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Exploring radical energy justice in remote Indigenous communities in Australia

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Authors declaration

No portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

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ABSTRACT OF THESIS

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Many Indigenous Australians live in remote areas far from major urban centers. Recent research has established these communities in the Northern Territory of Australia suffer from high levels of household energy insecurity. This form of energy injustice is detrimental to the wellbeing of Indigenous Australians and hinders their livelihoods. This thesis applies the radical energy justice framework to an analysis of current policies in place relating to electricity provision in remote communities as well as recent projects that sought to increase levels of solar power for electricity generation in these communities. Based on qualitative research, the findings reveal current policies and funding allocations create barriers to reliable access to affordable energy in remote Indigenous communities. It was further found these policies often serve the interests of government rather than the communities. Therefore, this thesis argues that energy injustice is entrenched in the Northern Territory energy system, which contributes to the continued disempowerment of Indigenous Australians. The findings also showed that projects that actively address the existing barriers to solar uptake in Indigenous communities and concurrently challenge the structures of the energy system can be successful in meeting the needs of the residents of these communities and thus strengthen energy justice. Such projects and their influence on policy are worthy areas of focus for future research.

Keywords: energy insecurity, Indigenous Australians, remote communities, energy justice, radical energy justice, solar power, policy, community energy.

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1 Introduction

People have inhabited what is now known as the Australian continent for at least 50,000 years (Cooper, Williams, and Spooner 2018). Therefore, Aboriginal people have been living on this land for as long as homo sapiens have been outside of Africa (Cooper, Williams, and Spooner 2018). Today's Aboriginal people in Australia all descend from this founding population and possess the world's oldest surviving culture (Malaspinas et al. 2016; Australian Institute of Aboriginal and Torres Strait Islander Studies 2022a).

The term Indigenous Australians refers to both Aboriginal and Torres Strait Islander people (Australian Institute of Health and Welfare 2021). They are not homogenous people but are instead made up of hundreds of groups with distinct "languages, histories and cultural traditions" (Ibid.). For clarity in this thesis, I will use Indigenous Australians as a general descriptor for the people who make up these groups. Recent research has identified high amounts of energy insecurity in remote Indigenous communities of Australia's Northern Territory (Longden et al. 2021). Therefore, my research will focus on electricity access for Indigenous Australians living in these communities, far from major cities.

1.1 Outline

This thesis has six chapters including this **introduction**. The next chapter features a **literature review** covering how remote Indigenous communities came to exist in their current form in Australia, the background on electricity provision for these communities, the factors related to energy insecurity for Indigenous households in the Northern Territory, as well as policies concerning solar power in Indigenous households and Australia more generally. The literature review will also highlight three case studies focused on increasing solar power generation in remote Indigenous communities and finally introduce the radical

energy justice framework that I will apply in an analysis of electricity access in remote Indigenous communities. In the **methods** chapter I will outline the sampling and interview process I followed to research the issues covered by in the literature review. This chapter also deals with the limitations of my research. The chapter following features the **results** of these interviews in which the participants discussed the selected case studies and broader issues in the Northern Territory energy system. These participant statements will be categorized according to their relation to different forms of energy justice. In the **discussion** chapter I provide an analysis of these results using the radical energy justice framework, which will highlight structural barriers to reliable access to affordable electricity in the Northern Territory and point to policy direction that could strengthen energy justice in remote Indigenous communities. The final chapter provides a **conclusion** for the findings of this thesis and points to potential areas of focus for future research.

2 Literature Review

2.1 Remote Indigenous Communities in Australia

European colonization of Australia resulted in great loss of life for Indigenous Australians (Australian Institute of Health and Welfare 2021). They also experienced displacement from their traditional lands (Ibid.). During the 19th and 20th century governments moved Indigenous Australians to government-sanctioned reserves and stations or church-run missions (Australian Institute of Aboriginal and Torres Strait Islander Studies 2022b). It was not uncommon for families to be split up (Ibid.).

According to the Australian Institute of Health and Welfare (2021) the effects of colonization remain today as disparities are maintained in social systems. "Indigenous Australians experience disadvantage in almost all measures of health and welfare when compared with non-Indigenous Australians," according to the institute (Ibid.).

From the 1970s many Indigenous Australians moved from "towns, missions and settlements to remote areas of northern and central Australia to establish small communities" (Australian Law Reform Commission 2010). These "homeland centers" or outstations allow Indigenous Australians to live a more traditional lifestyle (Ibid.). The "conferral of land rights based on traditional associations with land" in Australia was an important factor in this homelands/outstation movement (Ibid.).

Officially, more than a third of Australia is Aboriginal owned and managed land (Moritz, Ens, and Altman 2015). Much of this land is in very remote regions. This land has "inherent natural, cultural and spiritual meaning" to Indigenous Australians, and they refer to it as "Country" (Ibid.).

Bourke et al. (2018 in Australian Institute of Health and Welfare 2021) found that cultural factors have a positive influence of Indigenous Australian's health and wellbeing. These factors include "connection to Country and caring for Country, knowledge and beliefs, language, self-determination, family and kinship, and cultural expression" (Ibid.).

According to Kerins (2010), such cultural factors are integral to homeland/outstation communities. What these communities have in common is that "their residents have made a determined choice to actively engage with their land" (Kerins 2010). Their choices may be "based on a desire to protect sacred sites, to retain connections to ancestral lands and ancestors, to live off the land, or to escape social problems that might be prevalent in larger townships" (Ibid.).

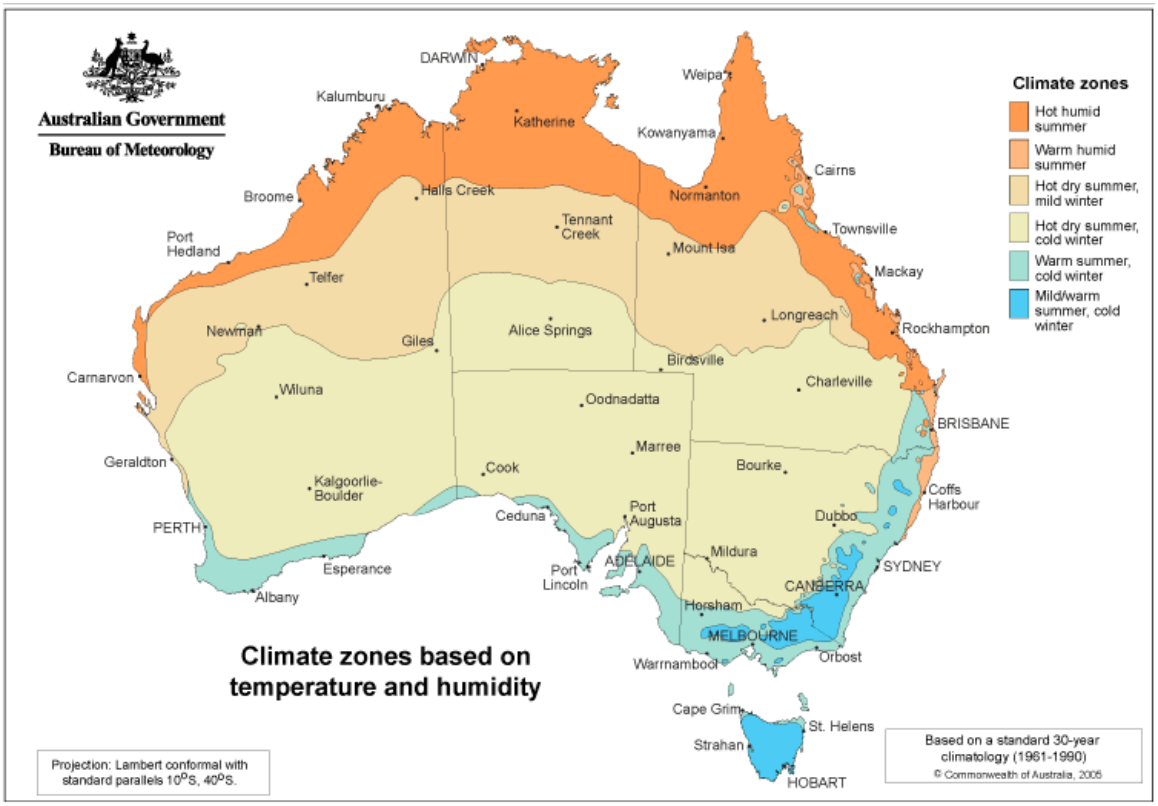
Many homeland/outstation communities consist of small family groups, but some have over 100 people (Kerins 2010). On top of this, some communities are populated year-round, while others only at certain times of the year (Ibid.). There is also a good deal of migration between these homeland/outstation communities and larger Indigenous communities (Ibid.).

These larger communities may have been established as missions, or are near cattle or sheep stations (Remote Area Health Corps 2012). There are also 43 so-called "town camps" in the Northern Territory (Northern Territory Government 2018). These are locations around remote towns with housing for Indigenous people. Some of these were established in 1970s and 1980s as places where Indigenous people visiting from more remote areas could stay temporarily. Some of these people have continued to live in these town camps (Ibid.). The town camps near the towns of Alice Springs and Tennant Creek consist of public housing owned by the Northern Territory Government (Ibid.). Whatever the type of community, these

are all in remote regions. Projections for 2021 suggested that 18% (154,900) of Indigenous Australians live in remote and very remote areas (Australian Institute of Health and Welfare 2021).

An important factor in the energy insecurity that will be explored in this thesis is the "extremes of dry and wet seasons and both high and low humidity" experienced by many remote communities in the Northern Territory (Energy Consumers Australia 2019). The Northern Territory has high temperatures during the summer months and below freezing overnight temperatures during winter (Tourism Northern Territory n.d.). These high temperatures have also increased due to climate change (Climate Change in Australia 2022). As suggested in a report from Energy Consumers Australia (2019) access to affordable electricity is crucial to the wellbeing of the people living these communities given these climate extremes.

Figure 1: Climate zones of Australia



Source: Bureau of Meteorology (2016)

2.2 Electricity provision in the Northern Territory

The Northern Territory Council of Social Service's (2019) “Cost of Living” report highlights several issues relating to energy access in the Northern Territory. The average weekly expenditure on utilities in the Northern Territory is the highest in the country. The lowest income households in the Northern Territory pay 6.3% of weekly disposable income on power, while the highest income households pay only 1.6%. The Northern Territory government subsidizes electricity prices so consumers pay less than the price of supply. The Northern Territory thus the highest rate of concessions for electricity in the country. It also has the highest per capita energy use (Ibid.).

Prepaid electricity meters were introduced by the Northern Territory government in the mid 1990s (McKenzie 2013). Such a prepayment arrangement is rare in urban Australia (Ibid.). On the other hand, 2,374 households use prepaid electricity meters in the Northern Territory (Northern Territory Council of Social Service 2019).

2.2.2 Electricity provision in remote Indigenous communities

The Northern Territory’s public energy utility is called Power and Water Corporation. Its not-for-profit subsidiary, Indigenous Essential Services provides electricity to 72 remote Aboriginal communities and 79 outstations/homelands in the Northern Territory (Power and Water Corporation 2019a). This services roughly 39,000 customers. To provide this electricity, the utility uses 50 isolated mini-grid power systems running on diesel fuel (Ibid.).

