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Community Owned Renewable Energy in North Coast NSW Social Housing

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Community owned renewable energy in North Coast NSW social housing

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Submitted in partial fulfillment of the requirements for Australia:

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[ISP Ethics Review](#)

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The ISP paper by Kelly Leatherman (student) does/does not* conform to the Human Subjects Review approval from the Local Review Board, the ethical standards of the local community, and the ethical and academic standards outlined in the SIT student and faculty handbooks.

*This paper does not conform to standards for the following reasons:

Completed by: Peter Brennan

Academic Director: Peter Brennan

Signature:

Program: Australia: Sustainability and Environmental Action

Date: 27/11/2015

Abstract

This study assesses the feasibility of implementing community owned renewable energy (CORE) technology in social housing units in North Coast NSW. I completed this study by conducting interviews with three renewable energy policy experts to ascertain the current state of renewable energy and CORE in NSW. Second, I conducted four interviews with separate social housing unit employees/residents to understand their interpretation of current barriers to implementing renewable energy in the social housing and if any of the units currently have any renewable energy technology or energy efficiency programs in place. After finishing this assessment, I did a comparative analysis with the barriers to CORE determined by academics and the barriers identified by social housing unit employee/resident interviews. This showed the significance of the capital and information barriers, as both academic and non-academic sources cited these as reasons against implementation of renewable energy.

After deciding the most significant barriers, I assessed unique benefits of CORE over standard renewable energy technology that can address these barriers. These benefits include the economic and social benefits of CORE, such as financing structures that enable high investment returns, possibility of donation based funding, community engagement, centralized location of renewable energy technology and ability for greater social cohesion. Understanding these benefits show the potential opportunities of CORE over standard renewable energy that social housing units should consider for future implementation.

The study shows the importance of innovating solutions as a way to connect low-access and vulnerable populations to renewable energy technology. As household and electricity costs continue to affect the North Coast NSW region, devising creative ways to address these impacts are essential to promote equity in achieving environmental sustainability. Therefore, if these barriers are addressed, CORE has the potential to be an effective way to transition social housing units to renewable energy and reduce their ecological footprint substantially.

Keywords: social housing, community owned renewable energy, renewable energy, vulnerable

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Lastly, I would like to thank Peter and Laura Brennan for overseeing the group during ISP and being resources whenever we needed assistance. Their tireless work is much appreciated.

List of figures, tables and abbreviations

Figure 1: page 25

This bar graph displays responses of social housing unit employees of barriers to renewable energy in social housing.

Figure 2: page 27

This is a Venn diagram of barriers identified by academic research and verified by interviews with social housing unit employees over barriers to implementing renewable energy in social housing.

Figure 3: page 29

This illustrates the structure of financing any renewable energy project where the entire upfront capital is not initially financed.

Table 1: page 4

Table 1 defines a variety of housing schemes that operate under the term ‘social housing’. These include community housing, affordable housing, public housing and Aboriginal housing. Though each meet a housing need, they vary on the audience they target and the purpose they serve past housing accommodation. Each definition is from the NSW Department of Family and Services writing Social Housing in NSW, a discussion paper or input and comment (2014).

Table 2: page 23

Table 2 depicts the social housing units in the region and their subsequent ‘energy status’. Meaning, whether or not they used renewable energy for electricity, any other renewable energy technology or energy efficiency programs.

Abbreviations:

- CORE: Community owned renewable energy
- RET: Renewable Energy Target
- DTI: NSW Department of Trade and Investment
- FACS: NSW Department of FACS
- OEH: NSW Department of Environment and Heritage
- CHPs: Community housing providers
- AHPs: Aboriginal housing providers

1. Introduction

1.1 Rising household costs

In the North Coast New South Wales (NSW) region, a housing affordability crisis has persisted for over a decade. The Northern Rivers Regional Organisation Council (NOROC), a local governmental body overseeing the North Coast NSW region, has developed a strategy designed to address, analyze and improve upon the housing affordability crisis. According to the NOROC (2012), this crisis emerged as a serious issue in 2000, resulting from numerous factors. These factors included economic growth, private investments, increased cost of land, increase in house construction, lack of investment in social housing and population growth. Considering these, housing stress persists and creates a level of disparity that limits access for low-income and vulnerable populations.

1.2 Rising electricity costs

In addition to rising household costs, electricity prices also can affect low-income and vulnerable populations. Australia's electricity prices have increased significantly within the last five years, largely due to network expenditure, such as upgrade to the poles and wires that deliver power to homes and businesses (Passey & Watt, 2010, p. 2). A predicted rise in electricity demand is the reason why this investment in network expenditure has expanded (Clean Energy Council (CEC), 2014a, para. 5). However, electricity use has actually decreased due to the rising electricity costs, energy efficiency actions and implementation of renewable energy technologies (Passey & Watt, 2010, p. 1). Nonetheless, network companies still have to pay for these upgrades, consequently leading to consumers paying higher power prices (CEC, 2014a, para. 5). In fact, NSW has experienced the highest increase in household electricity prices, with a 108% increase from 2007 – 2013 (Chester, 2013, p. 7).

In response to this increase in electricity costs, the NSW government is implementing a series of actions targeted to increase use of renewable energy as means of reducing overall electricity costs. A national renewable energy target (RET) of 33,000 Gigawatt-hour (GWh) renewable energy generation is in place, though this is a deduction from a previously legislated 41,000 GWh generation in June of 2015 (CEC, 2015, para. 1). Regardless of the reduction, the RET is still projected to produce major electricity cost savings for Australian households. According to a project by ROAM Consulting, if the RET were fully repealed, more electricity will come from coal and gas-fired power, spurring competition and consequent price increases. This will lead to each Australian household paying over \$50 more for electricity in 2020 without the RET (Gilmore & Giacomantonio, 2014, p. 1).

In order to achieve the RET, though released before the 2015 reduction, The Renewable Energy Action Plan was published in September of 2013 as a guide to NSW's renewable energy development. This plan has three goals: attract renewable energy investment, build community support and attract and grow renewable energy expertise (DTI, 2013, p. 5). These three overarching goals aim to secure both an affordable and clean energy future, hoping to achieve environmental sustainability while recognizing the need to combat growing energy costs. Though the RET has been reduced since the plan's release, progress has been made and documented in the Department of Industry's Annual Report for 2014, reporting a total of 9,335 GW of renewable energy generation with a predicted 5,400 Megawatts (MW) of potential projects applying for approval (DTI, 2014, p. 16). As renewable energy grows, potential cost savings could occur to combat rising electricity prices.

1.3 Role of energy efficiency

The DTI defines energy efficiency as using energy wisely and avoiding energy wastage in order to achieve more with less (DTI, 2011, p. 90). Considering the rising costs of electricity, energy efficiency is a potential solution to lowering household electricity costs. In the DTI's Energy Assistance Guide (2011), the most effective way to keep household energy costs down is managing one's energy use. These include taking shorter showers, implementing home insulation and drying clothes on a line amongst many other behavioral changes.

However, contention exists over if energy efficiency matters are an effective way to address high household electric costs, especially for vulnerable and low-income homes. Chester (2013) argues that government must address better ways to implement energy efficiency and consider vulnerable and low-income population's multi-faceted relationship to energy. Many barriers, such as the inability to afford energy saving appliances, the need for health-related use of heating and cooling, energy for life support equipment and presence of children are characteristics of vulnerable populations that are not idealistic for energy efficiency matters. Thus, better solutions should emerge to supplement or make energy efficiency more feasible for these populations so they may also reap the benefits of reduced electric costs.

Relating this to social housing, key demographics within social housing are low income and vulnerable populations (FACS, 2014a, p. 15). Analyzing these housing units show that creative and innovative energy solutions, in addition to existing energy efficiency practices, could enact energy cost savings. Therefore, creating renewable energy schemes

within social housing that are in alignment with the needs of the tenants could be a more holistic and successful solution than energy efficiency in producing electricity cost savings.

1.4 What is social housing?

As defined by the FACS, social housing is “rental housing provided by not-for-profit, non-government or government organizations to assist people who are unable to access suitable accommodation in the private rental market” (FACS, 2014a, p. 49). However, the term social housing also involves a wider spread of housing accommodations. Meaning, the definition of social housing also encompasses public, community and Aboriginal housing. Table 1 provides the definitions of the different forms of housing accommodation. Additionally, community housing encapsulates a variety of types of home accommodation, including affordable housing, also defined in the table below.

