development goals ☐

NZ/ Papakāinga leaders in planning and installation of RE systems ☐

Other ☐
Please give details

_____

_____

There is evident cohesion in terms of the opportunities and benefits the survey respondents anticipate this project bringing to Parihaka. Respondents were asked in Question 14, shown above, what they see as the opportunities arising from the knowledge from the Taiepa Tiketike research and implementation of the RE system. As can be seen in Figure 8, 69% saw increased independence from external electricity suppliers as the greatest opportunity, further emphasising the desire for greater autonomy. The second most identified opportunity was an increase in community awareness of and involvement in sustainable practices, which was a specific aim of Taiepa Tiketike.

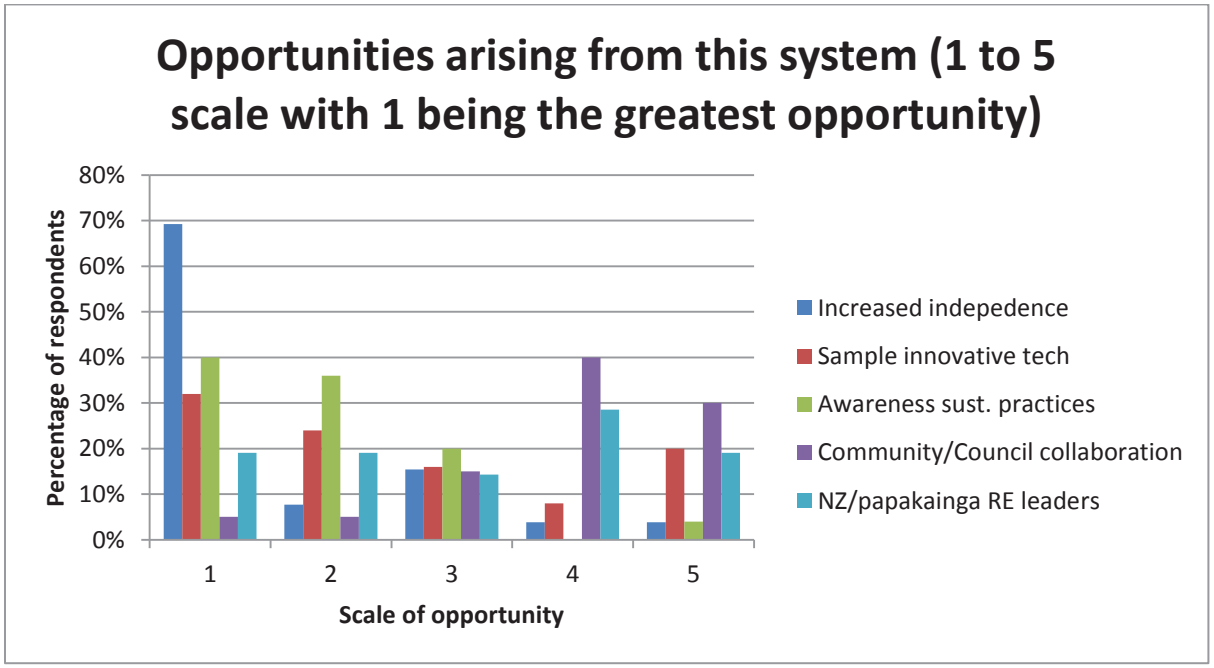

Figure 8: Anticipated opportunities arising from this system in Parihaka

Q15. What do you see as potential <u>benefits</u> for Parihaka that could arise from the knowledge from the Taiepa Tiketike Research and implementation of the renewable energy system? Please write 1 in the box to indicate the greatest benefit and so on. If you do not believe any of these options could be an benefit for Parihaka please write N/A.

Further strengthen community harmony and social connections ☐

Long-term relationship with the land and climate that generates the renewable energy ☐

Improved local and domestic air quality levels with reduced use of fossil fuels ☐

Local employment (e.g. Technical support, Consultancy and Eco-Tourism) ☐

More democratic form of energy governance with local energy supply and local participation ☐

Other ☐
Please give details

_____
_____
_____
_____
_____

The response to Question 15 regarding potential benefits showed that the respondents see a major cultural and social significance in this project with 75% noting that the greatest benefit would be establishing a long-term relationship with the land and climate that generate the RE (Figure 9). Improved local and domestic air quality with reduced fossil fuel use was the second most noted benefit showing health is also a major concern.

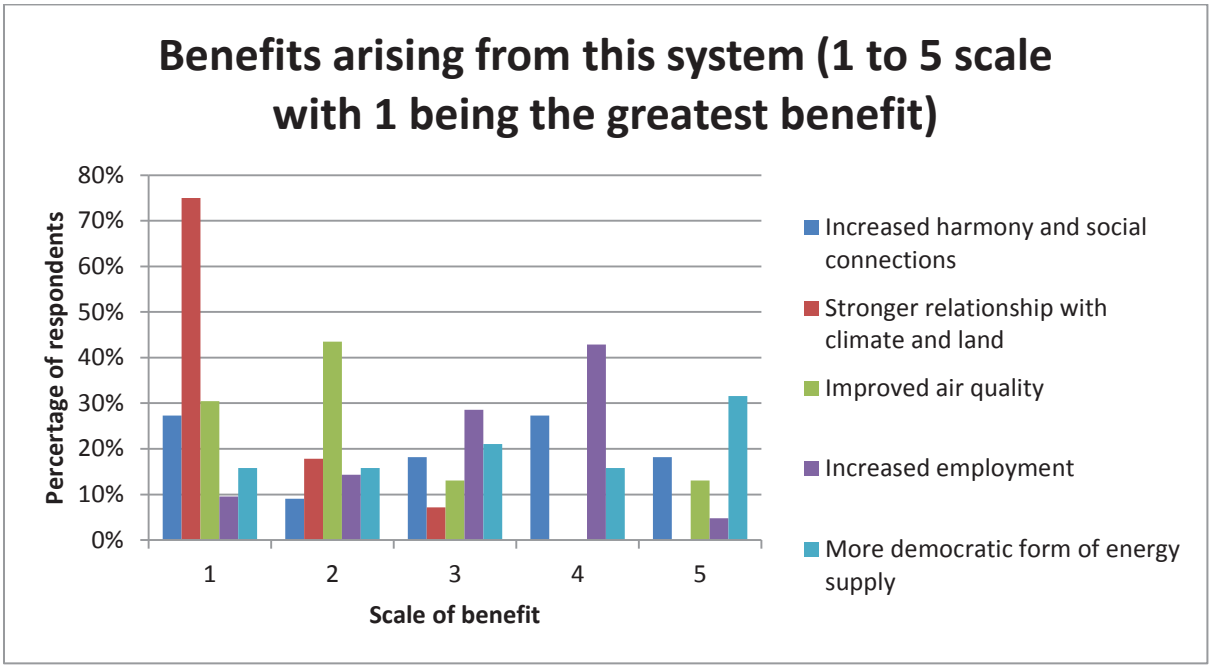

Figure 9: Anticipated benefits arising from this system in Parihaka

Q16. What do you see as potential <u>barriers</u> that Parihaka could experience in implementing this project? Please write 1 in the box to indicate the greatest barrier and so on. If you do not believe this could be a barrier for Parihaka please write N/A.

Public/community opposition ☐

Resource Consent process ☐

Lack of Policy support for renewable energy ☐

Difficulty getting the required finance (e.g. Bank Loans) ☐

Government financial stake in current electricity market ☐

Other ☐
Please give details

_____
_____
_____
_____
_____
_____

Responses to Question 16 regarding expected barriers were more varied with fewer consensuses. As outlined in Figure 10, the most noted barrier, with 55%, was a difficulty in

getting the required finance closely followed by public or community opposition, with 50% selecting this as the biggest barrier. A concern over the potential influence community opposition could have became a major theme in the interviews and will be discussed in further detail in section 6.2.

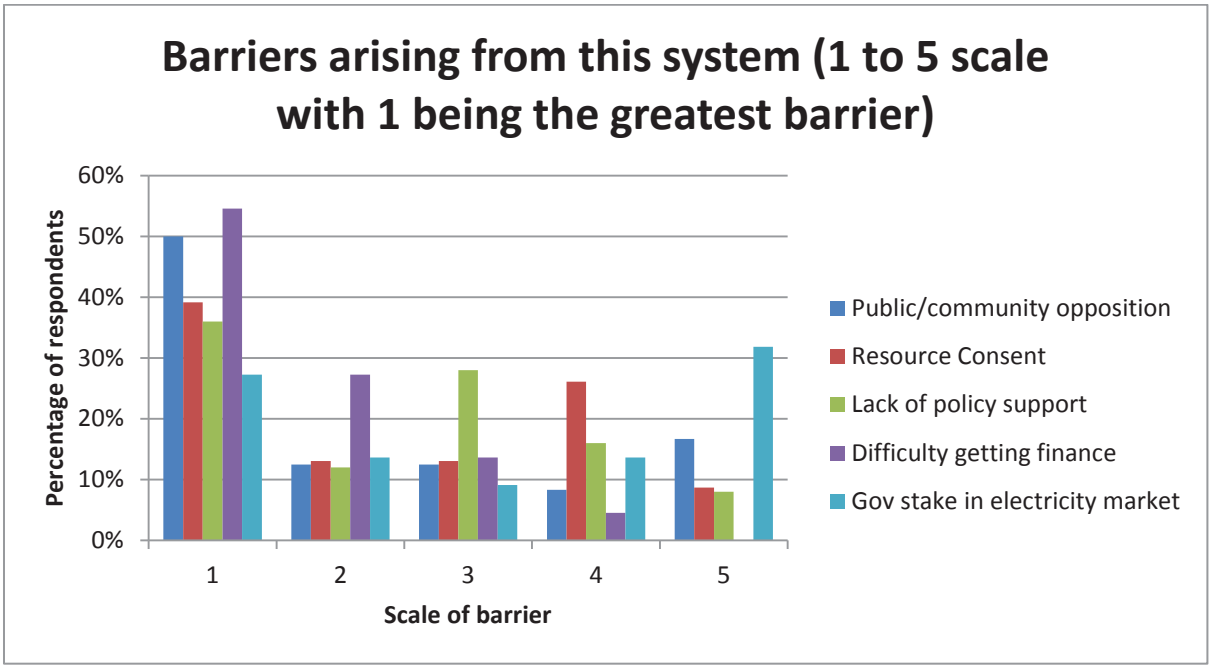

Figure 10: Anticipated barriers arising from this system in Parihaka

Q17. What do you see as potential <u>impacts</u> (both positive and negative) for Parihaka that could arise from this project? Please write 1 in the box to indicate the greatest impact and so on. If you do not believe this could be an impact for Parihaka please write N/A.

More environmentally conscious community ☐

Positive impact on social interactions, from structural and design[ix] changes ☐

Negative impact on social interactions, from structural and design changes ☐

Negative aesthetic impact of a wind turbine ☐

Financial risk ☐

Other ☐
Please give details

_____

_____

The final survey question, Question 17, gave respondents the opportunity to list the greatest impacts they see arising from Taiepa Tiketike and an RE system for Parihaka. There were two positive impacts and two negative impacts listed, along with an option to expand on any other impacts. This presented an opportunity to assess whether the survey participants saw the project having an overarching positive or negative impact. The results, outlined in Figure 11, showed a strong positive outlook with 88% of participants seeing a more environmentally conscious community as being the greatest impact from this research. Financial risk and a positive impact on social interactions in the community were the next most common options selected as having the greatest impact, showing that there is certainly some caution in terms of upfront and ongoing costs but that the overarching views are very positive.

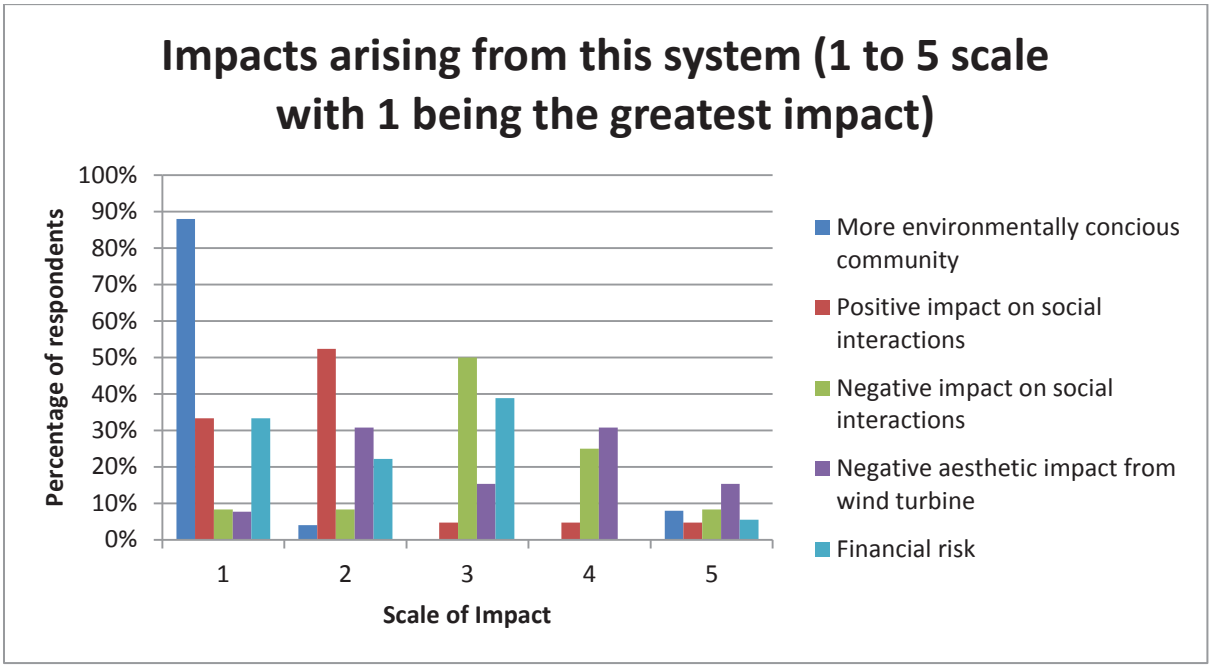

Figure 11: Anticipated impacts arising from this system in Parihaka

6.2. Interview Data

Before commencing the interviews the process was explained to all participants and they were advised that these questions were merely a guide and the interview was not limited to these questions. Each participant was encouraged to ask any questions they had and to feel free to diverge from the set questions should they wish. As noted in section 4.6, individual interviewee names could not be used in order to respect participant anonymity. Instead of names, each of the five interviewees has been assigned a number in order to identify their responses to each question while still ensuring they remain anonymous.

The first question aimed to determine the level of knowledge each participant had of the Taiepa Tiketike project and to assess if such levels had any influence on the way the remaining questions were answered or the direction in which the interview progressed.

Each participant showed a good understanding of the Taiepa Tiketike project and all expressed a keen interest in the progression of the project and in the findings outlined to the community in the final workshop scheduled for November 2016. This understanding is a good indication that project information and updates had been sufficiently disseminated amongst the community and also that the community members had a keen interest in the project.

Questions two, three, and four asked the respondents for their views on individually-owned and community-owned RE systems in Parihaka and showed that there are definitely some differing ideas on what would work best for Parihaka. One respondent firmly felt that a community-owned model would work best as it would produce far more benefits than just energy generation:

> *"Community owned. I look at it as a cooperative, everyone has a say and everyone has an input. It is beneficial for everybody physically and mentally"* (Interviewee 1, 2016).

Another respondent felt that there are certainly advantages and disadvantages of both models and had clearly done some research on how these apply to Parihaka specifically:

> *"Many homes allow for economies of scale and shared use of energy to help balance out periods of over production with periods of high usage. However individual homes may be better where there are risks to success in shared ventures in miscommunication, disputes between families and increased tensions if not well managed. Individual homes also allow for greater customisation of set up for personal needs"* (Interviewee 2, 2016).

Despite recognising such concerns with a shared community system, Interviewee 2 felt that a communal system fits better with overall development needs and goals for Parihaka and highlighted how this would facilitate a growing papakāinga.

> *"Communal systems would work better for four reasons: 1. Historical integrity of how the community operated in the past. 2. Wide differences between whānau so there are opportunities to support homes with lesser understanding. 3. There is the possibility to access grants or funding for community development projects that individual homes would not be eligible. 4. The houses are relatively close together and there are plans for expanded community size with new homes, making it more viable also for future development to more easily accommodate new residents"* (Interviewee 2, 2016).

Three other participants noted some major concerns that they had should a community-owned model be introduced and suggested that this may lead to community disharmony. For instance, Interviewee 3 saw the system as a whole providing cultural benefits such as uplifting community pride but felt that:

> *"A disadvantage would be the social cohesion which still needs to happen in terms of the maintenance side of things and the long-term commitment. There is a handful of people holding down most of the menial tasks that need doing around the pā and no indication that this would change with this new project"* (Interviewee 3, 2016).

Interviewee 4 also expressed concern that a community-owned model may not work due to a lack of cohesion. They see greater potential in separate, individually-owned systems, which they envisage brightening up Parihaka and bringing significant social benefits.

> *"Sometimes the community doesn't work together very well and there might be a struggle with that. I am afraid of that at the moment……I do believe it would be far better if they were individual so that each person is responsible….I think individual would be great and would suit Parihaka far better"* (Interviewee 4, 2016).

While still on the topic of ownership models Interviewee 3 elaborated on their long term views as to how Parihaka can use this project to further develop as individuals and a community. When asked if they felt the discussions generated from the Taiepa Tiketike project would engage more of the community into taking control of the everyday tasks needed to maintain the pā, their response was.

> "*It is hard to speculate at this stage but I would hope that any infrastructure input comes along with investment and some thought into how those that are left will maintain it. So some real investment in terms of that pathway and investment towards training. It is not about us holding our hands out and asking for handouts but about stepping forward and shouldering that responsibility equally*" (Interviewee 3, 2016).

Interviewee 3 sees great inspiration in the knowledge and technical skills of the onsite engineering student and project leader, who have discussed previous projects of theirs in certain workshops. They would love to see an engineering workshed on the pā equipped with the tools to allow residents to spend time working on individual projects and in-turn develop practical and innovative skills. This is an important point that delves into the vision for Parihaka and the impact that the whole Taiepa Tiketike process and interactions have had on Parihaka.

All respondents were asked to discuss how important it is to them personally that their energy is generated from renewable resources and if they would be willing to pay more for such energy. While some interviewees noted that there would definitely be a limit to how much extra they could pay as opposed to would be willing to pay, they all declared that they love the thought of their energy coming from renewable resources and that energy choice is about more than just money.