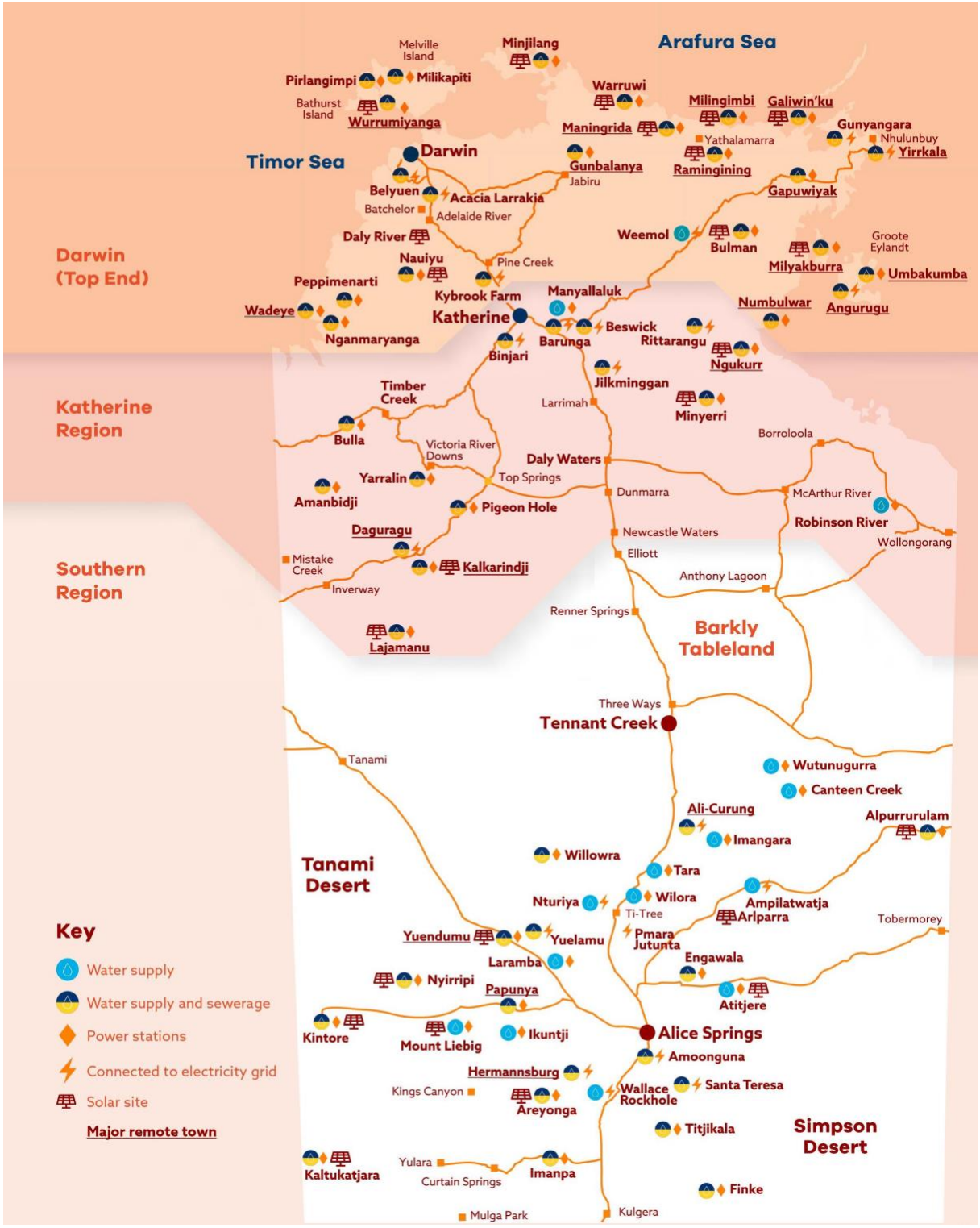
Most Indigenous residents living in towns camps and remote communities with electricity supplied by the public utility have the aforementioned prepaid electricity meters (Allam, Evershed, and Bowers 2019; McKenzie 2013). Some Indigenous residents of public housing

in towns also have meters (Allam, Evershed, and Bowers 2019). These are households who have been disconnected by the public electricity retailer due to an outstanding debt and therefore have a prepaid meter installed as a condition of reconnection (McKenzie 2013). Households with prepaid meters must add credit to a power card using their welfare payments or income (Allam, Evershed, and Bowers 2019). If the credit is used up, that household's electricity is disconnected until credit is added again (Ibid.). Interviews with Indigenous households using prepaid meters conducted by McKenzie (2013) found most respondents preferred prepaid electricity meters over conventional billing processes as this avoids large debts accruing due to unpaid electricity bills.

Many homelands/outstations are not connected to electricity grids (McKenzie 2013). Instead, these communities source electricity from diesel generators, solar and battery power systems or hybrids systems (Centre for Appropriate Technology Limited 2016). The service and costs related to this electricity povision depend on the local resource agency or council responsible for the respective communitiy (Ibid.).

A report from Amnesty International (2011) explained the Northern Territory government's Working Future policy dictated this service delivery to remote Indigenous communities. This entailed government resources being directed to 21 so-called "growth towns" and away from homelands/outstations. This is despite a higher percentage of Indigenous Australians living in these more remote communities. This policy also dictated most homelands/outstations would receive remote service delivery from growth towns, all housing in homelands/outstations would be defined as private, and the Northern Territory Government would build no new housing in homelands/outstations (Ibid.).

Figure 2: Remote communities' power, water supply and sewerage services



Source: Indigenous Essential Services (2021)

2.2.3 Energy insecurity in remote Indigenous communities

Unfortunately, the forms of electricity provision in remote Indigenous communities described above have led to household energy insecurity. A study from Longden et al. (2021) found 91% of households in a sample of 3,300 households in 28 remote Indigenous communities in the Northern Territory experienced an electricity disconnection during the 2018-19 financial year. 74% of these households were disconnected more than ten times, and on average 36 times a year. All these households have prepaid electricity meters. According to the study, prepaid credit is most likely to be used up when electricity use is at its highest, that being when the temperature is very hot or very cold (Ibid.).

Prior studies also identified automated disconnections due to expiring credit. In the third largest town in the Northern Territory, Alice Springs, 420 of 570 households with prepaid meters disconnected from electricity at least once during the months April to June in 2019 (Klerck 2020). These disconnections lasted on average just above 7.5 hours. Though not all these households had Indigenous residents, 285 of them were town camp dwellings (Ibid.). During this same period across the whole of the Northern Territory, 62% of prepaid electricity customers had a disconnection due to running out of credit on their power card. Again, the average disconnection duration was over 7.5 hours (Ibid.).

The First Nations Clean Energy Network (2021) suggests the prevalence of electricity disconnections and unreliable supply in remote Indigenous communities lead to life quality risks. For example, food and medicine in refrigerators is spoiled, dialysis machines stop running, and it becomes difficult to heat and cool homes (Ibid.). Members of these communities reported to the First Nations Clean Energy Network that they can only afford to cool one room per household in the summer (Ibid.).

A further issue identified by the First Nations Clean Energy Network (2021) is that Indigenous households face a complex regulatory environment to improve their access to affordable electricity. The Network accuses electricity utilities and retailers of being generally unprepared to support the shift of low-income customers to cheaper electricity options such as residential and community solar power (Ibid.).

Energy insecurity is also prevalent in communities not connected to public electricity grids. Research from the Centre for Appropriate Technology Limited (2016) found that almost 40% of homelands/outstations have no electricity supply or rely on small diesel or petrol generators. The report also found that the most residents pay for their own electricity costs. Problems of "ad hoc" access to electricity were also reported in homelands/outstations. This mostly related to irregular supply of diesel, insufficient solar panels and/or battery storage, or disrepair of systems due to lack of maintenance according to the Centre for Appropriate Technology Limited (2016).

McKenzie (2013) suggests that "Electricity costs are higher in most Indigenous households than in comparable homes in Australia," and highlights a number of drivers behind this in the Northern Territory. As with the report from Energy Consumers Australia (2019), the first driver she identifies are extremely hot temperatures during summer. In communities in central Australia this is compounded with freezing nights during winter (Ibid.). McKenzie (2013) also suggests poor quality housing is another driver of energy insecurity as the lack of thermal efficiency of homes leads to increased heating and cooling costs (Ibid.). This issue was also identified by a report on cost-of-living issues for Indigenous Australians from the Northern Territory Council of Social Service (2019).

Both Energy Consumers Australia (2019) and the Northern Territory Council of Social Service (2019) also found the Northern Territory has a high number of rental households that are prone to beng poorly insulated. Indigenous people having to use fixed high-energy use appliances in public housing is another driver of energy insecurity according to McKenzie (2013). A further driver she identified is the high costs of goods and services due to the geographic remoteness of Indigenous communities (Ibid.).

McKenzie (2013) also highlights "family structure, mobility and household management" as a driver of high household electricity costs. This refers to Indigenous households being more likely to house "several nuclear family units or generations of the one family" or welcoming extended family for long stays (Ibid.). This coupled with "long-term underinvestment in housing stocks in Indigenous communities" has caused another driver, overcrowding in homes (Ibid.). Energy Consumers Australia (2019) suggest the households in these communities have on average at least double the amount of people living in them as non-Indigenous households in Australia. A final driver is low household incomes according to McKenzie (2013). This does not increase electricity prices of course, but means Indigenous households struggle to pay for these costs (Ibid.).

2.3 Solar power in Australia

Unlike residents in these remote communities, more than 30% of households in Australia have been able reduce their household electricity bills through residential solar photovoltaic systems (Australian Renewable Energy Agency n.d.). The Australian Competition and Consumer Commission (2021) reports residential solar customers pay 29% less for electricity than homes without solar panels. The Australian Reserve Bank suggest the national and state

governments have particularly incentivized residential solar uptake through policies to stimulate a transition to a less carbon intensive energy system due to concerns over climate change (de Atholia, Flannigan, and Lai 2020). Specifically, these incentives are the national government's "small-scale technology certificate scheme," which acts as a rebate on upfront costs, and state governments' feed-in tariffs (Ibid.). Feed-in tariffs allow people with solar panels on their homes to receive payment for the electricity their panels feed back into the supply grid (Loynes 2014). These are important incentives, argues researchers from the Reserve Bank, as it decreases the "payback period" of household purchase and installation costs (de Atholia, Flannigan, and Lai 2020). There has been a further decline in payback periods in recent years due to high retail electricity prices and reductions in the costs of solar panel systems, which has again boosted uptake (Ibid.).

2.3.1 Barriers to solar uptake in Australia

Despite this strong uptake of residential solar in Australia, several studies suggest barriers remain for certain households. Research from Best, Burke, and Nishitateno (2019) found that more net wealth is generally linked to a higher likelihood to install residential solar in Australia. At the same time, renters are less likely to benefit from residential solar policy incentives (Best, Burke, and Nishitateno 2019; Byrne and Matthews 2017).

As described above, rebates and feed-in tariffs incentivize homeowners to install solar systems. But these incentives have not been enough to cover lacking capital, nor have they addressed the reduced agency of those who do not own their homes (Willand et al. 2021). Due to this, high-income households disproportionately receive the benefits from what are "socially-funded subsidies" suggests McConnell (2021). This means the poorest households do have access to the benefits of reducing their electricity bills with solar panels and are

therefore hurt most when prices spike (Chester, Elliot, and Crossley 2018; Byrne and Matthews 2017). As noted by Willand et al. (2020) this shows that incentives to adopt clean energy technologies that are not targeted to certain groups are likely to "(re)produce social inequalities."

Increasing access to affordable, clean energy is therefore reliant on policies that can address the barriers to residential solar installation for low-income and marginalized households. This is important as this would make the most of the high amount of general social acceptance for residential solar in Australia (Energy Consumers Australia 2021). For this to happen, Chester, Elliot, and Crossley (2018) argue access to solar for low-income households needs to be reframed. They suggest the problem cannot be solved by individual households. Therefore, access should not depend on their capacities to pay upfront costs or indeed be the owner of their dwelling (Ibid.).