As entailed in the definition, the purpose of the NSW social housing system is to provide housing products and services to individuals and families in housing needs. NSW has the largest social housing system in Australia, with around 150,000 dwellings supporting around 290,000 individuals (FACS, 2014a, p. 5). Currently, NSW’s social housing system is undergoing a series of improvements to better accommodate tenants and improve the system as a whole. For example, the FACS recently designed a comprehensive strategy to reform and improve social housing in NSW (FACS, 2015, para. 1). The strategy recommends three key pillars of change: Introduce a social housing system that provides opportunities and pathways for client interdependence, a social housing system that is fair and a social housing system that is sustainable (FACS, 2014a, p. 7). These goals hope to meet the complex needs of social housing tenants, who generally report lower educational achievement, high levels of unemployment, poorer health and higher rates of mental illness than the NSW average (FACS, 2014b, p. 5).

In addition to these goals, the NSW government is hoping to improve the asset portfolio of social housing. The housing portfolio has failed to keep pace with the needs of the tenants while no provider of social housing in NSW can earn a sufficient operating margin to cover the full lifecycle cost of asset maintenance and replenishment without accessing alternative revenue sources. This is due to increasing costs because of an aging portfolio of dwelling options (FACS, 2014b, p. 5). Thus, finding ways to save social housing providers costs, such as cutting down energy costs by using renewable energy, could be a potential solution aligned with the envisioned future for NSW social housing.

Table 1:

Term:	Definition:
Community housing	Subsidised rental housing for very low-to-moderate income households managed by a Community Housing provider. Community housing can include affordable housing for very low-to-moderate income households and crisis accommodation for people who are homeless or at risk of homelessness.
Public housing	Dwellings owned (or leased) and managed by State and Territory housing authorities to provide affordable rental accommodation.
Aboriginal housing	The Aboriginal housing sector seeks to meet the particular housing needs of the Aboriginal community although not all Aboriginal people in the social housing system use Aboriginal housing.
Affordable housing	Housing delivered using some form of government intervention (via funding/subsidies, policy or legislation) to supply housing that is affordable for and targeted to households on very low to moderate incomes.

Table 1: Table 1 defines a variety of housing schemes that operate under the term 'social housing'. These include community housing, affordable housing, public housing and Aboriginal housing. Though each meet a housing need, they vary on the audience they target and the purpose they serve past housing accommodation. Each definition is from the NSW Department of Family and Services writing Social Housing in NSW, a discussion paper or input and comment (2014).

1.4.1 Who uses social housing?

The profile of tenants in social housing has changed since the inception of the social housing system. Originally for low income working families, the system now is dominantly composed of singles with no children (FACS, 2014a, p. 58). Additionally, the FACS (2014) reports that:

- Over half of the household members are of working age (between 18-64 years old).
- 35% of tenants have a disability, and 19% have severe mental illness.
- 85% have completed junior secondary schooling, but only 33% have completed Year 12 education or beyond (junior secondary schooling is the equivalent of high school; Year 12 education or beyond is the equivalent of college).

- More than one in three individuals in social housing is a child or young adult, with roughly 4,000 of these young adults being the household head of the tenancy.

This profile is in addition to the overall requirement of residents being low-income, which is defined by the individual earning less than 50% of the NSW median income – including those who are on an aged/disability pension or other government benefit (FACS, 2013, para. 1). Thus, one should consider the diverse needs of social housing users when looking into potential implementation of renewable energy in units, in addition to recognizing financial constraints as a low-income individual.

1.5 Enova's role

Enova is a community owned renewable energy retailing and installation business based in Byron Bay, NSW. This business is aiming to partner with groups and agencies throughout the community to shape, finance and deliver programs to assist vulnerable households, lower socio-economic groups and community organizations (Enova, 2015, para. 5). Therefore, Enova is interested in partnering with social housing units in the surrounding NSW region to provide renewable energy at a competitive tariff that will make renewable energy a feasible option. However, this is contingent on variables such as types of housing units, how to pay for the renewable energy and ensuring each renewable energy installation is best aligned to the social housing tenant's needs.

To help facilitate Enova in initiating CORE projects, I analyzed where social housing is located in the region, ascertained from willing organization's their energy consumption and why they do or do not use renewable energy for electricity, any renewable energy technologies (such as solar hot water heaters) and energy efficiency programs. The goal is to ascertain the biggest barriers to implementation in social housing currently from the housing unit's perspective and see how CORE can address those barriers.

1.6 What is community owned renewable energy?

Authors within the Community Power Agency (CPA), an organization that specializes in supporting community groups to navigate the process of setting up a CORE project, defines community energy in Community owned renewable energy: A how to guide (Hicks, Ison, Gild & Mey, 2014, p. 3) as projects that develop renewable energy resources for electricity, heat and fuel in ways that:

- Reflect the motivations and aspirations of the local community;
- Maximize local ownership and decision making;

- Share the financial benefits widely;
- Match energy production to local usage.

CORE is also a form of renewable energy that reaps more overall benefits than standard renewable energy implementation. Meaning, the involvement and engagement of community can add an additional benefit of renewable energy past potential cost savings, environmental sustainability, etc. In Trust and community: Exploring the meanings, contexts and dynamics of community renewable energy, it is argued that a stronger sense of trust substantiated by community can emerge if the program is applied in the right context (Walker, Wright, Hunter, High & Evans, 2009). These relationships can emerge consequently to collectively benefit the community. Additionally, CORE can also include the renewable energy technology installation and maintenance being contained in the community, thus developing jobs and training opportunities (Hicks, Ison, Gild & Mey, 2014, p.3).

Though the above, ideal definition is one to strive for, Walker and Wright (2007) also explain that the definition of this energy can also fluctuate and should be flexible to best accommodate to the community's needs. With this assessment of community-based renewable energy, an ideal project for social housing units would be one where the community involved in the housing units could play a role in driving, developing and benefiting from the project.

1.6.1 Status of CORE in NSW

CORE is emerging as the NSW Office of Environment and Heritage (OEH) has undertaken two CORE grant rounds, totalling over \$1.2 million in grants supporting new development of CORE projects and business opportunities (Mey & Ison, 2015, p. 3). Additionally, OEH is investigating different programs and procedures for how to make CORE more accessible for low-income populations, including social housing, renters and apartment dwellers (Mey & Ison, 2015, p. 3). On a national level, the sector has grown from just 3 known CORE projects in 2009 to over 45 communities setting up CORE projects in 2014 (Hicks, Ison, Gild & Mey, 2014, p. 16). Though the field of integrating CORE into low-income and social housing is still on the forefront of development, it is being highly pursued and certainly becoming more of a feasible concept. Hence, Enova could position itself to take advantage of this trend and hopefully implement CORE in social housing in the future.

1.7 Justification for community renewable energy in social housing

Connecting social housing and community renewable energy therefore could be a ground-breaking relationship, as it could provide collective benefits to the community while being more sustainable. This intersection of environmental and social justice is an emerging field that is seeking to continually develop. Walker (2008) addresses the potential of implementing these forms of programs in urban contexts, such as social housing. He addresses this as a future incentive for companies to reduce poverty while incorporating renewables: “One idea is for renewable energy generation to become a standard part of urban regeneration initiatives, with community ownership providing economic and social returns as in rural areas, and linking to objectives for the reduction of fuel poverty” (Walker, 2008, p. 4).

Additionally, other researchers are continuing to dig deeper into ways to find a nexus between sustainability and environmental justice, particularly in community building. Julian Agyeman and Tom Evans explore this concept by assessing urban communities in the United States and how social equity can be promoted through sustainable measures. One case involved ways to integrate community-based residential energy. After assessing different community-based energy projects, the real challenge of residential sustainable energy remains creating the link between consumers and available technology in conservation and renewables (Agyeman & Evans, 2003). Nicky Ison and Franziska Mey also identify this disconnect when assessing how renewable technologies are less accessible for low-income populations, largely due to concerns over how the upfront cost of installing a renewable energy technology can be paid for (Ison and Mey, 2015, p. 6). Thus, Enova presents an excellent opportunity to bridge the social housing communities by providing the renewable technology at a more competitive and affordable price. With this, a potential connection between social and environmental justice could be created in this region of housing affordability stress and rising electricity prices that impact vulnerable populations.

1.7.1 Current research and future opportunities

Though CORE implementation in social housing is still a relatively new idea, there is substantial research on assessing how to implement renewable energy in low-income populations. Madison Dell, a previous SIT student, conducted a study in Spring of 2015 to assess NSW government policy’s adequacy in transitioning low-income households in transitioning to renewable energy. In her work, she concluded that the existing energy efficiency policies and programs are adequate in supporting vulnerable households to uptake

energy efficiency; however, existing renewable energy policies and existing solar photovoltaic programs are inadequate. (Dell, 2015, p. 45). The reasons Dell (2015) cited largely derived from the fact that they did not address the high up-front cost of implementing renewable energy. Additionally, other research conducted also affirms that the high cost of renewable energy is a main barrier to connecting low-income households to renewable energy (Mey & Ison, 2015).

