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There is no sun without shadow: Investigating the attitudes towards California's new solar energy mandate

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Abstract:

As the current energy system dependency on fossil fuels continues to perpetuate environmental harms, endangers economic stability and exaggerates international conflicts, there has been a growing momentum for a transition towards more sustainable forms of energies. When it comes to policies that aim towards a shift in energy systems, California has been recognized as one of the flagship regions in such solutions. Last year, the state became the first place in the world to mandate solar energy for all new households and major renovations.

By employing a case study approach, this thesis investigates attitudes towards the new solar mandate with a focus on residents of Butte county, California. The findings show that the recent crises in the county have increased interest in alternative forms of energy among the households. The respondents are overall receptive towards the new mandate, as it holds the potential to ensure larger energy security and economic benefits in the future. However, the residents also see that the new requirement could possibly overlook certain vulnerable groups of residents as housing tenants and people living in less adequate climatic conditions for sourcing of solar energy. Residents also considered themselves as being left out of the decision-making process.

The interviewee reflections are later discussed in a world context by engaging theories in human ecology that reflect potential obstacles such views and mandating household solar energy itself portends to just energy transition. This thesis concludes that while the new photovoltaic requirement resonates with the county respondents, it obscures the potential burdens on certain marginalized groups, which calls for a better incorporation of the concept of justice and investigation of public attitudes in order to ensure a more inclusive shift towards the alternative energy systems, like residential solar energy.

Keywords: solar, attitudes, mandate, energy transition, discourse analysis, California, energy security, entrepreneurial self

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This thesis is written for my *Mamma*, the biggest supporter and a listener only a phone call away – on the rollercoaster ride of life.

List of Abbreviations

CA - California

CCE – The Community Choice Energy

CDA – Critical Discourse Analysis

CDFFP – The California Department of Forestry and Fire Protection

CEC – The California Energy Commission

CO₂ – Carbon dioxide

CPUC – The California Public Utilities Commission

EIA – The United States Energy Information Administration

GHG – Greenhouse gas

IEA – The International Energy Agency

IPCC – The Intergovernmental Panel on Climate Change

kWh – kilowatt hour

NRC – The United States National Research Council

NZEBs - Net Zero Energy Buildings

OAPEC - The Organization of Arab Petroleum Exporting Countries

PG&E – Pacific Gas & Electric

PPA – Power Purchase Agreement

RCRC – The Rural County Representatives of California

US – The United States

USA – The United States of America

USEA – The United States Energy Association

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1. Introduction

In 2010 buildings added up to one-third of the total worldwide final energy use (IEA 2013) with energy demand predicted to double by mid-century (IPCC 2010). Based on the current observations, greenhouse gas (GHG) emissions from this sector have increased twofold since 1970 representing 19% of all global 2010 GHG emissions, and with the increase in demand for energy, this trend is expected to double or even triple (IEA 2013). Most of them are incidental carbon dioxide emissions from electricity and heat use in construction, which have quintupled in the period from 1970 to 2010 (IPCC 2010, 678). Residential housing specifically accounts for approximately three quarters of the energy use in the building sector (IPCC 2010). Considering the impacts residential constructions have on the environment, recent years have seen an increased body of work exploring the future of sustainable housing (IPCC 2010; Omer 2008; Santamouris 2016). According to IPCC (2010) the promotion of the newest technologies, sustainable energy policies and overall behavioural change, would create more efficient and “green” housing conditions that would lead to reduction of energy use in the housing sector and GHG emitted. One of the alternatives that has gained a lot of promotion is implementation of net zero energy buildings (NZEBS) (IPCC 2010; Marszal et al. 2010; Sartori et al. 2011). These are residential infrastructures that are equipped with *in situ* renewable sources, such as photovoltaic rooftops, wind turbines, or solar thermal systems, capable of producing the same amount of energy as consumed and decreasing GHG emissions created by the current dependency on depletable resources (IPCC 2010, 689).

In recent years, some of the most ambitious environmental and energy regulations in the world have been implemented in the state of California (USA), through aggressive promotion of clean-energy technologies (Temple 2018; Wiser et al. 1998). In 2018, the state adopted a legislation that would eradicate all fossil energies from the state’s electric grid by 2045 (Cohen 2018). Starting this year, California Energy Commission (CEC) made an aggressive step towards implementation of net zero energy buildings by passing a law that would require all new house and multifamily residencies of three stories or fewer, along with all major renovations, to be built with solar panels (CPUC 2018; Roberts 2018). California, therefore, has officially become the first state in the world to mandate household rooftop solar systems on such a large scale (Hsu 2018). The mandate itself offers the homeowners three options — either paying for solar panels outright, leasing them, or entering a power purchase agreement with developers; another option is for communities to pool resources instead of installing solar on individual homes (Chappell 2018; CPUC 2018). Installation costs are expected to start from 9,500 US dollars upwards, leaving many Californians concerned about the increase in housing prices and ambiguity this mandate puts on future rents that has already been a pressing matter in the state for decades (Funes 2018). The new mandate has also received criticism from California energy policy experts mainly by being a very expensive way to transition towards renewable energy systems in comparison to large-scale solar or wind utilities, and of being less cost-effective for the new homebuyers than it has been portrayed in CEC analysis (Borenstein 2018).

This thesis will investigate the adaptation process in one of the administrative areas where the law has taken effect this year – Butte county – that has seen a steep increase in population in the last 30 years (US Census 2018). The county was also subject to various natural disasters, including the Camp Fire in 2018 that affected large territories of the county and was the most destructive wildfire in state history (Simon 2018). Investigations by the California Department of Forestry and Fire Protection (CDFFP) discovered that the county fires were actually sparked by the outdated transmission lines of the private utility company Pacific Gas & Electric (PG&E). This has led the victims not only filing lawsuits amounting to about 25 billion US dollars (Fieldstadt 2020), but has also prompted the residents to search for alternative solutions to the current energy system (Fieldstadt 2020). The complexity of such elements as overall housing increase, increase of renovations after the disaster

and the current relationships with PG&E will be further examined in order to broaden the view of the local attitudes towards rooftop solar mandating.

While the leading researchers (Grubler 2012; Mitigation C.C. 2011; Riahi et al. 2012; Sovacool 2015, 202) consider moving away from our global energy systems of the utmost significance it is also crucial to ensure that this transition is just for everybody. This means a better understanding of the potential challenges and inequalities that could emerge from the adaptation of the new energy systems. According to Healy and Barry (2017, 451) putting justice at the core of various decarbonization strategies would help contemporary society from reproducing “the patterns of exploitation and dispossession that characterize the current global political economy”. Currently, our global energy regime is defined by a political economy that reflects the regards of influential actors, disregards the needs across the sociodemographic spectrum and fails to address the environmental burden that is created through the energy life cycle (Healy and Barry 2017). It is therefore crucial to see the changes in energy systems as an important process of challenging the potential “inequalities in power and injustices across entire socio-energy regime.” (Healy and Barry 2017, 452).

Following the emancipatory approach of energy justice, rather than looking explicitly at the energy policy expert outlook on the mandate, I have decided to employ a bottom-up approach by interviewing Butte county residents on their attitudes towards the new law that requires solar on the rooftops of new housing or major renovations. By exploring the various perspectives, I seek to understand what is the current *status quo* in the realm of renewable energy mandating and what narratives contribute to a deeper understanding of potential energy injustices that could emerge from the rooftop solar mandate. I see an investigation of the resident worldviews as the basis not only for the critique, but an invitation to a better contextualisation of future energy planning in California. By this I mean, that the worldviews the residents express should not only be taken as the critique of the current capitalist regime, but a valuable element for a better supported, easier and inclusive policy planning, as the overarching narratives speak to the ways we want the world to talk back to us.

The aim of this study is therefore to investigate Butte county resident’s attitudes towards solar rooftop mandate in order to gain a better understanding of the current outlook on renewable energy transitioning, challenges these kinds of implementations face, and the possible ways on moving forward and improving these policies.

1.1. Research questions

This research seeks to investigate people’s attitudes towards regulated household solar energy technologies.

In this research, a case study of the implementation of rooftop photovoltaic panel mandate will be examined in Butte county, California. This study seeks to explore:

- How does the crisis caused by the fires play a role in residents’ outlook on future energy governance?
- How receptive are the residents of Butte county to the new rooftop solar mandate?
- What are the factors that facilitate people’s acceptance of the new regulations?
- What does the implementation of this mandate portend for energy justice among various household groups of the county?

1.2. Structure

This thesis is divided in six parts. After introduction (1.) with the aim and research questions (1.1.), there is a background and context section (2.), which looks at energy politics and transition in the United States on various scales. Further, section three (3.) focuses on five theoretical frameworks and concepts that helped shaping the discourse of this thesis. The next section (4.) discusses methodology and methods of the thesis, starting from epistemology (4.1.) to use of methods as semi-structured interviews (4.2.2.) and discourse analysis (4.2.3.) and research positionality and limitation (4.2.4 and 4.3). The analysis and discussion of the interview data is found in section five (5.), which is divided in five subsections where at the end of every subsection is an in-depth discussion informed by the theoretical framework. These include: Crisis as a catalyst of change (5.1.), In search of energy security (5.2.), Money talks: economic reasoning as the key element rooftop photovoltaic adaptation process (5.3.), as well as State's role in mandating household solar energy (5.4.) and Gaps in Justice: identifying the possible inequalities emerging from the new mandate (5.5.). Finally, in the conclusion of the thesis (6.) I discuss the contributions of the study (6.2.), answer my research questions (6.2.) and provide an outlook for future research and limitations (6.3.).

2. Background and context

In this section, most of the information is presented in the upcoming subsection, but a more detailed analysis of the policies and energy statistics can be found in Appendix 2.

2.1. Energizing the United States of America

The United States of America currently is the world's second largest energy consumer, only surpassed by the People's Republic of China (Enerdata 2018). With the population of around 328 million, the country accounts for around 27% of the world's primary energy use and consumes around the same percentage of the world's electricity (Sovacool 2011; U.S. Energy Information Administration 2009). The country's main sources of energy are based in a variety of fossil fuels: coal, oil and natural gas that in 2018 supplied around 84 percent of the nation's total energy, 69 percent of its electricity, and 97 percent of its transportation fuels, which is expected to remain the same in the upcoming decades (Miller 2010, 585). This heavy reliance on fossil fuels makes the US the second largest emitter of the global greenhouse gas emissions (Sovacool 2011). Simultaneously, renewable energies accounted for approximately 11% of the total American energy consumption and circa 17% of electricity generation (EIA 2019a), where the main sources were hydroelectric, wind and biofuels (Figure 1). Albeit renewable energy consumption continues to increase, it is projected to reach solely 13% of the nation's total energy consumption by 2050 (Center For Sustainable Systems 2019; EIA 2019b).