> *"It's not about the money for me, it's about health"* (Interviewee 1, 2016).

> *"If it fits the package, if it fits the kaupapa, is environmentally sound, good for the social community then I can see it being about more than just money"* (Interviewee 3, 2016).

> *"I think the main point for Parihaka is to consider long-term self-sufficiency and sustainability. RE is a significant factor in becoming self-sufficient and promoting principles of self-sufficiency … the ability for Parihaka to include RE in education programmes for schools and the supporting of other communities to take these steps are also key factors. Therefore, the value of such a project exceeds the immediate cost-benefit calculations and therefore I think we would be ready to pay more"* (Interviewee 2, 2016).

Aside from these expected health benefits, each interviewee sees a great deal of social and cultural benefits arising from having an RE generating system in Parihaka, most notably in the form of employment. As in the surveys, this was mentioned in more than half of the interviews and one respondent elaborated further to include an opportunity to benefit from eco-tourism.

> *"The system would give work for some local people, preferably young people with some older people there for guidance. It could also bring in people who want to see it operating, so tourism…….it is educational and is very much like getting back to basics, eventually"* (Interviewee 5, 2016).

Question nine asked interviewees whether they would prefer an RE system owned within Parihaka, by the community or individuals, or a joint ownership model between Parihaka and a private company. This question produced some very interesting responses. From the data collected in the surveys a joint ownership model was perceived quite negatively with "Very Negative" being the most selected response at 29% and "Negative" and "Neutral" the next most selected both at 21%.

In contrast, the idea of a joint ownership model where external investors claimed some of the liability was perceived as the preferred option by all interviewees, although for differing reasons. One respondent was happy to include external investors as they would like to see Parihaka neighbours and wider communities get involved in RE generation. They believe that if Parihaka are able to establish this system then why not share it with others. They did, however, stress the importance that any external investors must share the community ethos and follow community practice, a point echoed by Interviewee 2. For this reason they would not welcome corporate investors who are in the project solely for financial gain without acknowledging the vision and beliefs of Parihaka.

> *"Public Private partnership sounds like a good idea but there are important questions to be asked … i.e. what are the principles of other parties and are they consistent with Parihaka's; what are the motivations and expectations that will be*

placed on Parihaka. If the community feels satisfied with the responses then I guess we would seriously consider it" (Interviewee 2, 2016).

Interviewee 3 also expressed an interest in a joint ownership but proceeded to explain how they would like to see this model phased out as the community become better equipped to self-manage and finance the system over time. They still see this as an opportunity for Parihaka to control their future needs and are clearly wary of a joint ownership model that has the opposite effect of phasing out the Parihaka involvement overtime.

> *"It could work well if the communication and the agreement were clear from the start or worst case scenario things fall apart and we're left with a sour taste in our mouth and we are left as observers for 25 years. A long term agreement where they have the ownership of it, where they set the rates and we are paying money to the landlord is what we wanted to move past. At the same time we have to be cognisant that we have to step up and own it, front up with investment and front foot it because it takes responsibility to maintain it"* (Interviewee 3, 2016).

The final four interview questions asked participants to discuss if and how they see an onsite RE system fitting with the kaupapa of Parihaka and what they feel Parihaka would hope to achieve by installing such a system. They were also asked if they felt this system would be capable of helping the community accommodate the anticipated population increase and maintain Parihaka's vision of being welcoming and inclusive and also if they felt they had sufficient opportunity to be involved in project discussions to date.

The aim of these questions was to determine if this system would be culturally appropriate for Parihaka today and also for future generations. It is also very important to establish if the individuals feel sufficiently included in the planning phase as it would be vital to raise as an issue to be addressed if they did not. The response was overwhelmingly positive and unanimous in the belief that such a system would absolutely fit with the kaupapa of Parihaka and firmly maintain and even enrich its vision as a welcoming and inclusive community.

> *"Absolutely. Lots of people are interested in saving the planet and if this system was in Parihaka it would be a big attraction to get people to come home. It is important for the future of Parihaka that the people do come back here to live and I think this will be a major draw"* (Interviewee 5, 2016).

> *"Yes there is definite potential that RE will help a greater number of whānau come to reside in Parihaka. There is a strong feeling that living in a community like Parihaka requires changes in daily practices and expectations on whānau … this includes the way energy is sourced and used. RE is a tangible element of what whānau returning to Parihaka will need to take into account"* (Interviewee 2, 2016).

> *"If the energy can be supplied it will make a big difference to Parihaka. It will bring more livelihood into the place and I think if the resource is there then there is an opportunity for bringing our people back home to the papakāinga"* (Interviewee 4, 2016).

All respondents felt that there has been ample opportunity to be involved in project discussions to date, noting the monthly updates on the 18th and 19th Rā days, the workshops and focus groups. There was also a clear appreciation of the significant presence that the engineering student who was placed in Parihaka on a part-time basis has had around the pā and also the regular presence of other research team members. They also all expressed passionate hope for the future of Parihaka and are confident this system will help the community to achieve a brighter future and be something that will be remembered for generations as a significant development for the papakāinga. Interviewee 1 has a vision for Parihaka that their children and grandchildren can stand in Parihaka in the years to come and say:

> *"My mother and father or grandparents helped create this. They had this vision and saw it through and if it wasn't for them pursuing this vision we would not have what we do today"* (Interviewee 1, 2016).

7. Discussion

Figure 12 provides an outline of the discussion chapter, summarizing what is discussed in each section and in-turn providing a summary of the list of barriers, opportunities, benefits and impacts an RE system can bring to Parihaka.

	Economic	Social	Cultural	Institutional
7.1 Barriers	**7.1.1** Willingness vs ability to pay. Technical expertise. Development costs.	**7.1.2** Social concessions. Inequitable workloads. RMA decision making model. NIMBY concern.	**7.1.3** Banks loans. Māori risk averse investors. Non-resident Parihaka land beneficiaries and those with whakapapa associations.	**7.1.4** Dependence on centralised energy structure. Institutional barriers not a key area of concern for survey & interview respondents **BUT** Literature Review suggests it is a key concern. Lack of sustained government policy assistance. Weak policy support for small investors. Competition for a place on the grid

7.2 Overcoming Barriers	Policy improvement; Priority grid access and bank assistance, information schemes to increase levels of locally owned projects, tax incentives. A shared community vision and commitment to realising this vision. **7.2.1** Overcoming Barriers to Papakāinga Development. Papakāinga Plan Change. Specific policy assistance to support whānau through the consenting process. Implementation of Māori principles to increase Māori participation in all aspects of development planning. **7.2.2** Parihaka development considerations. South Taranaki Regional Policy statement. Environmental Management Plans prepared by Ngāti Ruanui in 2012 and Ngā Rauru in 2013.

7.3 Policy Tools	Government grants to help cover cost of feasibility work. Government funded information schemes and standardised legal contracts to reduce legal fees. **7.3.1** Feed-in tariff **7.3.2** Renewable Obligation Certificates (ROCs) **7.3.3** Policy Plans specific to Parihaka

	Economic	Social	Cultural
7.4 Opportunities	**7.4.1** Increased independence. Pooled resources. Economies of scale. Employment and community investment. Economic savings from economies of scale. Ecotourism.	**7.4.2** Development knowledge. Innovation Hub. Community empowerment. Community awareness and education for all involved including surrounding neighbours.	**7.4.3** Continue the legacy of Tohu and Te Whiti. Consultants for other iwi. Knowledge transfer and promotion of Parihaka's history.

	Environmental	Social	Cultural	Institutional
7.5 Benefits	**7.5.1** Reduced GHG's. Improved local and domestic air quality.	**7.5.2** Greater autonomy. Social connections. Energy awareness & project experience.	**7.5.3** Long-term relationship with the land and climate. Papakāinga development expertise. Social cohesiveness key for restoring Māori language. Kaupapa of Parihaka.	**7.5.2** Greater autonomy. Social connections. Energy awareness & project experience.

	Environmental	Social	Cultural	Institutional
7.6 Impacts	**7.6.1** Bird deaths. Reduced fishing yields. Habitat displacement. Improved air quality.	**7.6.2** Environmentally conscious community. Social interaction.	**7.6.3** Return to innovative roots. Inspiration for other Communities.	**7.6.4** Challenge local and national policies and law. Pave the way for other Māori communities.

7.7 Community Susceptibility	Financial susceptibility if fully community-owned. Difficulty generating the upfront capital and ongoing maintenance and repair costs. Technical limitations and potential intermittency of energy supply. Social and cultural susceptibility in terms of how to progress with development and aesthetic impact.

Figure 12: Outline of Chapter 7 and summary of section content

The results of this research have found that there are various understandable barriers to the development of these technologies and also the community ownership model that will not be overcome easily. These results are based on the in-depth Literature Review and data collection phase, which consisted of workshops, focus groups, surveys and interviews.

As noted in section 4.3, the workshops and focus groups within the workshops were used to gauge the local views and improve their understanding of the project and the issue of RE generation and ownership models. This collaboration greatly increased the interest from the community in the project, increased their input and facilitated well thought out responses in the workshops which in-turn increased well thought out responses in the focus groups, surveys and interviews. These workshops were extremely valuable both in meeting the objective to increase community knowledge and awareness of the project and RE in general, but also for gaining a deeper insight into the community views.

The focus groups allowed for detailed discussions on various issues and topics of this research and seamlessly interacted with the other data collection methods producing an overall enhanced result. As this project was undertaken in the community eye and is an issue of high importance for many in Parihaka and surrounding areas, regular feedback and contact was sought. The community can further build on this project experience and expand this expertise into other areas of development and potentially create a hub of innovation based in Parihaka.

It is expected that major barriers will be financial and legislative, specifically land ownership issues. A further barrier in the way of these energy sources and this ownership model being implemented in Parihaka is a perceived lack of cohesion in terms of everyday tasks required for the upkeep of the papakāinga. Social cohesion is crucial for the success of community projects and if this is not present in Parihaka it could greatly hinder the planning, installation and maintenance process, a point raised as a matter of great concern by two interviewees. If, however, this can be overcome, a mixed-source RE system has the potential to greatly contribute to the power supply of Parihaka and reduce and overcome the strain on energy resources in a sustainable manner. Therefore, the barriers to RE implementation in Parihaka certainly need to be thoroughly considered but do not justify a slow or non-pursuit of the technologies needed to utilise these energy sources.

7.1. Potential Barriers to Community-Owned Energy Systems in Parihaka

It is generally regarded that there are three key barriers facing community-owned Renewable Energy Source (RES) projects and the IEA's Implementing Agreement for Renewable Energy Technology Deployment (IEA-RETD) have noted that they incorporate the following areas (IEA-RETD, 2016):

> a) The skills, expertise and technical capabilities of community groups to plan, develop, negotiate contracts, finance, build and then operate RES projects;
>
> b) The challenges of setting up a community organisation and securing the wider support of other local residents that are not members or investors in the community organisation;
>
> c) The difficulties in obtaining finance for the project (IEA-RETD, 2016, p. iii).

7.1.1. Economic Barriers

Finance is an important aspect to carefully consider for a proposed community-owned RES project and the Parihaka community are well aware of this, evident in the focus group where one resident stated that she believes there is a big difference between willingness to pay and ability to pay for RE. This was also a point made by two interviewees where they stressed that they would be willing to pay slightly more for energy generated from renewable resources but that there was certainly a limit when their budget was considered.

The IEA-RETD 2016 study comparing the cost of community owned wind and solar projects to commercially owned projects, concluded that, despite the goodwill and significant volunteer time that often goes into community projects, development costs tend to be higher than commercial projects (IEA-RETD, 2016). This is partly due to the complexity of RES projects, requiring knowledge of planning rules, financial analysis, and negotiations and legal contracts with various organisations and stakeholders (IEA-RETD, 2016). Commercial developers usually have this expertise along with experience in such practices, whereas communities are less likely to have this. Furthermore, due to the open and democratic nature of community projects there can be an extended timeframe for completing the development, therefore, increasing costs (IEA-RETD, 2016).

Another point of interest from this study regarding costs is the ability of commercial developers to secure lower construction and operating costs by bulk buying, and also have been said to be better at negotiating lower prices with suppliers (IEA-RETD, 2016). Furthermore, anecdotal evidence suggests that banks tend to lend smaller amounts of money to community developers in part due to a poor reputation for such projects in some countries and also due to the fact they often have less monetary resources to offer as security (IEA-RETD, 2016). This could compound the difficulty Parihaka would encounter acquiring loans due to the multiple-owned nature of papakāinga land.

While expected barriers were varied in survey responses the most noted barrier, with 55%, was a difficulty in getting the required finance. Furthermore, financial risk was the second most common option selected as having the greatest impact, with 33% of respondents selecting this. These results show that there is certainly some concern in terms of upfront and ongoing costs from members of the community and a thorough financial analysis is required before a decision is made on implementing this project. It is, however, important to note that development costs make up a small percentage of the overall project cost (roughly 10% for wind and 5% for solar projects) and the additional barriers facing community projects should not significantly impact the viability of the overall project (IEA-RETD, 2016).

7.1.2. Social Barriers

Should the final decision be to implement a community-owned, shared RE system there may have to be some allowances in order to ensure fair and equal distribution of energy, as some participants in the data collection phase noted a concern that some community members would use a lot more energy than others. There may also be the need for shared resources and one such possibility that was mentioned in the focus group was communal laundry and large clothes drying areas. While most of those present at the focus group stated that they would have no issues with this, there is a need to consider the expected population growth in the community when implementing such plans. The point was made in the same focus group that all people planning to relocate to Parihaka might not be comfortable with the idea of communal laundry areas or other shared resources so this is an issue that must be carefully considered with the future population growth kept firmly in mind.

Three interviewees noted that community ownership of the system concerned them as they felt that the whole community would not do their share in terms of planning, implementing and maintaining it.

> *"Sometimes the community doesn't work together very well and there might be a struggle with that. I am afraid of that at the moment…… I do believe it would be far better if they were individual so that each person is responsible……I think individual would be great and would suit Parihaka far better"* (Interviewee 4, 2016).

These concerns highlight the importance of continuous community discussion and a transparent and inclusive planning process so that Parihaka is fully aware of the work involved in implementing and maintaining this system. It is natural that some residents will have different visions for Parihaka and that there will be disagreements that require concessions. Sufficient discussion will allow for concerns to be aired and potentially addressed before it causes social disruption, impacting on the success of the system.

As noted in section 3.7, the RMA follows a CDDL decision making model which does not generally engage in dialogue with stakeholders before a proposed plan is issued. The planning process for Parihaka will need to avoid the use of the DAD and CDDL models, which can offend and anger affected parties, and instead follow a "consult-consider-modify-proceed" model, which can enhance the inclusiveness of the process (Pearce, 2008; Sinner et al., 2015; Wolsink, 2000).

While the literature review component of this research has determined that NIMBY (section 3.7) does not have a significant influence in the decision making process of RE projects it is nonetheless important to identify if such views exist in the community. One respondent claimed in the focus group that they felt a wind turbine had the potential to eat into the landscape. However, the ensuing discussion led to an overwhelming view that wind turbines being visible at Parihaka would be an opportunity to generate discussion on the use of this energy generating infrastructure and that can start to shift mind-sets, which is necessary for greater RE implementation. It was felt that such mind-set changes in and around Parihaka would greatly help the community realise its vision for a sustainable future. This sentiment was echoed by Interviewee 2 whereby they felt that individual buy-in was crucial to the success of the system and that they believed any negativity felt toward this system would dissipate.

> *"A key barrier is instilling and maintaining a high level of enthusiasm in order for people to change their energy use practices. People hold concerns about the impact of hydro on food supplies and water quality. I feel most people will grow to accept wind-turbines, even feel proud of them, to show the progressive approaches being undertaken in Parihaka"* (Interviewee 2, 2016).

Certain survey and interview questions in terms of impacts and barriers were not answered, with some respondents specifically noting that they would need more information, such as detailed structures of joint-ownership agreements, before answering. A full list of the areas respondents stated they would like further information on has been provided in section 6.1. These considered responses provide a good indication that the Parihaka community is not making uniformed choices or is overly influenced by publicized concerns, individuals are sensibly asking for more in-depth details before forming an opinion. Therefore, NIMBY is not seen as a major barrier in the way of the implementation of this project.

7.1.3. Cultural Barriers

As some areas in Parihaka are Māori multiple-owned land, seeking loans from banks can be complicated. The main reason for this, in terms of housing loans, is that banks will not normally accept Māori land as security against a loan because it cannot easily be sold, resulting in a reluctance to provide mortgages (Tibble, White, Ohia, & Perenara-O'Connell, 2011). For example, under the Kāinga Whenua loan scheme, introduced by Housing New

Zealand and Kiwibank in 2010, applicants must meet the Kāinga Whenua scheme criteria as well as additional bank requirements (Housing New Zealand, 2015).

This was a point raised in one of the focus group sessions by a Parihaka resident who stated that she previously had an opportunity to upgrade her energy system at home but could not afford the large upfront cost and could not get an approved loan as the house was on papakāinga multiple-owned land. On top of this there are a number of steps involved including getting; resource consent, building consent, the right to build on the land, and development contributions (Community Law, 2015).

As noted in section 3.7.1, having an external party cover the pre-construction costs of the project would see them assume financial responsibility for the more unpredictable phase of the project and it is common then for other more risk-averse investors to become interested at the post-construction phase where it is more predictable (McCrone et al., 2016). With many stakeholders in Māori land generally risk-averse this may be an attractive option for them. This issue introduces another interest group to Parihaka development plans as the majority of beneficiaries to the Māori-owned land in Parihaka do not reside there and, with no immediate rewards, may be resistant to risk. With Māori being generally risk averse relative to their land interests this extra resistance could provide a significant barrier (Kingi, 2013).

7.1.4. Institutional Barriers

7.1.4.1. Historical Policy Constraints

One participant in the first focus group was vocal in the belief that historical policy constraints will still present a significant barrier to Parihaka meeting its sustainability and self-sufficiency goals. The participant described how they felt that the Crown, through policy control, gave power to big businesses that needed a workforce. This was done by actively pushing people away from the subsistent life with a goal of centralizing people and energy use towards the urban centres where the business hubs were located. Some members of the community feel this is still the case, stating that there is now a form of control from dependence on the current fossil fuel and gas energy system and a struggle to pay power bills at times, bringing the threat of being cut-off. They felt that social engineering had made them economically dependent on the system and they envisage the new energy system as the first step to moving away from this.