However, my study wants to assess from the unit's perspective why they do not implement renewable energy and compare those answers with the current academic analysis of barriers. Lastly, limited research has connected CORE to social housing and assessed if making the renewables community driven could address these barriers in an enhanced way comparatively to a standard renewable energy program. From this, I want to conclude the best potential options for CORE implementation in social housing units.

1.7.2 Relevance to sustainability

Assessing the potential for community-based renewable energy within social housing has the potential to guide these housing units to reducing their ecological footprint substantially. The definition of sustainability is centered on inter and intra generational equity, so reducing fossil fuel consumption through renewable energy is a way to limit pollution for later generations. Second, sustainability has an emphasis on the triple bottom line of social, environmental and economic welfare. Since this study focuses on reducing the carbon impact of a vulnerable population, it will have allow for both social and environmental benefit. It has the possibility for economic benefit for the housing complex as well.

2. Methods

2.1 Ethical concerns

To ensure that my research abided by the ethical parameters of SIT, I submitted an ethics approval form to the LRB. Following, the LRB approved my form. When I originally submitted this form, I noted that I would not be working with ‘at-risk’ populations, such as children or Aboriginal people. In order to maintain these criteria, I did not directly contact any Aboriginal specific housing, as that could entail working with Aboriginal people. Conversely, I did mark that I will interview and potentially subject individuals to embarrassment because of my research. In order to combat this, I asked each individual for consent to be in my paper. After I interviewed, I asked if they are comfortable being cited in my paper and how they would like to be cited. If they did not feel comfortable, I would put anonymous. Though I ended each interview with this question, all parties expressed no discomfort and were willing to be in my paper.

Since I targeted my interviews to certain populations, there was no need for random sampling methods. Rather, I intentionally tried to target as many units as possible. Thus, I conducted my interviews on the basis of who was willing to respond and discuss their energy consumption. This led to little sampling bias. Additionally, I tried to structure the interviews so they were not biased.

2.2 Determining related policy

In order to understand the associated sectors involved in this topic, I conducted academic research through online resources, primarily academic articles and NSW government-made documents that highlighted relevant legislation and issues that would be of relevance for this study.

2.2.1 Social housing

The FACS produces several resources that detail relevant legislation to consider regarding social housing. In particular, I analyzed discussion papers and several fact sheets about what social, community, affordable and other forms of housing are and important legislation regarding social housing accessible via FACS.

2.2.2 Renewable energy

To understand renewable energy, I both conducted academic research and interviews with policy experts in the renewable energy and distributed generation fields. For academic research, I surveyed several academic papers concerning distributed generation, solar

photovoltaic power, the national RET and community renewable energy. I also analyzed many resources provided by the NSW Department of Industry regarding relevant NSW renewable energy policy. The framework for this analysis largely derived from Madison Dell (2015), who conducted a previous study solely on NSW government policy pertaining to renewable energy implementation in low-income housing.

Second, I conducted three interviews with policy experts in the distributed generation and renewable energy field pertaining to papers they authored:

- Robert Rosen: I conducted an email interview concerning incentives for landlords to install renewable energy.
- Chris Cooper and Nicky Ison: I conducted a phone interview concerning barriers to implementing renewable energy with low-income populations.
- Robert Passey: I conducted an email interview concerning market expenditures for renewable energy and incentives to use distributed generation.

2.2.3 Energy efficiency

To give context to what energy efficiency means, I assessed documents released by the DTI and related factsheets released by the NSW Department of Industry.

2.3 Defining and identifying social housing units

Since social housing encompasses a variety of housing accommodation forms, I first conducted an academic review of what social housing means. This entailed using online research tools to first assess what social housing is. These tools all derived from FACS, since they are the governing body of NSW social housing. Primarily, the FACS discussion paper, Social Housing in NSW: A discussion paper for input and comment (2014) provided the framework for defining social housing and its accompanying subtypes of housing.

Second, once I defined what social housing means, I conducted a second academic review of social housing unit locations across the North Coast NSW region. This entailed using appropriate resources for each type of housing:

- Community housing: I used an excel spreadsheet, accessible via FACS (2015b, para. 5) that listed community housing providers by local area. I identified localities within the North Coast region and documented their name and location within the region. Second, I also verified this spreadsheet by checking the FACS Housing Pathways website that also has a page dedicated to listing community housing providers (FACS, 2015c), doing the same procedure of identifying localities and documenting what

providers were in the relevant localities. After identifying these units, I contacted them via their provided phone numbers and spoke with representatives who would give more definitive information on the units and where their assets were located.

- Specialist homelessness services: Specialist homelessness services are a subset of community housing and entailed accessing a separate registry, also provided by FACS (2015e). This profile is region specific, so after assessing the assets documented, I called at the provided phone numbers remaining organizations I had not already called with my community housing assessment and spoke with representatives who would give more definitive information on the units and where their assets were located.

- Public housing: Similar to community housing, I relied on the FACS for information (FACS, 2015d) and identified the public housing offices in relevant localities, called the appropriate offices and spoke with representatives who gave more definite information about where public housing is located in the NSW region. Contrary to community housing, public housing does not entail other subsets of housing so this was the only resource I needed to use for this specific sector.

- Aboriginal housing: The registry I used to analyze crisis accommodation centers lists Aboriginal housing accommodation, so I referred to that document to assess locations of Aboriginal housing (FACS, 2015e). However, due to ethical constraints discussed above, I did not call the units for more details on specific location of the units.

2.4 Assessing energy status of social housing units

After contacting the units via telephone number to understand specific locations for the unit's assets, I would ask a representative if they would be comfortable conducting a short interview to understand the unit's 'energy status'. For purposes of my research, the term energy status means whether or not they receive electricity from a renewable resource and if the units operate any energy efficiency programs.

Due to time constraints, all units preferred to conduct interviews via email or phone. Below is a list of the housing providers I interviewed and the method to conduct the interview:

- Tweed Shire Women's Service: I conducted a phone interview with Carol Graham.

- Anglicare North Coast: I conducted a phone interview with Angie Laussell.
- On Track Community Programs: I conducted an email interview with Tim Haywood.
- Common Equity NSW: I conducted a phone interview with Patricea MacArthur.

All other providers not in the above list either did not want to release information, did not have time to accommodate an interview whatsoever or did not respond to my calls. The content of my interviews were standardized and the same for each unit.

2.5 Analyzing how CORE can address barriers of renewable energy in social housing

In order to understand the current barriers of renewable energy in social housing, I conducted both academic research and interviews with policy experts and employees of social housing units. Academic research consisted of studies produced by the CPA regarding their analysis of current barriers to implementing renewable energy in low-income populations. I analyzed these studies and conducted a phone interview with the authors to better develop a framework of potential barriers of renewable energy in social housing.

Other interviews are outlined above (the same interviews to ascertain locations of social housing units), as I asked questions about why the social housing unit has not implemented renewable energy when I interviewed units about their locations and energy status. After conducting these interviews, I did a comparison and targeted common barriers discussed both by academics/policy experts and social housing unit employees. After assessing those barriers, I identified benefits of CORE that could subsequently address those barriers using CPA documents. Once I identified the benefits, I analyzed how these can relate directly to the barriers and concluded the best options for Enova to proceed with future implementation.

3. Results/Discussion

3.1 Definition of North Coast NSW region

For the purposes of my research, I defined North Coast NSW region according to the parameters defined by FACS (2015f, para. 4).

According to this definition, the North Coast NSW region encompasses the following localities. Within these localities, a few specific regions were of importance, as properties of social housing units were located. I specified those regions below.

- Ballina
- Byron
- Clarence Valley
 - Maclean
 - Grafton
- Kyogle
- Lismore
- Richmond Valley
- Tweed Heads

3.2 Relevant legislation

In order to understand the relevant sectors, I assessed legislation involved with social housing and renewable energy.

3.2.1 Social Housing

Social housing has a technical regulatory and legislative framework with many moving parts and components. The FACS (2014a) details important legislation regarding social housing regulation. Though this legislation is strictly for social housing, the regulatory details entailed in the legislation do hold relevance in implementing CORE within the housing units, specified below.

3.2.1.1 Regulatory framework

Since social housing has many different forms of accommodation, several echelons of regulation oversee the implementation of social housing. FACS is the principal regulator and administrator of the NSW social housing system (FACS, 2014a). Within the FACS, the Land and Housing Corporation (LAHC) and the Aboriginal Housing Office (AHO) serve as statutory bodies that operate various forms of social housing (FACS, 2014a).