2.3.2 Barriers to solar uptake in remote Indigenous Communities

Sadly, such an approach has not been taken in the Northern Territory. In fact, the barriers outlined above for low-income households are amplified. For instance, the high number of renters in the Northern Territory means that residential solar installations are much lower compared to Australia's other states and territories (Northern Territory Council of Social Service 2019). 42% of all households are renting, which is the highest rate in Australia (Ibid.).

These barriers are not unknown to policymakers. In 2017, the Northern Territory government released the Northern Territory "Roadmap to Renewables". An independent expert panel published therein suggestions on how the Territory could reach 50% renewable energy by

2030 for electricity supplied to households and businesses (Langworthy et al. 2017). The experts also considered how to ensure "secure and reliable electricity at least cost to consumers and taxpayers" (Ibid.). One recommendation from the report was that the Northern Territory government develop a policy to ensure solar installations for all future public housing (Langworthy et al. 2017). The experts also recommended retrofits of existing housing public housing "to allow disadvantaged and low-income customers to participate in the renewable energy supply and reduce the cost of their electricity bill" (Ibid.). Such policies would go a long way to ensuring affordable and reliable access to electricity in the Northern Territory by taking the onus off individual households as suggested by Chester, Elliot, and Crossley (2018). However, these recommendations have yet to be acted on.

More recently, in December 2021, the first household in a remote Indigenous community was able to connect a residential solar system to the public electricity grid (Peacock 2021). Until then, regulations had prevented public housing households from connecting residential solar as they use a prepaid electricity meter (Ibid.). This outcome was part of one of the projects that will be used as a case study for this thesis. These projects focused on using solar power technology to provide electricity access in remote Indigenous communities. These will be elaborated on in the following section.

2.4 Case studies: Solar powers electricity provision in remote Indigenous communities

2.4.1 First Nations Clean Energy Network and Original Power

The First Nations Clean Energy Network aims to enable First Nations people to be co-designers and drivers of energy projects (First Nations Clean Energy Network 2021). This includes small-scale residential solar, the development of community-owned projects and "equitable arrangements for large scale renewable projects." The network thus aims to work

to secure a “supportive government policy framework and a commitment from industry and investors to apply best practice principles.”

The First Nations Clean Energy Network has three areas in which they focus their work: community, industry partnership, and policy reform (First Nations Clean Energy Network 2021). At the community level they aim to empower communities to implement projects that would reduce household energy costs and improve energy reliability. The network also aims to engage with local, state and federal government to remove regulatory barriers to clean energy generation (Ibid.).

The work of the First Nations Clean Energy Network was inspired by the work of First Nations communities in Canada (First Nations Clean Energy Network 2021). The rate of small-scale Indigenous clean energy projects has increased in the last 20 years. This has been supported by the establishment of the Indigenous Clean Energy (ICE) Network. This network works with government and industry to promote Indigenous involvement in renewable energy generating projects. This has led to large scale projects but also increased the number of communities installing community-scale or small-generation solar systems to supply local or regional power grids. One outcome of this is the replacement of diesel generation with solar power (First Nations Clean Energy Network 2021).

Original Power is an organization run by Indigenous Australians that is focused on building the capacity of Indigenous communities to determine themselves how to live. This includes by assisting with community energy projects and advocacy on energy issues (Original Power n.d.). Therefore, Original Power it is an integral member of the First Nations Clean Energy

Network in terms of the community pillar of the network (First Nations Clean Energy Network 2021).

2.4.1.1 Residential solar in Tennant Creek town camp

Original Power paid for a photovoltaic solar installation on the rooftop of Norman Jupurrurla Frank's house in Tennant Creek (Peacock 2021). The solar system was installed in August 2021 but was not connected to the electricity grid until December 2021. Permission was only granted for use of the panels following lobbying efforts from Frank and Original Power to the public electricity retailer. This was because regulations previously blocked public housing households from connecting to residential solar due to their use of a prepaid electricity meter (Ibid.).

Figure 3. Residential solar installation on Frank household

Photo courtesy of Original Power

2.4.1.2 Community solar project in Marlinja

Another Original Power project helped to install an array of solar panels on the community center in Marlinja in the Northern Territory (First Nations Clean Energy Network 2021). Marlinja is home to 60 people. As with other remote Indigenous communities, the inhabitants suffer from energy insecurity – with regular electricity disconnections during very hot periods (Ibid.). According to the First Nations Clean Energy Network (2021), the solar installation was a communitiy-led initiaitive. That is "residents were involved with project planning, installation of rooftop solar panels, and received training in electrical technology and carpentry skills." This solar installation helped reduce electricity bills from an average of AUD $150 per week to just AUD $40 per month (Ibid.). Currently Original Power is preparing for phase two of the project. This will involve a "100 kW solar array plus inverters and home battery systems." According to the First Nations Clean Energy Network (2021), this will be enough to provide electricity for all 13 community households in Marlinja.

Figure 4: Solar array on Marlinja community center

Photo courtesy of Original Power

2.4.1.3 Ngardara "Sun" Project in Borroloola

Original Power is also conducting a feasibility study to design a solar microgrid to power the remote community of Borroloola – which is home to 1,300 people (First Nations Clean Energy Network 2021). The study is being partly funded by the National Government's Regional and Remote Communities Reliability Fund. Apart from providing electricity, the project should also create local training and job opportunities (Ibid.).

2.4.2 Solar Energy Transformation Program (SETuP)

Through its subsidiary, Indigenous Essential Services, public utility Power and Water Corporation carried out the Solar Energy Transformation Program (SETuP) from 2004 to 2019 (Australian Renewable Energy Agency n.d.; Power and Water Corporation 2019b). According to the Power and Water Corporation (2019b), the program was designed to reduce the reliance on diesel fuel to generate electricity in remote communities serviced by Indigenous Essential Services. Therefore, SETuP led to 10 MW of solar photovoltaic capacity being integrated with existing diesel power stations without reducing energy reliability (Australian Renewable Energy Agency n.d.). 25 remote Indigenous communities received solar arrays, whihch generate electricity for about 1750 remote houses (Power and Water Corporation 2019b). One of the locations, Daly River, received both a 1 MW solar facility and a 2 MWh battery. This storage of the solar power meant the community now uses 50% less fuel (Ibid.).

Power and Water Corporation (2019b) suggested the lessons learned, in terms of community engagement and system design, from SETuP would be followed up on in future energy projects in other remote areas. Solar technology has now been integrated into the power generation systems of other remote communities in the Northern Territory, including

Borroloola (Ibid.). SETuP cost AUD $59 million with most of the funding coming from the Australian Government through the Australian Renewable Energy Agency (ARENA), with AUD $27.5 million from the Northern Territory government (Ibid.).

2.4.3 Bushlight project

The Bushlight project was implemented by the Indigenous science and technology organization Centre for Appropriate Technology Limited (CfAT) between 2002 and 2013 (Centre for Appropriate Technology n.d.). In this period, the program oversaw the installation of roughly 130 solar power systems in remote communities not connected to the utility electricity grids (Ibid.). The First Nations Clean Energy Network (2021) point to the Bushlight project, which operated in the Northern Territory, Western Australia and Queensland, as a success story for improving energy security for homelands/outstations. Members of remote communities reported to the First Nations Clean Energy Network that this scheme allowed households to keep refrigerators running permanently and reduced reliance on diesel generators (First Nations Clean Energy Network 2021).

The off-grid Bushlight systems included a solar array and a battery (Martire 2020). The systems were completed with an energy management unit (EMU) (Ibid.). This displayed a green light to the show power available for the community's discretionary use and a yellow light to show the power for the separate circuit for essential applications: such as refrigerators, freezers and lights (Martire 2020). This allowed communities to manage their energy use effectively and extend the life of their energy systems. In the time the Bushlight project ran, CfAT only had to replace one battery set (Ibid.).

The Bushlight project eventuated as a result of a market study conducted by CfAT and the Australian Cooperative Research Centre for Renewable Energy (ACRE CRC) into the remote renewable energy systems that were already running in Australia (Centre for Appropriate Technology n.d.). The so-called ACRE CRC report found that these systems did not meet the energy needs of residents, were installed without providing information and training to communities, and did not have a regular service and maintenance regime in place. Therefore, CfAT set up an energy division, Bushlight, to address these problems (Ibid.).

The Centre for Appropriate Technology (n.d.) report their Bushlight systems increased the reliability of energy services in remote communities, reduced community spending on diesel, diminished greenhouse emissions, and improved "residents' and service providers' abilities to carry out basic maintenance on their systems." The scheme was funded by a grant from the national government (Martire 2020).

2.5 Conceptual framework: Radical energy justice

2.5.1 Energy justice

Poruschi and Ambrey (2019) cite (Sovacool et al. 2016) in suggesting that energy justice is an extension of social justice that focuses on how the "distribution of access to energy services should occur in society." Therefore, research in this area has focused on the "production, consumption, distribution of energy" with the following aims: "reduce inequality in opportunity to access energy services; increase energy security; and improve sustainability" (Sovacool et al. 2016 in Poruschi and Ambrey 2019).

In their conceptual review of research related energy justice, Jenkins et al. (2016) outline three pillars of the research agenda. Those being distributional, recognition, and procedure

(Ibid.). Jenkins et al. (2016) further suggest energy justice researchers have both assessed injustices, an evaluative method, and made recommendations on how to approach these injustices, a normative method. Therefore, the evaluative method in regard to distributional justice asks where do the injustices emerge? The normative method asks how do we solve them? On top of this, distributional justice is concerned with both energy production and consumption (Jenkins et al. 2016). On the production side, researchers have uncovered community concerns over polluting fossil fuel facilities located near them. On the consumption side, Jenkins et al. (2016) give the example of energy poverty studies that identified which communities have been burdened by rising energy prices.

In regard to recognition justice, the evaluative method asks which sections of society are ignored or misrepresented (Jenkins et al. 2016). The normative method then follows on by asking how should we recognize? Research focused on production has uncovered the placement of power plants near populations of ethnic minorities or indigenous peoples, who are not connected to decision-making (Ibid.). According to Jenkins et al. (2016), consumption-focused research has exposed the fuel poverty of ageing and disabled populations for example.

Researchers looking into procedural justice using the evaluative method look to answer whether those making decisions have engaged with communities in a fair manner (Jenkins et al. 2016). Those researchers using the normative method ask which new processes would be preferable? Jenkins et al. (2016) cite a study from Warren and McFadyen (2010) as an example of procedural justice research. They showed how a process of building a sense of community ownership in a wind farm development increased levels acceptance for the development (Ibid.).

2.5.2 Radical energy justice

LaBelle, Bucată, and Stojilovska (2021) developed the concept of radical energy justice. These researchers suggest current approaches to energy justice label injustices and then explain what "ought to be done to rectify the injustice." However, these researchers state this normative approach does not take into account "location, social status, or other attributes" of those suffering the injustice (Ibid.).

Therefore, their radical framing aims to critique structures in order to address the causes of an unjust energy system. Specifically:

> "A radical energy justice paradigm looks at the energy system and understands it is the historical, social and physical institutional structures which induce and perpetuate injustice" LaBelle, Bucată, and Stojilovska (2021).

The majority of Australians recognize that Indigenous people experience injustice and high levels of disadvantage in Australian society (Gray and Sanders 2015). This raises the question as to whether problems related to electricity access for remote Indigenous Communities in Australia stem from structural causes. Therefore, this study will apply the radical energy justice framework to this issue. As outlined above these communities do not have a reliable access to affordable electricity and thus suffer from energy insecurity, which LaBelle, Bucată, and Stojilovska (2021) call a "crucial energy injustice."