As a result of this discussion in the first focus group it was expected that institutional barriers would be a key focus of concern for interview and survey participants. Surprisingly, however, the general consensus was that institutional factors did not pose as much of a threat as the social and economic barriers. There was a real sense of the future being in the hands of Parihaka with the onus on the community to work together toward realising their vision. As can be seen in Figure 10 in section 6.1, a lack of policy support was only the fourth

most selected option when asked what they perceived to be the greatest barriers facing Parihaka, considerably less than difficulty in getting finance and public and community opposition. Despite these results a thorough review of current literature does suggest that institutional barriers are considerable for community RE projects and the key barriers are discussed below.

7.1.4.2. Current Policy Constraints

As previously noted, Wolsink (2000) considers institutional constraints to have a greater impact on implementation rates than public attitudes and there is evidence of this in New Zealand. The central government in New Zealand has been slow to respond in implementing regulations to improve residential energy efficiency and incentivise residential energy management options. Along with industry, it appears to value profit from an increased demand for electricity over achieving the long-term social and environmental benefits that come from reduced demand (Armstrong, 2009). This slow response is a result of a combination of low political will, resistance from industry and market signals that create incentives for large-scale centralised energy systems as opposed to smaller-scale regional consumer-centric models (Armstrong, 2009).

Policy is considered the most important driver for energy investments and there have been various combinations of policy and practice used for promoting RE throughout the world with varying degrees of success (Shukla et al., 2013). Two mechanisms in particular appear to prevail, one being the FIT, and the other is the renewable portfolio standards (RPS), also known as renewable purchase obligations (RPOs) (Shukla et al., 2013). Despite this importance, however, there is a lack of sustained government assistance evident in many countries around the globe with policy support sporadic and fickle (McCrone et al., 2016). The UK government reduced assistance after the 2015 May election and the US Supreme Court ruled that all legal objections will be assessed before the implementation of the Environmental Protection Agency's Clean Power Plan, significantly delaying its employment (McCrone et al., 2016). These are just some examples of the ongoing and changing legislative barriers facing greater RE implementation today.

It is important to note that as individual countries have their own unique set of macro-economic conditions along with other historical and political considerations, there is no "one size fits all" policy framework (Shukla et al., 2013). Given the unique history of Parihaka and its status as a papakāinga there are various individual considerations that must be applied, although lessons can certainly be learned from nations with high levels of community owned RE systems.

Looking at the US market, for example, the importance of tax incentives, namely the Production Tax Credit for wind and the Investment Tax Credit for solar, is clearly recognised with Bloomberg New Energy Finance estimating that the recently agreed five year extension

to these schemes could lead to a further $73 billion in wind and solar investment from now until 2021 (McCrone et al., 2016). Moreover, Japan was, in 2015, the largest small distributed power market in the world, largely due to the sustained, generous FITs and reduced solar PV costs (McCrone et al., 2016). In contrast to this, examples of a drop in investment directly resulting from policy uncertainty can be seen from France and Italy with investments down on the previous year due to cuts and uncertainties in FIT support (McCrone et al., 2016).

Also in contrast to Japan and other countries, New Zealand is weak on policy support that encourages small investors, such as farmers and communities to enter the wind and other renewables generation sector (Schaefer, Lloyd, & Stephenson, 2012). The UK was similarly restrictive until they implemented a FIT in 2010 (Schaefer et al., 2012). The UK Government announced further support for community projects in 2014 which included the following; widening the definition of community organisation to allow a wider group of people access to the community provisions in the FITs scheme, provisions to allow more time for community energy projects to raise funds and engage the local community, and exemptions that help reduce up-front costs and make it easier to own individual assets (UK Department of Energy & Climate Change, 2015).

Research has found that before the introduction of the FIT community energy projects had no reliable source of income and that the FIT now provides this crucial component, greatly increasing the chance of project success (Nolden, 2015). When asked if they would be interested in personally investing in RE if a FIT was introduced in New Zealand, 43% of the Parihaka survey respondents said they were not sure with several commenting that they did not know enough about the policy (a list of the areas where survey respondents stated that they needed more specific information is included in section 6.1). Therefore, if a FIT is introduced it should be accompanied by an information campaign providing the public with sufficient knowledge of the policy in order to make an informed decision.

7.1.4.3. Subsidies

Analysis undertaken by the International Renewable Energy Agency (IRENA) and the Global Wind Energy Council found common elements among the more successful countries in terms of wind energy implementation. These elements were; a clearly designed support scheme, long-term political commitment, and sufficient remuneration allocated to enable investor profit and therefore reduced risk (Shukla et al., 2013). It has been argued that in addition to or in the absence of such direct policy support for renewables the best support they could receive is for the government to remove subsidies for fossil fuels to remove the unfair advantage they have long held (Schaefer et al., 2012). It was estimated by the IEA that as of 2013 global consumer subsidies for fossil fuels were US$548 billion annually, which was roughly four times the amount of financial support for RE at US$121 billion (Ministry of Foreign Affairs and Trade, n.d.).

With regard to New Zealand, the government provided NZD$84.92 million in fossil fuel subsidies in from 2012 to 2013, up from NZD$40.59 from 2008 to 2009 (WWF New Zealand, 2013). The government has recognised that such subsidies are counter-productive to the push for greater RE implementation and has taken a leading role in pushing for fossil fuel subsidy reform (MFAT, n.d.). New Zealand are members of the informal Friends of Fossil Fuel Subsidy Reform (FFFSR) group and along with Costa Rica, Denmark, Ethiopia, Finland, Norway, Sweden and Switzerland, are aiming to encourage G20 and Asia-Pacific Economic Cooperation (APEC) leaders to phase out these fossil fuel subsidies (MFAT, n.d.).

Even without an existing FIT in New Zealand, however, the electric lines industry is arguing that solar is overly incentivised and lines company Unison is pushing for further costs to be applied to users of these technologies in order to help cover the cost of the lines infrastructure which they use (Radio New Zealand, 2016). This is happening globally and is causing friction between utilities and customers, with utilities arguing that owners of solar generators are not paying a fair share of the cost of maintaining and operating the national grid (McCrone et al., 2016). Last year, the Nevada Public Utilities Commission increased the grid service fixed charges for solar owners, directly impacting on the solar operators and dramatically reducing the affordability of solar power (McCrone et al., 2016). Such moves are directly in contrast with national goals of increasing RE generation and are a major institutional barrier that must be overcome.

7.1.4.4. Competition within the current market structure

Existing knowledge in the field has made clear that wind energy can provide good quality, affordable energy with almost zero GHG emissions (IPCC, 2011; Snyder & Kaiser, 2009). New Zealand has an excellent source of wind energy, due largely to its location in one of the atmospheric circulatory zones. This area contains prevailing westerly winds, known as the Roaring Forties, which provides significant wind energy generation potential (Parliamentary Commissioner for the Environment, 2006). Specific evidence of the significance of this resource in New Zealand can be seen by the fact that the recently dismantled Brooklyn wind turbine in Wellington once set a world record for electricity generation for the size of the turbine (Meridian Energy, 2016; NZWEA, 2016). New Zealand has capitalised on this resource with 19 wind farms either in operation or under construction. Combined, these farms have an installed capacity of 622 MW, capable of supplying roughly 5% of the annual electricity generation in New Zealand (NZWEA, 2015).

A 2010 strategy published by the Bioenergy Association of New Zealand identified bioenergy potentially supplying more than 25% of New Zealand's estimated energy needs by 2040, including a 60% increase in biomass for heat production (IEA, 2010). Similar huge potential exists for solar power generation in New Zealand (IEA, 2010). It is, however, only in the developmental stage of utilising these resources for electricity generation, and as we can

see from Figure 13 below, wind contributed to 5.2% of electricity generation in 2014, Bioenergy 1.5%, and solar a negligible amount (MBIE, 2015a).

One possible reason for this is the already high level of mature RE infrastructure for both hydro and geothermal energy in the country. Together, geothermal, hydropower and small-scale wind farms provided an estimated 65% of net electricity generated in 2009 (Krumdieck, 2009). With RE already making up a higher percentage of the electricity supply than most other countries in the world there is significant competition for a place on the grid which can hinder the development of newer sources (IEA, 2010; IPCC, 2011).

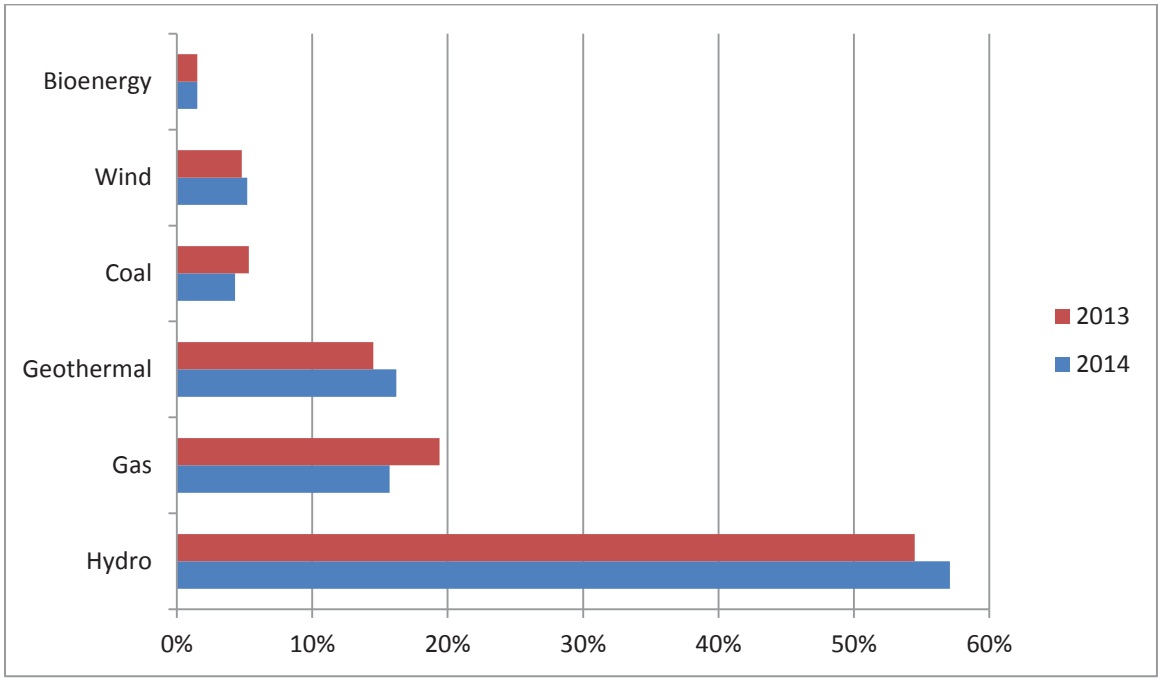

Figure 13: Electricity Generation by Fuel Type, 2013 and 2014 years

Source: (MBIE, 2015a)

Further to this point, as New Zealand's electricity market is made up of five major generators (Meridian Energy, Contact Energy, Mighty River Power, Genesis Energy, and Trust Power) who are also retailers, it is difficult for investors in small generation systems to get power purchase agreements (MBIE, 2015b; Schaefer et al., 2012). As these five companies are in competition with each other further entrants would provide even more competition and therefore, the emergence of small investors would not be considered as being in their best interests (Schaefer et al., 2012). This is, therefore, currently an institutional barrier with well-established RE infrastructure making it hard for new entrants.

In order to counter this barrier trading will need to bypass the conventional power purchase agreements used by small systems. Peer to peer trading is one such medium that can bypass the need to sell to the major generators. This trading system permits an individual with surplus energy generated from solar power or from batteries to sell excess energy to

someone else, bypassing the traditional electricity retailer and this has recently been trialled in Auckland (Mitson, 2016). With the trialling of such systems in Auckland along with the vast New Zealand RE resource and the clear global wave of RE transition and momentum evident from McCrone (2016) this should be viewed as an exciting opportunity for Parihaka specifically and New Zealand in general.

7.1.4.5. Resource Management Act (RMA) 1991 (and amendments)

A major hurdle for many wind farms has been complying with the Resource Management Act (RMA) 1991 and this has caused long delays and even curtailment of proposed projects (Schaefer et al., 2012). The reason for such delay is that once consent to build a wind farm has been granted by the local council, anyone who has made a submission against the scheme can appeal the decision to the NZ Environment Court, resulting in a time consuming and costly decision-making process (Schaefer et al., 2012). Interestingly, however, findings have shown that small-scale projects do not meet as many barriers, finding few delays (Schaefer et al., 2012).

The RMA does pay specific attention to Māori owned land and the duty owed by District Councils in the protection of this land. Section 6 of the plan outlines the need to recognise and provide for the relationship and traditions Māori have with their ancestral lands, water, sites, wāhi tapu (sacred objects and areas), and other taonga (prized possessions). This section also calls for the need to protect historic heritage from inappropriate subdivision, use, and development and to also protect customary rights (South Taranaki District Council [STDC], 2015b). Further to this, Section 7 of the Act requires the Council to ensure that kaitiakitanga, and the ethic of stewardship are firmly considered in all plans and also that the use and development of natural and physical resources is done so in an efficient manner (STDC, 2015b).

It is evident from these examples that the RMA does firmly consider the uniqueness and deeply entrenched traditional values of Māori owned land and should not be considered an institutional barrier in that regard. With such considerations and the aforementioned point that the RMA does not present a barrier for small-scale projects it should not pose a significant barrier for Parihaka should the community decide to implement this project.

7.2 Overcoming barriers and potential opportunities in New Zealand

The barriers facing any potential energy system at Parihaka are clearly manifold and it is important to note that key amongst these barriers could be the initial cost, widely acknowledged as being the greatest barrier for small-scale, local owned RE projects (Schaefer et al., 2012). The potential for RE industry growth can increase with a larger investor pool with greater access to investment capital (Barry, 2007). By 2004, Denmark had roughly 150,000 investors in its wind industry, largely due to the high level of community

ownership (Barry, 2007). Committed and progressive policy support was crucial to this success with the main driver being the firm government commitment to addressing climate change and attaining energy independence (Shukla et al., 2013).

The policy framework which allowed the Danish wind industry to grow included; a developed and constantly improved permitting and siting process, ensuring priority grid access for wind energy, and long-term development targets (Shukla et al., 2013). Germany, another country with high RE implementation rates, had similar policies in place to achieve this growth with the addition of a long-term FIT and local and regional banks making finance available for such projects (Shukla et al., 2013).

A closer look at these two world leaders in wind power development shows very high levels of locally or co-operatively owned projects. In 2012, 47% of RE projects in Germany were owned by citizens or co-operatives (Morris & Pehnt, 2015). Denmark showed that it had even longer established co-operative wind turbine ownership as early as 2001, when there were over 100,000 families involved in cooperatives that had installed 86% of the country's wind turbines (Shukla et al., 2013). From an early stage, information about establishing commercial schemes is circulated throughout the local area by project supporters and local agents for wind power generators allowing the local population to make fully informed decisions on the project and whether or not to get actively involved (Toke, 2005).

Crucial to the success of these schemes is again government assistance, this time in the form of tax incentives for investors (Toke, 2005). Specifically crucial for Denmark was the large subsidies for its nascent wind industry as early as the 1970's, including the FIT system and generous subsidies for research and development (R&D) (Shukla et al., 2013). Subsequent comprehensive reform of the electricity sector, the use of environmental taxation and ongoing policy updates ensured that the required support was available to progress the industry (Shukla et al., 2013).

However, despite the clear importance of government support for an increased uptake of locally owned RE generation a big part of the European wave of implementation was a "bottom up" local drive (Toke, 2005). Local individuals and groups initiated the schemes and with the assistance of outside consultants circulated required information to educate the population and progress the project from an idea to a working scheme (Toke, 2005).

Such experiences can give confidence to groups in New Zealand and show them what is possible with a concerted community effort. Moreover, this clearly shows the influence policy that facilitates community ownership can have on overall investment patterns and should be pursued. A common argument against greater RE implementation is perceived higher costs than fossil fuels, however, with developing nations investing more in RE in 2015

than developed nations the notion that these energy sources are a luxury can be conclusively dismissed (McCrone et al., 2016).

As noted by Armstrong (2009), the rural communities in New Zealand who are taking a communal approach to energy management exhibit similar characteristics which allow for this approach to work. Individuals in these communities tend to have a shared vision and a commitment to realising this vision. They also tend to have issues receiving affordable electricity services and have access to plentiful local RE sources (Armstrong, 2009).

Due to the historical land confiscations and urbanisations Māori became increasingly disconnected from their ancestral land (Badham, 2011). Forced removal and subsequent destruction of homes and cultivations had this effect on Parihaka also. However, the current projected repopulation and resurgence of the community suggests a strong commitment to regaining its identity. The Parihaka community's kaupapa of being a world leader in peaceful coexistence of people with its environment suggests that the individuals here also have a shared vision and commitment to achieving this (Anon, 2015; Massey University, 2014). The community also has issues with affordable electricity and due to the expected large increase in population is under pressure to meet electricity demand. Furthermore, as can be seen from the initial research for the Taiepa Tiketike project, Parihaka does have significant RE potential. This would suggest that Parihaka shares many of the characteristics that enabled these other rural communities to implement a communal energy management approach and, therefore, may be similarly suited to this model.

The Blueskin Wind Project, outlined in section 3.7, provides an excellent example of a community driven project aiming for community ownership, for Parihaka to learn from. This project originated in a similar fashion to the Taiepa Tiketike project, with informal discussions in a community meeting that subsequently led to a big vision and an active project (Blueskin Resilient Communities Trust, n.d.). While not anticipating a similar population increase to Parihaka it shares some similar aims, such as the generation of clean local electricity to contribute to the goal of sustainable development and to generate income that can be reinvested into further local development.

This project is a good indication to Parihaka that, while it can be a long and difficult process, it is possible for a small community to turn a locally inspired idea into a project that can be a significant source of community pride. The resilience shown by Blueskin Energy Limited, despite the initial rejection for resource consent, provides a strong example of how the will of the people can overcome various significant barriers and can provide motivation for Parihaka to overcome the barriers it will face.

The papakāinga set-up at Parihaka brings with it a great opportunity for solar PV. Non-papakāinga houses can change ownership regularly and as solar PV panels can have a

payback period of roughly five to seven years house owners and landlords may be reluctant to invest in one if they are unsure if they will remain the owner of the property this long (Ison & Mey, n.d.; Sustainable Electricity Association New Zealand, 2015). With papakāinga housing being multiple-owned property it does not change hands often and residents tend to remain there long-term and see the value in forward thinking, thus, increasing the likelihood of interest in investing in solar PV. It will also be interesting to note if community ownership of such infrastructure can help reinforce the community's identity through shared responsibility and standing together.