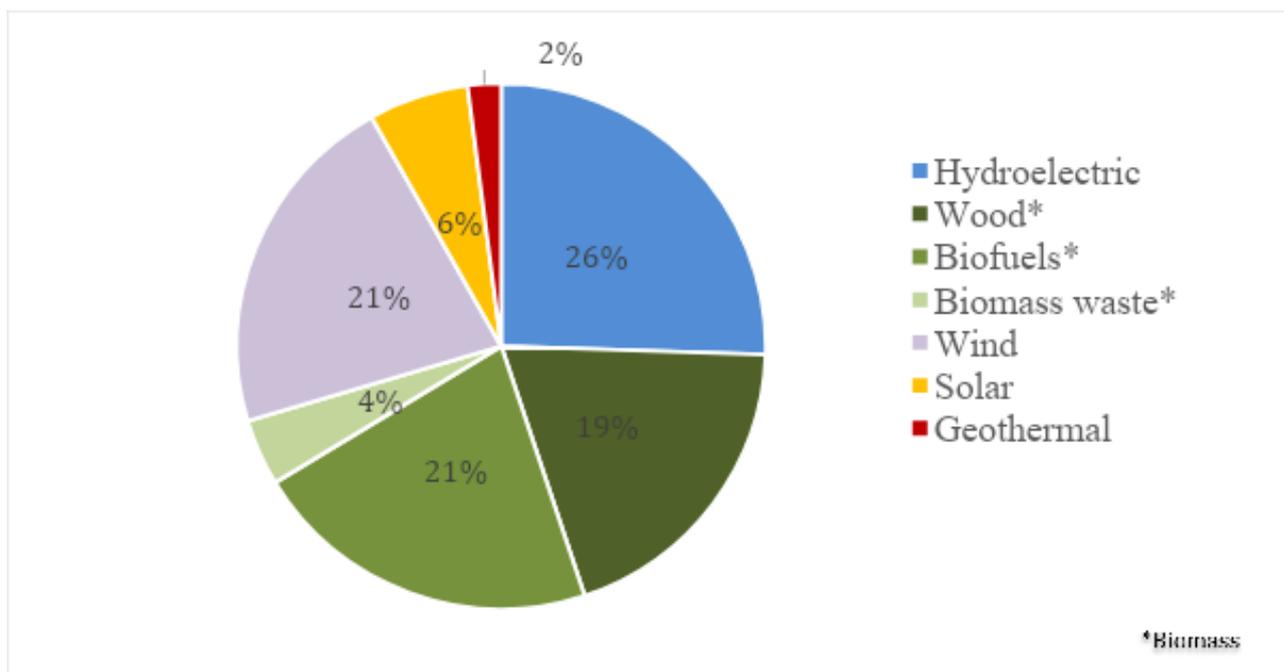


Figure 1. Renewable energy consumption by source in the US (Source: adapted by author from EIA (2019b))

When it comes to total energy consumption of end-use sectors, the industrial domain uses the largest share of energy in the US, followed by transportation, residential and commercial sectors (Figure 2).

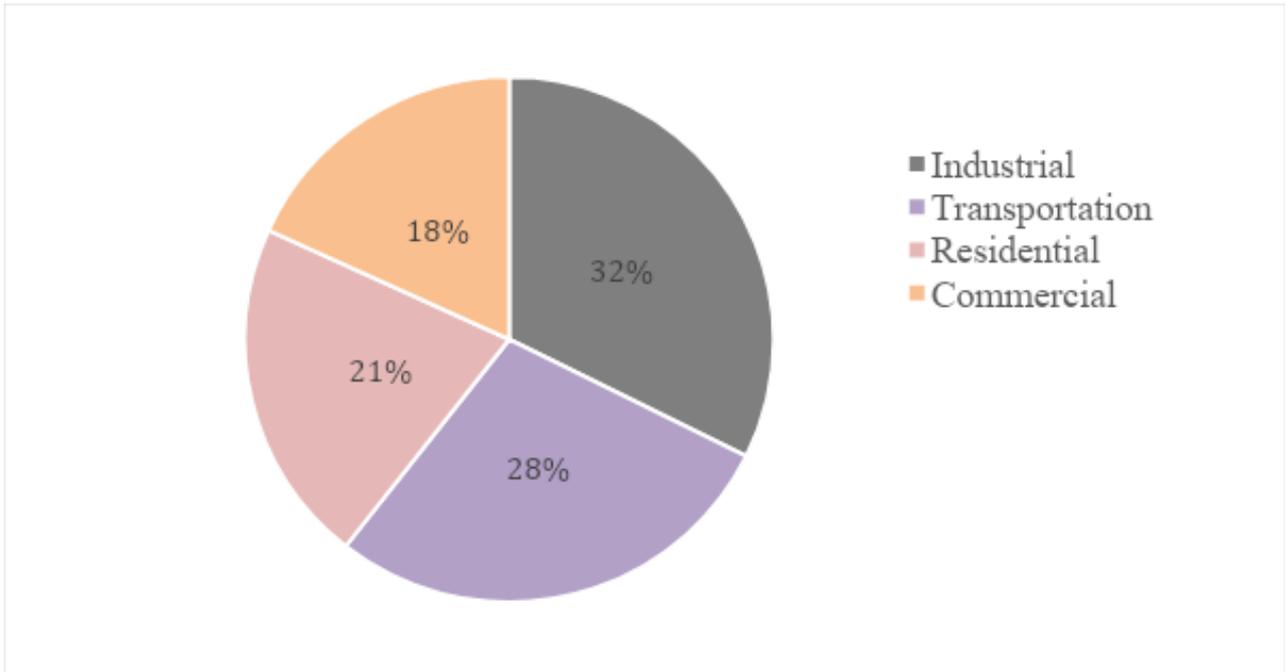


Figure 2. Total energy consumption by energy sectors in the US (Source: adapted by author from EIA (2019c))

Total energy consumption in these sectors is defined by their use of primary energy, expenditures in electricity, and electrical system energy losses that happen during electricity generation, transmission and distribution (EIA 2019c). On a residential level, the average American household consumes around 11 000 kilowatt hours (kWh) of energy per year, the second highest average in the world after Canada (Wilson n.d.). The US households use one half of their energy to power their home devices and equipment and the other for heating or conditioning of the space (EIA 2019d). The main sources of energy are electricity (mainly used to power devices, but it has other end uses), natural gas and petroleum (more household energy statistics in Appendix 2.1.) that are used for space and water heating (EIA 2019d).

More on the current issues and future strategies in the realm of energy in the US can be found in Appendix 2.8.

2.1.1. Energy laws of the US

For the most part of American history, the federal government has not been a major player in the decision-making surrounding the energy industry (Cornell Law School 2017). In the US, Congress represents the legislative power that develops particular taxes, environmental requirements and spending subsidies on energy industries (Van Doren 2016). It was only during the period from the Great Depression and World War II that the US administration began to organize a regulatory framework in the realm of energy (Van Doren 2016). One of the first country-wide regulations was The Federal Power Act in 1920, which was created to manage the development of hydroelectric projects more effectively through licensing systems (Cornell Law School 2017; IEA 2019). Later, in the 1940s the introduction of nuclear weapons initiated large-scale regulations on nuclear power (Cornell Law School 2017). Another important law was the Clean Air Act of 1963 that was aimed to manage air pollution with a particular focus on automobiles, leading to enhanced private transport efficiency standards in the future (IEA 2019) (Figure 3). According to Van Doren (2016) up until the

1970s the federal government tightened its control over the price of energy and developed stronger market regulations, while in late 1970s policy makers started to change the course of action by enacting large-scale deregulations in fossil fuel markets (Van Doren 2016) (Appendix 2.2.).

Under the current administration, led by the president Donald J. Trump, the US government policy is based on the concept of “energy dominance” (IEA 2019, 3) that reflects a strategy to have a more significant role in global energy exports, increase overall energy production within the country and establish itself as a worldwide leader in energy technology advancement (IAE 2019). The strategy to achieve that is to eliminate legislative barriers that halt the competitiveness of the US energy industry and the expansion of the US energy production (IEA 2019). This means that under the current administration, many current environmental regulations that stagnate the expansion of the energy sector are revisited and repealed (IEA 2019). Some of the examples include the US withdrawal from the Paris Agreement (Figure 3), elimination of the Obama Administration’s Clean Power Plan to minimize carbon dioxide emissions from the power industry, acceleration on federal approval of the Keystone XL oil pipeline (IEA 2019, 30).