LaBelle, Bucată, and Stojilovska (2021) cite Jenkins et al. (2016) in summing up the normative approach used by previous energy justice as aiming to solve and recognize injustices as well as discovering new processes to address them. But the researchers suggest the weakness of this normative approach lies in not seeking to identify who causes the

injustice and why it may "serve specific interests or existing power structures of the energy system" (Ibid.). Therefore, these researchers argue energy justice scholars should develop "a more radical critique of government policies that perpetuate institutional structures of injustice" to make "energy justice as a framing becomes more effective" (LaBelle, Bucată, and Stojilovska 2021). This approach recognizes the importance of power relations which then exposes "injustices of the energy system rather than surface-level injustices happening within the energy system (Ibid.).

Table 1: From normative to radical energy justice

Energy justice	Radical energy justice
Identifies structural cause(s) of injustice, including scale and spatial inequity	Identifies the sources and construction of the energy system to create domination and leverage over social groups
Describes role of structures shaping perceptions of justice and injustice in society or lives	Identifies role of (historical) institutions shaping perceptions of a just socially constructed energy system
Identifies causes of injustice according to type of justice infringed i.e., distributional, procedural, recognition	Identifies causes of injustice according to type of justice infringed; Describes whose interests served by injustice; Exclusion framing of injustices highlight areas of conflict and power relations
Describes how justice can be served through implementing policies guided by specific justice concepts	Shows how institutional and social practices within the energy system should change to enhance everyday life

Table adapted from LaBelle, Bucată, and Stojilovska (2021)

LaBelle, Bucată, and Stojilovska (2021) developed this framework with a focus on the transition away from carbon intensive industries in the Jiu Valley, Romania. Job opportunities have been declining in the region since the early 1990s with the closure of the first coal mines. Therefore, the European Commission chose the Jiu Valley as one of the regions to receive financial assistance through the Just Transition Mechanism. The aim of which is to ensure coal-dependent communities receive adequate support in the face of job losses so that inequalities do not increase (Ibid.). The region was also subject to a failed

professional job re-training program in 2019 that was overseen by government and private sector (Ibid.).

According to LaBelle, Bucată, and Stojilovska (2021), a just energy system requires positive action through good governance. Therefore, they suggest the solution to energy injustice is to identify embedded structural injustices, determine who is responsible, and then create structural change. This thesis will seek to apply this conceptual framework to a much different context on the other end of the energy system. Miners in the Jiu Valley of Romania suffer from an injustice related to phasing out a form of energy production. On the other hand, the injustice for Indigenous Australians living in remote areas relates to electricity access. Nevertheless, both sets of people are far from the corridors of power and are the victims of neglect in terms of policy and funding.

2.6 Aims and Objectives

The purpose of this study is to identify structural injustices related to access to affordable, reliable energy in Indigenous Australian communities and determine who is responsible for them. Therefore, the overarching research question is, what are the barriers to affordable, reliable energy in remote Indigenous Australian communities? While a secondary question is why do these barriers exist and who is responsible for them?

3 Methodology

3.1 Qualitative research

This thesis made use of semi-structured qualitative interviews. This meant questions were pre-planned prior to the interview but participants could elaborate on their answers and provide further explanation where needed. As explained by Bryman (2008 cited in Alsaawi 2014) the benefit of this approach over structured interviews it to get deeper and richer responses. As suggested by Dörnyei (2007 cited in Alsaawi 2014), the open-ended questions were provided to participants in advance to allow them prepare thoughtful answers.

3.2 Sampling

This study made use of purposive sampling in combination with snowball sampling. Both these techniques are examples of non-probability sampling (Galloway 2005). One way to use purposive sampling is to choose participants based on their knowledge of the research subject (Robinson 2014). Therefore, I aimed to first select potential participants with expertise or personal experience related to the case studies outlined in the literature review. I identified three groups of potential interviewees that could give a broad view of the electricity access issues in remote Indigenous communities in the Northern Territory. These were:

1. employees of government or public bodies;
2. experts on energy access in remote communities; and
3. members of Indigenous-controlled groups or Indigenous community members.

The breakdown of these participants is shown in Table 2.

Snowball sampling refers to requesting already confirmed participants to identify relevant people to be involved in the research (Dudovskiy n.d.). Therefore, on confirming participation with members of the above groups, I asked for further recommendations for potential participants. This was done before the interviews for some participants and on

finishing the interviews for others. This was particularly important for including Indigenous community members in my research in an ethical manner. Specifically, I first established an interview with a member of Indigenous-controlled organization Original Power before asking if they could assist me in speaking to community members. In this way, Original Power essentially vouched for my character.

Table 2: Participants in the qualitative research

1. Employees of government or public bodies	2. Experts on energy access in remote communities	3. Members of Indigenous-controlled groups / Indigenous community members
- **Sam Latz** – Team Lead Connections and Modelling System Control, Power and Water Corporation	- **Brad Riley** – Research Fellow at the Centre for Aboriginal Economic Policy Research & Institute for Climate, Energy and Disaster Solutions, Australian National University (ANU) - **Steve Rogers** – Pro Vice-Chancellor Research & Innovation, Charles Darwin University (CDU) - **Simon Quilty** – Visiting fellow Research School of Population Health, Australian National University (ANU) - **Hayley Michener** – Program Manager for Community Solutions at the Future Grid, Arid Lands Environment Centre (ALEC)	- **Raymond Dixon** – Marlinja resident & Mudburra community leader - **Norman Frank Jurrpurrula** – Tennant Creek resident & Warumungu Traditional Owner - **Lauren Mellor** – Clean Energy Communities Project Coordinator, Original Power - **Ruby Heard** – Founder of Alinga Energy Consulting and Jaru woman - **Paul Rodden** – Senior Project Manager & Renewables Engineer, Ekistica

The interviews took place between May 13 and June 06, 2022. The first of these was conducted in Vienna via a video call. All other interviews were conducted in the Northern Territory of Australia. Most participants expressed their preference for video calls over in-person interviews. However, both Indigenous community members and Lauren Mellor of Original Power participated in in-person interviews. The interviews with the community members took place in their communities. I was therefore able to witness firsthand the energy infrastructure in these communities, including the outcomes of Original Power's work there.

3.3. Analysis

3.3.1 Coding

This thesis used thematic coding to analyze the answers given by the participants. This involved a process of first transcribing each interview. Then, following the instructions of Seidman (2012 cited in Alsaawi 2014), I went through the process of identifying the most interesting information in relation to the thesis topic, labeling it, and then putting it into a particular category. The three pillars of energy justice of Jenkins et al. (2016) provided the basis for the categories. Drawing from the semi-structured interviews, I identified the following categories:

- Introductory information: Name, job title / community role, connection with selected case studies
- Context for electricity provision and energy insecurity in remote Indigenous communities
    - Drivers of high cost of provision
    - Drivers of high household electricity use
- Type of energy justice infringed or strengthened
    - Distributional justice
    - Procedural justice
    - Recognition justice

3.3.2 Ethics

The ethical considerations were considerable for the research component of this thesis. This was due to the sensitivity required in researching issues faced by people who have suffered from historical oppression that may relate directly to these issues. As a white Australian and therefore a member of the group of people who have acted as oppressors, I aimed to place great importance on approaching Indigenous participants with respect, ensuring that my research methods matched their needs and expectations.

The ethics process began by completing an ethics proposal checklist before undertaking any research. In this form I outlined the possible ethical ramifications of my research and how I would address them. Ethical approval to begin my study was given by my thesis supervisor on condition that I create an informed consent form that would be provided to each participant before they took part in an interview (see Appendix 1). Therefore, the ethics proposal checklist acted as the foundation for the informed consent form. This form was either read by participants and signed or, if they preferred, was summarized verbally by me and they provided me verbal consent. This form included the following information:

- the nature and objectives of the research
- the methodology of the research and conditions under which it was conducted
- the persons/institutions that had access to personally identifiable information about participants
- the form in which research results will be published/communicated
- who is undertaking the research and from which institution
- the potential risks and inconveniences that may arise
- the potential benefits that may result
- what participation in the research required
- whether it will be possible, and if yes, until what point, to withdraw from participation

Participants were given the opportunity to review statements before they were included in this thesis. They were informed in the consent form that they could then withdraw or amend

these statements up to three weeks after the interview. On top of this, participants had the choice to participate anonymously, either completely or partially. Specifically, this meant they could remain anonymous, have a pseudonym used, or be identified by their real name.

3.3.2.1 Ethical challenge during research

On the recommendation of another participant, I contacted a PhD candidate to ask if they would be willing to be interviewed as a participant in the study. They responded that they were hesitant as it appeared I had not received "local ethics approval," but agreed to speak to me to find out more about the ethics process related to the thesis. In our call, they explained that it is commonplace when research involves direct engagement with Indigenous Australians to first seek approval from either the Top End Human Research Ethics Committee (HREC) or the Central Australia Human Research Ethics Committee (CAHREC). I had already conducted interviews in person with two elders who lived on Indigenous land in CAHREC's jurisdiction. Therefore, I contacted that Committee to explain the situation and ask for guidance.

The Chair of the CAHREC requested the ethical protocols that I followed before and during my research as well as a letter of Original Power confirming they were happy to auspice me and the research, and a brief description of the benefit Original Power see in the research for the community in which it occurred.

On receiving this information, the Chair provided me with the following feedback:

"I am not in a position to formally endorse or challenge what has occurred. It seems that you have undertaken this research transparently and according to the governance and ethical processes that have been requested of you. I have assumed that there have been no negative consequences of your project and that it is essentially concluded with the aim that it will potentially contribute to benefit the communities, or those like it, in which the research was undertaken"

Therefore, I continued with my research. On reflection I decided to provide the option to interview participants to have any statements they make redacted in the final thesis so that only the graders would be able to read the comments attributed to them. This was done to provide participants further assurance that their comments on sensitive subjects would not cause them any reputational harm. I mentioned this option when contacting them with the statements I would like to use in the final thesis. I also added the option of providing consent to use these statements in any publication that is based on the findings of the thesis.

3.3.3 Limitations

There were limitations related to the sampling method and scope of research participants. Though there are remote Indigenous communities in various regions of Australia, initial responses to my purposive sampling efforts were mostly stakeholders related to the Northern Territory. Therefore, the snowball sampling that followed from these initial responses also meant most interview respondents related to the Northern Territory. I thus made the decision to focus the thesis on electricity access for remote communities in the Northern Territory only.

Another limitation regarding the strength of the results was that only three of the eleven participants were Indigenous or identified with having Indigenous ancestry. This is a minimal contribution for a study that is focused on addressing issues that affect Indigenous people. Furthermore, I only secured one interview from the "Employees of government or public-owned bodies" participant group. This means there is a gap in perspectives from those responsible for policy relating to electricity access. Initially, the recently appointed Director for Remote Power Systems in the Northern Territory originally agreed to an interview. He was put forward as an expert by the Executive Director of the Sustainable Energy

Department. However, he withdrew from the research and explained to me that he did not want to “compromise the procurement process” relating to projects that aim to “increase renewable energy in the communities” that are about to be put to market. I mentioned the guarantee that statements could be redacted, however this did not persuade him.

4. Results

4.1 Remoteness and cost of electricity provision

Before examining how the selected case study projects infringed or strengthened the different forms of energy justice, it is important to note that several participants highlighted the high costs of electricity provision to remote regions in the Northern Territory. For example, Steve Rogers of the Charles Darwin University (CDU) explained this distance not only makes transporting materials very expensive, but so to employing or hiring labor to install or repair energy systems. He further suggested this created "incredibly high ongoing lifecycle costs" in relation to maintenance of these systems. Therefore, each project I use as a case study in this thesis had to deal with this barrier in some way.