7.2.1. Overcoming Barriers to Papakāinga Development

It is recognised that there are multiple approaches needed to overcome the barriers blocking development on Māori land due to their complexity (Newlove, 2016). Whangarei District Council are currently proposing a Papakāinga Plan Change (94B) for public consultation, which would remove the requirement for resource consent for development on Māori freehold land administered under Te Ture Whenua Māori Act. While these changes would certainly go some way to removing unnecessary bureaucracy out of developing on Māori land, WDC is aware that there remain further barriers that need to be addressed, such as the difficulty in obtaining loans, previously mentioned in section 7.1.3 (Newlove, 2016).

Kake (2015) discussed this further and explained how local government bodies are responding to the various and diverse needs of Māori landowners by designing progressive zoning for papakāinga and Māori purpose in districts across the country. WDC has implemented policy which aims to support whānau through the consenting process, by assisting them with GIS constraint mapping and other techniques, and which only requires an Outline Development Plan as opposed to a standard Resource Consent application. The council have also introduced plans to simplify the regulatory processes and work more closely with landowners to ensure papakāinga development plans that reflect their aspirations, rather than solely comply with the current requirements of district and regional plans, are accommodated.

The aim of revamping this whole process is to emphasise the importance of learning as opposed to compliance and to facilitate papakāinga development in an open and collaborative manner that ensures the sustainability of the area and natural and physical resources (Kake, 2015). In doing this, WDC are clearly adopting kaupapa and Mātauranga principles regarding the development of Māori land and have set a strong example for other local governments to follow. This is an example of the opportunity that can arise due to institutional change and assistance. The opportunity in this case being the support to develop the papakāinga how they want it and in a way that reflects their aspirations. By working with STDC this system could be an important step in a long line of discussions to develop Parihaka how the community want it to be developed.

Rolleston and Awatere (2009) conclude that it is possible to increase participation of Māori in all aspects of urban planning by following their proposed set of nine Māori principles and values with regard to papakāinga design plans. They outline that these specific principles are not only applicable to all aspects of urban planning but to many other areas of development also. Development of infrastructure for the RE systems proposed for Parihaka must consider these principles in order to reflect Mātauranga and Māori values and acknowledge the different planning approach that papakāinga land requires. A summarised version of the set of nine principles and values proposed by Rolleston and Awatere (2009) are as follows;

1. ***Whānaungatanga*** - Whānaungatanga refers to membership and participation within communities and that the design of the spaces within the settlement should encourage the community to make social and environmental connections and not isolate or segregate any community members.
2. ***Kotahitanga –*** From a design perspective kotahitanga encourages spaces and environments that are in harmony with their surroundings. Physical spaces must be designed in a manner that links and connects people with one another and also with the environment. It is vital that cross-cultural and multi-disciplinary knowledge collaboration is employed and Māori values and perspectives are understood. With this regard it is imperative that any new infrastructure does not disrupt the surroundings and community input is sought throughout the design process.
3. ***Wairuatanga –*** From a design perspective Wairuatanga refers to the personal connections people make with physical and natural spaces and subsequent bond that can form with the environment.
4. ***Mauritanga –*** This comes from the word mauri, meaning life force, and considers communities to be animate environments. This stresses the need for design to account for the presence of the existing mauri of an environment, and that no development should take away this.
5. ***Orangatanga –*** This refers to health and well-being and the role that the structure and design of physical environments can have on this. Design can impact both positively and negatively on the well-being of the immediate community and it is important that new infrastructure does not hinder social, cultural, and environmental interaction for people in the immediate area.
6. ***Manaakitanga –*** An important aspect of Manaakitanga is to have the ability to protect inhabitants of the community and to provide a hospitable and kind environment. Any design changes must not impact on this ability as it is an important cultural tradition for Māori.
7. ***Kaitiakitanga –*** Sustainable management of the natural environment is at the heart of this principle and any planning must consider the importance of protection and conservation of natural assets and also allowing for and providing for its use and development.

8. ***Rangatiratanga –*** This principle is very applicable to Mātauranga and kaupapa Māori research values as it seeks to promote recognition and acknowledgment of the significant contributions that utilising traditional Māori knowledge and a Māori world-view can bring to the design and planning phase. Rangatiratanga is about strengthening the rights of indigenous communities to play a key role in these phases of development and is something that the Taiepa Tiketike project considers a priority.
9. ***Mātauranga –*** Mātauranga, as previously discussed differs greatly from traditional western views and recognises the importance Māori culture places on oral traditions and cultural and heritage values regarding specific areas and resources. This principle advocates for the consideration of these values when designing or planning developments in the local area.

7.2.2. Papakāinga Development Considerations specific to Parihaka

As noted in section 3.2, papakāinga developments are increasing in number throughout New Zealand and many council's now have specific housing policies to accommodate such developments in the district (Badham, 2011). The South Taranaki Regional Policy statement directly targets increased support for the development of marae, papakāinga and kaumātua (elders) housing in addition to a focus on the protection of historically and culturally important sites to iwi and hapū (STDC, 2015b). Even more significant to this policy is the Environmental Management Plans prepared by Ngāti Ruanui in 2012 and Ngā Rauru in 2013 which will be taken into account under Section 74 (2A) of the RMA for the purposes of the District Plan Review. These plans include a range of topics, including Whakahoutanga, which relates to RE and conservation and have led to a series of new proposed objectives (STDC, 2015b).

One particularly important example is objective 2.13.8 which is:

> *"To recognise and provide for development by iwi and hapū that enhances their social, cultural and economic well-being in a way that achieves sustainable management of the environment"* (STDC, 2015b).

Within this objective is a policy specific to Parihaka whereby Policy 2.13.20 is to:

> *"Identify the Parihaka Cultural Area and recognise its historical and cultural significance to Tangata Whenua and the community, by providing for development and a range of activities based on the needs and values of tangata whenua"* (STDC, 2015b).

With the sustainable development of the current energy system and infrastructure in Parihaka key to accommodating the expected population increase such policy support will be invaluable.

Clearly recognising the importance of this support for Parihaka, STDC has directly consulted and engaged with the PPT regarding its long-term 30 year plan to develop 300 houses and other community facilities to accommodate the increased population. In addition to the houses, a community centre or museum, arts and craft shop, community garden, produce market, and a school have all been proposed, along with a community (Trust) owned water treatment and sewerage facility (STDC, 2015b).

Parihaka Papakāinga Trust specified certain matters that it would like considered through the District Plan review, including exemptions from some rural zone provisions and a Limited Notification clause for resource consent for on-site servicing and the council have specifically stated that it plans to facilitate and respond to the aspirations Parihaka has for the future (STDC, 2015b). The fact that the District Council is actively engaging in these consultations and considering provisions that are in the best interests of the Parihaka community is a promising sign that local institutional barriers to developing this RE system can be overcome through collaborative engagement between the council and the community.

In order to make informed and robust decisions such as implementing a new development, it is important to have access to quality information, including knowledge sharing between local government, infrastructure developers, and iwi/hapū (Awatere, 2012). Sharing of plans, rules, policies and guidelines can facilitate a mutual understanding and create a beneficial outcome for all parties involved (Awatere, 2012). Taiepa Tiketike can provide PPT and Parihaka with quality information and tailored research to help make an informed decision on development in their community which is consistent with recommendations from Awatere (2012) and can provide assistance for effective development planning and design using Mātauranga Māori methods.

7.3. Specific Policy Tools to overcome barriers

New Zealand is one of the most transport fuel dependent countries in the developed world and also has one of the highest GHG emitting economies per capita, due to the focus on the agricultural industry (Krumdieck, 2009). The agriculture industry was the highest GHG emitting sector from 1990 to 2009 and in 2008 accounted for 46.6% of total national emissions (IEA, 2010; Ministry for the Environment, 2011). The New Zealand economy is heavily reliant on this sector, with various primary commodities, such as dairy, meat, fish and fruit making up around half of the country's exports (IEA, 2010; MBIE, 2016). This reliance requires a policy approach tailored to New Zealand along with buy-in from the agriculture industry, community acceptance, and public and industry education and information schemes, if emissions are to be reduced without harming the economy.

Government grants to help cover the cost of feasibility work and assistance sourcing project finance could be of great benefit to Parihaka and community projects in general. Social

lenders are available in some countries and there is a public development bank in Germany which provides very low interest rate loans (IEA-RETD, 2016). Increased government efforts to ensure policy certainty can also facilitate an easier financing process with the knowledge of long-term support, for example, assurance that they can secure certain levels of subsidies if the project is completed by a certain date (IEA-RETD, 2016).

Governments can provide further assistance by providing government paid development experts, “how to” guides for community use, standardised legal contracts to reduce legal fees, and clear advice on what different legal community entities can do (IEA-RETD, 2016). Such revenue and development stage support can enable community RES projects to better compete with commercial developers and generate the various additional social and economic benefits associated with community projects (IEA-RETD, 2016). Below is a review of some of the policy instruments that can overcome these barriers and Figure 14 is a graphic representation showing how these policies can combine to combat the barriers facing RE system implementation.

7.3.1. Feed-in Tariff

Feed-in tariff (FIT) systems generally work by requiring electric utilities to pay a specific fixed price per kWh for all renewable generated electricity purchased. These can have different requirements depending on the country it is implemented, with Germany, for example, previously requiring energy supply companies to pay 90% of the average price of electricity charged to final consumers in the previous year when purchasing renewable generated power (Butler & Neuhoff, 2008).

Schaefer et al. (2012) assessed the suitability of a FIT for wind energy in New Zealand and a lot of the points made could be applicable to other renewable sources also. As part of their research the authors spoke with Scott Willis, project manager for the small community wind energy project at Blueskin Bay, Dunedin and he noted that there were no policies currently in place that would enable individuals or even communities to invest in wind energy. He went on to explain that he felt there was a distortion in policy that greatly favoured large scale corporate investment and for small community-owned projects to work there would need to be policy change in the form of a FIT. This would allow for guaranteed prices for the energy generated which would make getting bank loans to fund the projects easier.

While the New Zealand government have implemented policy assistance, in the form of a ban on new coal and gas generation and a national emission trading scheme, both were either removed or significantly weakened in 2008 with the introduction of a new governing party, showing a lack of commitment and resolve from the government (Schaefer et al., 2012). There is a clear trend amongst the leading countries for wind energy implementation where they have all benefitted from targeted RE policy support schemes. The leading choice of policy support is the FIT and interestingly quite a few of the more successful countries chose a modified FIT model known as Premium FITs (Schaefer et al., 2012). This version

provides wind energy producers with an hourly market price for electricity on the spot market and an additional premium, giving them a higher payment when market prices rise and lower when they drop (Schaefer et al., 2012).

Some of the reasons given in support of a FIT by respondents in Schaefer et al. (2012) include; increased competition, the ability of individual investors to participate in electricity production, and promotion of small-scale, local owned projects, which was the preference over large-scale projects. A policy that directly encourages and enables local ownership by residents and community members would be of huge benefit to Parihaka and as this project progresses it could spur on further communities to initiate similar projects.

It is not surprising that a significant amount of the opposition to FITs come from large electricity companies and governments that firmly advocate a "free market" economy, as these are organisations that could stand to lose out on profit if this tool was put into place (Schaefer et al., 2012). As the New Zealand government is a majority stakeholder of three of the five electricity generators (Genesis Energy, Mighty River Power and Meridian Energy) it may not deem the FIT as being in its best interests in terms of profit from the existing electricity market structure (MBIE, 2015b). This should not be considered as a reason against implementing a policy that has proven to be effective as the transition to RE, to reduce harmful emissions and combat climate change, is far more important than individual company profits.

Overall, the introduction of a FIT in New Zealand could remove the barrier of not receiving a high enough price for electricity sold back to the grid and as this policy tool supports small-scale projects it would indirectly reduce the barrier of obtaining resource consent (Schaefer et al., 2012). Furthermore, if FITs could be implemented at city level as opposed to a national level it could greatly increase installations, helping to alleviate high spot market electricity prices when hydroelectricity supply is low (White, Lloyd, & Wakes, 2013). In addition to this, it could reduce grid transmission costs and increase grid resilience as generation could be sourced close to the point of use (White et al., 2013). Therefore, if the government are in fact taking the solely economic view of immediate profit over the long-term view of mitigating climate change and environmental degradation through, amongst other methods, increased RE generation then it is contradictory to the message it is portraying to the public and must be remedied.

7.3.2. Renewable Obligation Certificates (ROCs)

Despite contrary belief, Renewable Obligation Certificates (ROCs) can actually be more beneficial for co-operative project ownership than non-co-operative, as was the case with the UK Renewable Obligation (RO) scheme (Toke, 2005). The basis of this policy tool is to encourage electricity suppliers to meet a specified minimum proportion of their power generation from renewable sources and can be set to increase each year (Toke, 2005). Power generators have two income streams under this scheme, one from the sale of the

actual electricity and another from selling the ROCs they earn per MWH of electricity they generate from renewables (Toke, 2005).

The scheme is not without flaw in that fines handed out to suppliers who fail to meet their renewables quota and are passed on through the market to those who do meet their quota, somewhat eliminates the incentive to avoid missing the quota (Toke, 2005). This does not, however, affect co-operative power projects as they generally work on short-term contracts with the option to renew and these shorter contracts can ensure a higher wholesale electricity price and higher valued ROCs for generators (Toke, 2005). This policy tool, therefore, may greatly incentivise an uptake of co-operative owned RE projects if implemented by the New Zealand government. Moreover, if this policy can be established alongside a FIT then, with a guaranteed price for the electricity sold, investors would be more protected which could facilitate more assistance from the banks and encourage community participation.

7.3.3. Policy Plans specific to Parihaka

South Taranaki District Council recently produced the Proposed South Taranaki District Plan 2015, as a result of a review of the Operative South Taranaki District Plan 2004 (STDC, 2015a). The Section 32 report of the proposed plan recognises the importance of enabling Māori to "provide for their cultural, economic and social well-being whilst ensuring the sustainable use of this land" (STDC, 2015b, p. 18). This report recognises the need to allow for a wide range of activities by iwi and hapū on key sites in order to achieve this (STDC, 2015b).

With Parihaka being one such key site, and RE generation seen as key to ensuring the sustainability of the community and surrounding land, the South Taranaki District Plan must contain policies that facilitate the development of these technologies. The District Council have recognised that a more collaborative working relationship with iwi must be established and proposals have been made for the revised District Plan to include policies and methods that ensure iwi have a bigger involvement in the decision-making process from an early stage (STDC, 2015b).

There may be some initial resistance to this as catering for the expected population influx to Parihaka will require much broader infrastructure for sewerage needs, roading and more, which can create a financing issue for the council. It is vital however, that the government acknowledges research that highlights the counter-intuitive nature of using a solely economic view when assessing the potential benefits of a community RE system (Armstrong, 2009). If these stated aims can be sufficiently put in to practice and the New Zealand Government take into account discount rates for investment and policy to support these systems, such as Gross Feed-in-Tariffs, then this barrier could turn in to an opportunity (Armstrong, 2009).

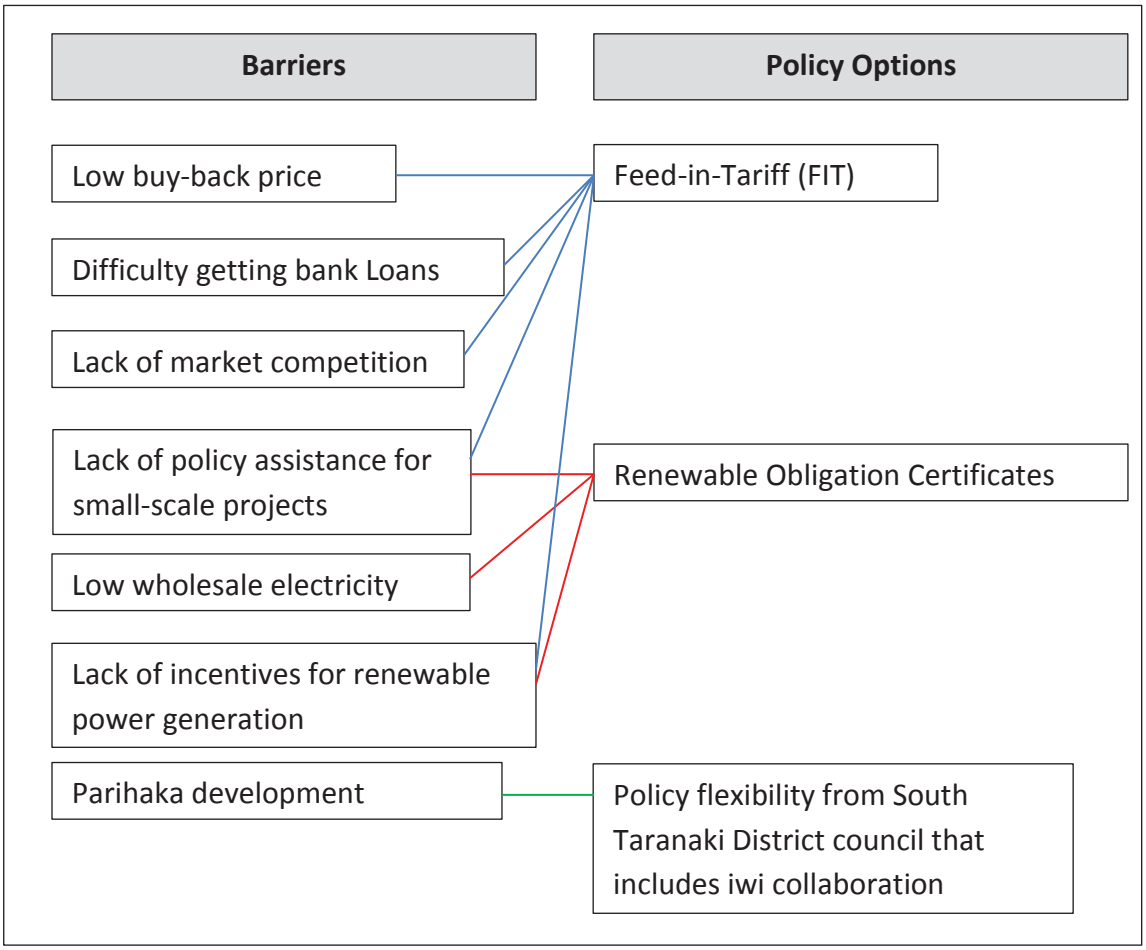

Figure 14: Barriers facing community RE systems and policy solutions

7.4. Potential opportunities community-owned renewable energy can bring to Parihaka

7.4.1. Economic Opportunities

During the first focus group held at Parihaka it was noted by several community members that they felt they had become economically dependent on the current energy system consisting mainly of fossil fuels and gas. It was felt that Parihaka was historically an energy producer, with an onsite hydropower system from as early as 1899 and a history of using locally sourced firewood. The community members now felt that they had become heavily reliant on consumerism, losing its independence, and leaving it at the mercy of the current system. This is an issue of great concern for the community but there is now an opportunity to move away from this with an onsite RE system which can provide financial benefits for the community from a reduction in energy imports. Furthermore, a community owned energy system could allow for pooling of financial resources to establish the system and also potentially benefit from economies of scale.