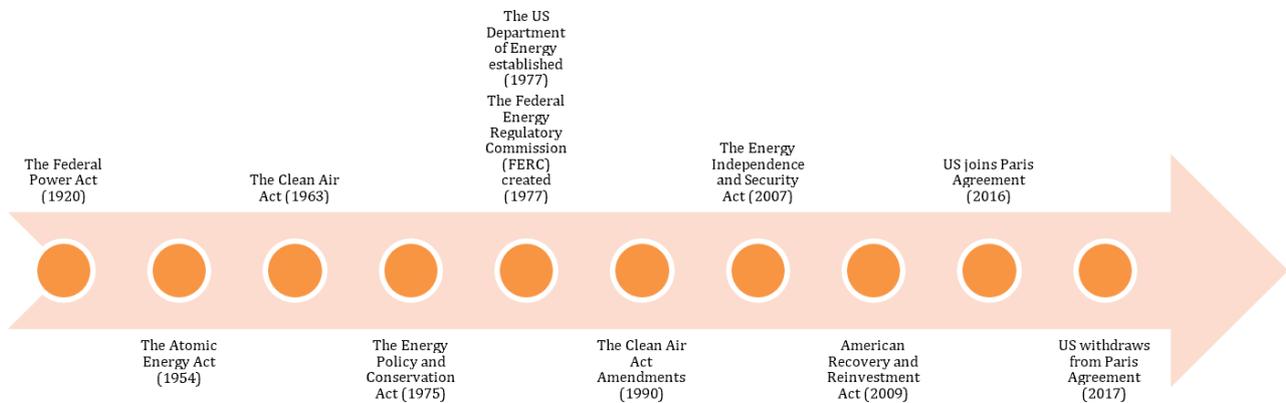


Figure 3. Timeline of the main energy policies in the US (Source: created by author from Amadeo (2020); Cornell Law School (2017); Energy Independence and Security Act (2007); IEA (2019))

International Energy Agency (IEA 2019, 38) describes the relatively short history of the US energy law as having “frequent regulatory course changes”. Views on the federal government’s role in the energy sector are particularly divided due to the bipartisan system, represented by Republicans and Democrats, where many of the introduced policies tend to lack support from both parties or are repealed after the election of a president from another party (IEA 2019). In addition, according to Brown and Hess (2016) policies that push for energy transition to renewable alternatives are influenced by the lobbying and influential campaigns of various party donors and firms which often is the fossil-fuel sector and the utilities. This heightens the long-term risk of legal challenges against regulatory action and perpetuates uncertainty for both states and industry when it comes to the idea of energy transition, which will be explored in the next subsection (Brown and Hess 2016). While it has historically been hard to reach agreements on a federal level, there is also the tendency for the states to operate on their own, where, for example, California is known as a world-wide leader in energy transition, which I will discuss in further sections (Brown and Hess 2016; IEA 2019).

2.1.2. (Political) perspectives on energy transition

Our modern society is deeply reliant on energy provision systems. Without them, the structure of contemporary life instantly begins to fall apart. (Verbonf and Loorbach 2012). Lamentably, at the core of this supply system lie the fossil fuels that have proven to be anything, but a resilient resource to depend on (Verbong and Loorbach 2012). These resources are exhaustible, they perpetuate foreign resource reliance, their lifecycle requires complex sets of technologies and their availability causes geopolitical conflicts, which can lead to price fluctuations at any given time (Verbong and Loorbach 2012). On top of that, fossil fuels are known for their adverse effect on the natural environment, specifically the immense contribution to climate change (Verbong and Loorbach 2012). In this sense, the current systems are not capable of ensuring more resilient and sustainable future of our society and therefore there is a need for transition towards new energy practices that not only have much less carbon footprint, but aims to transform the way we as a global community produce and use energy (Jacobsson and Lauber 2006; Newell and Paterson 2010; Verbong and Loorbach 2012). However, Sovacool (2016) disputes that this transition is a challenging operation since it meets resistance from both, the private markets and the governments, that are embedded in and profit from the current fossil practices. Moreover, transitions to modernized low carbon energy systems demand a significant shift in political governance, taxes and pricing administration, along with behavioral change of users and adopters that has seen resistance across the world (Sovacool 2016).

In this sense, the US serves as a great example of the polemics surrounding the policies that aim for energy transition towards renewable energies. Brown and Hess (2016) argue that the US Congress, represented by Democratic and Republican party is highly polarized when it comes to the issue of energy transition (Appendix 2.3.). One example of polarization can be seen through the introduction of Clean Air Act Amendments in 1990 that required decreases in power plant emissions (Brown and Hess 2016) After this law, there were no major requirements introduced regarding more sustainable energy practices in the upcoming years largely due to opposition from the Republican party (Brown and Hess 2016). One of the most recent examples of party polarization is the opposition of the national carbon trading legislation (Clean Energy Jobs) and a renewable portfolio standard (America Power Act) in 2009 and 2010 (Brown and Hess 2016). The law was largely opposed by the Republicans as a reaction against the Democratic leader's Barack Obama's election in 2008, as well as strong lobbying from the fossil fuel industries (Brown and Hess 2016). According to Brown and Hess (2016) the relationship between conservatives and the fossil industry has tightened ever since. In recent years, the conservative legislators have utilized model laws to promote reversion of significant energy transition requirements such as renewable energy and efficiency standards (Brown and Hess 2016, 973), which is also supported by the current presidential administration, as discussed in the previous subsection. More on polarization on energy transition in the US can be found in Appendix 2.7.

2.2. California's energy politics and energy transition

California is a territory in the West of the US. It is the country's most populous state with around 40 million inhabitants (EIA 2019f). California has a variety of climate zones, but most of the inhabitants reside in dry and relatively mild climatic conditions (EIA 2019f). In comparison to other states, it is also known to be the country's largest economy and the second highest energy consumer after the state of Texas (EIA 2019f). The transportation sector accounts for around 40%, while the industrial sector accounts for nearly 25% of state end-use energy consumption (EIA 2019f). In comparison, the commercial and the residential end-use sectors each consumed a bit less than 20% of the state's energy (EIA 2019f).

Although California is the nation's leader in energy intensive industries like agricultural production and manufacturing, per capita energy use in the state is recognized to be the country's second lowest (EIA 2019f). This can be largely attributed to the state's broad efforts to boost energy efficiency and expand alternative technologies throughout history (EIA 2019f). California has always been at the forefront of the US energy transition by implementing various climate friendly policies and pioneering the latest technological approaches in greenhouse gas reductions (Lavelle 2018). Some of the most impressive policies include the 2003 Energy Action Plan (EAP) that was created to guarantee the provision of sufficient, reliable, and affordable electric power and natural gas supplies, increased energy conservation and efficiency and upgraded electricity transmission and distribution infrastructure (EIA 2019f). For other policies in energy transition, I refer to Appendix 2.4.

When it comes to renewable resources, which are at the core of this research, California is one of the leading places in the world for technology deployment and advancement, particularly in hydropower, solar, geothermal and biomass energy systems (Lavelle 2018). In fact, hydropower and small-scale (less than 1-megawatt), customer-sited solar photovoltaics provided around 50% of California's in-state electricity generation in 2018 (EIA 2019f), making it one of the nation's highest ranking renewable energy generators (EIA 2019f). California among other state's is probably best-known for the advancements in solar energy (EIA 2019f). It is an alternative energy source that has seen an almost exponential growth in overall production in the US during the last decade (Mulvaney 2019). Solar energy production is argued to create almost no greenhouse gasses, it has long-term reliability because of the use of an undepletable resource — sunlight (Johnston 2019). In 2014 it became the first state in the US that surpassed 5% of its utility-scale electricity generation from solar energy (EIA 2019f) (more statistics are found in Appendix 2.5.). Much of the success of solar energy can be attributed to California state support in the last two decades (Temple 2018). The state government has been particularly successful to implement solar on a household level by introducing various initiatives and rebates through the period of 2007 – 2016 that exceeded the total budget of 5.4 billion US dollars, resulting in more than 3 000 megawatts of new residential solar energy instalments, which is the highest rooftop solar technology deployment per capita among all states in the US (Go Solar 2018). One of the examples is The California Solar Initiative that used rebates and grants to encourage residents of the state to install rooftops solar systems on their homes or businesses (EIA 2019f; Go Solar 2018; Misbrener 2019). By 2015, there were already 1 million homes with residential photovoltaic systems (Misbrener 2019).

Finally, in 2019 the state updated its building energy efficiency standards with a requirement that all new homes and multifamily residencies of three stories or less, built in 2020 and later must incorporate solar PV systems (EIA 2019f). This also applies to major renovations (CPUC 2018). With pushing forward practices like these, California does not only act against the current tone of climate denialism set by Trump's Administration in the US (Selby 2018), but also pioneers large-scale climate change commitments that will set the standard for the rest of the world (Temple 2018). On the other side, the issue of energy transition is more complex than it may seem at first. In fact, the last decade has also seen an increasing amount of critique, which contests not only the supposed efficiency, but also the overall environmental impacts (from production, the use and disposal) of this type of alternative for households (Mulvaney 2019; Zehner 2012). The building code itself has been named as a "very expensive alternative" (Borenstein 2018, 1; Pyper 2018), but apart from that there has been limited amount of research done on the overall social inquiries that the transition to alternatives entails (Byrne and Toly 2006). With the enactment of California's rooftop solar mandate, renewable energy will now be a household regulation on a state level. Therefore, this case would work as a great exploratory ground for the state residents' reception and attitudes towards this decision, as well as possible future challenges that could arise in the larger discourse of energy transition.

2.3.Previous research on the attitudes towards energy transition

As stated in the reflections on the topic, California is the first state in the world to mandate residential rooftop solar energy for new households or major renovations (Hsu 2018). It is therefore hard to elaborate on previous research that deals with the receptiveness of a similar law that obliges new residents or renovators to install rooftop PV systems on their houses. Nevertheless, there have been several papers published on the possible barriers and motives in the residential solar panel adaptation process in Sweden, United Kingdom and United States by Balcombe et al. (2013), Palm (2018), Schelly (2014) amongst others. Although these investigations mostly deal with respondents that have shown interest in becoming the prosumers (or producers and consumers of energy) of household PV systems, that gives the reader an overview on the current attitudes towards residential solar energy, which is a good starting point in order to understand the receptiveness of mandating this form of energy system.

According to Balcombe et al. (2013), Palm (2018) and Schelly (2014), environmental value is the most important factor for solar panel installation among prosumers, but it is clearly not enough in the decision to install PV systems for the purpose of energy micro-generation. Other important factors that must be considered are also the overall possibility to save money in the long-term or protect oneself from the possible high costs of energy in the future, which is normally derived from the grid. In addition, prosumers name the importance of the symbolic value of rooftop photovoltaic panels that embodies their care towards the environment to the larger public, as well as self-sufficiency and energy security, when it comes to energy production and consumption (Balcombe et al. 2013; Palm and Tengvard 2011). There are also certain barriers that cause stagnation of PV system installation. The main reasons are the investment costs, the lack of subsidies and the long pay-off time (Palm 2018). This inertia is further retained by the idea that the positive effects of the solar systems (future pay-off and the environmental value) are abstract and will manifest only in the long-term, which makes it difficult to transition away from the current energy systems (Jager 2006). Other obstacles pro-installation are uncertainty and mistrust that the systems will perform as coveted, elaborate maintenance tasks and the complexities associated with the current energy system change – administrative procedures and construction work in order to actually implement a rooftop solar system (Balcombe et al. 2013; Palm 2018). More on barriers in the adaptation process can be found in Appendix 6.3.