4.2 Case studies: Solar powers electricity provision in remote Indigenous communities

4.2.1 Bushlight project

4.2.1.1 Distributional justice

As mentioned in the literature review, the Bushlight project was designed to address energy insecurity in remote communities that were not connected to public utility grids owned by Power and Water (Indigenous Essential Services 2021). Therefore, Bushlight attempted to rectify the distributional injustice that saw homeland/outstation communities receiving a reduced level of electricity provision compared to even other remote communities.

Two participants had first-hand experience with the project. Paul Rodden works for Ekistica, which is a subsidiary of the Centre for Appropriate Technology (CfAT). CfAT implemented and managed the Bushlight project. Rodden explained that he began working with the project in 2004 and was responsible for system installation, commissioning and procurement. Between 2010-2015, before working at the Australian National University (ANU), Brad

Riley worked for CfAT on the Bushlight project in the East and West Kimberley region in northwest Western Australia. Both participants pointed to ACRE CRC report, mentioned in the literature review, that found off-grid solar systems in homelands/outstations were experiencing operational failures (Centre for Appropriate Technology n.d.). Steve Rogers of CDU was CEO of CfAT towards the end of the Bushlight project. Rogers explained that prior to Bushlight, many "homelands and outstations did not have electricity supply at all" and those who did had diesel generators for the community. Rogers labelled this a "market failure."

According to these participants, an important factor in addressing this failure was the availability and quality of contractors who performed maintenance on the Bushlight systems once they were installed. Paul Rodden highlighted the sense of ownership felt among these contractors. He explained they would be responsible for annual service visits and be on call should the community experience any problems. Brad Riley described them as "regional place-based responders, who were accountable, answerable to folks on a day-to-day basis." Steve Rogers from CDU echoed this sentiment. He stated that strength of Bushlight was that contractors hired by the organization "were people that were absolutely aligned to the culture of CfAT in terms of culturally appropriate engagement when you go into community." This resulted "in a very strong service culture," according to Rogers.

4.2.1.2 Procedural justice

According to many participants, a key to Bushlight's success was that CfAT designed the energy systems to meet the needs of residents based on the organization's consultation with them. As Brad Riley of ANU termed it, the project was built on the understanding that "people don't live on the supply side, they live on the demand side." Riley thus highlighted

the value of meaningful community engagement, partnering and participation, which allowed for an "understanding of energy demand, and of energy cultures at operation in many remote communities." Paul Rodden of Ekistica similarly attributed Bushlight's success to a "mixture of quality components, good maintenance, good engagement, and good design as well."

Participants suggested this community engagement also helped residents in remote communities use the energy systems appropriately. Paul Rodden emphasized the importance of "just really getting the community on board and making sure they understood the limitations of the system and managing expectations." Steve Rogers echoed this view, and the findings of Martire (2020), when he highlighted the Bushlight energy management units (EMUs). He explained that CfAT asked each household what electrical appliance was most important to them and that the EMU had a button residents "could press to ensure that that key circuit was always running." Paul Rodden stated residents generally identified the most critical need for energy related to "refrigeration, lighting, fans, TV and communications" with "refrigeration and lighting" being the most important of these. He added that due to remoteness of these communities, residents would buy a large amount of food when they visited towns that then needed to be stored. Brad Riley elaborated on this point:

"Anyone that has worked in the Bushlight project, knows on a really organic level that the refrigerator can never go off – once that happens, health and safety is compromised really quickly, and housing is immediately rendered inadequate."

All of Paul Rodden, Steve Rogers and Brad Riley mentioned this engagement with the community on energy budgeting created a sense of ownership and understanding of the energy systems. Rogers explained in the "informal evaluation of Bushlight" performed by CfAT, "one of the most astounding things that we found was how little vandalism had occurred in Bushlight systems, where communities were still occupied." He further mentioned CfAT trained community members to do "simple maintenance" of the Bushlight

systems. This included “checking the batteries, to top them up, if need be, and to clean the solar panels,” said Rogers. This also “gave people ownership” over their energy systems according to him.

The benefits of the participatory processes of Bushlight were also highlighted by participants who die not have direct involvement with the project. For example, Lauren Mellor of Original Power suggested her organization “learned a lot” with how to approach energy access in homelands/outstations. Mellor particularly highlighted how Bushlight dealt with “changes in electricity usage and demand and population growth.”

4.2.1.3 Recognition justice

As established in the literature review, the national government funded the Bushlight project. This demonstrates that policymakers recognized the lacking energy provision in remote off-grid communities. Participants also elaborated on this point. For instance, Steve Rogers of CDU said the national government took the initiative to provide reliable electricity to these communities to “close the gap” on wellbeing between Indigenous communities and other Australians. He partly attributed the success of the project to this “significant investment” that was “not short of AUD $100 million.” Paul Rodden recalled that funding came through a public agency devoted to reducing greenhouse gas emissions as well as the former Department of Families, Housing, Community Services and Indigenous Affairs.

Participants also described about how this government support increased wellbeing in these homelands/outstation communities. For example, Paul Rodden explained that the electricity provided by Bushlight systems also enabled other services such as water and communication.

He further mentioned how this fostered education in homelands/outstations – allowing Indigenous children to "live on Country and go to school."

However, many participants highlighted how the end of funding for the Bushlight project, again led to energy insecurity in these communities, supporting the findings of the Centre for Appropriate Technology Limited (2016). Paul Rodden noted the quality of work on solar and battery installations in remote communities has decreased again in the post-Bushlight era. He described the maintenance as "ad-hoc" meaning some systems haven't been serviced since the Bushlight project ended in 2013. This was corroborated by Ruby Heard of Alinga Energy Consulting. She recounted that a Bushlight system in one of the Western Australian communities that Alinga is working with was starting to fail due to lack of maintenance. Rodden suggested the problem is that the organizations with the current maintenance contracts are "not funded to do anything properly." Steve Rogers stated the organization now responsible for these remote energy systems in the Northern Territory "contracts local, commercial solar installers or electricians in the particular area... but they're not people who share the organizational values of an Indigenous company that is focusing on bettering the lives of people in remote First Nations communities."

This infringement of distributional justice is having real effects in these communities. Lauren Mellor of Original Power suggested that residents cannot support economic opportunities in the homelands/outstations near Borroloola, such as "cattle enterprises or tourism", because they cannot afford the fuel. Mellor noted this is emblematic of the problems met by communities living off-grid across the Northern Territory. Even those with old Bushlight systems faced high costs to replace batteries and other components, she explained. This in turn has led to homelands being abandoned.

Participants pointed to the high ongoing costs of Bushlight leading to the government endings the project's funding. Paul Rodden and Steve Rogers explained the national government considered the maintenance costs to be too high, so put out a tender to supply electricity to homelands/outstations. Another organization put on "a much cheaper bid" than CfAT and won the contract, Rodden explained. Rogers further suggested the cost of community engagement as "one of the reasons why CfAT lost the contract when it went to tender" as it was "not competitive with the commercial market." "Every system would have had a AUD $50-$60,000 front end co-design community engagement loading," Rogers stated. As summarized by Ruby Heard, the Bushlight project overcame "so many of the barriers" to providing clean, reliable energy in these remote communities, "apart from providing a business model that could keep it going."

This shift in funding model shows the government's failure to understand best practice for electricity provision in homelands/outstations according to the participants that worked on the Bushlight project. Paul Rodden stated maintenance is crucial to getting value from combined solar battery systems in remote regions. Most of the costs are in the initial investment in the system whereas the operational costs are very low, he noted. Therefore "incremental funding" is required for maintenance to ensure that initial investment does not go to waste. Steve Rogers suggested the lack of funding for community engagement leads to "longer-term implications" of higher "ongoing maintenance and replacement costs." Rogers elaborated:

> "But that is the fundamental issue that we see all the time in remote Australia. And it's not just Bushlight, it's any sort of infrastructure, especially in remote communities. Governments are willing to pay for infrastructure installation, the whole thing then falls over when it comes to the lifecycle costs of infrastructure. And Bushlight was a classic case of not considering those full lifecycle costs, in my opinion."

A final point noted by participants was that the end of funding for Bushlight coincided with a wider change in policy direction from government, also documented by Amnesty

International (2011). Brad Riley explained that "there was a strong shift towards supporting service provision in those larger growth towns and communities." The national government also expected state and territory governments to take on a greater funding role, according to Riley. Steve Rogers labelled this "passing on responsibility" by the national government. Paul Rodden concluded "essentially, there is no funding for these outstations, not just energy services, but all services" in the Northern Territory.

4.2.2 First Nations Clean Energy Network and Original Power

4.2.2.1 Distributional justice

The literature review established the lack of reliable access to affordable electricity in the communities Original Power has worked in (The First Nations Clean Energy Network 2021). Participants with knowledge of these communities elaborated on this energy insecurity and the drivers of this energy insecurity. Lauren Mellor of Original Power stated that "Indigenous populations in the Northern Territory, have some of the highest energy insecurity in the world." She suggested this has "flow-on impacts" on "health, social and community wellbeing." This reflected the lived experience of Norman Frank Jupurrurla in public housing in Tennant Creek. "We have a prepaid meter," he explained "The power used to go off every now and then," stated Frank, which meant "the food and my medication in the fridge" would also go bad. Raymond Dixon of Marlinja also explained his community experienced many "blackouts" in 2016 when the electricity transformer "blew out". He also stated, "Before the solar installation, I was paying AUD $60-80 for power a week." "We could have no power for a week if can't pay our debts," concluded Dixon.

Participants also highlighted the problems of the poor-quality Indigenous housing in town camps and remote communities, as identified by McKenzie (2013). Simon Quilty of the

Australian National University (ANU) stated, “those houses are really dangerous in the new heat that we're experiencing,” calling them “just terribly designed.” Quilty further noted the public housing department in the Northern Territory does not install air conditioners in their housing due to an “implicit acceptance that Aboriginal people can't afford to use air conditioning.”

Other participants also highlighted how policies did not treat Indigenous households equally to other Australian households. Confirming the findings of Peacock (2021) and the Northern Territory Council of Social Service (2019), Lauren Mellor of Original Power explained that “Currently, Indigenous customers with prepaid meters on their home are locked out of the immediate cost savings of rooftop solar that other electricity customers in more urban environments enjoy.” Specifically, Mellor explained households with prepaid meters in the Northern Territory were denied connection for rooftop solar systems because the public utility believed there to be “technical constraints to safe integration of the meter and solar PV [photovoltaic].”

The Original Power trial project to install residential solar on the house of Norman Frank Jupurrurla in Tennant Creek was designed specifically to challenge the existing policy. Lauren Mellor explained Original Power was able to work with the prepaid meter manufacturer, the Northern Territory electricity retailer Jacana and the utility Power and Water to demonstrate the compatibility of solar power and the meters, and how this “could reduce the rate of household electricity disconnection.” However, Simon Quilty recalled that the Northern Territory public housing department first rejected the application to install solar panels on the Frank household. The department suggested “roofs of Indigenous houses” do

not have the required “structural integrity,” according to Quilty. This was overcome by having an assessor certify the structural integrity of the roof, he explained.

The trial in Tennant Creek also had to overcome the lack of state subsidies for solar installations for Indigenous households in public housing. Simon Quilty stated “every single set of solar panels across the Northern Territory has had some kind of government subsidy to get it there. And yet, Aboriginal people are completely locked out.” Therefore, Norman Frank Jupurrurla’s household did not benefit from a subsidy for his solar installation, recounts Quilty. As explained in the literature review, Original Power therefore paid for the solar installation (Peacock 2021).