The overarching economic opportunity here is to implement a system that can be established at a reasonable and affordable upfront price and that can be an ongoing source

of economic saving and source of revenue from energy generation. Renewable energy projects often create more jobs than conventional energy production, with one study finding that wind power and solar PV create 40% more jobs per dollar than coal production (IEA-RETD, 2016). Community projects are stated to offer 12-13 times as much community value re-vested into local areas as 100% commercial models, which can help ensure that some of the money generated by the system stays within the community, stimulating the local economy (IEA-RETD, 2016).

The knowledge in energy efficient practice gained by the community throughout the Taiepa Tiketike research has been noted on several occasions by community members. They feel there is an opportunity for significant economic savings from more efficient use of energy in individual homes and also at the Rā and other community events, where a large amount of energy is used.

There is also the potential to increase ecotourism in the community as a result of any potential energy system. Prinsloo (2013) cited examples from Denmark (Horns Rev) and the UK (Scroby Sands) where RE structures have become a tourist attraction in themselves, increasing local tourism numbers and subsequently boosting the local economy. The local economy can be boosted in various ways through increased tourist numbers, with increased commercial activity in places such as; on-site museums, information centres, cafés and restaurants. This has been a topic discussed in some of the workshops and focus groups and one that the community have shown a strong desire to get involved in. Eco-tourism was stated to be one of the biggest opportunities that could emerge from this system by one of the interviewees who highlighted the educational importance of it.

> *"The system would give work for some local people, preferably young people with some older people there for guidance. It could also bring in people who want to see it operating, so tourism…….it is educational and is very much like getting back to basics, eventually"* (Interviewee 5, 2016).

7.4.2. Social Opportunities

One option Parihaka has regarding this RE system is to install micro grids within the community to distribute on-site generated energy but also retain some connection to the local network as a back-up. As RE is intermittent, retaining such a connection for use when the renewables are not generating could produce a very reliable, resilient energy system that will still give some autonomy to the community. There are also options for individual ownership, such as solar PV panels on individual houses and community ownership, such as a wind turbine to feed energy into houses in the community. These options provide ample technical opportunity for Parihaka to utilise cutting edge technical infrastructure to help realise the goal of being a progressive, innovative community.

The presence and daily use of new technology and ideas can produce a significant opportunity for the local community to learn and experience such technology in action, further enhancing the possibility of an innovation hub developing. It was noted in the first focus group that generating your own energy connects and centralises it to the community. One participant exclaimed that it may be cheaper to just go to the supermarket and buy your food rather than invest in your own garden and grow your own food, but long-term the benefits of a well maintained and prosperous garden are much better for the community. This participant felt that such investment and effort would provide a source of social pride and esteem amongst peer communities, and it would be the same with energy generation. The Parihaka philosophy is about empowering the community, creating an innovative papakāinga and ensuring it is in control of its own destiny and many respondents in the focus group see the current system as confining them to being solely consumers, whereas the new system can provide the opportunity to be producers also.

When asked what they see as the opportunities arising from the knowledge from the Taiepa Tiketike research and implementation of the RE system, 69% of survey participants saw increased independence from external electricity suppliers as the greatest opportunity, further emphasising the desire for greater autonomy. Greater energy autonomy was something that was mentioned regularly by participants in the focus groups as well, who felt that this could be a major benefit of the project and would facilitate a move away from the current reliance on market principles and policy.

The second most identified opportunity was an increase in community awareness of and involvement in sustainable practices, which was a specific aim of Taiepa Tiketike, and the third most selected option as being the greatest opportunity, was a chance to sample innovative technology. These results highlight the great significance the Parihaka community place on social development. Financial gain is clearly not at the forefront of the community mind when considering this system and the emphasis on learning and empowerment is evident.

7.4.3. Cultural Opportunities

Cultural relevance emerged as a strong topic of conversation throughout the workshops and focus groups with many cultural opportunities identified by participants. The new energy system presents the opportunity to tune into the old aspirational and inspirational Parihaka and continue the legacy of Tohu and Te Whiti by using innovation to improve the community life and sustain it long-term. This RE system can establish a base to tap back into this collective, innovative way of thinking and become a source for knowledge transfer, allowing Parihaka to reclaim its position as an inspirational community which other iwi consult to better their community.

It was well noted in the focus groups that this project was seen as a major step towards educating, training and getting the community to think more about sustainable practices to

meet the kaupapa of sustainable living and peaceful coexistence. This education could also extend outside the community with promotion of school and other educational tours. This provides a great opportunity for people of all ages to visit a working RE system and learn about this technology and also about sustainable living. Such potential was highlighted by one of the interviewees who felt that this opportunity could in-turn help promote learning about the history of Parihaka and help to achieve the goal of more Te Reo influence in youth.

7.5. Potential Benefits of Community-owned Renewable Energy in Parihaka

7.5.1. Environmental Benefits

Globally, one of the most talked about dangers facing humanity at the moment is climate change and the call for action to combat this has never been higher. The Paris Agreement, which was adopted to the UN Framework Convention on Climate Change in December 2015, has the objective of limiting global temperature rise to as far below 2 degrees Celsius as possible (United Nations News Centre, 2016). In April 2016, this agreement was signed by 175 world leaders, which UN Secretary-General Ban Ki-Moon remarked was the highest number of countries to ever sign an international agreement on the one day, clearly showing how serious the international community is about taking action (United Nations News Centre, 2016). Global general consensus is finally starting to emerge regarding RE implementation being the key to effectively reducing these greenhouse gas emissions, mitigating climate change and achieving a sustainable global energy system (Moomaw et al., 2011).

The impact of climate change will be significant and will affect many aspects of everyday life. It has the potential to greatly alter regional food yields and to disrupt fisheries affecting food supply, people's livelihoods and displace populations (McMichael, Woodruff, & Hales, 2006). It will also increase the frequency and severity of extreme weather events while also making them more widespread, with sea level rise and storm surges affecting certain species and coastal land (McMichael et al., 2006). These problems are on a global scale and greater RE implementation is necessary to help meet this international target.

On a local level an RE system can reduce the amount of fossil fuels used for energy needs and significantly reduce the health effects associated with the burning of these fuels. The World Health Organisation international Comparative Risk Assessment project of WHO (WHO CRA) estimated that roughly 36% of DALYs (disability-adjusted life years) lost from lower respiratory infections were caused by indoor smoke generated from burning biomass and coal (Wilkinson, Smith, Joffe, & Haines, 2007).This WHO project further linked indoor air pollution with tuberculosis, low birth weight, cancer, asthma and heart disease highlighting the necessity for immediate action to this issue (Wilkinson et al., 2007).

These issues are certainly a concern for the Parihaka community which they believe can be somewhat addressed by a greater focus on RE. Thirty percent of survey respondents felt that improved local and domestic air quality levels, with a reduction in fossil fuel use, would be the greatest benefit to emerge from this system, which was the second most selected response. Health benefits also became an important issue in the interviews with one respondent noting several times that they see huge health benefits to be gained from this system for themselves and their family, which is far more of a priority for them than money.

Bottom-up community-owned energy systems can greatly improve collaboration between local authorities and communities, which in-turn can increase community acceptance. With great potential for this to be achieved in Parihaka, and a stated commitment from STDC to increase iwi involvement in the local planning process, this project can have a far reaching impact on the New Zealand environment. The direct benefit will come from having a greater amount of national electricity generated from renewable sources and a stronger mix of sources to ensure reliability and security of supply. Indirectly, this project can inspire other communities in New Zealand to follow suit, and also show policy makers that this can be achieved on an even greater level with further support.

A stable national energy supply based on low carbon energy sources can ensure national emissions reduction targets are achieved, reducing the associated health and social problems previously discussed. Crucially, this can all be achieved without affecting agricultural yield or profits, showing that vast reductions in GHG emissions need not be at the expense of economic performance.

7.5.2. Social and Institutional Benefits

There is increasing recognition of the importance of community involvement in energy generation with the World Wind Energy Association emphasising the need for this in order to successfully transition from the current fossil and nuclear based energy system to a democratic, emission-free, and sustainable energy system (Schick, Gsänger, & Dobertin, 2016). There are many notable benefits of community-owned wind and RE generators, such as; an easier planning process, increased social acceptance, greater energy autonomy and an overall more equitable system (Schaefer et al., 2012). Community led projects often avoid many planning barriers due to often already having personal links with the local population, making it easier to organise campaigns and communicate with local planning regulators (Toke, 2005). The increase in social acceptance for such projects is clear from Schaefer et al. (2012) where surveyed land-owners stated that they would be more open to providing their land for RE generation to investors other than electricity companies. These results suggest distrust toward the big electricity companies, likely stemming from a steep increase in electricity prices over the years.

It is evident from Ratima (2015) that there is much focus on building social capital for Parihaka from within the community, namely strengthening the relationships among

stakeholders at Parihaka in order to work towards a common purpose (Ratima, 2015). This is something that has been evident from the very early stages of the Taiepa Tiketike workshops and was a key focus of attention throughout the data collection phase. The community feel that the benefits and opportunities from the Taiepa Tiketike research and subsequent system implementation will be significant in terms of social capital which shows how relevant this research is to the Parihaka vision. In addition to this, the community also anticipate an increase in collective community action, enhanced relevance of Parihaka to other groups, and the creation of a positive profile of the community (Ratima, 2015). The Parihaka community has identified such strengthening of external relationships as being among the political benefits they expect to emerge from the implementation of this system (Ratima, 2015).

Key to generating genuine community benefits are the processes and outcomes throughout the life cycle of the project. The process refers to who develops and runs the project, who is involved in the planning and decision making and how open and extensive the consultation process is, and the outcome refers to who the project is for and who benefits socially, economically and spatially from it (Hicks & Ison, 2011). The benefits of community-owned RE projects were found to be closely related to who had the majority of ownership, with higher levels of local ownership resulting in more benefit and development to the community. A good example of this can be seen in the Minwind Energy developments in Minnesota, USA, outlined in section 3.8.

Parihaka can work towards similar project success to the Minwind group and continue to reap the social benefits long after the two-year Massey University and PPT Taiepa Tiketike research has ended. Immediate benefits of the Taiepa Tiketike research, at community level were:

- The employment and training of a local Research Assistant.
- Collaborative workshops and focus groups.
- Formal coursework for a number of students in renewable energy technology, at the Southern Institute of Technology.

At an institutional level, the PPT and the community interacted with the Massey Academic community to solve a scientific and engineering problem with the PPT gaining experience working with academics and vice versa. Provided the community remains committed and unified in terms of planning, Parihaka can utilise this experience to ensure there are many future benefits to be gained. There is the potential to eventually establish Parihaka as a base for manufacturing or installation expertise, in which other regions could model themselves on and enlist their help. An on-site community RE system also has the potential to create more local labour in the form of installation, road improvements, connection to the grid and ongoing maintenance and a Canadian study on community ownership found that it can produce five times more jobs than a project owned by an outside company (Schaefer et al., 2012).

This was duly acknowledged by focus group participants who felt that one of the most important benefits expected of this project was an increase in community employment, both voluntary and paid. Parihaka is a low income community and current employment rates are low with census data showing that the average incomes in the community are below the regional average (Ratima, 2015). Furthermore, Ratima (2015) noted that young people and families are often forced to leave Parihaka in order to seek further education or employment. Therefore, if this RE system does lead to increased employment opportunities then it would have a significant impact on the community from an economic, social and cultural perspective.

It is hoped that throughout the development stage, Parihaka residents will be trained in how to install and maintain the system, which will increase the level of local knowledge and practice of how to live sustainably on the land. Furthermore, it was unanimous amongst the focus group participants that this project had the potential to increase and sustain social skills and build a real and lasting relationship with energy that is used to build community harmony and ensure a social connection is maintained within Parihaka.

7.5.3. Cultural Benefits

The following section outlines the various cultural benefits that can be gained from a community-owned RE system in Parihaka and identifies how this project can facilitate papakāinga improvements, Māori knowledge enhancement, and project experience, which are all crucial cultural considerations. As with social benefits, cultural benefits resulting from this project was a significant topic of conversation in the workshops and focus groups. The participants felt that there were many cultural benefits to be gained, and a major factor in this is the fact that the proposed RE system firmly fits in with the kaupapa of Parihaka.

The first point to be mentioned was that such an on-site system would bring a long-term relationship with the land in Parihaka, and further develop and enhance a strong relationship with the climate that generates the RE. Climate has always been of key importance to Māori, used to frame their existence and past. This project, using the wind, sun and water to power the community is how they can frame the cultural relevance of this project and one participant felt that if their tūpuna (ancestors) had the current technology available to Parihaka now that they would certainly have used it. This was very much echoed in both the surveys and interviews with 75% of survey respondents seeing the greatest benefit of the system as facilitating a long-term relationship with the land and climate that generates the RE. This was significantly higher than the next most selected option at 30% highlighting the passion the community feel for such a benefit.

The societal link with the land would be further enhanced with new housing being planned and built in a way that maximises the RE generation. This connects housing to nature and the environment and with the projected population increase expected to be substantial

there should be ample opportunity to expand this, amongst the existing Parihaka residents and also those newly relocating.

It was noted that while papakāinga blocks used to be common in the Taranaki area, there were now very few functioning papakāinga settlements. The presence of an on-site RE generation system and ongoing development in a sustainable manner can provide a shining example of how to establish and prosper in these papakāinga blocks. Parihaka can once again become a source of inspiration for other Māori settlements and lead the way in a widespread restoration of this form of settlement. The resulting social cohesiveness of increased numbers of functioning papakāinga was seen by the participants as key to restoring the use of Māori language.

Parihaka can also be a source of inspiration for non- Māori communities in terms of what can be achieved when a community takes a collective approach to renewable energy generation and community sustainability.

> *"….the real value is probably the impact on people's attitudes towards renewable energy. Because Parihaka is prominent among many Māori networks and its position of self- sufficiency is reasonably well known, Parihaka has the potential to encourage other communities to utilise RE strategies. More generally Parihaka can potentially demonstrate to the country how a small community can take a collective approach to RE and therefore the impact on reducing non-RE approaches can be more widely reduced"* (Interviewee 2, 2016).

The Parihaka RE system is, therefore, seen as the central component in the drive to realise such community benefits and Interviewee 2 highlighted how important they consider RE generation to linking the past to future cultural goals at Parihaka.

> *"RE systems are cutting edge community development tools and provide Parihaka with a further opportunity to work as a collective. By focussing on projects like RE we are able to represent the legacy of Tohu and te Whiti not as an historic or distant narrative of Crown/Māori experiences but as something that is still alive and engaging with the world we live-in. This challenges what many people think about Parihaka. For us we see Parihaka as an unfulfilled legacy and a responsibility placed on this and future generations to achieve. RE offers us with a contemporary approach to fulfilling the notion of self-sufficiency as was important for our ancestors in the past"* (Interviewee 2, 2016).

7.6. Impacts

7.6.1. Environmental Impacts

Many studies on the impact wind farms can have on birds have been inconclusive or have not indicated a major impact on specific species. Some studies have, however, found that an inappropriate location of a wind farm can have a significant adverse effect on wild bird populations including collision, displacement due to disturbance, and habitat loss (Drewitt & Langston, 2006). Developers for both onshore and offshore wind farms are advised to avoid concentrations of vulnerable bird species where possible and if there is any doubt that concentrations may be present then detailed, long-term environmental impact assessments should be undertaken (Drewitt & Langston, 2006).

Due to the many inconclusive studies in this area more information is needed on the range of long-term potential impacts of onshore and offshore wind farms on birds in order for developers to make fully informed decisions on location and turbine designs. Detailed monitoring and research is crucial throughout the planning and implementation phase and it is essential that local community members, developers, consenting authorities and their advisors gather and communicate such information, once available. Negative impacts associated with the use of wind turbines, such as killing birds and affecting fishing yields are expected to be local and, therefore, of primary interest to the local community. It is important, however, to consider the positive impacts, such as vastly reduced GHG emission levels, which will be felt globally and wind developers are well aware of the need to inform the community of this viewpoint in order to garner support (Berg, 2003; Snyder & Kaiser, 2009).

There have been reports of bird fatalities from collision and being burnt by solar rays from solar heat energy infrastructure, suggesting a similar concern for avian impacts to that of wind turbines (Upton, 2014). However, research shows that, provided sufficient attention is given to the environment during the planning and operation phases, the effects on vegetation, soil and habitat are minimal (Tsoutsos, Frantzeskaki, & Gekas, 2005). Furthermore, while some species, such as birds, cannot be relocated to avoid habitat disruption and some birds may be attracted to certain utility scale solar system infrastructural elements, compared to other anthropogenic impacts on birds, mortality rates have been found to be low for these solar systems (Hernandez et al., 2014).

Large-scale hydropower systems have received wide spread concerns over adverse environmental impacts and issues resulting from small-scale, dispersed systems appear no less serious. These negative impacts include; habitat disturbance due to the interruption of water flow, barriers to animal movement in the water, and increased water loss from evaporation (Abbasi & Abbasi, 2000). Further issues with smaller hydro systems include the need to construct more low-head systems than anticipated due to storage issues, and the

problems of siltation and eutrophication which can be serious with smaller and shallower bodies of water created by mini and micro projects (Abbasi & Abbasi, 2000).

Overall, there is certainly potential for significant environmental impacts from small hydropower projects and also the wind, solar and biomass components of the proposed system, which should rightly be a source of concern for Parihaka. This should not be seen as reason to discard the system but more so to be considered as part of a balanced view of the benefits and shortcomings of RE generation (Abbasi & Abbasi, 2000). This information should be used to reinforce the importance of elaborate environmental planning, impact assessments, rationalisation of site selection and generation of substantial preventative measures to greatly reduce impact levels (Abbasi & Abbasi, 2000).