2.4.A closer look at Butte county

Butte county is an administrative area in northern California (USA). Located in Sacramento valley, the county has a total area of around 4 237 km² or 1 636.46 square miles (US Census 2018). At the present time, Butte county is known to be one of the key agricultural spaces not only in California, but the US (University of California 2016). Other industries include healthcare and social assistance, retail trade and education services (Butte county 2018). The largest employers in the county are the local government, California State University Chico division, Sierra Nevada Brewery and Enloe Medical Center (Butte county 2018). More on the county's historical development is found in Appendix 2.9.

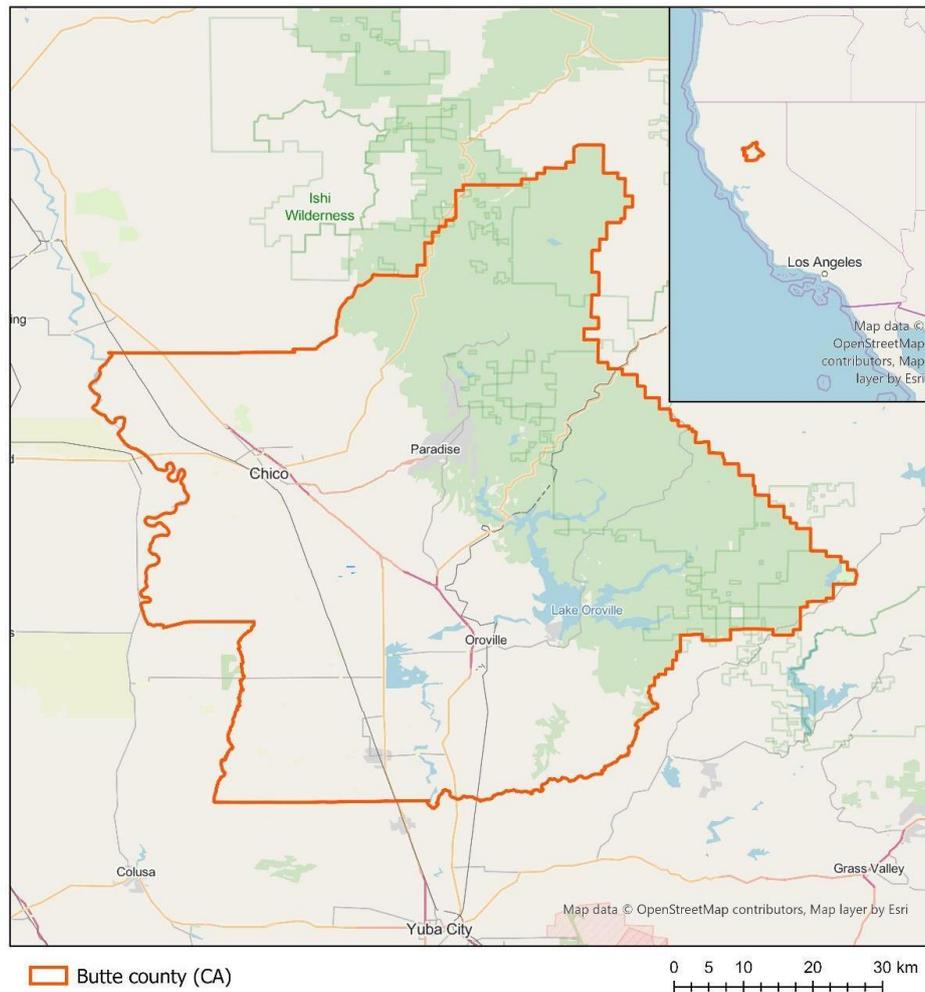


Figure 4. Butte county, California (Rudus, 2020) US (Source: created by author from ESRI (2020))

Throughout the period from 1990 to 2018, the county has seen an increase in the population from 182 000 in 1990 to 231 256 residents (US Census 2018). Most of the residents live in the towns of Chico (111 706 inhabitants) and Oroville (19 204 inhabitants) (Butte county 2018). The county has a predominantly white population that is almost equally female and male. Median value of housing and monthly rent is lower than that of the state of California (Table 2) and the same applies to yearly income that can be classified as low or average low in the state, according to US Census California (2018). In comparison to California, Butte county also has less residents with an education level of bachelor’s degree or higher (Table 2).

Table 2. Sociodemographic profiles of Butte county and the state of California: a comparison (Source: adapted by author from Data USA (2018); US Census (2018); US Census California (2018)).

Sociodemographic factors (2018)	Butte county (CA)	California
Race and Origin	White (71.6%), Hispanic or Latino (16.7%), Asian (4.9%), American Indian (2.5%) and other	Hispanic or Latino (39.3%), White (36.8%), Asian (15.3%), Black or African American (6.5%) and other
Age distribution	Under 18 (25.5%), 18 – 65 (55.9%) and 65 or more (18.6%)	Under 18 (28.9%), 18 – 65 (56.8%) and 65 or more (14.3%)
Gender	Female (50.6%) , male (49.4%)	Female (50.3%), male (49.7%)
Housing units	100 003	14 277 157
Owner-occupied housing rate	59.2%	54.6%
Median Value of Owner-Occupied Housing Units	248 100 US dollars	475 900 US dollars
Median Gross Rent	1 016 US dollars	1 429 US dollars
Issued building permits	1 426	110 197
Households	86 797	12 965 435
Persons per household	2.55	2.96
Education	High school or higher (89.3%), bachelor’s or higher (26.5%)	High school or higher (82.9%), bachelor’s or higher (33.3%)
Medium yearly income	48 443 US dollars ((based on 255 census tracts, the lowest in East Butte 16 000 US dollars, while the highest average in Chico suburbs 95 000 US dollars)	71 228 US dollars (lowest Trinity with 38 700 US dollars and highest Santa Clara with 110 800 US dollars)

Most of the county’s energy is supplied by Pacific Gas & Electric (PG&E), an investor-owned utility, while some municipalities, like Gridley and Briggs have their own utility (White 2018). PG&E sources their energy mostly from renewable energies, nuclear and large-scale hydroelectric (69 %) and the rest from fossil fuels (White 2018). When it comes to energy consumption, residents of Butte county use more electricity for their households than the state on average, however it has a low share of renewable energies in the end-use energy mix (Appendix 2.6.). To ensure better energy transition, the county has created its own Climate Action Plan in 2016 that aims to implement a Community Choice Energy (CCE) program that allows the local administration to obtain electricity and supply it to customers without services of investor owned-utilities that are currently prevalent in the county (DDS 2016). This would also allow to increase the share of renewable energy supply for lower costs. In lines with the current action plan, the county currently also participates in a variety of energy efficiency rebate programmes. Butte County also has a number of initiatives to encourage the installation particularly household photovoltaic panels (DDS 2016).

3. Theoretical frameworks and concepts

This section presents the theoretical frameworks and concepts that have guided the study process. As I am interested in how Butte county resident attitudes reflect larger discourses around renewable energy mandating, I first introduce the concepts of crisis as a catalyst of change, energy security and sovereignty, Foucault's take on neoliberal identity through the concept of "Entrepreneur of the Self", as well as the notion of place in the formation political identity. Finally, residential and expert interviews are observed through the theoretical lense of energy justice to understand what are the potential inequalities emerging out of this new requirement, and what are the possible ways to tackle this.

3.1. Crisis as a catalyst of change

In the most simple terms, crisis is an indicator of change for better or worse (Bergman-Rosamund et al. (2020)). Political scientist Keeler (1993, 233) sees it as a large-scale public discontent or even fear that originates from a broad spectrum of economic problems and/or an extraordinary level of social unrest and/or danger to national security. In comparison to other disruptive events, it is characterised as being severe enough to create extensive public reaction, which then leads to a consensus on its depiction as a crisis (Keeler 1993).

Drawing on the extensive work of Helderma's (2015), Keeler (1993) and Utting et al. (2012) on crisis and social change, it is often seen as an event that disrupts the accepted beliefs of the world and calls for re-evaluation of the established norms at the time. Crises are complex moments of unclarity, nevertheless the outcome of the turmoil lies within the societal response to it (Utting et al. 2012). Particular attention should be paid to who are the emergent decisive agents, as their action has the ability to consolidate the existent beliefs or change the course of the track through a paradigmatic shift (Utting et al. 2012). The meaning of crisis should not be reduced to basic contradictions that create circumstances for rupture and collapse, but it must be viewed as a point in time in which a "decisive intervention can and should be made by an agent" (Hay 1996, 254). In reality, there is often no generally acknowledged threshold beyond which a certain issue should be characterized as a crisis, nor is it always transparent who is authorized to take any actions, but it usually is perceived as such by an emerging group of agents capable and eager of making a decisive interference at the scale it is recognized (Hay 1996; Helderma 2015).

A wide discussion has been created around the notion of unclarity that is the initial stage of a crisis. Keeler (1993) and Utting et al. (2012) argue that this particular moment determines the future outcome of the society on various scales. Crisis can bring awareness about the ideas and policies of ruling governments, which could often lead to discrediting of the *status quo* at the given time with an increase in the opposition against the ruling authority. It can also rearrange the given socio-political environment that enables immediate action on certain ideas through the urgency of the situation (Keeler 1993). Nonetheless, it is not always the case of crisis leading to a larger awareness on the potential issues of hegemonic power (Utting et al. 2012). Naomi Klein in her book "Shock Doctrine" (2007) goes as far as to say that the confusion the crises create in society can be also misused by the powerful actors of neoliberal system to strengthen the hegemonic ideas through new destructive policies. Utting et al. (2012, 25) recognizes that such approaches to crises occur when the ruling management systems fail to provide any help and continue to reappear in future or onto increasing groups of vulnerable or marginalized people. This can cause "social stasis or regression, attempts to restore the old system through *force majeure*, fraud, or corruption, [...] leading in some cases to exceptional regimes (for example, military dictatorship, fascism)" (Utting et al. 2012, 25). For further definitions and categorizations of a crisis, I refer to Appendix 6.2.