As mentioned in the literature review, feed-in tariffs have been an important driver of residential solar uptake in Australia (de Atholia, Flannigan, and Lai 2020). The lack of access to feed-in tariffs for Indigenous households was highlighted by participants. Lauren Mellor of Original Power stated that the Frank household in Tennant Creek was initially denied the feed-in tariff available to other households with solar in the Northern Territory. However, she explained the advocacy from the organization and Frank himself led to the energy retailer Jacana eventually granting the feed-in tariff to the household. Both Mellor and Simon Quilty mentioned the feed-in tariff has decreased the household’s electricity costs and automated disconnections significantly. Subsequently Jacana also granted access to the feed-in tariff to another Original Power project, the Marlinja community center, noted Mellor.

The participants residing in these communities attested to the increased access to affordable electricity thanks to the Original Power projects. Norman Frank Jupurrurla stated that since he has had solar panels on his roof, “I'm finding it's cheaper and I don't spend much money

now." Previously the Frank household would experience frequent electricity disconnections. "Especially when it's summer, when we got air conditioning on – probably about two times a day," Frank recounted. Frank continued by saying he worries less about energy use now. "We use the air conditioning in summertime. Now when we get cold we use the heater. Raymond Dixon also suggested the solar installation on the community center has reduced costs and automated disconnections. Dixon further explained having solar power meant "the community center could be used for COVID isolation when people in the community caught it." Lauren Mellor also mentioned the community center now acted "as a relief center for the community when the power went down" and could "host a whole range of activities for the community." Raymond Dixon expressed his satisfaction with the installation: "I think solar is good for here and good for humanity."

By documenting the outcomes of the Tennant Creek case, Original Power hoped to encourage the government to adopt similar solutions for other Indigenous households and "change the rules," said Lauren Mellor. Therefore, Original Power aimed to "find a way to use that prepaid metering system to actually assist in delivering lower cost, more reliable power directly to the households." Mellor further explained that the cooperation with the public utility and retailer seen in Tennant Creek has now extended to the Marlinja community. She recounted they have "entered a trial" with her organization to connect a microgrid consisting of a solar array and battery systems to the existing diesel power station. This would provide an "energy distribution model" for remote communities in which the "prepaid metering system registers dollar value credit from the microgrid," said Mellor. Marlinja resident Raymond Dixon mentioned he will not be satisfied until the plans for the microgrid are seen through. "If it happened six months ago, I could say it was a good project," he stated, "But we are waiting. It's good for the future. We use too much power."

Figure 5: Prepaid electricity meter for Marlinja community center

Source: Author

4.2.2.2 Procedural justice

The First Nations Clean Energy Network (2021) has a stated goal to enable First Nations people to be co-designers and drivers of projects. The participation of residents in these projects was highlighted by the research participants involved. For example, Lauren Mellor of Original Power recalled that during community consultations, Indigenous community members highlighted a preference for prepaid meters as they allow household members to share the cost of credit at the time of use rather than receiving a high electricity bill each

quarter. Therefore, Original Power and Norman Frank Jupurrurla rejected the request of Power and Water that the Frank household switch to a regular electricity meter in order to benefit from solar power. Mellor stated this switch also would have made residential solar an "inaccessible solution for almost every other resident of a remote community in the [Northern] Territory," as prepaid meters were also the policymaker preference for Indigenous households. "To make special exemptions for one or two people wouldn't actually solve the problem on a community level," concluded Mellor.

Both Raymond Dixon and Lauren Mellor recounted Original Power's engagement with the Marlinja community began in 2019. This involved developing a community energy planning scenario that matched the growth models for the community along with the community members' stated desire to make use of clean energy to support activities to increase wellbeing, recalled Mellor. From this scenario, Original Power developed an energy offer that could be integrated with the existing diesel-powered electricity grid. Raymond Dixon of Marlinja commended the work of Original Power. "They're a good team," he said. He also recalled the "local involvement" in the initial solar installation for the community center. Lauren Mellor stated this community engagement also led Original Power to first install a solar and battery storage system on the Marlinja community center to meet immediate energy needs.

Figure 6: Battery energy storage system for Marlinja community center

Source: Author

This focus on meeting community needs fulfils the stated aims of the First Nations Clean Energy Network. Ruby Heard of Alinga Energy Consulting explained she has recently taken on the role Project Officer of the community pillar for the Network, which Original Power is also part of. In her own work, energy projects begin by asking communities about the

challenges they have, recounted Heard. She suggested there must not be a “siloed” approach to energy issues but instead “larger issues in the community” should be considered.

The advocacy provided by Original Power for residents in dealing with public bodies was also highlighted by participants. This helps Indigenous communities overcome the “complex regulatory environment” identified by the First Nations Clean Energy Network (2021). Norman Frank Jupurrurla said that other residents of the Tennant Creek town camps ask, “How did you get yours [the solar panels], I want them.” Referring to Original Power, he said “It was my friends who helped me. Because I used to have this problem [disconnections] all the time. And we wanted to test it out.” Frank suggested the “hard part” was negotiating with the Northern Territory Housing Department and Power and Water. “I don't know if they were just ignoring me or didn't want me to put it on there,” he explained. Even after the panels were installed “It took me another four months” to have them connected to the prepaid meter recalled Frank. Simon Quilty of ANU explained Original Power’s involvement was crucial to the success of the project, as they could “negotiate with Power and Water and the Department of Housing.”

The participants’ responses also show Original Power’s importance to helping residents determine how to address energy insecurity in the communities they belong to. For example, Raymond Dixon recalled he was born in of Marlinja. “I boarded in Alice Springs for school but I’ve lived here for all my life,” he continued, “I’m a Mudburra man. It’s very important to take responsibility for the homelands – it was passed down from my family.” Similarly, Norman Frank Jupurrurla explained he was from Tennant Creek. “I'm a local Warumungu man. And I'm a native title holder and elder and a leader of the community of Tennant Creek,” he continued. “I've been here all my life. Born here and I grew up here and yeah, I

live here still today," he added. Norman Frank Jupurrurla emphasized he didn't want to be the only Indigenous man to benefit from solar power:

"I'd like to see more communities in the [Northern] Territory and Aboriginal housing have more panels. Because I'm just the first one. And I hope that I can see more people get the panels up in their house as well, from Territory Housing, and see if the government can help."

The dual engagement Original Power has with both residents and public bodies means the organization is designing its energy systems to benefit to all parties. Lauren Mellor noted that due to costs it was "not realistic for most communities to go completely standalone and disconnect from the diesel power stations." She said Original Power also considered the "sunk costs" the Northern Territory government has in the diesel power plants. Therefore, the "most beneficial scenario to both government and community parties would be if we can dramatically reduce the need for the reliance on these diesel power plants, which are heavily subsidized by the Northern Territory government," Mellor stated. She further mentioned that if this could be replicated across the Northern Territory, "the high costs are of remote generation comes down, and we could eventually see a reduction in the tariff across the whole Northern Territory." "For the community, they get an immediate benefit through meeting most of their energy needs through solar. But they also have the benefit of grid backup if they need to," she added.

4.2.2.3 Recognition justice

Many participants mentioned the lack of acknowledgement the government-mandated prepaid electricity meters make to energy insecurity. For instance, Brad Riley of ANU was a member of the research team for the Longden et al (2022) study that uncovered the high number of "involuntary self-disconnection events" in the Northern Territory. He suggests this number is much greater than seen in other regions of Australia utilizing prepaid meters, such as Tasmania, or "international comparators, from Germany and New Zealand." Lauren

Mellor of Original Power labeled prepaid meters “discriminatory.” She suggested “automating disconnection may make the job of the retailer easier, but it ignores the fact that an overwhelming number of Indigenous residents are experiencing significant energy insecurity and the flow on effects this has on health and community wellbeing.” “Governments can hide behind rhetoric of individual fiscal responsibility while ignoring the responsibility to provide access to reliable, affordable electricity that is the basis of a healthy home,” she summarized.

Participants further elaborated on the lack of understanding of the negative effects of prepaid electricity meters. For example, Brad Riley suggested the issue is not prepaying for power per-se, but rather the issue lies in mitigating the risk of those households with limited means. He therefore suggested the first step to managing the level of electricity disconnections is “transparent monitoring and reporting on the numbers in order to develop benchmarks and drive better outcomes.” Riley continued by saying Australia’s Energy Regulator is “rightly concerned with limiting the number of disconnections among those customers connected to the National Energy market” in Australia’s eastern states however there “remains a policy ‘blind spot’ in relation to remote and regional First Nations communities, especially those communities utilizing prepaid metering.”

Participants finally highlighted the drivers of energy insecurity for households with prepaid meters. For example, Simon Quilty of ANU explained that residents in Tennant Creek have just one outlet in town to buy credit for their prepaid power cards. There is also a hotline to call along with a website. But “the phone number and internet require that you have a credit card, and no one has a credit card, so they couldn't use them,” explained Quilty. Brad Riley explained “the probability of disconnecting is greatly increased during temperature

extremes," whether that be hot or cold, as this increases electricity use in the home. He also identified many of the same reasons for high energy use in the home as McKenzie (2013), including "inadequate housing that isn't built with a view to maintaining thermal safety and comfort," overcrowded households and energy-intensive fixed appliances – such as old air conditioners or stovetops. Again, like McKenzie (2013), Riley further highlighted low household income as a driver of energy insecurity. Finally, Riley explained that the Northern Territory electricity retailer Jacana has set an increased usage rate to replace the supply charge for prepaid customers, meaning "high-energy use households" often end up paying more for their electricity than others.

More generally, participants suggested there is a lack of government recognition of Indigenous Australians' roles in the country's transition away from fossil fuel use. For example, Lauren Mellor of Original Power stated the renewable energy transition in the Northern Territory could be a "process that happens to Indigenous communities" so that the benefits bypass them and are instead "seen by large companies and others." "That's the real challenge," she said, "That's the reason we're involved in it." Mellor thus reiterated Original Power's mission is "to work with communities to self-determine development priorities."

Lauren Mellor further pointed out there have been no allocations in the Northern Territory Government budget to "leverage investment in remote renewables" despite it being on the government's policy agenda. She proposed the new energy distribution model to be trialed in Marlinja would allow communities to attract financing from the Aboriginal Benefits Account. This fund provides grants for the benefit of Indigenous Australians using royalties generated from mining on Indigenous land in the Northern Territory (National Indigenous Australians Agency 2016). Mellor recounted that Original Power has communicated to government that

the model could meet the government's policy objectives to "achieve both diesel savings and emission savings… as well as achieve household energy savings, and leverage the investment that they want to see in the transition to remote renewables." She added that most communities are very interested in following this model rather than relying on or waiting for government to make renewable energy investments, whose benefits have "bypassed communities and only been seen by government."

4.2.3 Solar Energy Transformation Program (SETuP)

4.2.3.1 Distributional justice

As outlined in the literature review, the Northern Territory public utility Power and Water designed the SETuP program to reduce the reliance on diesel fuel for electricity generation in remote communities serviced by Indigenous Essential Services (Power and Water Corporation 2019b). One research participant, Sam Latz, was a Project Engineer for the SETuP program before becoming a Project Manager. He suggested Power and Water had been piloting the integration of renewable technologies, such as solar arrays, into their diesel-powered grids for 25 years. The TKLN (Ti Tree, Kalkarindji, Lake Nash) Solar Project, completed in 2013, provided the framework for the integration of solar systems to existing diesel power stations to power remote communities that inspired SETuP, according to Latz. He continued by saying that, "The premise of SETuP was to get that solar diesel hybrid in as many communities as possible." With the financial backing of the Australian Renewable Energy Agency [ARENA] and the Northern Territory Government, the idea was to "roll out several solar arrays" so they are "so big an asset based at so many sites that it becomes business as usual," he added.