The “green revolution” of the 1960’s highlighted the pitfalls of only considering the benefits of natural resource development activities without consideration of the impacts. In this case, India was amongst other countries swept by “green revolution”, greatly intensifying agricultural practices without sufficient long-term analysis. The resulting adverse effect on the land, such as, waterlogging, salinization, depleted soil productivity and pollution were disastrous and a direct result of inadequate environmental impact forecasting (Abbasi & Abbasi, 2000).

Not one survey respondent indicated that they felt this system would have an adverse environmental impact and neither did any interview respondent when asked. The topic was raised in two workshops but the ensuing conversation indicated that those present similarly felt there would be little negative environmental impacts, with the overwhelming community feeling being that this system would be of great environmental benefit. Despite the lack of local concern it is crucial that all variables are fully considered, such as, benefits, impacts and the variance of such benefits and impacts due to system scale. Long range, robust environmental impact assessments must be methodically completed to ensure a similar fate to the countries swept up in the “green revolution” does not befall those involved in local RE generation.

It is also vital that the above concerns are fully considered against the alternative continued reliance on fossil fuels for energy generation, which have far more negative impacts on the environment. While wind turbine objectors have expressed concern regarding a threat to avian life in the vicinity this should be considered against the environmental devastation of say an oil spill from an offshore oil refinery. One recent example of such devastation is the Deepwater Horizon offshore oil rig explosion in April 2010, which killed eleven oil workers and released a US government—estimated 4.9 million barrels of crude oil into the Gulf of Mexico (Mendelssohn et al., 2012). Following this explosion crude oil was continuously released into the Gulf of Mexico for 87 days, infiltrating the fragile wetlands of Louisiana's Mississippi River Delta ecosystem, which are responsible for a third of US fish production (Mendelssohn et al., 2012).

The spill created an oil slick that covered more than 112,000 km^2 on the ocean's surface and was found to be toxic to a wide range of organisms; including plankton, invertebrates, fish, birds, and sea mammals (Beyer, Trannum, Bakke, Hodson, & Collier, 2016). Adverse effects on these species included; reduced growth, disease, impaired reproduction, impaired physiological health, and mortality. Furthermore, oil concentrations were found to exceed the toxicity threshold in surface waters, sediments, and marsh habitats in many locations, causing injuries to a wide range of habitats, species and ecological functions over a large area (Beyer et al., 2016).

Specific long-term impacts of this spill are yet to be determined for large fish species and deep-sea corals showing that the effects of this disaster may continue well into the future (Beyer et al., 2016). Add this to the fact that the burning of fossil fuels is known to be intensifying climate change which is adversely affecting ecosystems and human and animal health and the potential negative environmental impacts of RE pale in significance (Haines, Kovats, Campbell-Lendrum, & Corvalan, 2006).

7.6.2. Social Impacts

The data collection phase brought about some interesting results in terms of social impacts from the Taiepa Tiketike research and subsequent implementation of the system. The workshops, focus groups and surveys displayed a very high level of optimism amongst the community. Throughout the workshops and focus groups there was an overwhelming sense of excitement when discussing the social impacts this project could have on the community. It was felt that the whole process from start to implementation and ongoing maintenance would greatly enhance social connections in Parihaka both with each other and with the land. It was further noted that while there are always several projects ongoing in Parihaka this is one of the most exciting in a long time.

The final survey question gave respondents the opportunity to list the greatest impacts they see arising from Taiepa Tiketike and an RE system for Parihaka. There were two positive impacts and two negative impacts listed along with an option to expand on any other impacts. This presented an opportunity to assess whether the survey participants saw the project having an overarching positive or negative impact.

The results (shown in figure 11) showed a very strong positive outlook with 88% of participants seeing a more environmentally conscious community as being the greatest impact of this research. This was the highest percentage of all the survey questions showing that here lies the greatest consensus. Financial risk and a positive impact on social interactions in the community were the next most common options selected as having the greatest impact, showing that there is certainly some caution in terms of upfront and ongoing costs but that the overarching views are very positive.

The interviews in contrast showed quite a high level of concern in terms of social impacts. This was most prevalent when discussing the various ownership models, with three interviewees expressing concern about a fully community-owned system. It was felt that a current lack of social cohesion would cause issues and such an ownership model could further increase this, having a negative social impact.

> *"A disadvantage would be the social cohesion which still needs to happen in terms of the maintenance side of things and the long-term commitment. There are a handful of people holding down most of the menial tasks that need doing around the pā and no indication that this would change with this new project"* (Interviewee 3, 2016).

> *"Sometimes the community doesn't work together very well and there might be a struggle with that. I am afraid of that at the moment"* (Interviewee 4, 2016).

Such concern was unexpected as there had been such a high level of focus on the significant positive social impacts that the community felt would emerge from this research and system. While the overarching feeling from the data collection process is that the Taiepa Tiketike research and RE system will have an overall positive social impact in Parihaka the above noted concern must be seriously considered and addressed in the early planning stages. If it is not considered and discussed within the community it could lead to significant disruption of the project further down the line and even deeply affect community harmony.

7.6.3. Cultural Impacts

The data collection stage has shown that participants are more cautionary about discussing cultural impacts emerging from this project than social impacts. In one focus group it was noted that some elders were concerned that by adopting a highly technological system they were moving away from traditional values. The ensuing discussion and interviews determined that the community members present and the interviewees did not agree with this and felt that Parihaka was a highly innovative community in the days of Te Whiti and Tohu and had such technology been present at that time they had no doubt they would have taken advantage of it. It is a concern by some, nonetheless, and will require in-depth conversations about the direction of the project ensuring ample consideration is given to those voicing concern.

> *"I think there is a strong fit of RE with Parihaka collective ventures. There is evidence that Te Whiti was actively exploring the use of modern technology of that time … and the concept of sustainable resource resonates with most of the members of our community"* (Interviewee 2, 2016).

Even if this concern does not materialize, there will certainly be a cultural impact from the project. The survey question showing a wind turbine in the background, and shown from four different angles, produced interesting results. While it was the same turbine and in the same exact location it received varying levels of support depending on which marae or

monument was shown in the foreground of the photo. The second photo which showed Te niho o te Ātiawa marae showed that 26% of respondents were very positive about the aesthetics of the landscape with the addition of the wind turbine, as opposed to 33%, 33% and 30% for photos one, three and four, respectively. These results suggest that there are differing levels of support depending on the view from specific sites of cultural value and will need to be carefully considered and discussed during the planning phase in order to overcome any issues.

Other than these concerns, the majority of discussion and results have shown that the community believe this system will have a positive cultural impact in that it will allow them to go back to their roots of being innovative and a source of inspiration for other communities. There was constant reference to Te Whiti and Tohu when discussing this topic and when asked if this system would fit with the kaupapa of Parihaka and help maintain the Parihaka vision of being a welcoming and inclusive community it was a resounding "yes" from the interview participants.

> *"Absolutely. Lots of people are interested in saving the planet and if this system was in Parihaka it would be a big attraction to get people to come home. It is important for the future of* Parihaka that the people do come back there to live and I think this will be a major draw" (Interviewee 5, 2016).

7.6.4. Institutional and Legal Impacts

Depending on how this project fits in with or challenges the current local and national policies and law it could have an impact in that it changes the policy going forward and potentially paves the way for other Māori and non- Māori communities to benefit from the changes. As previously stated in section 7.1.4.1, institutional concerns were not considered by the participants to have as big a bearing on the outcome of this project as other areas. Furthermore, it is difficult to establish exact impacts this system could have institutionally due to the Parihaka status as a papakāinga and the fact that STDC have committed to working with Parihaka outside of the standard policy requirements in order to assist development (STDC, 2015b). With this commitment it is expected that the institutional impacts of this system will be largely positive and mirror the institutional opportunities previously outlined.

7.7. Community susceptibility from this system

Depending on the final structure of the RE system Parihaka will be susceptible to some threats, which must be firmly considered before beginning the implementation phase. For instance, if the system is fully community-owned they could be very susceptible financially. The main difficulty would likely be with upfront capital for the purchase of the necessary infrastructure and initial installation, however, this susceptibility could be present throughout the lifetime of the system due to ongoing maintenance and repair costs.

Alternatively, if the system is to be part or fully externally owned Parihaka could be just as susceptible as their current energy set-up, if not more, to over-dependence on an energy supplier and vulnerable to market price fluctuations.

Implementing and becoming reliant on an energy system based on renewable sources brings with it technical susceptibilities for the community. While grid infrastructure and storage technologies have greatly improved in the last decade, wind, solar and hydropower are still intermittent energy resources driven by a varying climate, and there are further technological hurdles that must be overcome (Cherukuri & Balasubramaniyan, 2016; Larcher & Tarascon, 2014). With a shared community energy system built around these sources allowances would need to be made in Parihaka around energy use levels to reduce the risks of low energy availability at certain times.

Social and cultural susceptibility must also be considered before implementation and threats could be present right from the planning phase. This system would be a major change to the current set-up of the community and would be one of many significant changes, which includes the expected influx of new residents. Community members may not be in full agreement with how to progress with these developments and could lead to disagreements and have the opposite desired effect of promoting social harmony and togetherness.

The aesthetic impact of a wind turbine on the current horizon is one aspect of the project with the potential to cause such disagreement. While initial consultation with the community suggests that this will not be an issue it must be considered nonetheless. Similarly, initial consultation has suggested that this project aligns with the kaupapa of Parihaka and provides an opportunity to revisit and continue the legacy and beliefs of Tohu and Te Whiti, however, not all community members have been in attendance at the workshops and focus groups when this was discussed and may not agree.

8. Conclusions

8.1. Research findings specific to Parihaka

As noted in section 1.2, the aims and objectives of this research were manifold and were not firmly established until after the first meeting with the Parihaka community. This research was based on an actual community project as opposed to a theoretical model so there was a limit to the relevance of published research and books on thesis structures and guidance. With the results of this thesis and the other Taiepa Tiketike research playing an integral role in the decision making process of an RE system in Parihaka it was crucial to remain open to refining aims, objectives and methodologies throughout. Despite these early refinements, the list of aims, objectives and methodologies required very little change from those initially set after the first consultation with the community, which is testament to how effective the community engagement was from the initiation of this research.

There were high levels of satisfaction from participants in the workshops, focus groups, interviews and surveys about how inclusive the Taiepa Tiketike research project has been. Every respondent spoke very highly about the level of community engagement, presence of on-site researchers and regular presence at hui. Not one respondent felt that they did not have sufficient opportunity to engage in the research process and this is a significant success as it was one of the primary objectives of this research.

The basis of this thesis was to provide a list of benefits, barriers, opportunities and impacts an RE system can bring to Parihaka, and Chapter 7 discusses each of these elements in detail with Figure 14 providing a summary of this discussion. Other research in the Taiepa Tiketike project focused on the technical side of the system and this research intended to establish how it would impact on all other aspects of life in the community (a list of the other research conducted as part of the Taiepa Tiketike project has been included in the appendices).

Initial discussions with the community established the areas of importance to them and as a result categorized the above list into economic, environmental, social, cultural and institutional headings. The literature review established that these are all very important areas to consider before, during and after the implementation stage of a community RE project. This thesis successfully outlined each area with specific regard to Parihaka, providing a clear picture to the PPT, residents and stakeholders as to what can be expected, significantly assisting in the decision making process.

The data collection phase required in-depth analysis of the principles of kaupapa research methods and Mātauranga. The literature review provided some useful recommendations and was a good starting point in the design of the workshops, focus groups, interview and survey schedules. It was, however, community engagement and consultation with the

projects research assistant and our client, the PPT that validated the structure of these data collection methods.

The aims of the data collection phase were to survey the community to assess resident views on small-scale RE and the different ownership options available to the community, while ensuring kaupapa research methods and Mātauranga principles were adhered to throughout. The combination of all four mediums provided a rich, complimentary set of results that showed an overwhelming level of community support for the on-site generation of RE, while cautioning that there remain some concerns that must first be addressed.

There was a high response rate with well attended workshops, focus groups and a 100% response rate on surveys and completion of five out of the six scheduled interviews. While community interest in the project played a major role in this response rate it was evident in the interviews that the level of inclusiveness of this research was also a major factor in the willingness to participate, with every interviewee declaring they had more than enough opportunity to be involved.

It was evident from the very first community consultation that one of the most important factors of this system would be the ownership model, with a lot of passion displayed from hui and workshop attendees for a community-owned system. As a result, a focus of this research was to outline some examples of community-owned systems and present the varying structures of such ownership models using projects that have been or are currently being implemented. This was intended to inform the community on the overall structure of these models while also outlining the various barriers, impacts, opportunities and benefits these projects have afforded the respective communities. The difficulty of achieving this objective lay in the unique papakāinga structure in Parihaka with no case studies of other community-owned RE systems implemented on papakāinga land. To overcome this issue, national and regional policy was evaluated and considered in conjunction with community-owned case studies in order to relate these case studies to Parihaka.

Despite this focus on a community-owned model, other ownership models were evaluated and presented in this research as the PPT have yet to decide on the best model for Parihaka. It was the questions regarding ownership that provided some of the most interesting results in this research, with some unexpected. The passion for a community-owned system noted from early workshops was expected to be further emphasised in the data collection phase and when survey respondents were asked to provide their views on certain ownership models this certainly did materialise as expected.

Some 66% and 62% of respondents were “Very Positive” or “Positive” about individually owning and the papakāinga owning RE systems, respectively. However, only 14% were similarly positive about a joint ownership model with a private company and not one respondent noted that they were “Very Positive” about a private company fully owning an RE system in Parihaka. In fact, the response was so strongly against a private company fully

owning this that 57% of respondents claimed to feel “Very Negative” about this ownership option. Interestingly, the interviews told a different story with three participants declaring some major concerns that they had should a community owned model be introduced. A lack of social cohesion and an imbalance of work ethic in terms of maintenance around the papakāinga were cited as the main reasons for these interviewees pushing for a joint ownership model.

It was further noted that a lack of technical skills and experience with RE technologies within Parihaka worried them and they felt that the presence of an experienced project partner would greatly increase the likelihood of a successful system. A crucial side note to this point was the importance these respondents placed on the make-up of such a partnership. One respondent was in support of a joint partnership on the condition that Parihaka could, once capable, buy their partner out and have full ownership of the system and an avoidance at all costs of the opposite happening, whereby Parihaka became a bystander with no stake in the system. This was clearly a deeply embedded concern from historical experience and an explanation for the overwhelming community desire for greater autonomy and self-sufficiency. This system is, for many, seen as an opportunity to develop the community environmentally, economically, socially and culturally but it is important that an objective view is taken for the planning phase to ensure that raw passion does not take precedence over methodical planning and evaluation of resources and impacts.

For the most part the data collection phase verified much of the literature review in that Parihaka community views reflected research to date. Examples include high levels of project support when community involvement and consultation throughout the planning phase is present, expected local employment gains and a preference for at least a joint community ownership stake in the project. However, while the literature review and case study assessments highlighted institutional barriers as a significant barrier to implementing a community owned RE system the data collection did not reveal much of a concern from respondents for institutional barriers or blame current government policy. Parihaka community members are instead most concerned with social and cultural community barriers and feel that they need to focus on this aspect to be successful.

This is not what was expected to be found but says a lot about the community mind-set whereby the focus is on developing themselves and overcoming internal barriers as opposed to blaming an outside force and expecting help in order to make a success of this system. If this desire for self-improvement can be translated into concerted action then Parihaka stands a great chance of developing the skills and social cohesion necessary to sustain this system in the community and realise the full benefits.

8.2. Research findings with a global perspective

There have been various publicised reasons for opposing RE technologies and these are being pushed as reasons to stay with the status quo and creating an extremely difficult resource consent process. The resource consent application process can be so rigorous that it is preventing smaller developments from entering the market due to prohibitive initial costs and also very expensive and time consuming appeal processes. The perceived negative impacts and barriers of these RE technologies must be assessed with consideration to the fossil fuel equivalents in order to get a clearer picture.

Visual impact on the landscape from wind turbines is a major source of opposition and is the primary reason the Blueskin Bay wind farm resource consent application was rejected. Visual impact is subjective and residents and people living in the vicinity have the right to disapprove of the aesthetics of a wind turbine. However, surely it cannot be denied that a single or collection of wind turbines is a much better option visually than a coal powered plant or an offshore oil refinery. Moreover, the stated concerns about the impact of wind turbines on birds and bats must consider the impact air pollution has on avian life or the devastation of an oil spill.

The use of hydropower technology has raised concerns around the impact on aquatic life, yet studies show that if sufficiently considered in the planning phase and accommodated for then this can be minimal. Again it cannot be denied that this would be much less of an impact on aquatic life than a deep sea oil refinery or chemicals used for oil and gas extraction would have, and that is not even accounting for the possibility of serious oil spillages into the water.

Overall, unless society is willing to seriously curtail the current way of life then we will still need enormous amounts of energy. Renewable energy is a much safer source of energy in terms of human and animal health and for the sustainability of the planet, than fossil fuels. While impacts of wind turbines and hydro systems must be considered and research undertaken to improve designs in order to reduce these impacts the bigger picture much prevail. If we want to sustain our current way of life concessions are needed and a small visual intrusion on a landscape is a far better concession than the continued pollution caused from burning immense amounts of fossil fuels.

8.3. Research limitations

There are a number of limitations to this research that should be acknowledged. Time restrictions necessitated a smaller interview group in order to allow sufficient time to interview all candidates. While the interview group ensured all three marae were represented, the size of this group is a major limitation as it did not allow for a representation of residents and landowners that do not reside in the papakāinga full-time yet still have something to gain from the proposed RE system as landowners. Efficient

scheduling of interviews did mean that all five completed interviews were conducted over one weekend visit to Parihaka and there was little difficulty arranging these interviews due to the strong desire of the community to take part in the research. The presence of a Research Assistant based in Parihaka and use of email also meant that there were very few issues completing surveys and this facilitated a high response rate.

According to the principles of kaupapa Māori aligned research, the data collected is not considered the property of the researcher. The group that the research is based on claims guardianship of its knowledge, which could potentially have led to conflicts of representation and accountability where the group may not wish certain material, which the researcher deems relevant, to be used (Walker et al., 2006). This potential issue required careful negotiation between the researcher and participant group and further highlights the importance of collaborative work (Walker et al., 2006). Again, due to the desire of the community to be involved in this research and the high level of interest in the research findings, individual participants were extremely accommodating and noted that they wished for all relevant information to be included in the final thesis in order to enhance the research outcomes.

8.4. Recommendations for further research

This research is intended to provide the PPT with a list of barriers, opportunities, impacts and benefits that an on-site RE system can bring to Parihaka. This list is discussed in detail in Chapter 7 and Figure 14 provides a summary of this discussion. Along with a comprehensive set of data outlining community views on this system and areas of particular community importance, this can greatly assist the PPT in the decision making process as to how to progress with this development.