Though one department of government wholly oversees social housing, there are four separate types of providers who report to this overseeing government department (FACS, 2014a). Those four providers are:

- The LAHC, who own public housing, though FACS manages the properties.
- The AHO, who owns Aboriginal housing, though LAHC manages the properties.
- Community housing providers (CHPs), who manage and own community properties.
- Aboriginal community housing providers (AHCPs), who own and manage Aboriginal housing.

Relevance to CORE: Understanding the regulatory framework enables future retailers of renewable energy to recognize what body they should communicate to for management of asset properties. For example, working with community housing providers entails reporting to the provider itself for guidance on CORE implementation. Conversely, working with a public housing entails communication with LAHC and FACS, since both own and manage the assets.

3.2.1.2 Housing Act 2001

The *Housing Act 2001* (NSW) regulates a large portion of the social housing system. The Housing Act envisages a social housing system with broad objects to provide universal access to secure, appropriate and affordable housing for all (FACS, 2014a, p. 52).

Relevance to CORE: The *Housing Act 2001* (NSW) outlines several objectives to achieve its overall vision stated above. In particular, their objective (e) to “ensure that public and community housing reflects the housing standards of the general community and is designed to cater for the ongoing needs of consumers” (FACS, 2014a, p. 68) holds applicability to CORE. This objective exemplifies the need for retailers to make CORE continually available so social housing can keep pace with other communities transitioning to renewable energy technologies. This objective also serves as a platform for CHPs and other associated social housing providers to implement CORE projects, as it will benefit the consumers of social housing and keep pace with the surrounding communities as CORE gains popularity in the North Coast NSW region.

3.2.1.3 Social housing funding sources

Funding for the NSW social housing system comes from a range of sources. The two largest sources are indirect and direct Commonwealth and State government funding and

rental income (FACS, 2014a, p. 6). Though there is a main funding vehicle, facilitated by the *National Affordable Housing Agreement 2009*, varieties of other sources supplement the main vehicles of funding for social housing.

A particularly relevant form of funding is rental income. The four types of providers of NSW social housing all have different rent models that are pertinent to potential implementation of CORE projects. Whereas tenants who occupy LAHC managed dwellings are required to pay market rent (unless their income is insufficient), CHPs have a different rent structure, supplemented by Commonwealth Rent Assistance (CRA) payments (FACS, 2014a, p. 34). The Commonwealth Government provides the CRA paid to people on Centrelink benefits to assist with the rental costs. FACS (2014a, p. 34) reports that tenants will pay rent at 25 – 30% of their income and that CHPs will receive this payment in addition to the CRA payments.

Relevance to CORE: Though *Barriers* discusses this in greater detail, understanding the structure of funding for social housing facilitated by rental payments can relate to CORE projects. As different repayment structures for the upfront capital cost of renewable energy technology emerge, a potential way to pay back for the cost is to increase rental payments for tenants in social housing. Considering the different factors of rental payments, such as the role of CRA, can influence deciding the best way to structure a repayment program.

Additionally, FACS (2014b, p. 5) notes that a key challenge to the current social housing system is a decline in revenue due to operating costs of ageing assets. Assessing ways to retrofit and improve aging properties with CORE technology, while potentially reducing energy costs, could be an ideal way to increase revenue for the social housing unit and improving the asset infrastructure.

3.2.1.4 The Legislative Council Select Committee on social, public and affordable Housing

This council was established in November 2013 to inquire into various issues relating to social, public and affordable housing (FACS, 2014a, p. 53). The council has made recommendations based on submissions from individuals, local government, professional associations, community organizations and other entities to improve public housing maintenance arrangements, new funding for social housing and how to best prioritize the allocation of new tenancies (FACS, 2014a, p. 53).

Relevance to CORE: As an acting body dedicated towards continually improving the social housing system, their willingness to accept submissions and work with the community to improve social housing could be a platform to suggest CORE implementation. Additionally, the Council's role in assessing ways to improve housing design (FACS, 2014a) is applicable, as social housing design in the future should incorporate CORE.

3.2.2 Renewable energy

For the majority of the research concerning renewable energy policies Madison Dell, a student with SIT Study Abroad, conducted a study highly relevant to this topic. Dell (2015) analyzed the adequacy of policies in NSW supporting vulnerable households in transitioning to renewable energy. Thus, I relied on the policies she targeted to be relevant as low-income households are highly similar to social housing units. However, for my research purposes, I specifically focused on renewable energy policies pertaining to CORE.

3.2.2.1 Renewable Energy Target

According to the Australian Department of the Environment, on June 23, 2015 the Australian Parliament reformed the federal RET to large-scale generation of 33,000 GWh in 2020. The purpose of the reduction was to protect Australian jobs, remove certain review requirements and reinstate biomass from native forest wood waste as an eligible source of renewable energy (Australian Department of Environment, 2015, para. 5).

However, even with the reduction of the target, the overall scheme of the RET remains the same. Since the RET's inception in 2011, the scheme has operated in two parts – the small-scale renewable energy scheme and the large-scale renewable energy target (Australian Department of Environment, 2015, para. 8). The large-scale scheme creates a financial incentive for the establishment or expansion of renewable energy power stations; conversely, the small-scale renewable energy scheme creates a financial incentive for households, small businesses and community groups to install small-scale renewable energy systems (Australian Department of Environment, 2015, para. 9).

3.2.2.1.1 Small-scale technology certificates

Small-scale renewable energy systems at the time of installation receive small-scale technology certificates according to the amount of electricity they are expected to produce or displace in the futures (Australian Department of the Environment, 2015, para. 11). The purpose of these certificates are to create a financial incentive to install small-scale renewable energy, such as a delayed cash payment or a discount on the invoice, in exchange for the right

for the electricity retailer to create and sell the STCs (Australian Department of the Environment, 2015, para. 11).

Relevance to social housing: Having an RET encourages continual research and investment in uptake of renewable energy technologies, such as implementing renewable energy in social housing. Additionally, the STCs are potentially incentives that could displace costs of initial installation of renewable energy.

3.2.2.2 NSW Renewable Energy Action Plan

As mentioned in the *Introduction*, the NSW Renewable Energy Action Plan is meant to guide NSW's renewable energy development in accordance with the RET (DTI, 2013). The plan has three overarching goals: attract renewable energy investment and project, build community support for renewable energy and attract and grow expertise in renewable energy (DTI, 2013).

In particular, the goal to integrate the community entails NSW supporting CORE projects. The NSW government intends to support by collaborating with local community organizations and recently made funding available through the Renewable Energy Precinct Program for locally owned renewable energy programs. (DTI, 2013). According to their Annual report (2014), progress has also been made since the inception of the Renewable Energy Action plan that has consequently led to more government supported renewable energy programs, such as the Government Resource Efficiency Policy and the smart meter policy (DTI, 2014). However, progress is marked as 'ongoing' for more CORE specific projects, such as "engaging communities early and effectively in renewable energy projects" (DTI, 2014, p. 2).

Relevance to social housing: Understanding the status of these programs shows the emerging opportunities for CORE implementation and the feasibility of potential implementation in social housing.

3.2.2.3 Regional Clean Energy Program

The Regional Clean Energy Program (RCEP) creates opportunities for communities throughout NSW to fully participate in local renewable energy initiatives (OEH, 2015, para. 1). A key component of this program is the funding opportunities supported by the OEH to develop community-based projects.

Relevance to social housing: Considering the OEH interest in CORE implementation in low-income and forms of social housing shows the merit in investigating current barriers and how to overcome those barriers for implementation.

3.2.2.4 Solar Bonus Scheme

The Solar Bonus Scheme provides a feed-in-tariff of 20 cents per kWh or 60 cents per kWh for eligible customers with small scale solar or wind generators connected to the grid (DOI, 2015, para. 1). The scheme expires in December 2016 and now only offers the 20 cents tariff to new customers. The purpose is to incentivize customers to receive money back after exporting excess energy into the electric grid from the according energy generator (DTI, 2015, para. 1). The STCs provide an upfront rebate in addition to the incentive (Passey, 2015, pers. comm). Therefore, a few existing programs do encourage the installation of renewable energy and allow customers to receive a favorable payback rate.

Relevance to social housing: This scheme could be a financially beneficial method to allow social housing unit providers to get better financial returns on CORE investment.

3.2.3 Energy efficiency

Energy efficiency holds relevancy to social housing because it is a way to reduce energy costs while avoiding the major transitional changes associated with implementation of CORE and other renewable energy technologies. In order to facilitate more energy efficient homes, the federal and NSW government has implemented policies to promote measures to make homes more energy efficient.