3.2. Energy security and sovereignty

There is no doubt that our contemporary lifestyles are built on intensive energy use to run our vehicles, enable food production, manufacture various commodities and of course, power our housing (Sovacool and Mukherjee 2011). Therefore, having control over energy is of high importance for any country around the world. The 1973 oil crisis, when the members of the Organization of Arab Petroleum countries put embargo on the developed countries of the world, is often mentioned as the turning point in modern day energy security concerns (Sovacool 2007; Yergin 2006). More than ever before, the affected countries started investigating strategies that would ensure better planning in case of supply disruption in form of energy supply diversification and creation of a better buffer systems against sudden disturbances that include strategic reserves, back up supplies, as well as information flows on the market situation (Yergin, 2006). Ever since, energy security has been one of the top priorities in national and global politics, regularly gathering leaders for numerous discussions on the issue (Yergin 2006). Khatib et al. (2000, 112) define it as “the continuous availability of energy in varied forms, in sufficient quantities, and at affordable prices”, while Cherp and Jewell (2014, 419) paraphrase it to “low vulnerability of vital energy systems”.

Energy security has been one of the central concerns in the American politics for decades (Miller 2010; Miller 2005). It comes, though, as no surprise, due to the fact that the country is the largest energy consumer in the world and is projected to only increase the utilization in the upcoming decades (Miller 2010). Miller (2005) and Huber (2013) Sovacool and Brown (2010) imply that the key factor for the economic power of the US, is access to great quantities of cheap energy, therefore the main aspects of American outlook on energy security throughout the years have been the sufficiency of inexpensive supplies, protection of suppliers, which are mainly still based in the Middle East, as well as control over key petroleum reserves, and finally minimizing physical danger that could to affect energy infrastructure.

While often interpreted as an explicitly global or national problem, recent years have seen strategies on how to ensure energy security also on a consumer level, which implies equitable ways of supplying inexpensive, efficient, trustworthy and socially inclusive energy services (Sovacool 2011). A potential lies in energy diversification, which is primarily known as increase in the variety of supply countries for energy resources, but recently also for new, alternative sources within a certain country in the form of renewable energies (Pasqualetti and Sovacool 2012). In the past years, there has also been a growing momentum for the idea of energy sovereignty or “the right of conscious individuals, communities and peoples to make their own decisions on energy generation, distribution and consumption” (Cotarelo et al. 2014, 1). Menges (2003) and Farhar (1999) studies on German and American utility customers show that there has been an increased demand for the choice of the energy sources. Over years, a growing number of customers also expressed their negative attitudes towards dependency on the national grid or dictates of energy companies and their fortunes (Farhar 1999; Menges 2003).

Among customers and state executives, household rooftop solar systems have been mentioned as one of the ways to ensure energy source diversification, as it encourages new sources for energy generation on a residential level (Pasqualetti and Sovacool 2011). Public acceptance on energy diversification through *in situ* solar systems depends on a variety of factors, where some value the potential independence and environmental benefits it has, while others are discouraged by the high prices, long pay off time and maintenance that these systems require (Smith-Cavros and Sunyak 2019; Sommerfeld et al. 2017), which will be further explored in the research.

3.3. “Entrepreneur of the Self” and “the American Way of Life”

In his 1978-1979 lectures, known as “The Birth of Biopolitics” (2008), Michael Foucault theorized that in comparison to classical liberalism that focuses on market exchange, at the heart of neoliberal economy are the mechanisms of competition that regulate society as a whole. For Foucault, the existence of this kind of economy was based on the multiplication of the enterprise form through all the aspects of life. In this sense, the key feature of neoliberal system is that the economic agent is a oneself that is created by being sold (Foucault et al. 2008; Weeden and Bolluk 2014). In McNay's (2009, 56) words “individuals would be encouraged to see their lives and identities as a type of enterprise” or as Foucault would put it being “Entrepreneur of the Self” (Foucault et al. 2008; Huber 2013, 226). As enterprise is not anymore only a constituent dimension of societal place, but at the heart of it, every domain of life is subsumed by it (Weeden and Bolluk 2014). Foucault et al. (2008) therefore view private property as the key element in order to materialize this enterprise form. In a neoliberal society the success of an individual's life is represented through how well they manage their investments, family or household budget, how well-prepared they are for the pension or mortgage payments for the housing that turns the individuals into a multi-dimensional and permanent enterprise themselves (Foucault et al. 2008; Huber 2013).

In this sense, your own entrepreneurial capacities: productivity and ability to plan resources are seen as the “fundamental form of belief by the masses that they exercise an ultimate self-determination within the existing social order (Anderson 1981, 20). Huber (2013) argues that in that regard, neoliberalism offers “freedom” and “choice” in the realm of social reproduction, as long as the society ensures production under the control of capital. This “freedom” is also represented and further induced by the easy access to loans that allows us to reach for “better” forms of living, while tied to a life-long practice of working and paying off the debt (Huber 2013).

Huber (2013) further expands that untrustful attitudes towards the government among the US citizens is a reflection of Foucault's “Entrepreneurial Self” mode, as the public authorities can represent certain danger to mechanisms of the free market, which can then affect the liberties within the “realm of “life”— home, family, and consumption” (Huber 2013, 22). In the US, government welfare is often seen as distorting “the competitive landscape and unjustly benefitting uncompetitive bodies that were marked for not making the right choices “in life” ”(Huber 2013, 22) or on a larger-scale public in the form of public authorities being greedy by taking hard-earned, private money for its own good (Huber 2013). Huber (2013) argues that this particular vision of increased standard of personal life with entrepreneurial efforts is contingent on the dependence on oil. While American individuals believe that they are in charge of their own lives, it is the petroleum that is embedded in the creation of the specific lived geographies in the US or as the author calls it “the American Way of Life” (Huber 2013, 42) with private homes and cars that all consume incredibly large amounts of energy. In this sense, fuel fosters a lifestyle that makes the individuals the “masters of their own lives severed from ties to society and public forms of collective life” (Huber 2013, 23). Huber disputes that oil until this day is indispensable to the reproductive forces of everyday life therefore the new regulations or foreign threats of the petroleum supplies are largely met with public anxiety or discontent, especially among suburbanites that are so reliant on these resources in their quotidian life (Huber 2013, 17). In my thesis, I do not aim to explore the residents' perception on petroleum as the constituent of their daily life, but see whether household solar energy possesses the same characteristics as oil in expression of freedom and individuality, and what other qualities or concerns it entails.

3.4. Place and Political Identity

Successful energy transition from fossil fuels is dependent on support that cuts across the entire political spectrum. One of the key issues in modern day US is the political polarization that is distinct in different geographic locations around the nation (Chipman 2017; Martin and Webster 2018). Therefore, to have a better overview on the factors that influence attitudes towards California's solar mandate, I see it important to delve deeper into understanding of how place plays role in shaping political identity and how this knowledge can then be used to improve on energy transition policies in order for them to speak to a larger extent of localities.

There is a vast amount of literature that deals with the understanding of factors that influence our political identities (Dreier et al. 2001; Gimpel and Karnes 2006; Oliver 2001). Some of the sources focus on the socioeconomic elements, such as age, income, gender (Huddy 2001; Lovenduski 1992), but others centre on contextual influences, like specific characteristics of place (average income, racial diversity, and size) (Alex-Assensoh 1998; Oliver 2001), historical development (Woodard 2011), or the configuration of the place as an affect (Gainsborough, 2005). By exploring the various contextual factors mentioned before, Gainsborough (2005), Gimpel and Karnes (2006), Lassiter (2013) showcase that three place categories – urban, rural and suburban – can be characterized with particularly distinct political identities. Due to research scope and focus, I have decided not to expand on the causalities that may affect these identities, but give a theoretical overview on the differences each category of place possesses in order to understand the possible challenges it may create in energy policy planning. I mainly draw on literature with the US as the focal point.

Gimpel and Karnes (2006) suggest that rural residents embody a strong feeling of self-reliance embedded in an individualistic ethic that dates back to the beginning of the American republic. This ethic is tied closely to a desire for little or no government control of entrepreneurship and a “belief in the notion that those who succeed in a competitive marketplace owe nothing to those who fail” (Gimpel and Karnes 2006, 469). Economic individualism is not only articulated with a highly conservative outlook towards welfare but is also supported by two foundational elements of the rural economy: self-employment and extensive property ownership. Therefore, policies that might run contrary to an individualistic and competitive spirit are usually hindered (Gimpel and Karnes 2006). Due to its characteristic focus on agriculture and small-business, the mode of production that has formed rural areas through times is that of the “small independent owner-operator – the *petit bourgeois*” (Gimpel and Karnes 2006, 469). In this spirit, the legacy of self-made and self-reliant morale until this day has formed the rural inhabitant self-image of the independent businessman and property holder.

On contrary, urban populations are less self-reliant and more dependent on the state, as well as expressing higher trust in governmental regulations (Gimpel and Karnes 2006). Cityscapes are characterized by higher populations in denser spaces, as well as more diverse racial and ethnic make up, where the economy is dominated by secondary and tertiary sectors that are mostly wage-based (Hugo et al. 2003). Additionally, resources from the state tend to be concentrated in urban centres which justifies the perception people here have (Gainsborough 2005; Hugo et al. 2003). Osgood (1977) and Gainsborough (2005) point out that urban residents overall express less doubts on the possible uses of tax money allocation and they are more supportive of the idea that the government is responsible to ensure that everyone has a good job. Finally, urban residents also express higher trust in public welfare, like social housing, minimum guaranteed income etc (Hugo et al. 2003; Osgood 1977).

On the contrary to the popular belief, Gainsborough (2005) disputes that suburban residents reflect a more similar political outlook to rural residents, but in a different spatial context. The setting of rather

detached and homogenous communities from the city core with plentiful resources and fewer costly problems may develop “a different sense of what kinds of government programs are needed and what kind of priority these programs should be accorded than those who live in heterogeneous communities” (Gainsborough 2005, 439). Consequently, much like rural residents, suburbanites are in favour of a reduced role of government in their lives, as well as more flexibility for local authorities to decide on their own spending and taxing resolutions (Gainsborough 2005).

When it comes to situating my study object, Butte county, in a spatial context, I refer to Appendix 8.1.

3.5. Energy justice

In recent years, there has been a growing interest among social science scholars on the issue of energy justice (McCauley et al. 2019). Much like environmental justice, it seeks to apply the principles of justice, but in the field of energy. It encompasses a variety of research areas, from production to consumption to disposal to policy planning and other dimensions of interest (Jenkins et al. 2016). While usually seen as a research interest of the physical sciences, Sovacool (2014, 11) calls for a shift towards more human-centred research when it comes to energy planning and development. According to the author, the ways we allocate the costs and the benefits of various energy systems has a material effect on our society, therefore there is a need for evaluation of fairness and inclusivity of energy planning (Sovacool 2014), which can be viewed through the theoretical “lense” of energy justice. The focus of the field is to investigate where “injustices emerge, which affected sections of society are ignored, which processes exist for their remediation in order to reveal, and reduce such injustices” (McCauley 2011, 3).