This research is not intended to cover all aspects that must be considered throughout the planning phase and further research that covers the next stages of the planning phase, with specific regards to papakāinga land, is recommended. This future research should include the preparation of a resource consent application and the legalities and considerations that must be addressed in order to increase the chances of success. The importance of such research must not be overlooked as an initial decline of this application can break a project due to the costly and lengthy appeal process.

Research into the specifics of the desired ownership model is also recommended and should canvas a much broader group of stakeholders, including those not residing in Parihaka. It was noted in the interview process that a big fear of a joint ownership arrangement was that Parihaka did not have sufficient experience in contract negotiations leading to a concern that they could subsequently be pushed out of the partnership. Further research could evaluate these ownership options and provide recommendations as to what the best and most secure option would be for Parihaka to allay these concerns. It is also

recommended that future research considers the ongoing community commitments needed to maintain the system and provide a recommendation on how best to manage this need to ensure a fair distribution of responsibility.

9. Ethical Statements

The Massey University Screening Questionnaire to Determine the Approval Procedure has been used to determine the appropriate ethics approval or notification procedure. As all questions were answered “No”, it was determined that this was low risk research. This was submitted to the Ethics Committee and an email notification was received on 3rd March 2016 advising that the application had been recorded in the Massey University Human Ethics committee system. A copy of this notification has also been included in the appendices.

Further discussion on this was had with my supervisors as ethics is a very important consideration for Vision Mātauranga projects. The finalised interview and survey structure was reviewed with my supervisors before proceeding with the interviews. Significant consideration was given to the fact that this research took place in a cross-cultural space, where western centric ideals are sometimes at odds with those of the community. As part of this consideration, a commitment was made to provide ongoing communication that was respectful, open, honest, and timely. Such commitment leads to a trusting relationship between the researcher and the research participants and facilitated successful cross-cultural collaboration (Gibbs, 2001).

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10. Appendices

Appendix A

Confirmation of Low Risk Research Application

Appendix B

Information Sheet and Consent form for survey participants

Information Sheet and Consent form for interview participants

Appendix C

Interview Schedule

Appendix D

Copy of Survey

Appendix E

Taiepa Tiketike final community PowerPoint presentation

Appendix F

Full list of research conducted as part of the Taiepa Tiketike research

Appendix A: Confirmation of Low Risk Research Application

Date: Thu, Mar 3, 2016 at 9:28 AM
Subject: Human Ethics Notification - 4000015514

HoU Review Group

Ethics Notification Number: 4000015514
Title: Opportunities and barriers to, and benefits and impacts from papakainga owned energy systems: A case study of Parihaka.

Thank you for your notification which you have assessed as Low Risk.

Your project has been recorded in our system which is reported in the Annual Report of the Massey University Human Ethics Committee.

The low risk notification for this project is valid for a maximum of three years.

If situations subsequently occur which cause you to reconsider your ethical analysis, please log on to http://rims.massey.ac.nz and register the changes in order that they be assessed as safe to proceed.

Please note that travel undertaken by students must be approved by the supervisor and the relevant Pro Vice-Chancellor and be in accordance with the Policy and Procedures for Course-Related Student Travel Overseas. In addition, the supervisor must advise the University's Insurance Officer.

A reminder to include the following statement on all public documents:

"This project has been evaluated by peer review and judged to be low risk. Consequently it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named in this document are responsible for the ethical conduct of this research.
If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact Dr Brian Finch, Director (Research Ethics), email humanethics@massey.ac.nz. "

Please note that if a sponsoring organisation, funding authority or a journal in which you wish to publish require evidence of committee approval (with an approval number), you will have to complete the application form again answering yes to the publication question to provide more information to go before one of the University's Human Ethics Committees. You should also note that such an approval can only be provided prior to the commencement of the research.

You are reminded that staff researchers and supervisors are fully responsible for ensuring that the information in the low risk notification has met the requirements and guidelines for submission of a low risk notification.

If you wish to print an official copy of this letter, please login to the RIMS system, and under the Reporting section, View Reports you will find a link to run the LR Report.

Yours sincerely

Dr Brian Finch
Chair, Human Ethics Chairs' Committee and
Director (Research Ethics)

Appendix B: Information Sheet and Consent form for survey participants

Information Sheet

Opportunities and barriers to, and benefits and impacts from papakāinga owned energy systems: A case study of Parihaka.

Who is the researcher?

My name is Jonathan Quinn and I am currently studying a Master of Environmental Management at Massey University. I am part of the Taiepa Tiketike research team and my research component will form my thesis which makes up half the credits for the Master of Environmental Management.
If you have any questions about my research I can be contacted by phone on xxxxxxxxxxx or by email at xxxxxxxxxxx. My supervisors can also be contacted and they are;

Dr Phil Murray
School of Engineering & Advanced Technology
Massey University
Telephone: +64 (06) 356 9099 ext. 84157
Email: P.Murray@massey.ac.nz

Dr Nick Roskruge
Institute of Agriculture & Environment
Massey University
Telephone: +64 (06) 356 9099 ext. 84876
Email: N.Roskruge@massey.ac.nz

What is the research about?

This research will be conducted alongside of the MBIE Vision Mātauranga Capability funded project titled Taiepa Tiketike. Taiepa Tiketike is a partnership project between the Parihaka Papakāinga Trust and the Massey University Centre for Energy Research.
This specific research aims to:

- Identify the benefits and impacts, and barriers and opportunities that may arise from a community-owned energy system.

Key objectives of this study include:

- Determine the plausibility of community ownership (within the papakāinga concept) of this system and the benefits and opportunities such an ownership model could bring to Parihaka.
- Present some alternative ownership options should community ownership not be the preferred option.
- Increase community awareness and knowledge of the benefits renewable energy and sustainable energy management can bring to all aspects of society.

Participant Involvement

I would value your participation in this research and it would greatly benefit the research to have an insight into the views of community members.

Participant's Rights

Participation in this research is on a voluntary basis and, therefore, should you agree to participate you can at any stage decide to;

- Decline to answer any specific question

- Ask your own questions about the study
- Request that specific or all of the information you have provided not be included in the research

I would like your permission to attribute your responses to you in the written component of this research and I have included a line to grant such permission below. I have also included an option to remain anonymous, should this be your wish. All participants will be sent a documented summary of the findings of this research once it has been concluded.

"*This project has been evaluated by peer review and judged to be low risk. Consequently it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named in this document are responsible for the ethical conduct of this research.*
If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact Dr Brian Finch, Director (Research Ethics), email humanethics@massey.ac.nz.

Participant Consent Form

Research Title: Opportunities and barriers to, and benefits and impacts from papakāinga owned energy systems: A case study of Parihaka.

I have read the Information Sheet and understand the details of the study and my rights as a participant.

I have been given the opportunity to ask any questions I have about the study before signing this form and understand that I can ask further questions at any stage.

I agree to participate in this study and give the researcher permission to attribute responses to questions to me in the written component of this research ☐

I agree to participate in this study but wish for my responses to questions to remain anonymous in the written component of this research ☐

Signature:

Date:

Full Name – printed:

Information Sheet and Consent form for interview participants

Information Sheet

Opportunities and barriers to, and benefits and impacts from papakāinga owned energy systems: A case study of Parihaka.

Who is the researcher?

My name is Jonathan Quinn and I am currently studying a Master of Environmental Management at Massey University. I am part of the Taiepa Tiketike research team and my research component will form my thesis which makes up half the credits for the Master of Environmental Management.
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Key objectives of this study include:

- Determine the plausibility of community ownership (within the papakāinga concept) of this system and the benefits and opportunities such an ownership model could bring to Parihaka.
- Present some alternative ownership options should community ownership not be the preferred option.
- Increase community awareness and knowledge of the benefits renewable energy and sustainable energy management can bring to all aspects of society.

Participant Involvement

I would value your participation in this research and it would greatly benefit the research to have an insight into the views of community members. Should you agree to participate I would like to interview you either by email, telephone or face-to-face, whichever you feel most comfortable with. The interview can also be at a time and place of your choosing. The overall length of the interview is likely to be just under one hour but should you wish to make it shorter or longer than this we can do so. With your permission I would like to record the interview as it would allow me to listen back over it and ensure all the relevant information is captured, however, should you prefer it not to be

recorded I will just take written notes. Should the interview be recorded participants will be offered the chance to review the audio transcripts before the information is used.

Participant's Rights

Participation in this research is on a voluntary basis and, therefore, should you agree to participate you can at any stage decide to;

- Decline to answer any specific question
- Ask your own questions about the study
- Request that specific or all of the information you have provided not be included in the research
- Request the audio recording to be stopped
- Withdraw from the study completely

I would like your permission to attribute your responses to you in the written component of this research and I have included a line to grant such permission below. I have also included an option to remain anonymous, should this be your wish. All participants will be sent a documented summary of the findings of this research once it has been concluded.

"*This project has been evaluated by peer review and judged to be low risk. Consequently it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named in this document are responsible for the ethical conduct of this research.*

If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact Dr Brian Finch, Director (Research Ethics), email humanethics@massey.ac.nz.

Participant Consent Form

Research Title: Opportunities and barriers to, and benefits and impacts from papakāinga owned energy systems: A case study of Parihaka.

I have read the Information Sheet and understand the details of the study and my rights as a participant.

I have been given the opportunity to ask any questions I have about the study before signing this form and understand that I can ask further questions at any stage.

I understand that face-to-face and telephone interviews will be audio recorded and I consent to this ☐

I do not wish to have my interview audio recorded ☐

I agree to participate in this study and give the researcher permission to attribute responses to questions to me in the written component of this research ☐

I agree to participate in this study but wish for my responses to questions to remain anonymous in the written component of this research ☐

Signature:

Date:

Full Name – printed:

Appendix C: Interview Schedule

Interview Schedule

Participant Name: Date of Interview:

Time of Interview:

Q1. What do you know about the Taiepa Tiketike project?

Q2. What do you think are the advantages and disadvantages of community-owned renewable energy systems? E.g. a collection of solar PV panels, a Wind Turbine or Hydro system that feeds into the community

Q3. What do you think are the advantages and disadvantages of individual owned renewable energy systems? e.g. Solar PV panels on individual houses

Q4. Do you think single, individually owned systems or community systems would suit Parihaka better and what would your preference be? Why?

Q5. How would you feel about a mixed renewable energy system comprised of small-scale hydro, wind turbine(s), biomass (firewood and fuel crops) and solar panels in Parihaka? Do you see any potential social, cultural or environmental barriers for any of these components or the system as a whole?

Q6. What would you see as potential environmental benefits of such a system for Taranaki, and Parihaka specifically?

Q7. What would you see as potential social and cultural benefits of such a system for Taranaki, and Parihaka specifically?

Q8. How important is it to you that Parihaka's energy is generated from renewable sources? Would you be willing to pay more for energy generated from renewable sources or is the cheapest price the priority?

Q9. Would your preference be for a community-owned and/or individually-owned renewable energy system or an alternative ownership model, such as, a Public Private Partnership where Parihaka and an external partner share the ownership and liability?

Why this preference?

Q10. How do you see a community or individual owned renewable energy system fitting with the kaupapa of Parihaka? Similarly, how would you see a Public Private Partnership owned renewable energy system fitting with the kaupapa of Parihaka?

Q11. Do you see this system as being capable of helping the community accommodate the projected population increase and preserve Parihaka's vision of being a welcoming and inclusive community?

Q12. Do you feel there is sufficient opportunity for you to be involved in the discussions for implementing this system? If not, how do you feel the planning phase could be improved so that community members have more opportunity for input?

Q13. Finally, what is your vision and aspirations for Parihaka and what would Parihaka hope to achieve by installing renewable energy systems in the papakāinga?

Appendix D: Copy of Survey

Taiepa Tiketike Survey

Participant Name:

Date:

Q1. What are your views on small scale[x] renewable energy technologies [solar, wind, biomass (firewood and fuel crops), hydro] as a source of energy production?

Solar electric[xi]

1. Strongly Support **2.** Support **3.** Neutral **4.** Oppose **5.** Strongly Oppose

Solar water heating[xii]

1. Strongly Support 2. Support 3. Neutral 4. Oppose 5. Strongly Oppose

Wind turbines

1. Strongly Support 2. Support 3. Neutral 4. Oppose 5. Strongly Oppose

Biomass (firewood and fuel crops) for heating

1. Strongly Support 2. Support 3. Neutral 4. Oppose 5. Strongly Oppose

Hydro power

1. Strongly Support 2. Support 3. Neutral 4. Oppose 5. Strongly Oppose

Q2. Of these listed renewable energy resources please rank them in order of preference (mark “1” in the box next to your preferred resource, “2” in the box next to your second preferred resource and so on). You can have equal preferences by placing the same ranking against multiple options.

Solar ☐

Wind ☐

Biomass (firewood and fuel crops) ☐

Hydro power ☐

Q3. The following are four photos of a potential wind turbine site with a turbine added in. Please indicate how you rate the aesthetics of the landscape in each photo, with the addition of such a wind turbine?

Photo 1.

1. Very Positive 2. Positive 3. Neutral 4. Negative 5. Very Negative

Photo 2.

1. Very Positive 2. Positive 3. Neutral 4. Negative 5. Very Negative

Photo 3.

1. Very Positive 2. Positive 3. Neutral 4. Negative 5. Very Negative

Photo 4.

1. Very Positive 2. Positive 3. Neutral 4. Negative 5. Very Negative

Q4. The following photo is of an existing hydro system in Scotland. What are your views on having a similar structure installed in Parihaka?

This picture was taken from the PowerSpout website, Retrieved from http://www.powerspout.com/powerspout-plt-gallery/ [2]

1. Strongly Support **2.** Support **3.** Neutral **4.** Oppose **5.** Strongly Oppose

Q5. How would you feel about individually-owning[xiii] a renewable energy system, for example, solar PV panels on your roof?

1. Very Positive 2. Positive 3. Neutral 4. Negative 5. Very Negative

[2] Permission to reproduce this picture was granted by Michael Lawley, from EcoInnovation, on 8th August 2016.

Q6. How would you feel about the papakāinga owning[xiv] the renewable energy systems if they were installed in Parihaka?

1. Very Positive 2. Positive 3. Neutral 4. Negative 5. Very Negative

Q7. How would you feel about a joint ownership model, between the papakāinga and a private company[xv], for the renewable energy systems if they were installed in Parihaka?

1. Very Positive **2.** Positive **3.** Neutral **4.** Negative **5.** Very Negative

Q8. How would you feel about a private company fully owning[xvi] the renewable energy systems if they were installed in Parihaka?

1. Very Positive **2.** Positive **3.** Neutral **4.** Negative **5.** Very Negative

Q9. If the government were to introduce policy support (such as a Feed-in-Tariff[xvii]) for renewable energy systems, whereby a return on any investment in the system was secure would you be interested in personally investing in the system that would be based in Parihaka?

1. Very Interested **2.** Maybe Interested **3.** Not Sure **4.** Not Interested **5.** Definitely not Interested

Q10. How would you feel about using firewood to heat your home?

1. Very Positive **2.** Positive **3.** Neutral **4.** Negative **5.** Very Negative

Q11. How would you feel about supporting a community business by paying for locally produced firewood to heat your home?

1. Very Positive **2.** Positive **3.** Neutral **4.** Negative **5.** Very Negative

Q12. How would you feel about a plantation of trees, for a community firewood supply, being grown at Parihaka?

1. Very Positive **2.** Positive **3.** Neutral **4.** Negative **5.** Very Negative

Q13. What would be your preferred method of heating for any new homes built on the papakāinga? Please rank them in order of preference (mark "1" in the box next to your preferred resource, "2" in the box next to your second preferred resource and so on). You can have equal preferences by placing the same ranking against multiple options.

Wood burner ☐

Heat pump ☐

Passive Solar Heating[xviii] ☐

Other ☐
Please give details

_____

_____

_____

Q14. What do you see as the opportunities arising from the knowledge from the Taiepa Tiketike Research and implementation of the renewable energy system? Please write 1 in the box to indicate the greatest opportunity and so on. If you do not believe any of these options could be an opportunity for Parihaka please write N/A.

Increased independence from external electricity suppliers and reduced vulnerability to market prices[xix] ☐

Chance to sample an innovative technology ☐

Further increase in community awareness of and involvement in sustainable practices ☐

Increased collaboration between community and councils to achieve sustainable development goals ☐

NZ/ Papakāinga leaders in planning and installation of RE systems ☐

Other ☐
Please give details

_____

_____

_____

_____

_____

_____

Q15. What do you see as potential benefits for Parihaka that could arise from the knowledge from the Taiepa Tiketike Research and implementation of the renewable energy system? Please write 1 in the box to indicate the greatest benefit and so on. If you do not believe any of these options could be an benefit for Parihaka please write N/A.

Further strengthen community harmony and social connections ☐

Long-term relationship with the land and climate that generates the renewable energy ☐

Improved local and domestic air quality levels with reduced use of fossil fuels ☐

Local employment (e.g. Technical support, Consultancy and Eco-Tourism) ☐

More democratic form of energy governance with local energy supply and local participation ☐

Other ☐
Please give details

_____
_____
_____
_____
_____

Q16. What do you see as potential barriers that Parihaka could experience in implementing this project? Please write 1 in the box to indicate the greatest barrier and so on. If you do not believe this could be a barrier for Parihaka please write N/A.

Public/community opposition ☐

Resource Consent process ☐

Lack of Policy support for renewable energy ☐

Difficulty getting the required finance (e.g. Bank Loans) ☐

Government financial stake in current electricity market ☐

Other ☐
Please give details

_____
_____
_____
_____
_____
_____

Q17. What do you see as potential impacts (both positive and negative) for Parihaka that could arise from this project? Please write 1 in the box to indicate the greatest impact and so on. If you do not believe this could be an impact for Parihaka please write N/A.

More environmentally conscious community ☐

Positive impact on social interactions, from structural and design[xx] changes ☐

Negative impact on social interactions, from structural and design changes ☐

Negative aesthetic impact of a wind turbine ☐

Financial risk ☐

Other ☐
Please give details

_____
_____
_____
_____
_____
_____

Important to Note:

Ownership of the renewable energy system(s) does not constitute ownership of the land and the Parihaka Papakainga Housing Policy and Maori Land Court regulations apply

Glossary of terms and definitions from the survey questions

_____

[x] Small-scale is referring to a system that can power a small community, like Parihaka, and is much smaller than commercial-sized systems.