3.2.3.1 The NSW Energy Efficiency Action Plan (EEAP)

The NSW Office of Environment and Heritage has developed EEAP to reduce electricity bills or households and improve energy productivity for businesses. OEH has set a target goal of achieving annual energy savings of 16,000 GWh by 2020 (Dell, 2015). In order to achieve this energy savings, OEH has provided several energy saving programs of relevance to social housing, specified below (Dell, 2015):

- Energy Efficient Homes Program: This program will put \$26.8 million toward high-return energy efficiency improvements for low-income households, including those who are renting their homes. It will also work with community housing providers to upgrade community housing properties for tenants.

- Home Power Savings Program: This program ran between May 2010 and April 2014, where participating households received a free in-home assessment from a trained energy expert, a Power Savings Kit of energy efficient products and a personalized Power Action Plan. Though this plan is no longer in operation, the Energy Efficient Homes Program aims to build on the success of this program in the future.

Relevance to social housing: As acknowledged by Dell (2015), NSW has successful ways to address rising electricity costs through government programs that encourage energy efficiency. Since there are upfront barriers to renewable energy, implementing energy efficiency matters could be a potential supplement or subsequent solution. However, Chester (2013) does warn that energy efficiency is largely less impactful in combating energy costs and difficult for low-income populations.

3.2.4 Other related policy

Other related policy includes the Corporation Act 2001 and Retail Law 1995.

3.2.4.1 Corporations Act 2001

This is national legislation regulated by the Australian Securities and Investment Commission that ensures that all companies are subject to legal responsibilities (Hicks, Ison, Gild & Mey, 2014, p. 30).

Relevance: This relates to both social housing and CORE, as it dictates how companies can raise fund and the investor rights of the company. According to Ison, Gild & Mey (2014), the most appropriate company for CORE project is a public company limited by shares, as they can raise funds through issuing shares to the public. Not all social housing programs are public companies; however, major community housing provider, such as North Coast Community Housing, are. Additionally, CORE is not only limited to public company limited by shares. Rather, this pertains for community investor share projects where the public can invest in the renewable energy generation.

3.2.4.2 Retail Law 1995

Under the Retail Law, a person usually must hold a retailer authorization in order to sell energy (Australian Energy Regulator, 2015, para. 1).

Relevance: If a unit wishes to sell energy to the tenants, they must apply for exemption under this retail law if they have more than 10 dwellings within their unit (Robert

Rosen, 2015, pers. comm.). This means that larger housing providers need to consider this if they wish to sell the renewable energy to tenants.

3.3 Social housing unit providers in the North Coast NSW region:

Below is an overview of the social housing unit sector in the North Coast NSW region, separated by form of housing accommodation:

1. Community Housing:

Overview: There are five major providers in the region, the two largest being North Coast Community Housing and On Track Community Programs (FACSB & FACSc, 2015).

Housing unit provider:

North Coast Community Housing
On Track Community Programs
Anglicare North Coast
Common Equity NSW
BaptistCare

2. Public Housing:

Overview: Housing NSW offices across NSW operate public housing; two offices are located in the region, Lismore and Tweed Heads (FACSD, 2015).

Housing unit provider:

Housing NSW (offices in Lismore and Tweed Heads)
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3. Aboriginal Housing:

Overview: The Aboriginal Housing Office works in partnership with housing providers and indigenous organizations to manage housing services (AHO, 2015, para. 1). The list is from the NSW compilation of all specialist homelessness services, with four providers solely for Aboriginal housing (FACS, 2014e).

Housing unit provider:

Gurehlgam Corporation
Jali Local Aboriginal Land Council
Lismore Neighborhood Center
Tweed Aboriginal Co-Operative Society

4. Specialist homelessness services:

Overview: Though some social housing units provide homelessness services, below are organizations with missions strictly towards homelessness and crisis accommodation. The list is from a NSW compilation of all specialist homelessness services (FACS, 2014e). *Note:* The list provided by NSW also includes support and not housing accommodation services. Listed below are verified units that do provide refuge and housing.

Housing unit provider:

Clarence River Women's Refuge and Outreach Services
Tweed Shire Women's Services
Women Up North
Byron Emergency Accommodation Project
The Family Center
Youth Connections North Coast
Northern Rivers Women and Children's Services

3.4 Location of assets and energy status

Table 2 on the following page provides a framework for the location of assets of different housing providers, their subsequent energy status and whether or not the unit providers have implemented an energy efficiency program.

Note: For my research, I use the term ‘energy status’ to convey whether or not they use any renewable energy for electricity. I also specified the method of inquiry, as it is what determined whether or not I could attain the provider’s energy status, use of other renewable energy technologies and if the providers have any energy efficiency programs.

The gray colored units are community housing, the blue special homelessness assistance programs and the green public housing providers. Note that I did not list the Aboriginal housing units because I did not survey them.

Provider:	Location of assets:	Inquiry mode:	Use of renewable energy for electricity:	Use of any other renewable energy technology:	Use of energy efficiency program:
North Coast Community Housing	Kyogle, Lismore, Tweed, Byron, Ballina, Richmond and Clarence Valley.	Online research (no interview available because of time constraints).	Not available.	Not available.	Not available.
On Track Community Programs	Tweed Heads.	Interview.	Yes; some complexes do but a majority do not.	Yes; some use solar hot water heaters.	No.
Anglicare North Coast	Grafton, Maclean, Yamba and Murwillumbah.	Interview.	No; standard connection through a retailer.	Yes; six units have solar hot water heaters.	Yes; a position through the NSW government existed to promote energy efficiency but the position was defunded in 2014.
Common Equity NSW - North Coast Women's Housing	Mullumbimby, Clunes and Federal.	Interview.	No; standard connection through a retailer.	Yes; all units have solar hot water heaters.	Yes; an employee with their electricity retailer visited and offered ways to make homes more efficient.
BaptistCare	Not available.	Online research (no interview available because of time constraints).	Not available.	Not available.	Not available.
Clarence River Women's Refuge and Outreach Services	Grafton.	Online research (no interview available because of time constraints).	Not available.	Not available.	Not available.
Tweed Shire Women's Service	Tweed Heads.	Interview.	No; standard connection through a retailer.	No.	No.
Women Up North	Lismore.	Online research (no interview available because of time constraints).	Not available.	Not available.	Not available.
Byron Emergency Accommodation	Byron Bay.	Online research (no interview available because of time constraints).	Not available.	Not available.	Not available.

The Family Center	Not available (due to privacy constraints).	Online research (no interview available because of time constraints).	Not available.	Not available.	Not available.
Youth Connections North Coast	Nimbin, Goonellabah and Lismore.	Online research (no interview available because of time constraints).	Not available.	Not available.	Not available.
Northern Rivers Women and Children's Services	Lismore.	Online research (no interview available because of time constraints).	Not available.	Not available.	Not available.
Housing NSW	Houses across region from Tweed Heads - Grafton.	Online research (no interview available because of time constraints).	Not available.	Not available.	Not available.

Table 2: Table 2 depicts the social housing units in the region and their subsequent 'energy status'. Meaning, whether or not they used renewable energy for electricity, any other renewable energy technology or energy efficiency programs.

3.5 Barriers of CORE implementation

A comparative analysis of barriers perceived by employees of social housing units and CORE policy experts addresses the most imperative barriers to consider for CORE implementation in social housing.

3.5.1 Barriers ascertained from CORE experts

The South Coast Health and Sustainability Alliance (SHASA) secured funding from the OEH and the Growing Community Energy Program to develop and implement a new model of community energy that directly benefits low-income households (Cooper & Ison, 2015). In order to ensure the most successful project possible, CPA and Future Energy Consulting has been commissioned to undertake an analysis of current barriers to consider for future implementation of the CORE project.

In this analysis, the major barriers identified are the capital barrier, split-incentives, cultural barrier, common property barrier and information barrier.

3.5.1.1 Capital barrier

According to Mey and Ison (2015), a major barrier to implementation of CORE in low-income (and subsequently, social housing) is not having the disposable income to fund a capital-intensive renewable energy technology. To give context to this investment, the average cost for installation of a solar 5kW system is \$8,000 in NSW (Solar Choice, 2012, para. 1). Fronting this investment in a sector characterized by limited fiscal flexibility. Additionally, low-income households do not have the credit to access debt finance due to their income level (Mey & Ison, 2015). This consequently leads to the lender, funding the capital for installation of CORE or associated renewable energy technologies, to take on an additional risk relative to insecurity of credit of low-income individuals.

3.5.1.2 Split -Incentives

Mey and Ison (2015) defines split- incentives as “situations where a course of action with an economically efficient outcome is obstructed because it is not in the interests of a particular party” (p. 6). This relates to social housing, as the landlord is reluctant to invest in CORE projects because the benefit would simply accrue for tenants paying less for their energy bills (Mey and Ison, 2015).