The concept of energy justice is particularly relevant within the context of energy transition towards less carbon intensive systems (McCauley et al. 2019). While this recent shift away from fossil dependency has been recognized as a key element for future sustainability, it is crucial to ensure that this move towards low carbon and more sustainable energy alternatives fosters more inclusive, secure, equitable, affordable and reliable lifestyles among various socioeconomic groups, in comparison to the current practices (McCauley et al. 2019). This concept will be used to understand how the enactment of solar rooftop mandate (which is part of California’s bigger goal to eliminate fossil fuels from the electrical grid¹ by 2045) targets, ignores or even increases social injustice occurring in this process.

Jenkins et al. (2016), McCauley et al. (2019), Sovacool (2014) focus on three central principles of energy justice analysis: distributional, recognitional and procedural. Distributional justice is based on the idea that the global energy system is innately unequal when it comes to the locations of technologies and who can access their outputs (McCauley et al. 2019). The justice of recognition underlines the need for an examination of locations where inequalities could potentially arise, which can then help in addressing the potentially vulnerable communities or individuals that need to be protected (McCauley et al. 2019). And finally, procedural justice focuses on creation of a more equitable decision-making process that “engages all stakeholders in a non-discriminatory way” (McCauley 2013, 2).

¹ The electrical grid is the electrical power system network comprising the generating plant, the transmission lines, the substation, transformers, the distribution lines and the consumer (Kehinde 2018).

4. Methodology and Methods

4.1. Epistemology

I situate my research in a critical realism framework. Critical realism is based on a realist view of being in the ontological domain, whilst accepting the relativism of knowledge as socially and historically conditioned in the epistemological domain (Mingers 2004). For a critical realist the world can be seen through three domains: the real, the actual, and the empirical (Mingers 2004). This means that there is an independent reality, one that humans cannot grasp, and it consists of different underlying structures (physical, social, conceptual) with powers or tendencies to act (or not) in particular ways and where we as human beings experience only a small subset of these conjunctions in a specific point in time (Archer et al. 1998; Wynn and Williams, 2012). What distinguishes critical realism from realism, is that it also sees discourse as a significant element in the formation of the reality because our perceptions surrounding the matters of life manifest materially in behaviour (Bhaskar 1989). This indicates that discourses are real in a manner that they operate as mechanisms and yield causal effects on the world around us (Bhaskar 1989). In terms of my research, the way energy transition through solar mandate unfolds can be seen as intertwined with various mechanisms that form the ways energy is perceived and further utilized in California. In the analysis sections, I discuss the ways seemingly separate factors, such as 2018 California fires, place of residence, neoliberal identity etc all have an effect on the way household solar mandates is perceived, and what it portends to future energy transition.

4.2. Methods

In its form this research is inductive, as it has the aim to create a new understanding of a specific topic (Bryman 2008) – more particularly by investigating the case of mandating solar energy and attitudes towards it in Butte county. The project uses qualitative research methods by collecting data mainly through form of semi-structured interviews. The use of qualitative methods provides help in the understanding of socially constructed knowledge, it encourages different actors to express their views, and to push forward the theory by an in-depth examination of the processes that surround the phenomena investigated (Ragin 1994).

4.2.1. Case study: Butte county

I have taken the case study approach for this research, as it “investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (Yin 2009, 9). While the solar mandate is active in all of California, it was necessary to follow Baxter and Jack’s (2008) suggestion on placing limits on a case that prevents it from becoming too extensive and impossible to carry out. That is why this project focuses on Butte county serves as a representative case where the author is familiar with some of its residents. While the idea of placing spatial boundaries for investigation has been criticized to be antithetical to the understanding of the world across various scales, (Herod 2010) I fully acknowledge that the case of Butte county does not represent the global attitudes on solar energy mandating. Nevertheless, it is still representative of the state of California, where this mandate is currently active. It is also my belief that this thesis will help broaden the understanding of future energy justice issues that may arise in case of mandating solar energy on a household level in other states and countries.

4.2.2. Semi-structured interviews

For this research, I conducted 29 interviews in total between 27th of January (2020) and 27th of February (2020) in Butte county and through phone calls, while in California or back home in Copenhagen (Table 3; Table 4). Three types of non-probability sampling approaches were used to carry out the interviews during my field work. The first approach was convenience sampling where I visited educational institutions, public parks, cafes and neighbourhoods to conduct my interviews with random residents of the area. The interviews were conducted in the largest towns of the county – Oroville and Chico, as well as the suburban and rural parts of Butte county. After carrying out these interviews, I employed snowball sampling by requesting the already interviewed participants to refer to other potential respondents, where some of them were approached later during my field research. The other part of the interviewing process was carried out through two different strategies of purposive sampling. One strategy was to identify the socio demographic groups (ethnicities, age groups, income levels, education etc) that were not covered during my first days of convenience and snowball sampling, and visit specific locations (university campus, more affluent or diverse neighbourhoods, rural areas) to ensure larger diversity of respondents. Three respondents did not reside in the county (they were there for work or family), but they were interviewed as they were able to provide a different perspective on the issues that Butte county residents may have not reflected on. Meanwhile, I contacted potential experts of solar energy politics in California that were defined as the key interviewees through e-mail and university visits (Table 4).

The interviewees had a choice to answer in the name of a household or as individuals, due to differences in ownership forms, where tenants could be rejective of naming their roommates as a household. In order to ensure anonymity, I decided to change the names of the participants, except the expert interviewees who have their name and surname written before the used excerpt.

Table 3. The list of residential interviewees

Name*	Overview*	Interview circumstances*
Lee-Ann	Female, white, 35-44, high income, owner, Chico suburbs	28/01/2020
Sebastian	Male, white, 18-24, low income, tenant, Chico urban	28/01/2020
Kelsey	Female, white, 18-24, low income, tenant, Chico urban	28/01/2020
Jennifer	Female, white, 18-24, low income, tenant, Chico urban	29/01/2020
George	Male, white, 55-64, high income, owner, Chico urban	30/01/2020
Mikey	Male, white, 18-24, low income, tenant, Chico urban	30/01/2020
Noah	Male, white, 18-24, low income, tenant, Chico urban	30/01/2020
Savannah	Female, pacific isl.-white, 18-24, low income, tenant, Chico urban	30/01/2020
Bruce	Male, white, 18-24, low income, tenant, Chico suburban	30/01/2020
Mitchell	Male, white, 35-44, high income, Chico urban	31/01/2020
Leo	Male, white, 35-44, medium income, Chico urban	31/01/2020
Nathan	Male, white, 35-44, medium income, Huntington beach	31/01/2020*
Allan	Male, white, 65-74, retired, Oroville urban	1/02/2020
Pati	Female, white, 65-74, retired, Chico urban	3/02/2020
Colton	Male, white, 25-34, medium income, Chico urban	4/02/2020
Barbara	Female, white, 75 or older, retired, Oroville suburban	4/02/2020
Sharon	Female, white, 65-74, retired, Oroville suburban	4/02/2020
Gavin	Male, white, 35-44, medium income, Oroville suburban	4/02/2020
Gill	Female, white, 35-44, no income provided, Lincoln suburban	4/02/2020
Simon	Male, hmong, 25-34, low income, Fresno suburban	4/02/2020
Louise	Female, white, 35-44, high income, Oroville suburban	5/02/2020
Mike	Male, white, 35-44, high income, rural Lake Madrone (Butte c.)	5/02/2020
Kate	Female, white, 25-34, medium income, Berkeley suburban	16/02/2020
Brad	Male, white, 35-44, high income, Oroville suburban	16/02/2020
(*changed from the given)	(*gender, ethnicity, age group, income level, ownership form, living area)	(*all interviews were in person-recorded, except the ones starred)

Table 4. The list of expert interviewees

Name	Position/Relation to the issue	Interview circumstances
Danny Cullenward	<ul style="list-style-type: none"> ● Energy economist and lawyer; ● Lecturer in Law at Stanford Law School; ● The Policy Director at Near Zero. Research Associate with the Carnegie Institution for Science. 	Phone call/written interview on 3/02/2020
Dustin Mulvaney	<ul style="list-style-type: none"> ● Associate Professor of Environmental Studies at San José State University; ● Author of <i>Solar Power: Innovation, Sustainability, and Environmental Justice</i>. 	Phone call/recorded interview on 27/02/2020.
Cheri Chastain	<ul style="list-style-type: none"> ● A member of the City of Chico's (Calif.) Sustainability Task Force; ● Former sustainability manager for Sierra Nevada Brewing Co. 	In-person interview in Chico (USA) 01/02/2020
Rahul Young	<ul style="list-style-type: none"> ● Deputy Director at SF Bike Coalition 	In-person interview in San Francisco (USA) 15/02/2020
Mandi McKey	<ul style="list-style-type: none"> ● Sustainability Manager at Sierra Nevada Brewing Co. 	Phone call/recorder interview in San Francisco (USA) 17/02/2020

Semi-structured interviews were chosen as they give the interviewee certain kind of freedom to pursue topics of interest, while still having interview guidelines with key questions to retrace the discussion process (Bryman 2008; Punch 2005). Questions in the interview guide were set to be open ended standardised questions as then the participants could contribute as much detailed information as they desire, while allowing me to ask probing questions for follow-up (Turner III 2010). This process ensured that interviewees themselves lead me to specific contextual issues on California energy situation that I, as an outsider, was not aware before, later allowing me to modify and further develop my interview guide that resulted in removal of overlapping or redundant questions and addition of new inquiries that emerged out of the initial responses.

4.2.3. Discourse Analysis

I have chosen discourse analysis as the way to examine my interview data. While not strictly adhering to any particular methods of discourse studies, I have chosen to integrate Fairclough's three dimensions of critical discourse analysis (CDA) (Jørgensen and Phillips 2002) with Gee's (2014) toolkit for discourse analysis as a supplementary material specifically for nuances in textual analysis.