[xi] Solar PV system that uses solar panels to convert sunlight to electricity.

[xii] This is the conversion of sunlight into renewable energy for water heating using a solar thermal collector

[xiii] Individual-ownership of renewable energy systems can:
-increase the level of autonomy and decrease the reliance on market properties.
-increase employment (both voluntary and paid) for installation, maintenance and operation of the system.
-increase the knowledge of how these systems operate, reduce households energy bills and potentially provide a source of income for any energy exported.
However, there is more financial responsibility for repairs and replacements as it would be an individual cost as opposed to community or external cost. Also, the issue of upfront costs would be an individual one as opposed to a community one and possibly more difficult to raise the necessary funds.

[xiv] Community-ownership of renewable energy systems can:
-increase the level of autonomy and decrease the reliance on market properties.
-increase employment (both voluntary and paid) for installation, maintenance and operation of the system.
-increase the knowledge of how these systems operate and can provide a source of income for the community.
However, it does bring more financial responsibility and risk with the community responsible for the upfront installation costs and ongoing repair costs.
This question is aiming to assess how the community feel about owning the system and what you feel would be the challenges of such an ownership model.

[xv] Having an external party cover the pre-construction costs of the project would see them assume financial responsibility for the more unpredictable phase of the project. Joint ownership models benefit the developer by improving personal relations with the local population and therefore eliminating some planning barriers. The local population can also benefit from this ownership model as it offers returns from the project for the community and not just the institutional investors.

This model does, however, decrease the level of autonomy for the community and potentially reduce the level of input they have in the initial planning and implementation phase and the ongoing operation of the system. It would also introduce an external benefactor meaning the community would receive a lower proportion of the profits.

[xvi] This would heighten the advantages and disadvantages of a joint ownership model in that the community would assume little, if any, financial responsibility but may have much less input into the planning, implementation and operation of the system. The community may also not achieve much energy autonomy from the system.

[xvii] Feed-in tariff systems generally work by requiring electric utilities to pay a specific fixed price per kWh for all renewable generated electricity purchased for a fixed period of time. These can have different requirements depending on the country it is implemented.

[xviii] Passive solar heating involves designing a building in order to:
- Collect solar energy through properly-oriented, north-facing windows.
- Store this energy in building materials, such as, concrete slabs, brick walls, or tile floors.
- Naturally distribute the stored solar energy back to the living space.
Passive solar heating systems do not have a high initial cost or long-term payback period. If properly designed, passive solar buildings have fewer fluctuations in temperature, resulting in increased thermal comfort, while generating no greenhouse gases. The system is, however, reliant on having maximum exposure to the sunlight and as the intensity of sunlight is intermittent so too is the amount of energy generated. The system can also overload, which may adversely affect particular electrical appliances. (Fosdick, 2012; Eco Design Advisor, 2016).

[xix] The international price of oil, for example, can be extremely volatile. An overdependence on imported oil can leave a country or region vulnerable to such changes. A notable example is the 1970's oil price spike triggered by the Arab-Israeli war which had a detrimental economic effect on many countries that were over-reliant on imported oil as a fuel source. While some gas will likely still be needed in Parihaka an on-site renewable energy system can reduce the reliance on imported, external resources.

[xx] This could be in the form of a meeting place by a wind turbine or hydro system, or increased social interaction when gathering or purchasing firewood.

References

1. Fosdick, J. (2012). *Passive Solar Heating*. Retrieved from http://www.wbdg.org/resources/psheating.php
2. Eco Design Advisor. (2016). Retrieved from http://www.ecodesignadvisor.org.nz/assets/Uploads/Passive-solar-design-no-4.pdf

Appendix E: Taiepa Tiketike final community PowerPoint presentation

MASSEY UNIVERSITY
CENTRE FOR ENERGY RESEARCH

Taiepa Tiketike

Punanga Ngi 6:

20th November 2016

Jonathan Quinn

Opportunities and barriers to, and benefits and impacts from papakāinga owned energy systems: A case study of Parihaka

Punanga Ngi: 6 1

Aims

- Outline the benefits and impacts, and barriers and opportunities from a community-owned energy system.
- Show a complete picture of what needs to be considered in the process and decision-making required to implement the system in Parihaka

Objectives

- Determine the feasibility of community ownership (within the papakāinga concept) of this system and the benefits and opportunities it could bring to Parihaka.
- Discover potential barriers and impacts of such a system that may present in future or during development of the community ownership model.
- Increase community awareness and knowledge of the benefits and opportunities of the system.

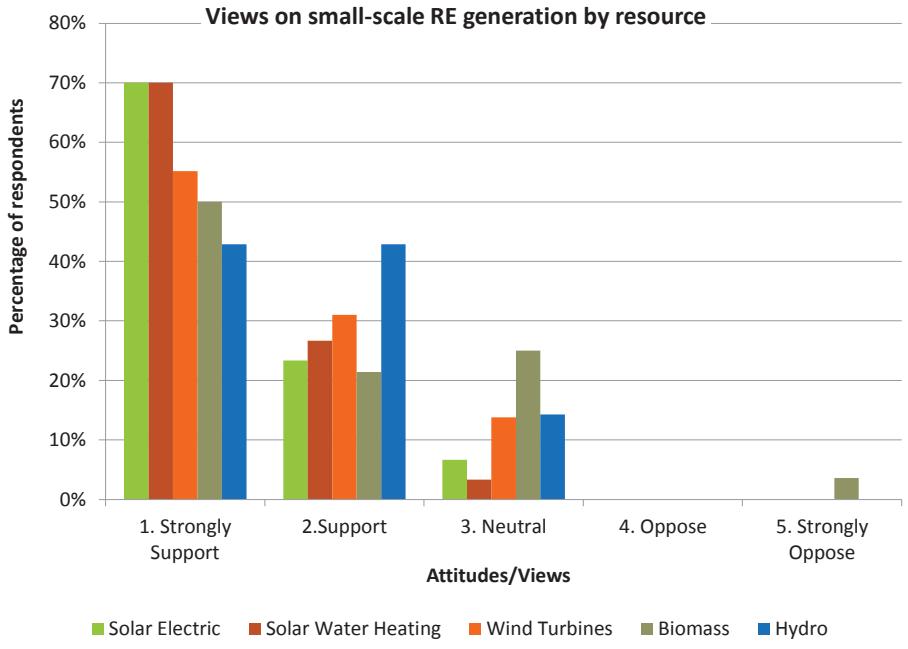
Key Topics of Focus

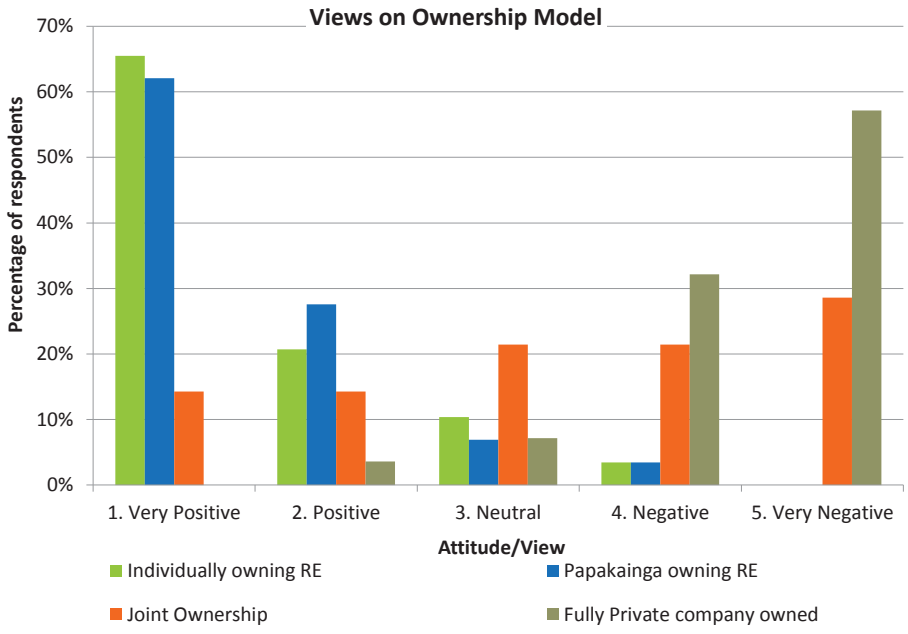
- **Public views towards Renewable Energy**

Attitudes will vary from source to source and have been assessed for Wind, Solar, Hydro and Biomass.

- **Different types of ownership models**

Research has mainly looked at community/papakāinga ownership. Brief overview of some other models also.





Ownership Models

Fully private owned;

- Reduced financial liability and risk for both initial and ongoing costs. But far less autonomy

Full community ownership;

- Individual owned – Solar PV panels for individual houses
- Papakainga owned – Array of solar PV panels, community wind turbine, hydro system, biomass

Ownership Models

Joint Ownership

- **Split ownership**

- The community and commercial developer own different assets.

- The grid connection may be shared.

- The commercial developer will generally cover the majority of the development phase costs.

Ownership Models

- **Joint Venture**

- The community and commercial developer both own a percentage of the assets.

- The grid connection may be shared.

- The commercial developer will generally cover the majority of the development phase costs.

Ownership Models

- **Shared Venture**

- The commercial developer will own all of the assets and the community will have a right to a share of the revenue.

- The commercial developer will fully own the grid connection.

- The commercial developer will generally cover the majority of the development phase costs

Ownership Models

- Westmill Farm (UK) - initiated by a local farmer and mostly financed through a co-operative share offer. Preference given to local people (investments from £250 and £20,000). Board of local people run the co-operative and the financial aspect managed by another co-operative with project experience.
- Shows the flexibility that is possible and Parihaka can find best fit for community.

Barriers

- These are categorized into;

Economic Barriers

Cultural Barriers

Social Barriers

Institutional Barriers

- Recommended tools for overcoming these barriers and associated opportunities will also be outlined.

Impacts

- These are categorized into;

Environmental and Health impacts - *both locally and nationally and how local impacts can feed into the national perspective*

Cultural Impacts

Social Impacts

Institutional Impacts

Benefits

- These are categorized into;

Environmental Benefits

Economic Benefits

Social and Institutional Benefits

Cultural Benefits

Opportunities

- These are categorized into;

Economic Opportunities

Technical and Social Opportunities

Cultural Opportunities

Data Collection

- This was gathered from;

Workshops and Focus Groups

30 Surveys completed

5 Interviews completed with community members

Key Findings

- Barriers are manifold but seem to be weighted toward institutional barriers.
- Many social benefits and opportunities to be gained.
- Environmental impacts are contentious and very scale specific e.g. small-scale systems do not have much impact.

Economic Barriers

- Upfront cost.
- Community project development costs higher than commercial projects.
- Planning rules, financial analysis, negotiations and legal contracts with various organisations and stakeholders.
- Commercial developers have this expertise and experience but communities usually need to pay for external experts.
- Banks lending less for community projects.

Cultural Barriers

- Difficulty getting bank loans due to papakāinga multiple-owned land.
- Resource consent, building consent, the right to build on the land, and development contributions.

OR OPPORTUNITY

Social Barriers

- Such projects require buy-in from whole community.
- The planning process should be open and transparent to avoid disruptions. Important to address concerns early.
- Blueskin Bay wind farm resource consent recently declined with some local residents firmly against it. Very costly appeal process.

Institutional Barriers

- Global inconsistency on effective subsidies.
- Incentives for large-scale centralised energy systems as opposed to smaller-scale regional systems.
- NZ weak on policy support that encourages small investors (e.g. farmers & communities).
- Utilities vs Customers (solar).

Institutional Barriers

- Existing high level of Renewable Energy in NZ means competition for place on the grid
- NZ electricity market made up of 5 major generators (Meridian Energy, Contact Energy, Mighty River Power, Genesis Energy, and TrustPower), difficult for small investors to get power purchase agreements.
- These 5 companies in competition so emergence of small investors not considered in their best interests

Environmental and Health Impacts

- Danger to wildlife

Birds and bats killed by turbines, solar infrastructure (collision, dazed, burnt).

- Turbine noise, shadow flicker.
- Habitat disturbance from interrupted water flow.
- Mitigation requires detailed monitoring and research which is costly and time consuming.
- BUT – much better vs alternative e.g. Gulf of Mexico devastation.

Cultural Impacts

- Traditional values vs(?) highly technological system
- Differing levels of support for wind turbine depending on the view from specific sites of cultural value and will need to be carefully discussed during the planning phase.
- Innovative community & source of inspiration for others.

Cultural Impacts

- Can help maintain Parihaka's vision of being a welcoming and inclusive community.
- Location of the wind turbine and visual impact.

Survey Picture 1

Punanga Ngi: 6 27

Survey Picture 2

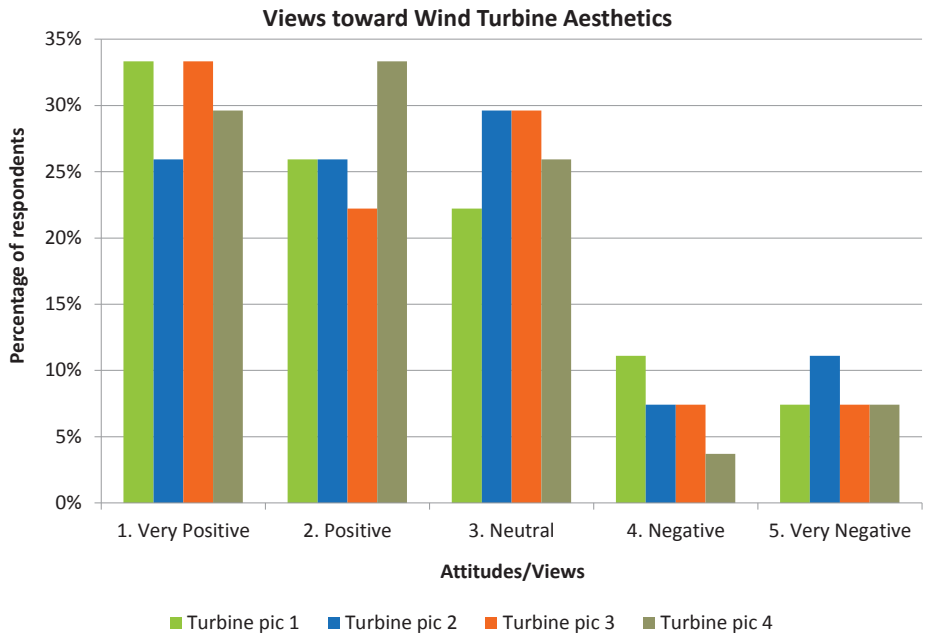
Punanga Ngi: 6 28

Survey Picture 3

Punanga Ngi: 6 29

Survey Picture 4

Punanga Ngi: 6 30



Social Impacts

- Environmentally conscious community.
- Positive impact on social interactions in the community.
- Financial risk.
- Lack of social cohesion = potential negative social impact from a community model.

Institutional Impacts

- A successfully implemented system could potentially change local and national policy going forward and potentially paves the way for other communities to benefit from the changes.

Environmental Benefits

- Locally - reduce amount of fossil fuels used for energy needs and reduce the health effects associated with the burning of these fuels
- Nationally – pave the way for increased community projects increasing the overall use of renewable energy and achieving the above benefits on national level.

Social and Institutional Benefits

- Community-owned
- Easier planning process.
- Increased social acceptance.
- Greater energy autonomy and overall more equitable system.
- Local employment.

Social and Institutional Benefits

- Increase local knowledge of Renewable Energy systems and how to live sustainably on the land.

- Build lasting relationship with energy and the land that is used to build community harmony and ensure a social connection is maintained within Parihaka.

Cultural Benefits

- Māori knowledge enhancement, and project experience.
- Fits in with the kaupapa of Parihaka. Long-term relationship with the land in Parihaka and develop a strong relationship with the climate that generates the energy.
- New housing being planned and built in a way that maximises the renewable energy generation connects housing to nature and the environment.

Economic Opportunities

- Long-term

- Financial benefits of reducing energy imports may accrue to the community.

- Community/collectively owned energy system could allow for pooling of financial resources to establish system and potentially benefit from economies of scale.

Economic Opportunities

- Short-term & Long-term

- Knowledge in energy efficient practice.

- Economic savings from more efficient use of energy (individual homes and also at the Raa and other community events).

- Ecotourism. Education tours, School tours

  e.g. Horns Rev in Denmark and Scroby Sands in the UK.

Social Opportunities

- Significant opportunity to learn and experience new technology and ideas in action enhancing the possibility of an innovation hub developing.
- Generating your own energy connects and centralises it to the community bringing an opportunity to empower and innovate the papakāinga.

Cultural Opportunities

- Establish a base to tap back into the collective, innovative way of thinking and become a source for knowledge transfer.
- Parihaka to further its position as inspirational community which other iwi consult to better their community.
- Educating, training and getting the community to think more about sustainable practices to meet the kaupapa of sustainable living and peaceful coexistence.

Summary

- An open, transparent planning process crucial to gaining the required support.
- Location of wind turbine should consider noise, shadow flicker and other impacts.
- Ample benefits and opportunities to be gained and many e.g's of successful implementation. **However** no "one-size fits all" and must take time to consider all barriers, impacts, benefits & opportunities to see what works best for Parihaka.

Summary

- There are various ownership options available and again no "one-size fits all" model. Need to establish what works best for Parihaka through in-depth consultations with all parties.

List of Case Studies

- Blueskin Wind Project: Blueskin Bay, Otago.
- Falck Renewables and Wind Prospect: UK.
- Westmill Farm Project: UK.
- Minwind Energy developments: USA.
- Totarabank development: Central Wairarapa.
- Horns Rev: Denmark.
- Scroby Sands: UK.

You can Google Search any of these for further details

Further Information

- A fully bound copy of my research will be given to each of the 3 houses once completed

- A full electronic copy of my thesis will be available in the Massey University library from about March 2017. Can be requested from http://mro.massey.ac.nz/

Appendix F: Full list of research conducted as part of the Taiepa Tiketike research

Taiepa Tiketike Researcher	Research Title
Jonathan Quinn	Opportunities and Barriers to, and Benefits and Impacts from, Papakāinga owned energy systems: A case study of Parihaka
Joshua Curd	Hybrid energy system designs for an expanding Parihaka Papakāinga community
Ingrid Lambert	Parihaka Papakāinga low energy passive solar housing designs
Ana Hernandez	Energy efficiency gains in the Parihaka community
Ray Mohan	Low Carbon Transport Options for residents of the Parihaka Papakāinga – Future Travel Scenarios