3.5.1.3 Cultural barriers

Often, there are not established processes for considering and deciding issues of investment in CORE and other renewable energy technologies. Consequently, Cooper and Ison (2015) argue that this creates a cultural barrier that inhibits discussion about the possibility of implementing CORE technologies.

3.5.1.4 Common property barrier

Regarding shared property rights, there are many complications associated with deciding who will pay for the cost of installation, benefit from the saved energy costs and decide on the best form of CORE or renewable energy technology (Cooper and Ison, 2015, p. 7). Additionally, there is a belief that cultural barriers of believing that CORE and renewable technologies are also not feasible in dwellings, particularly those of the strata nature, also allow for these ideologies (Cooper and Ison, 2015).

3.5.1.5 Information barrier

Considering the technical nature of the energy sector, imperfect and misrepresented information is a common barrier that can affect use of existing resources (Cooper and Ison, 2015, p. 7). Additionally, Cooper and Ison (2015) also argue that by theory, lower average

education is correlated with low-income housing. Referring to FACS (2014a) discussion, social housing’s demographics are consistent with this assumption, as many tenants have not achieved past junior schooling. Structuring the process of payment, installation and structuring consequent electricity bills for tenants would be a multi-step, technical and complex process. Thus, in order to create a successful CORE project, structures would need to be in place that streamlined the process and made it very easy for tenants to understand (Cooper and Ison, 2015).

3.5.2. Barriers ascertained from interviews

Figure 1 shows the responses attained from interviews with social housing units regarding the barriers they feel prohibit them from implementing various renewable energy technologies. The modal response of the interviews is clearly financial constraints; 2 out of 4 social housing unit employees also discussed however retrofitting. Though some social housing unit employees/residents discussed certain barriers more frequently than others did, I displayed each barrier discussed by at least one of the social housing employees.

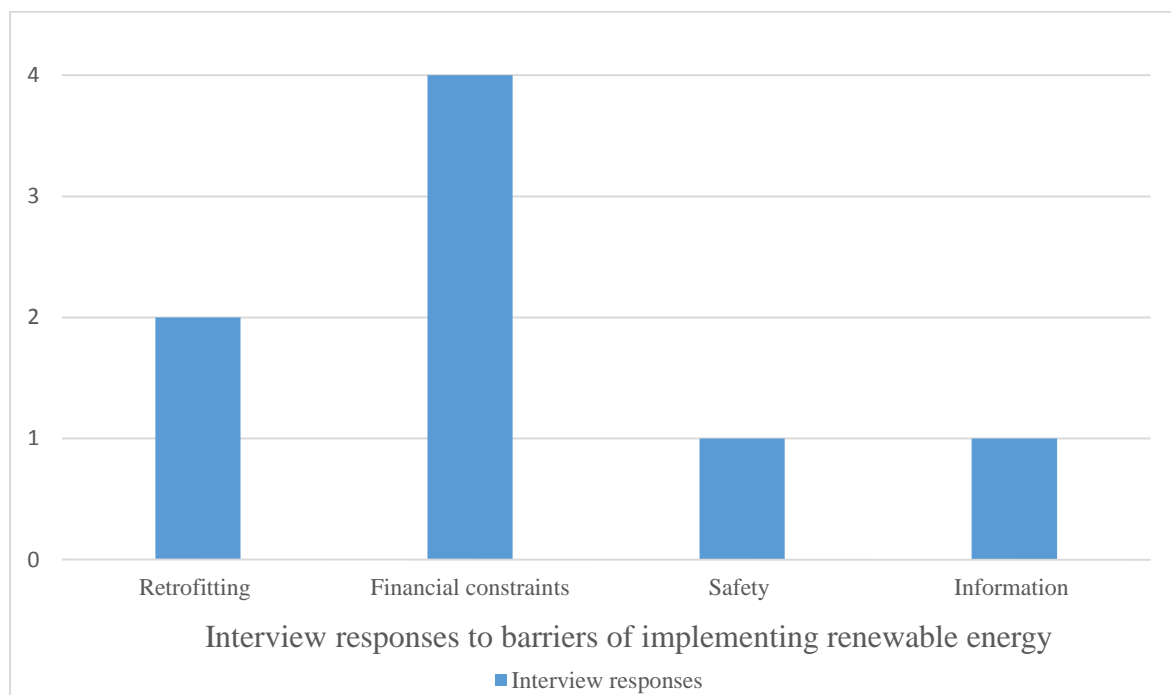


Figure 1: Graph displaying responses of social housing unit employees of barriers to renewable energy in social housing.

3.5.2.1 Retrofitting old infrastructure

In order to accommodate CORE or any other renewable energy technologies, such as solar hot water heating systems, 3 of the 4 units assessed expressed concern for the cost of not only installing the CORE technology but also retrofitting the aging infrastructure of the

units (Laussell, MacArthur and Haywood, 2015, pers. comm.). For example, Angie Laussell of Anglicare North Coast expressed this concern when explaining how some units use solar hot water technology only because they are newly constructed units: “Six units that were recently constructed have solar hot water systems... the other properties are older and don’t have the capacity for a solar hot water system” (Laussell, 2015, pers. comm.). Thus, aging infrastructure can pose a barrier that does not enable CORE technology.

3.5.2.2 Capital barrier

Similar to analysis of barriers discussed above, all four of the units interviewed expressed concern over the upfront installation cost to install the CORE technology or any other renewable energy technology. Considering the funding of these units, largely reliant on government assistance, all stated they do not have the fiscal capacity to afford renewable energy technology (Laussell, MacArthur, Haywood and Graham, 2015, pers. comm.).

3.5.2.3 Information barrier

Additionally, one unit expressed concern over an information barrier that could restrict implementation. Laussell (2015, pers. comm.) stated that many of the residents within Anglicare North Coast social housing would require detailed explanation of any CORE or energy transition initiative, as many of the residents have literacy problems. Just as Cooper and Ison (2015) explained, the highly technical and complex nature of the sector further perpetuates this barrier. Therefore, in order to move forward with implementation, enhanced communication and transparency with the tenants would be beneficial.

3.5.2.4 Safety barrier

One of the four units expressed difficulty in implementation because of the safety requirements entailed in Department of Work, Health and Safety requirements. These restrict works to install panels or hot water heater technology because of the height of the unit’s roofs (Laussell, 2015, pers. comm.). Using CORE installation or having a separate installation not on roofs could be a potential way to address.

3.2.5.5 Implied cultural barrier

Though no interviews explicitly stated this, the sector is inherently difficult to work with because of the complicated regulatory nature (such as, some homes are regulated by LAHC whereas some are regulated by CHPs) and the demographic of the units. FACS (2014a) describes the complex needs of tenants, including fiscal insecurity, mental illness and lower education status. Though CORE or any other renewable energy technologies could be

advantageous, it is not the top priority for these units. Rightly, addressing the needs of tenants should take priority and is a legitimate barrier that made even initial contact difficult with many of the units. Reaching the right people who had the knowledge and time to interview reflected this difficulty, as many housing unit employees did not have the time or interest in considering CORE or renewable energy.

3.5.3 Assessment of barriers

As depicted in Figure 2, academic research and employees/residents of social housing both addressed two barriers: capital and information barriers. Assessing the frequency of discussion of these barriers, social housing units should address these barriers before CORE implementation in social housing. That being said, all barriers do hold merit and social housing units should seriously consider each presented.

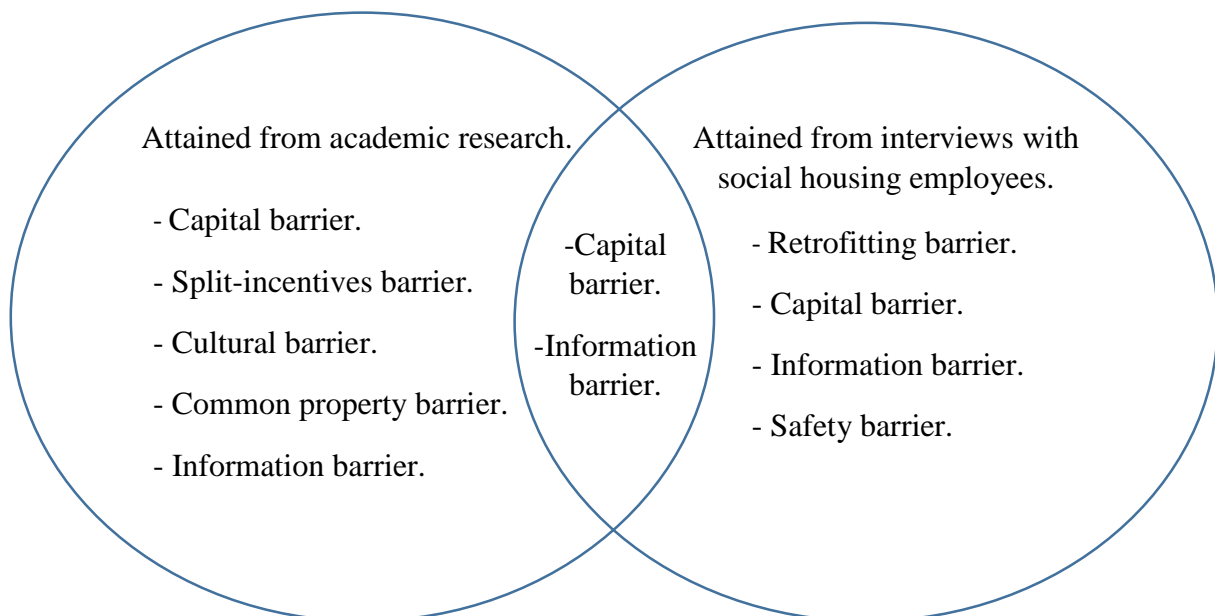


Figure 2: Above is a Venn diagram of barriers academic research and interviews with social housing unit employees identified to implementing renewable energy in social housing.