SETuP was indeed successful in providing more clean energy to the communities Power and Water implemented the program in. Sam Latz stated “The key learning area for SETuP” came from the solar and battery system installed at Daly River. “We successfully demonstrated that we could turn off the diesel engines 12 hours a day and run the community off a battery with solar,” said Latz. He added the only issue since the installation has been the “solar array getting hit by lightning a lot.” Sam Latz suggested Power and Water has “rolled out these learnings” to other communities. He added the savings on diesel provided a “strong incentive for that investment in a battery.” Latz further suggested the knowledge from the Daly River project will help the government hit its “stated target of 70% renewable by 2030 for remote communities.” “It's just a matter of balancing the size of battery and solar to achieve a higher level of diesel savings,” he concluded.

As mentioned above, SETuP is a government-funded program. Sam Latz of Power and Water explained the “complicated arrangement” for funding: roughly half the program was funded by ARENA and other half from the Northern Territory government “as a direct grant subsidy with strings attached.” For SETuP, “Power and Water would take out loans from the Northern Territory government and the government would continue to fund Indigenous Essential Services as if the diesel was still being burned,” explained Latz. He added Power and Water would then bill the government on the savings on the diesel from the solar power before the savings were reinvested to pay off the loans. Latz stated the SETuP model “provides an incentive to make sure the assets work because if you've got loans to pay off, you need to make sure that you're making those [diesel] savings.”

Participants explained however the government has not reduced electricity prices for residents of communities targeted by SETuP. Lauren Mellor of Original Power stated the

smaller government-owned solar arrays implemented through the SETuP program “haven't achieved anything in terms of lower cost power for the households there” despite achieving “some diesel savings in those communities.” Sam Latz suggested that “no [cost] savings accrue to the residents of those communities” because their electricity is “already substantially subsidized.”

4.2.3.2 Procedural justice

Like the Bushlight project and the projects facilitated by the First Nations Clean Energy Network and Original Power, community engagement was integral to the SETuP project. However, unlike those projects, this engagement did not involve resident participation in project design. Lauren Mellor of Original Power suggested the SETuP program did not lower community electricity costs because it was a “generation-led, rather than a customer led approach to renewable energy.” Sam Latz explained that “there was a lot of work put into community engagement to communicate the project’s activities and what the benefits to communities would be.” He suggested the benefits were “less diesel being burnt, less trucks carrying diesel around, less noise and less pollution.” Latz explained Traditional Owners also receive “lease income” as Power and Water rented Indigenous land for the SETuP installations. He emphasized that while SETuP would not result in reduction in the power tariffs “there's a range of benefits to communities”.

This community engagement did lead to community buy-in from residents according to Sam Latz. He said Power and Water “did not commission a direct evaluation of the effectiveness of the community engagement,” however, “the very low rates of vandalism of the solar arrays and lack of complaints received suggest success.” This is “particularly in comparison to the

experience in other jurisdictions which reported some community pushback on similar rollouts," said Latz.

4.2.3.3 Recognition justice

The SETuP program's lack of fulfilling the above two areas of energy justice suggests public bodies did not recognize the energy needs of Indigenous communities. As explained by Lauren Mellor of Original Power, the goal of Power and Water and the Northern Territory government was simply to reduce diesel use, but they did not think about how to distribute the cost savings to communities. She noted the result of this is that benefits of the "huge investment" from SETuP "just completely bypass the residents and people are seeing a higher rate of disconnections across households."

Sam Latz of Power and Water was the only representative of a public body in this study. Individually, he did acknowledge the importance of electricity provision to the wellbeing of Indigenous Australians. He suggested homelands/outstations enable "Aboriginal people to retain connection to Country and to avoid the social issues." Therefore, these communities require "modern amenities and housing" while allowing Indigenous Australians to "retain their connection to traditional ways," continued Latz. However, he also emphasized the financial cost of meeting these needs, suggesting the "more isolated and small communities are, the more expensive service provision can be." He added for context that, "remote communities serviced by the Indigenous Essential Services program are about 8% of the size of the Northern Territory's regulated energy consumption footprint, then homelands are a percentage of that again."

It appears the Northern Territory government will continue to not meet the needs of these Indigenous communities as the SETuP program is their model for rolling out renewable

energy in remote communities. Evidence for this came from Sam Latz when he explained he seconded to the Northern Territory government to "contribute to their remote power systems strategy." Therefore, "key learnings from SETuP were injected directly into policy advice," he added. However, he noted the government has yet to publish this strategy. On the other hand, he stated that "government has prioritized an investment" in a battery and a larger solar array at Wurrumiyanga – a community of approximately 2000 residents. This showed "one of the benefits of the multi-party investment in SETuP was the potential for cost-effective increases in renewable contribution," according to Latz.

Other government-funded renewable energy programs in the Northern Territory also do not stand to increase energy security for Indigenous Australians. Hayley Michener from Arid Lands Environment Centre (ALEC) is leading community engagement for the virtual power plant component of the Future Grid project in Alice Springs. Similarly to SETuP the project is funded by a mixture of national and Northern Territory government money and aims to increase the amount of solar power in the Alice Springs electricity grid, explained Michener. As mentioned in the literature review, public housing households experience a high number of automated disconnections in Alice Springs (Klerck 2020).

Michener suggested however that those renting and living in public housing in Alice Springs do not have to a subsidy available to install a solar and battery system. Therefore, the Future Grid virtual power plant project will only benefit homeowners with existing installations, according to Michener. In response to this, she further explained ALEC has commissioned a study that will outline the barriers to solar power for "lower socio-economic" households, which is currently at the draft stage.

Hayley Michener also alluded to the lack of government resources and coordination for public housing in the Northern Territory. She explained that after contacting the Northern Territory government as part of the lower socio-economic study, a representative told her organization “We don't have the funding to install solar” in public housing. Michener suggested though, even with the required funding, the siloed nature of the government departments in the Northern Territory acts as another barrier to solar uptake in public housing. This is because responsibilities for new public housing infrastructure and maintenance are split across two departments, and they “don't like to talk to each other,” according to Michener.

5 Discussion

In this chapter I will address the two research questions for this study using the results outlined in the previous chapter. To explore the barriers to affordable, reliable energy in remote Indigenous Australian communities, I will first outline the differences and similarities between projects that attempt to overcome these barriers that I used as the case studies in the previous chapter. This will not only allow me to identify barriers but also provide a preliminary analysis as to why these exist and who is responsible for them. However, to provide a deeper understanding of this, I will employ a radical framework to analyze the energy injustice associated with these barriers in the second section of this chapter.

As in the results section, I will classify these injustices into the three pillars of the normative approach to energy justice as identified by Jenkins et al. (2016). However, taking up the radical framework of LaBelle, Bucată, and Stojilovska (2021), I will foreground responsibility and power relations, before finally suggesting what policy approach could strengthen energy justice in the Northern Territory.

I will not discuss in depth the wider drivers of energy insecurity in the Northern Territory that the case study projects did not or could not address directly. These include low household income, family structures, overcrowding, high levels of rental, poor quality housing and fixed-high energy use appliances in public housing. However, the fact these drivers of insecurity were mentioned by many participants show they are important to the context these projects were working in.

5.1 Solar power projects to addresses energy insecurity

The most prevalent barrier to affordable, reliable electricity in Indigenous communities mentioned by participants was the cost of providing services to remote areas. Therefore, all projects that I used as case studies had to deal with this challenge in some form. The results revealed also how these high costs affect government policy relating to energy provision. This included what models of provision receive funding and preference for prepayment of electricity for Indigenous households. These policy matters therefore also affected these case study projects.

Solar technology was central to each of these projects. Whether off-grid systems, or a solar array or microgrid integrated into a larger electricity grid, the solar applications were all designed to reduce reliance on diesel to produce electricity. This not only decreased polluting emissions but cut one of the major costs associated with remote community energy provision.

In homelands/outstations the solar panel and battery systems of the Bushlight project were able to reduce the costs to residents reliant on buying fuel for diesel generators. However, the cost to implement the project led to CfAT losing the government-funded contract to supply and maintain the solar and battery systems. Therefore, Bushlight was a victim of the national government's desire to reduce costs. Energy insecurity has increased in homelands/outstations since the end of the project due to lack of maintenance and replacement of the solar and battery systems.

The government-funded SETuP program was able to lower the costs to the Northern Territory government related to supplying electricity to communities connected to diesel-fueled grids. The increase in solar power reduced diesel fuel use. However, these savings

were not passed onto residents in the communities in the form of reduced electricity prices. The reasoning for this was that the government already subsidized these energy costs. Therefore, while the SETuP program delivered on providing more clean energy to remote Indigenous communities, it did not increase energy security due to government policy.

The Original Power pilot projects point to solutions in which residents reliant on diesel-fueled grids can have reduced electricity costs, whether that be from medium-scale solar arrays with a battery or residential solar installations. Therefore, energy security has increased for these residents. These projects were implemented without public funding but aim to influence future government policy. This includes removing the current barriers to Indigenous households with prepaid meters using solar power and accessing feed-in tariffs. Original Power also proposes a model to fund solar-powered community microgrids through Indigenous land royalties, therefore bypassing the need for government funding. However, the organization hopes the Northern Territory government would then decrease the electricity tariffs for households across the Territory due to the resultant reduction in electricity provision costs.

According to participants, all three case study projects had a heavy focus on community engagement. However, the goals for this engagement differed depending on the overall goals of the project. For the SETuP program, the engagement was focused communicating benefits to residents and ensuring they were aware that they would not receive reduced electricity prices. In the Original Power projects, community engagement focused on giving residents a voice to determine what they wanted to achieve with improved energy access. The aim was to ensure that the solar technologies installed would meet the needs of the communities. This

was the same goal as the Bushlight project. It is worth noting here that both Original Power and the organization behind Bushlight, CfAT, are Indigenous-controlled organizations.

The ability of the Bushlight project to increase energy security in homelands/outstations directly strengthens the self-determination of Indigenous Australians who have chosen to reconnect with their ancestral lands. Strengthening self-determination for Indigenous Australians is also a stated aim of Original Power. The pilot projects used as case studies in this thesis show how the organization allows communities to co-design their own energy systems. Moreover, Original Power supported the advocacy efforts of residents to overturn regulations enforced by public bodies that increased energy insecurity. By contrast, the community engagement model of the SETuP program did not lend itself to fostering self-determination.

Based on the above of summary of the case study projects, we can see that government policies and funding preferences create barriers to affordable, reliable energy in remote Indigenous Australian communities. Clearly then, the state and public bodies bear at least some responsibility for energy insecurity. To gain an understanding as to why this is the case, I will apply the radical framework to assess this energy insecurity.

5.2 Radical energy justice

The energy injustice in the Northern Territory's remote Indigenous communities takes the form of energy insecurity for households. LaBelle, Bucată, and Stojilovska (2021) suggest shifting from a normative approach to energy justice to a radical approach requires identifying the causes of injustice according to the type of justice infringed but also

describing whose interests are served by the injustice. Therefore, I will discuss this injustice in relation to Jenkins' et al. (2016) three pillars of energy justice.

5.2.1 Distributional justice

In examining distributional justice in the Northern Territory I can begin with a normative approach to first "identify structural causes of injustice, including scale and spatial inequity." (LaBelle, Bucată, and Stojilovska's 2021). This already reveals infringements of distributional justice relate to policy and funding choices from government. For instance, the Northern Territory government has concentrated remote energy provision in a small number of "growth towns" to save costs, which has caused some homeland/outstation communities to have unreliable access to electricity. This has been compounded by the national government decreasing funding for solar technologies in homelands/outstations. On the other hand, the national government is willing to allocate funding to projects that provide cost savings on energy provision without consideration as to whether this improves energy security for communities, as was the case for the government-funded SETuP project.