Fairclough's CDA does not only analyse how discursive practices within a certain domain are involved in the shaping of new forms of politics, but also that discursive practices are influenced by societal forces that do not have a solely discursive character, like organization of a political system or institutional structures (Jørgensen and Phillips 2002). This approach, according to Jørgensen and Phillips (2002, 61) sees discourse as "an important form of social practice which both reproduces and changes knowledge, identities and social relations including power relations, and at the same time is also shaped by other social practices and structures" (Jørgensen and Phillips 2002, 61). With that in mind, I see CDA as a crucial tool in connecting Butte county interviewee perspectives to a larger social discourse on the existent ideologies and hegemonic power (Jørgensen and Phillips 2002, 76). More on why CDA is particularly relevant in this thesis can be found in Appendix 3.1.

To investigate the data, Fairclough offers a three dimensional model as the analytical framework (Figure 5) for social research, which focuses on the linguistic elements of the text, interpretation of the text through its production and consumption, and the understanding of larger social practices that the material reveals (Jørgensen and Phillips 2002, 68). While I do not intend to strictly follow this exemplar, I envision this model to help structure and support my analytical outlook on exercising critical social research. This is further encouraged by Janks (1997) emphasizing that the analysis of the material should not explicitly undergo these three levels in a specific order, but that they are portrayed as interconnected and justifying each other in a connected storyline.

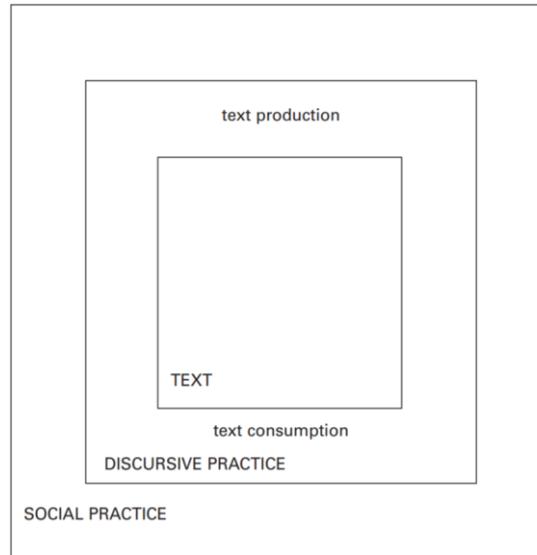


Figure 5. Fairclough’s three dimensional model for discourse analysis (In: Jørgensen and Phillips (2002) adapted from Fairclough (1992)).

4.2.4. Research positionality and ethics

Considering the approaches discussed in the previous paragraphs, I see my research as critical and along the lines of CDA, explicitly examining relations of power, committed to societal transformation (Jørgensen and Phillips 2002). I am personally open to mandates that favour renewable energies, but I am also highly aware that the ways these systems are implemented can escalate various forms of injustices for certain vulnerable groups of people or reproduce the current unsustainable practices that are reflected in the use of fossil resources. I have no intention to discredit the transition towards new energy systems, but by assuming the current academic education in human ecology, I see my role in providing a critique of the current conditions of the law, and the investigated perspectives that surround it, in terms of culture, power and sustainability, which could then lead to a more equal and aware energy planning process particularly in the domain of household solar energy.

In order to minimize the possibility for hierarchical interrelations between myself and the respondent, I strived to create an interview that does not reflect a certain stance towards the issue. Throughout the interviewing process, I was also highly aware of how my own status as a researcher in the field of human ecology could influence the respondents to provide answers that reflect my potential vision in order to show their interest in it. Finally, I informed every interviewee about the value of personal perspective and diverse responses. I reassured the respondents that it is this diversity of narratives that provides a better understanding of future energy planning. More on the ethics while being on the field is found in Appendix 3.2.

4.3. Limitations

I would like to recognize the time constraints and the available funding as important factors in the scope of my research project, especially when it comes to the amount of interviews carried out. This however, is a prospect for future investigations within PhD studies. Further, I also have to emphasize on my position as an outsider from Europe. This research project is my first deeper insight in energy politics of California, therefore some of the suggestions made may not be possible to execute within the given political context. Nevertheless, I acknowledge that this status has also revealed certain

knowledge that the residents of California have so far taken for granted or overlooked, thus ensuring an alternative vision on the issue.

Although there are other counties that might reveal different patterns or new emerging themes in attitudes towards solar mandating on household level in California, I am assured that this in-depth investigation reveals meaningful interpretations of the new requirement, and while it does not cover the state as a whole, my investigation on Butte county is a valuable and relevant contribution to the understanding of the emerging field of energy transition and justice.

5. Exploring the attitudes towards California's rooftop solar mandate

In this section I intend to present my findings and analysis from the 29 semi-structured interviews I conducted with residents of Butte county and field experts in California. The interview guide is found in Appendix 1. This section is divided in five themes: crisis as a catalyst for change (5.1), in search of energy security (5.2), state's role in mandating solar energy, (5.3) *money talks*: economic reasoning as the key element in rooftop photovoltaic adaptation process (5.4) and gaps in justice: identifying the possible inequalities emerging from the new mandate (5.5). Instead of drawing from the existing theory, the recurring themes emerged from the interview transcription and reading process. The previously mentioned five subsections combine the quotes and excerpts from the interview material accompanied with my analysis of the material. Summaries of each subsection are found in Appendix 4.

5.1. Crisis as a catalyst of change

In November 2018, California experienced its all-time deadliest wildfire, known as the Camp Fire. The disaster was caused by the state's largest electrical utility Pacific Gas & Electric (PG&E) transmission line failure that created a public outage in Northern California (Eavis and Penn 2019). The current company solution in the fight against the possible future fires is mandatory power shut offs with a short time notice (sometimes less than 24 hours) that has left up to 2.7 million residents in 2019 without electricity for four days or in certain places even longer (Reyes-Velarde 2019). Due to these drastic solutions, PG&E has been widely criticized by the public and the current political leaders (Eavis and Penn 2019). More on the discourse surrounding the crisis and trajectories forward is found in Appendix 7.3.

During the initial interview process, I noticed that most of my respondents were shifting their stories on solar mandating towards the current situation with PG&E and the company's future introduced in the previous section. Rather than seeing this as drifting away from the interview process, I saw this concern as intertwined with the attitudes formed towards residential rooftop solar mandates, but in the specific context of Butte county.

To begin with, expert interviewee Dustin Mulvaney, Author and an Associate Professor of Environmental Studies Department at San Jose State University drew attention to the past problems that PG&E had caused in California, underlining that the extent of the Camp Fire and the damage the company had caused in this context, is what created a long-lasting momentum of public attention to the variety of issues PG&E distribution systems and company policies have:

I think [the public attitude on PG&E] has changed now because of these catastrophic fires that have taken place, and we actually want an entity that does not do only the routine inspections but a severe overall change, every dollar left over for safety, not towards the shareholders.

It is not only the fires that revealed how outdated the current distribution systems are, but also the power shutdowns that further highlighted to the county residents that the current models of fire mitigation are inefficient and there is a need for change in the ways electricity is managed. While not every respondent that had knowledge on the events surrounding PG&E explicitly mentioned both events together, these two particular occasions emerged as the tipping points for changes that need to occur in the current energy distribution and governance system.

Gill:

PG&E? I think they were completely about their own profits...and I talk [...] about years [of] not fixing and not upgrading and not taking care of the actual people that are living off their product that could have been fixed like that...campfire, that [transmission line] that actually started the campfire was around 90 years old, and it should have been fixed already a long time ago. [So this could be something that could potentially change in the future?] Yes! – yes.

Ann-Lee:

[...] so now every time a breeze goes they are shutting the system off [...]. People are so mad [...], like is this our new life? One thing is when power goes out, but scheduled every week — you can't do your homework, you have to sit by the candles, you can't go down to *Starbucks*, so it's very annoying. So a lot of people are looking for [alternatives].

It can be seen that these two events: outdated transmission line self-ignition and power shutdowns lasted long enough to open up for a larger discussion of the problems that the company has – not only with safety matters, but also with the current shareholder ownership model that has not been targeted by the public as much before.

Kate:

[...] How do I feel? I mean I think it should not have been allowed to even get to this point, so somehow somebody did not pay attention, and did not hold them accountable. But the problems that we have here [...] I mean honestly they should put all people in jail, when I moved here a year ago the problems that PG&E has for the money that they have gathered as a company, is just ridiculous.

Dustin Mulvaney:

I mean what we are [...] really talking about [...] is the entity that delivers electricity more beholdng to the customers than the shareholders, because now it is a full profit company that does that, and they get all of the return.

These responses partially allow the researcher to answer RQ1², where residents of Butte county and field experts see the crisis PG&E had caused as a driver for the need to alter the ways energy distribution is governed in California. To continue with, when asked how they see the future unfold now that PG&E has bankrupted, three visions of change were expressed among the participants: (1) publicly or state-owned utility, (2) more individual energy systems through power generators and 'islandable' housing in long-term or (3) restructuring of the current PG&E model as reflected in the statements below:

Cheri Chastain:

[...] that is the future discussion of PG&E, just taking ownership out of investors hands and having it state-owned and managed resource [...].

Ann-Lee:

now people are running around buying generators and make the right plug to run it, even though we did that, because we anticipate that this crap is going to constantly happen, especially the fire system.

² Research Question 1

Gill:

[being off-grid means that] you do not longer have PG&E bill [laughs] and obviously not using their [PG&E] electricity and we would eventually like to get an electric car powered by our solar energy.

Mike:

Yeah, I don't think you can [change the whole system] [hesitant] here you go once again government giving an intervention, I don't want government take over here, and I don't think any company would buy PG&E, [inaudible] you cannot stop the fires, you need to restructure the grid.

Change from the current electricity governance model is expressed through three different alternatives, each proposing a specific perspective that resonates among particular groups of residents. It was mostly male and/or suburban county residents that voiced their support for restructuring of the same company. The main reason for this is that without PG&E people would lose jobs, government intervention is high risk for potential tax increases and the company already has the base infrastructure that needs to be remodelled.

Mike:

They need to pay restitution, they need to reinvest in the system and rebuild the grid in the right way. That's what they should do.

Brad:

Just for people to stay where it is...because they [PG&E] are a big employer, a big enterprise [silence] people do not want as much change in general.

Another perspective on dealing with this crisis was individual power generators that are used to ensure energy autonomy for a day or two without charging. This has been especially prevalent among more affluent suburban home-owners. The respondents advocated for this solution because it was seen as an immediate fix for the current problems, while the fire crisis situation stabilizes, without giving explicit solutions in the long-term.