3.6 Benefits of CORE

Considering the two most relevant barriers to my study, capital and information, I assessed benefits of CORE that can address this. Particularly, two benefits of CORE addressed these major barriers: the economic and social benefits.

3.6.1 Economic Benefit

Economic barriers to implementing renewable energy in social housing – or any household – can vary and are largely dependent on the type of accommodation. For example, social housing can come in a variety of forms: apartments, stand-alone homes, townhouses, etc. However, a consistent theme to address the economic barriers is considering the landlord – tenant relationship, since the homes are not autonomously owned by the tenant.

Ison and Mey (2015) elaborated on the unique benefits that CORE can provide to social housing to address the fiscal constraints of purchasing any renewable energy technology, arguing that CORE is most ideal for those who would like to invest in renewable energy but are constrained because of they can't do so on their own property due to renting, unsuitable roof or living in an apartment (Ison & Mey, 2015, p. 7). Considering the housing variety of social housing, CORE could be a consistent way to implement renewables for tenants who live in different housing units while not inflicting more costs onto residents who do not have homes as suited for renewable energy.

Additionally, Ison and Mey (2015) state that CORE offers participants a unique opportunity because generally they receive a return on investment from a favorable interest rate. However, many social housing units interviewed expressed concern over the initial upfront capital; not the following return on investments.

3.6.1.1 Addressing financing and repayment

When trying to install renewable energy with a vulnerable or low-income household, certain barriers present themselves that entail addressing. Particularly, low-income households cannot typically access direct finance through institutional lenders or renewable energy retailers because the lender will see the household as too risky and more likely to default (Cooper & Ison, 2015, p. 10). In order to make up for this, a 'repayment collector' collects repayments from the household using renewable energy by adding these extra payments onto an existing bill. This incentivizes the original financier to proceed with the installation, as they will not carry the risk of repayment (Cooper & Ison, 2015, p. 10). Below, Figure 3 from Cooper and Ison's study (2015) illustrates this payment flow.

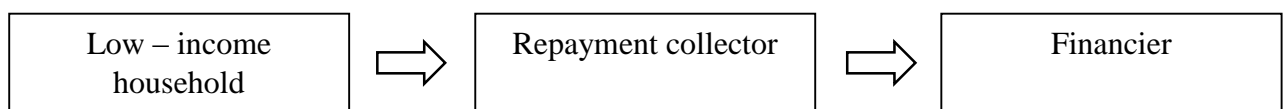


Figure 3: This illustrates the structure of financing any renewable energy project where the entire upfront capital cannot be financed must undergo.

Cooper, Ison and Mey (2015) provide a variety of repayment collectors and financiers who can fund the implementation of renewable energy. Of relevance though is the community serving as the chief financier of the implementation of renewable energy. This option entails a community group raising funds via an investment crowdfunding approach, where members buy a share in the investment to fund the capital and installation cost of the renewable energy for the units. Thus, the community is the financier, and the landlord serves as the repayment collector by having an increased rent payment for tenants to pay back the community investments (Cooper, Ison & Mey, 2015, p. 19). Though there is a variety of methods to cover the capital, Ison and Cooper (2015) argue that CORE financing could provide an enhanced community investor cash return that not all other repayment and financing situations provide. Thus, community investments that reap greater community returns could cover the initial capital. This incentivizes community members to invest while providing social housing units the opportunity to access renewable energy technologies.

Though this is an advantageous solution to the capital barriers of installing renewable energy, it is worth noting that other methods of financing and repayment can be effective additionally. In an interview with Chris Cooper and Nicky Ison, both emphasized that conclusively deciding the most effective method for financing renewable energy will not be appropriate. Meaning, every situation and community differs, so it is imperative to investigate the community and housing needs to set up the most appropriate form of renewable energy and financing: “The variables just need to be considered to develop the best option. So, assessing the community capacity, appetite for the housing providers to implement this in the first place and finding the best financing model must be considered” (Ison & Cooper, 2015, pers. comm.).

3.6.2 Social Benefit

As stated in the *Introduction*, CORE projects offer a unique benefit of community involvement and empowerment. Additionally, CORE projects provide local ownership and decision making over the renewable energy technologies implemented, income diversification within the community and potential community income from jobs consequently (Hicks, Ison, Gild & Mey, 2014, p. 15). In particular, CORE’s emphasis on increasing energy literacy can address the information barrier (Ison & Mey, 2015, p. 6).

A major concern for implementation within social housing was addressing how the tenants of the social housing unit will understand and have a role in CORE implementation. Since the process of funding and operating CORE will be contained locally, many educational opportunities could emerge consequently to improve energy literacy and address the information gap. If the maintenance of the CORE project was also contained in the community, this could lead to potential career opportunities for able tenants additionally. However, it is imperative that key decision makers in social housing units find ways to transparently include and engage tenants in the CORE implementation process.

3.7 Significance of results

Understanding the significance of the results determined by both academic and non-academic sources can show the most important barriers for consideration and how the benefits of CORE can overcome these barriers.

3.7.1 Barriers

After assessing barriers identified by academic research and interviews, having barriers affirmed by both parties show the applicability of these barriers. When an employee of the unit who does not have the knowledge or research experience in the renewable energy field addresses barriers identified by knowledge experts in the renewable energy field, it shows the importance of that barrier.

3.7.1.1 Capital barriers

Having all four respondents affirm the barrier of upfront cost of installation shows the significance of financial constraints (Laussell, Haywood, MacArthur & Graham, 2015, pers. comm.). However, the nature of the financial constraints differed from the academic analysis and the interviews. Laussell (2015) and Haywood (2015) both introduced the theme of new versus old infrastructure and the difficulty of applying new renewable energy technology in aging units. Conversely, Ison and Mey (2015) largely discussed capital barriers as fronting the installation cost and consequently how to structure the initial financing and repayment program. Reasons for this disconnect could be that employees of the housing units are not away of repayment possibilities or have not considered it because of not even being able to afford initial installation. Regardless of the difference, the financial barrier's persistence across both academic and non-academic sources shows that this barrier is the most serious one to consider in the future.

3.7.1.2 Information barriers

Though information barriers was only explicitly acknowledged by one social housing employee (Laussell, 2015, pers. comm.), this barrier remains significant as it was affirmed by academic research additionally. Even with explicit recognition, the information barrier largely manifested itself implicitly in the process of interviews with social housing units. When conducting the interviews, I noticed an apprehension and general confusion over the purpose of my interest and why renewable energy could be beneficial for the social housing unit. Assessing the demographics of social housing and the complex needs accordingly (FACS, 2014a), this disconnect makes sense. When greater needs, such as homelessness, mental illness and disability require addressing, the energy consumption and environmental footprint of the units themselves will not be a priority for the social housing sector. This concept is most affirmed by the response rate of special homelessness assistance units, as only one out of the seven I contacted were willing to interview. Considering the immediate needs of tenants in this form of social housing, the employees were too time-constrained to accommodate my research. Thus, figuring out how to make the transition to renewable energy as technically easy to understand will be highly beneficial for this sector. This can include improved communication efforts, such as more in-person communication and working with the social housing units to identify the best communication avenues for tenants.

3.7.2 Benefits of CORE

After addressing the most significant barriers of renewable energy implementation in social housing units, according benefits of CORE show why this form of renewable energy could be more beneficial for social housing units.