By examining these infringements of distributional justice together, a pattern emerges of policies that serve the interests of the national and Northern Territory governments but not Indigenous Australians. This suggests there is an inherent dominance of state over Indigenous people that exists in this energy system. This is where I can call on the radical framework of LaBelle, Bucată, and Stojilovska (2021), who suggest it is necessary to "identify the sources and construction of the energy system that has created this "domination and leverage."

In this regard, I note colonization caused the displacement of Indigenous Australians from their ancestral lands and disrupted traditional ways of life. I suggest this set a status quo in

which Indigenous Australian's were actively disempowered. Regarding the energy system in the Northern Territory, I believe the colonial power structures have carried over to the post-colonial era. This is evidenced by how infringements of distributional justice have undermined the efforts in the post-colonial era by Indigenous Australians to re-establish communities on ancestral lands and/or improve standards of living. This has served to uphold a status quo of disempowerment for Indigenous Australians. I can make no judgement as to whether this is the intention of policymakers. Rather I only state that this is the outcome of the current energy system.

The existence of this status quo provides some explanation as to why there are policies in place that do not appear to serve anybody's interest, but instead seem built on an implicit acceptance by public bodies that Indigenous households cannot benefit from solar technology in the same way as other Australians. For example, state subsidies for solar installations are not available for Indigenous households in public housing and current regulation blocks installations for households with prepaid electricity meters. Such policies cause further infringements of distributional justice.

5.2.2 Procedural justice

The same energy system power structures that effect distributional justice in the Northern Territory also lead to infringements of procedural justice. That is, a status quo consisting of state dominance over Indigenous Australians means a top-down approach to designing the energy system is in place. This reinforces disempowerment and perpetuates injustice.

This is evidenced in policymakers' exclusion of residents of remote Indigenous communities from decision making process in how energy should be provided in the Northern Territory.

For example, the government-funded SETuP program did not meet community energy needs as engagement with residents did not focus on their desires but rather on convincing them of the benefits of a predetermined project. This lack of meaningful access to institutional decision making also prevents these residents in Indigenous communities from shaping policies to address problems that lead to energy injustice, such as failing solar and battery systems in homelands/outstations and automated electricity disconnections for households on prepaid meters.

This infringement of procedural justice means Indigenous-controlled organizations, such as Original Power, have taken up the mantle of actively consulting with households to design their energy projects, as well as providing and supporting advocacy efforts to public bodies to overturn unjust policies and regulations. The organization's small successes to date show early signs of redressing the power imbalances of the Northern Territory energy system.

5.2.3 Recognition justice

LaBelle, Bucată, and Stojilovska (2021) state a radical approach to energy justice should "describe the role of structures shaping perceptions of justice and injustice in society or lives" and "identify the role of (historical) institutions shaping perceptions of a just socially constructed energy system." This is an interesting point to unpack in relation to the Northern Territory energy system. Based on the results of this study, it is clear there is a failure of policymakers to recognize the important contribution energy insecurity makes to remote Indigenous communities' poor wellbeing and to hindering economic activity, which is an infringement of recognition justice. On the other hand, the national government does recognize wellbeing gaps between Indigenous and other Australians, including poverty disparity. This partly dictates policy related to Indigenous communities in the Northern

Territory and means the government subsidizes energy prices for remote communities connected to public electricity grids. This was the reason provided for not distributing the cost savings from the SETuP program to residents.

To me, this suggests that policymakers believe these state subsidies have created a just energy system in the Northern Territory. This construction of a "just energy system" by the state is obviously flawed however, as there is a lack of recognition that poverty levels in Indigenous communities mean electricity prices are still too high and thus energy insecurity prevails. As suggested by Lauren Mellor of Original Power however, by emphasizing household fiscal responsibility, the government shirks responsibility for this injustice.

It is perhaps this lack of responsibility that led to the failure of the national government to recognize the potential outcomes of decreasing funding for electricity provision in homelands/outstations. This effectively undid the good work of the Bushlight project in strengthening distributional justice. Here the government's financial concerns over maintenance and community engagement costs won out over the welfare of the residents of these communities. Another example of lack of acknowledgement from public bodies of the effects of policies are prepaid electricity meters. This has necessitated academics step in to measure the levels of automated electricity disconnections and Indigenous-controlled organizations begin work to assist communities in meeting their energy needs and advocate to make these policies more just.

5.2.4 Strengthening energy justice in the Northern Territory

According to LaBelle, Bucată, and Stojilovska (2021) a radical energy justice approach "describes how justice can be served through implementing policies guided by specific

justice concepts." This would take policymakers to recognize reliable access to affordable electricity for residents of remote Indigenous communities as a right. Ideally, this would lead to Indigenous Australians gaining access to state institutions and decision-making processes as well as social services to assist them in addressing current policy barriers.

Moreover, to construct a more just energy system policymakers would need to recognize the opportunities the clean energy transition presents for improving energy security for Indigenous households as it has for other Australians. Combined with greater participatory power, this would also provide Indigenous communities the opportunity to co-design clean energy projects to meet their needs. Furthermore, this may lead the Northern Territory government to take the onus off individual households in line with the suggestion of Chester, Elliot, and Crossley (2018), and therefore adopt the suggestion of Langworthy et al. (2017) to increase solar installations for public housing.

As it stands currently, it has taken Indigenous-controlled organizations to recognize the rights of Indigenous Australians and thus fill in gaps in policymaking and even fight to overturn policies that cause energy injustice. In the absence of institutions within the current energy system acknowledging the needs of remote Indigenous communities, it is these organizations that have recognized how reliable electricity provision in these communities can greatly improve wellbeing for Indigenous Australians. It is worth noting public bodies are now beginning cooperation with Original Power in trials for electricity provision in remote Indigenous communities. On a further optimistic note, Original Power's proposed model to fund solar-powered community microgrids through Indigenous land royalties in the Northern Territory would require far less government funding. Therefore, this would remove the state incentive to cut costs that currently underlies the Northern Territory's unjust energy system.

6 Conclusion

The radical energy justice framework highlights the necessity of a shift in policy to address energy insecurity in the Northern Territory's remote Indigenous communities. The current energy system contains structural barriers for access to reliable, affordable electricity as well as infringes on distributional, procedural and recognition justice. The negative effects of this on wellbeing and livelihoods leaves Indigenous Australians disempowered, reinforcing a status quo that has existed in Australia since colonization.

The pilot projects from the First Nations Clean Energy Network and Original Power point to how a more just energy system can be designed. These come at an opportune time with the Northern Territory government considering new forms of procurement to "increase renewable energy in the communities" according to the government's Director for Remote Power Systems. Whether these are influenced by the examples provided by Original Power or instead the SETuP program will be important in determining whether energy security increases in the Northern Territory. The solution's proposed by the former seek to change the structures of the energy system, while those of the latter comply with these structures. Therefore, the policies and funding associated with renewable energy in remote communities should be a continued focus of research, so that improvement and structural change, or lack thereof, is measured and recorded.

It would also be beneficial to continue to follow the work of Indigenous-controlled organizations in this area, such as Original Power, even if their influence on policy remains minimal. This is because their work is built around addressing injustices and ensuring the best outcomes for Indigenous Australians. Therefore, their solutions may suggest what good governance could look like in contrast to policies that continue to serve the interest of

government. Moreover, it would be interesting to see whether future electricity provision in homelands/outstations is influenced by the best-practice solutions of the Bushlight project, especially if alternative funding models can be sourced that alleviate government concerns over spending.

Another suggestion for future research would be an examination of the drivers of energy insecurity that don't relate directly to electricity provision. This includes low household income, overcrowding in homes, high rental levels, and energy inefficient housing and appliances. As one of the research participants Ruby Heard stated, we cannot take a "siloed" approach to energy issues, so further investigation is required in relation to how the above factors affect energy insecurity and how they interact to decrease wellbeing amongst Indigenous Australians.

Finally, comparative studies could be utilized to further develop the conceptual framework of radical energy justice. Regarding energy justice for Indigenous communities, an analysis of the electricity provision in other Australian states with remote Indigenous communities would show whether the structures in place in the Northern Territory energy system are also present in other states. Also, given that the work of the First Nations Clean Energy Network was inspired by the successes of Indigenous-controlled clean energy projects in Canada, a comparative analysis of these projects would provide insight into the relationship between energy justice and the disempowerment of Indigenous peoples in another former colony.

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Appendix 1 Informed Consent

Central European University

TITLE OF STUDY
Exploring radical energy justice in remote Indigenous communities in Australia

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PURPOSE OF STUDY

You are being asked to take part in a research study. Before you decide to participate in this study, it is important that you understand why the research is being done and what it will involve. Please read the following information carefully. Please ask the researcher if there is anything that is not clear or if you need more information.

The purpose of this study is to identify structural injustices related to access to clean, reliable energy in Indigenous Australian communities and determine who is responsible for them. The overarching research question is, what are the barriers to clean, reliable energy in remote Indigenous Australian communities?

STUDY PROCEDURES

You will participate in a 30-minute interview. The interview will not begin until you have read this document completely and signed it to show you are a willing participant.

The researcher will then guide you through the interview with questions relating to the research topic. These interviews will take place either virtually or in person. In both cases, your answers will be recorded for the purpose of analysing them.

On request you will have the opportunity to view the final transcribed manuscript of the interview. You then have the chance to make amendments to the statements you provided during the interview.

RISKS

Please be aware that the answers you provide in this interview may be published in publicly available research. Therefore, it is possible individuals and/or entities that you mention in your answers will read the study. There may be negative consequences for you that occur because of this. There may also be possible reputational risks associated with your answers.

Therefore, you may decline to answer any or all questions and you may terminate your involvement at any time if you choose.

BENEFITS

There will be no direct benefit to you for your participation in this study. However, the researcher hopes that the information obtained from this study may inform better policy making which supports greater access to lower-cost, more reliable energy for Indigenous Australians living in remote areas.

CONFIDENTIALITY

The thesis will be stored, in electronic and physical form, at the library of the Central European University. The information therein can therefore be accessed by staff and students at the university.

For the purposes of this research study, you have choice to participate anonymously, either completely or partially. Specifically, this means you can remain anonymous, have a pseudonym used, or be identified by your real name.

The notes, interview transcriptions, and any other identifying participant information will be available only to the researcher.

Participant data will be kept confidential except in cases where the researcher is legally obligated to report specific incidents. These incidents include, but may not be limited to, incidents of abuse and suicide risk.

CONTACT INFORMATION

If you have questions at any time about this study, or you experience adverse effects as the result of participating in this study, you may contact the researcher whose contact information is provided on the first page. If you have questions regarding your rights as a research participant, or if problems arise which you do not feel you can discuss with the researcher, please contact the secretary of the CEU Ethical Research Committee Dr. Eszter Bordás by phone on +36 1 235-6137 or email at bordase@ceu.edu.

VOLUNTARY PARTICIPATION

Your participation in this study is voluntary. It is up to you to decide whether or not to take part in this study. If you decide to take part in this study, you will be asked to sign a consent form. After you sign the consent form, you are still free to withdraw at any time and without giving a reason up until three weeks after the interview. Withdrawing from this study will not affect the relationship you have, if any, with the researcher. If you withdraw from the study before data collection is completed, your data will be returned to you or destroyed.

CONSENT

I have read and I understand the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

Participant's signature _____ Date _____

Investigator's signature _____ Date _____