3.7.2.1 Retrofitting benefit – address capital barrier

Since the CORE model generally includes having a central renewable energy generator large enough to accommodate several housing units, this overcomes the retrofitting barrier better than installation of solar photovoltaic or other standard renewable energy technology. As the model will not be on a building itself, but on a location elsewhere, this negates the need for the units to be retrofitted or updated for renewable energy technologies (Ison & Mey, 2014). As a result, Laussell (2015) and Haywood (2015) will have one of the barriers they discussed accounted for. Consequently, this alleviates the capital concern over retrofitting to accommodate new technology.

3.7.2.2 Fundraising and investment structure – address capital barrier

Already noted, Ison and Cooper (2015) have acknowledged that community investment in renewable energy can lead to more advantageous investment returns for the financier and consumers of the energy (*Note: if the housing unit is a public company with limited shares, such as North Coast Community Housing*). Even without the ability for an investment model way of financing, and the landlord or housing unit absorbing the upfront cost of installation, there is opportunity for the community to finance or support the initiative to alleviate the financial constraint of renewable energy implementation. Though this form of fundraising is time intensive and requires a large amount of effort for the fundraisers, this is a potential advantage to CORE over standard renewable energy financing.

3.7.2.3 Community involvement – address information barrier

Hicks, Ison, Gild and Mey (2013) discuss how community engagement can cover a wide range of activities and depths. However, clear and consistent communication throughout the project is necessary to keep all key parties engaged during the project duration. This integration of community into the implementation of renewable energy is what offers CORE a possible advantage over standard renewable energy technology. Considering the information barrier discussed by Laussell (2015), the potential inclusion of tenants and housing unit members offers the possibility to address this information barrier more effectively than standard renewable energy. However, in order for this benefit of CORE to combat the information barrier, one should consider creative and innovative ways to accommodate to tenant's needs. Hicks, Ison, Gild and Mey (2013) give examples for how to do this: survey of the local community, town meetings, community picnics, drop-in information sessions, etc. Working the units directly and considering the best facets for how to engage tenants can effectively address the information barrier and potentially increase energy literacy.

Additionally, CORE implementation can also increase local jobs if the installation and maintenance of CORE is kept in the community itself (Hicks, Ison, Gild and Mey, 2013, p. 3). Working with generally lower income populations within social housing units who are able to learn and understand the trade could ideally be a potential community engagement partnership that could offer job opportunities for applicable tenants. However, this extrapolation is an ideal and one should test this with proper sensitivity to the willingness and interest of tenants.

3.7.2.4 Increased access benefit – address information barrier

Lastly, CORE's community engagement and potential opportunity to provide financing for low-access populations to renewable energy close the environmental privilege gap. Kollmuss and Agyeman (2002) assess various behavioral models to determine what contributes to environmentally sustainable behavior and levels of environmental awareness. In this analysis, major factors discussed included economic, social and cultural factors. In particular, the infrastructure accessibility and price of more environmentally sustainable materials are a large component to decision making and whether or not the individual can even afford to be environmentally sustainable (Kollmuss and Agyeman, 2002). However, this analysis also considers the role of social and psychological factors associated with economic status that could limit one's ability to make their actions more environmentally sustainable (Kollmuss & Agyeman, 2002). Thus, providing the infrastructure for social housing units to use renewable energy could be an excellent way to make sustainable more inclusive.

Though a standard renewable energy connection could provide the above infrastructure, CORE is more beneficial because of the community cohesion that results. Kollmus and Agyeman (2002) discuss the importance of cultural norms in encouraging environmentally social behavior. Having a community-driven program that also equalizes and provides a consistent distribution of renewable energy technology could facilitate a stronger cultural understanding of renewable energy technology. Rather than only installing renewables on infrastructure that can accommodate that technology, having a separate generator could create energy for all to access. This could consequently lead to more community cohesion.

4. Conclusion

The goal of this study was first to assess locations of social housing in the North Coast NSW region, their 'energy status', barriers for implementing renewable energy in social housing according to academic research and interviews with willing social housing units and how CORE could be a more beneficial way of addressing those barriers comparatively to standard renewable energy. After defining social housing, contacting relevant units and attaining their energy status, I found the most significant barriers for renewable energy implementation is financial and information barriers. CORE's financing model with the potential of donation based fundraising or high investment returns with the according legal status are a beneficial way to address those barriers. Second, CORE's focus on community engagement could be an effective way to address information barriers.

Considering the rising housing and electricity costs influencing this region, the feasibility of renewable energy and CORE technology will have to increase. Since social housing demographics are generally those with lower access to renewables currently, working within the social housing and assessing the tenants needs will be the most effective method to implement CORE. Doing so will subsequently lead to the capital and information barriers being considered, as working with the tenants will allow for information spread and devise the most appropriate way to finance and potentially repay for the program. As CORE continues to spread across NSW, facilitated by government policy mechanisms, one should consider it as a solution to barriers of renewable energy more effectively than standard renewable energy technology. In doing so, it will begin to bridge vulnerable populations to environmental sustainability, creating a more environmentally just society in the future.

4.1 Further research

Continuing to assess CORE implementation with social housing by doing a trial implementation in a unit or surveying tenants to see their interest in CORE would be an insightful analysis on the feasibility of this study's conclusions. Additionally, assessing policy mechanisms to make CORE more feasible for social housing (not just low-income housing) will be an institutional way to transition social housing to CORE technologies. Lastly, doing a trial comparative analysis of a CORE project versus a standard renewable energy project, including an analysis of how soon the investment paid for itself and which initiative had greater electricity bill savings over time would be insight for the best way to proceed with renewable energy in social housing

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Appendix

Applicable Interview Transcripts:

Chris Cooper and Nicky Ison:

6. Overall, do you think that implementing community renewable energy in community housing is a beneficial option? If so, why? If not, why not?

First, it depends on what you mean with community renewables. Community renewable energy is one where the community plays a role in developing the sustainable energy. The community owns the clean energy. So, it is beneficial but a lot is contingent on financing and how the community pays for the energy. However, commercially, this does not necessarily mean that the community energy in a community housing unit has to be financed by the community. There is no silver bullet and different models will work with different variables. If a retailer, such as Enova, wanted to have a role in providing the community renewable energy, then this could be a really beneficial option.

The variables just need to be considered to develop the best option. So, assessing the community capacity, appetite for the housing providers to implement this in the first place and finding the best financing model must be considered.

Angie Laussell:

1. Where are the community housing units located for Anglicare North Coast?

The units are located in Grafton, Maclean, Yamba and Murwillumbah.

. All the units are designated for lower income populations, but four units are specifically targeted to those with limited mobility.

2. What options are there for unit's electricity provider?

There are currently no off-the grid options. All houses are connected to a standard energy retailer.

3. Do any of the houses use renewable energy?

Six units that were recently constructed have solar hot water heater systems.

Probe: Why?

There are newer constructions. The other properties are older and don't have the capacity for a solar hot water system.

4. Do you see any of the units transitioning to using renewable energy for electricity?

No, not unless it becomes easier to afford. There are financial constraints getting the upfront capital to install and it is difficult to replace the current hot water systems. Installing also has a safety risk that is difficult to overcome.

Probe: Can you explain?

The Department of Work Health and Safety has restrictions that limit our ability to have contracted workers install solar panels or hot water heaters because of the height of the height of the roofs.

5. In the future for new units, would you install renewable energy?

No, mainly because it is quite costly to retrofit homes to accommodate renewable energy. It would take a long time to accrue the capital funding to do so.

Robert Passey:

2. Second, are there still tariffs in place or any other related incentive for customers to use distributed generation? Or do the customers have incentives through the energy company they receive their electricity from? I read about the feed-in tariff for solar panels that is set to expire in Dec. 2016 but I ascertained that the clause now is only for people who already have panels. Is there anything else in place to incentivize new customers?

Page 21 of the report [here](#) has the full explanation of the various feed-in tariffs. As you say, in NSW, new installs don't get any mandated FiTs (retailers have the option of providing around 6c/kWh on exports from net metered systems). All PV systems do get an upfront rebate through STCs (see page 16 of the same report).

Patricea MacArthur:

7. If you do not use renewable energy, why? Provide reasons (such as installation cost, time constraints, etc.) in the box below. If you do use renewable energy, put N/A.

The cost factor. The cost for paying for the panels is too much. As a co-operative we are all keen to go down that track, but we can't commit to anything because of the cost factor.

Tim Haywood:

7. If you do not use renewable energy, why? Provide reasons (such as installation cost, time constraints, etc.) in the box below. If you do use renewable energy, put N/A.

Alot of the "nation building" unit complexes use renewable energy. However a majority the homes we manage on behalf of HNSW have no renewable energy systems in place. This would be because of the age of the homes built & the cost of installing these systems.

Carol Graham:

7. If you do not use renewable energy, why? Provide reasons (such as installation cost, time constraints, etc.) in the box below. If you do use renewable energy, put N/A.

The cost of installation is too high.