Ann-Lee:

[...] I don't know how people are dealing with this, you should see *Facebook*, but now people are running around buying generators and make the right plug to run it, even we did that, because we anticipate that this crap is going to constantly happen, especially the fire system.

More affluent rural and urban respondents saw PG&E failures as the moment to seek for larger energy independence where their house would be able to supply energy on their own, entirely off the grid.

Gill:

In my vision every house being completely off the grid, whether that being on the batteries or solar. I really think that [energy independence] is going to happen.

Further, the idea for state or municipality-owned utility as an alternative was voiced through younger and/or urban residents and expert interviewees as a possible future alternative.

George:

I know they are talking Chico deriving their own energy, instead of the company, so there is a movement that is happening

Cheri Chastain:

That is the future discussion of PG&E, just taking ownership out of investors hands and having it state-owned and managed resource.

The same respondents also expressed that these kinds of decisions were filled with certain doubts as there were only discussions surrounding it, not actual agreements. Furthermore, the majority of respondents that were for state-regulated distribution utility underlined their powerlessness in the decision-making process.

George:

[...] but we cannot do it [public utility] all over the county, you see we have districts, not like a county power, districts have their power and they can decide their resolutions, but countywide...county supervisors have some power, but is not as easy as to say power goes to the municipalities.

Mitchell:

Yeah, everybody hates PG&E...but they did it before and now they are doing it again. They were a monopoly before, they were too big, and all of these same problems existed before and now.

For summary of the subsection, I refer to Appendix 4.5.1.

Discussion

Utting et al. (2012) argue that crisis creates a moment of confusion, where old systems are re-evaluated and new ideas appear along the horizon. In case of my research, the crisis created by the fires and shut downs can be seen as a catalyst for change, as more and more people are looking for means that could get them off the current PG&E system. Interestingly, among the respondents, the crisis has created a growing momentum for energy transition to new alternatives, including greater use of renewable energies, as people look for the potential use of rooftop solar systems or a completely islandable housing system.

To understand the outcome of the crisis, and the trajectory energy governance in Butte county will be directed to, Utting et al. (2012) suggest paying particular attention to the emerging decisive agents (Utting et al. 2012) who hold the potential to influence the ways energy is managed in the future. As stated before, some residents (predominantly urban and or/young) see this crisis as an opportunity to change ownership of the electricity distribution from shareholders to state or at least public in certain places. While Hay (1996) and Helderman (2015) see change as dependent on the capabilities and eagerness of these emerging agents, based on my analysis I suggest that the way political systems are built in California, and the political power that is given to counties and/or individual residents plays a major role in the possibility to act on these kind of decisions. This can be accentuated by the attitudes of the majority of the interviewees that expressed their powerlessness to affect these future decisions, because of the ways policies are implemented in California. To understand what are the actual ways a resident can influence the future trajectory of energy governance, I see it as a crucial step for the development of my research in future. Nevertheless, in the current context there are opportunities for individual means of change through purchasing power generators or investing in new 'islandable'

energy systems for those who can afford it. It would be interesting to see if there would be an increase in these kinds of solutions and a more solid group of supporters (potential agents of change) and how that would affect the future of energy distribution and justice in California. Finally, there is also a group of interviewees that suggest reorganizing the current PG&E system, which is a potential future outcome as a lot of residents are employed by the company and PG&E still owns the distribution grid, leading to change within the current management practices of the company. I see all of these aspects as important to follow up in further investigations. More discussion is found in Appendix 7.1.

5.2. In search of energy security

In the previous subsection, I identified the three different alternatives that the residents of Butte county mentioned as the possible future scenarios in state energy distribution governance. As many of the interviewees mentioned energy independence through household rooftop solar systems as one of the possible scenarios, I decided to investigate if this presumption affects the ways the new solar mandate is perceived. Most of the interviewees expressed that they resonate with the new law as it pushes for energy independence that can be achieved on an individual level, which also helps answering RQ2.

Mike:

[...] I like it [the mandate], I am a firm believer of energy independence, I mean I absolutely am on board with having to have solar panels on new construction, but maybe on the existing event [current issues with PG&E], to generate electricity and be independent is, I think, that's a good thing.

Leo:

I think it is a good mandate [...] because people want to be off grid [...]. This mandate would push people to increase the use of solar. It would be interesting to see people totally off the grid.

Nevertheless, rooftop photovoltaic systems alone do not actually offer complete energy independence for the household. According to the experts, Dustin Mulvaney and Cheri Chastain, to achieve a complete energy independence from the current electric grid, a resident should also invest in solar batteries, inverters, reverse power relays and other technologies that save the accumulated energy and disconnect its flow from the larger grid.

Dustin Mulvaney:

[...] Currently those systems in California you are grid tied with the rooftop system, all these new houses built are required to be grid tied, but they are not required to be 'islandable' [or] that you can change setting and if you have a battery, your house can basically operate as an island from the grid.

Cheri Chastain:

When you have the ability to work independently off the grid is typically called island mode [...] it means you can operate without the grid, to be able to do that is super expensive [...] because [apart from the solar batteries] there is reverse power relays, or they call them reclosure, [...] it closes that ability for the power to reverse into the utility's grid.

Additional investments, according to the experts, can amount to high costs that make the supposed energy independence achievable only for very wealthy residents. To continue with, the data also

shows that only less than a half of those who perceived solar mandate as a way to larger energy independence mentioned that there are additional costs to making their house off grid. In this sense, there is a large proportion of the interviewees unaware that the installment of a typical household photovoltaic rooftop system in California does not guarantee energy independence.

However, a few among those who were aware of the extra investments to go completely off grid still saw mandating solar energy as a great way to increase energy source diversity, which would reduce foreign energy sources and it is a more environmentally-friendly alternative that is safe in comparison to the current systems. In this sense, I see it more as an effort to ensure energy security (Sovacool, 2011), rather than complete independence, which I will further expand on in the discussion section.

Mike:

Politically, I am for it, you know...And I am absolutely for new energy sources, wind and solar...and also nuclear, we think we could minimize our consumption specifically outside our own borders, but also inside, it is our own resources [household solar] we can minimize them and keep them.

Brad:

I kinda like having the option to have your own individual solar. Overall it is a new, natural, safe [source], you don't have all the PG&E wires, you can get it anywhere, as long as you have Sun.

When asked why the idea of adapting household solar energy could lead to energy independence is resonant among so many of the respondents, Colton expressed that it potentially would allow people to be in charge of their own electricity production and distribution, a possibility that is not likely with the current dependency on the grid. This self-sufficiency narrative would potentially resonate with many sides of the political spectrum, but this will be further explored in the next subsection.

Colton:

By going solar [apart from regular folks] it also fits in with sort of individualistic concepts where right-wing or anti-government kind of people feel, because they want to produce their own energy and not want to be dependent on a centralized utility [...] they want to be off the grid entirely.

For summary of the subsection, I refer to Appendix 4.5.2.

Discussion

As many of the residents underlined that mandating solar energy on a household level would be a larger push for energy independence in the future, there is a common misconception on what photovoltaic rooftop solar systems can provide, as explained by the field experts. Nevertheless, knowing that there were many respondents who knew about the costs and additional technologies of actually going off grid, they still saw this as an opportunity towards larger energy security. At a national level, one of the US strategies for increased energy security is energy source diversification, which can be observed in the narratives of some of the respondents above. Meanwhile, it also aligns with Farhar (1999) studies on American utility customers that revealed increase in the individual demand in their choice over energy production, consumption and distribution or in other words, energy sovereignty (Cotarelo et al. 2014). Finally, this view also resonates with Smith-Cavros and Sunyak (2019) and Sommerfield et al. (2017) research where the potential of energy independence was mentioned as one of the key factors in forming residents' acceptance of rooftop solar systems. In

this sense, I see the use of energy security and sovereignty as the key elements in the public discourse in order to ensure larger societal support of requirements that aim for energy transition to alternative and more sustainable sources. In many cases, it is less about climate change and sustainability and more about security and sovereignty in the realm of energy.

5.3. *Money talks*: economic reasoning as the key element in rooftop photovoltaic adaptation process

Having established that energy security plays a major role in Butte county resident receptiveness towards California's solar mandate, I was interested in understanding what are the other factors that influenced Butte county residents' attitude towards the new requirement. Inspired by Devine-Wright's (2007) model on public attitudes towards renewable energies, I explored how various contextual factors (attitudes towards the environment, economic challenges or benefits associated) play a role in resident receptiveness towards regulated household solar energy. Less than a half of the residents (mostly urban and/or young residents, as well as experts) underlined that the solar mandate was seen as a positive move towards environmentally 'friendlier' alternatives in comparison to the current practices that are based on non-renewable resources. A few of the same interviewees expressed their concern for the environment and saw mandating solar energy as a step towards climate change mitigation and adaptation.

Rahul Young:

I understand that the increase of the cost is a negative implication [...]. To me it feels like the nature of the crisis is so big that we have to find the priority, the ways to deal with the inequality, that could be exacerbated by this

Kate:

Oh, it is just sustainability [...] it is better for the environment [...] I think ultimately it would help save energy and probably it would be cheaper [...]

Nevertheless, these factors were never mentioned as the only or main reasons for the support of the mandate (as seen from citations above), but always intertwined with the economic challenges or benefits that the new requirement entails, rather than environmental beliefs (or any other factors) on their own.

Mike:

I think in general [...] solar is a movement that supports energy independence [...] and also minimizes carbon footprint, so that is kinda the reason why they all do it, in the long run typically saving money.

Louise:

Well, besides the cost of installing it that is going to save you the money in the long run you don't have to rely on someone else, but the Sun [...]

Bruce:

I would like to install solar if it would help me out in some sort of economic way.

As all of the residents were discussing the economic implications of the new law, I was interested in exploring what kind of assumptions they have when talking about the economic challenges or benefits this new law would portend. First, more affluent households (combined household income of 80000 US dollars and more) and expert interviewees that had previous experience with solar energy, saw

the new law as reasonable in costs, mentioning the long-term savings that the rooftop solar installation creates through getting off the current PG&E grid tariffs with the additional environmental benefits (less carbon footprint, ability to transition from fossil fuels) as the main reasons for their support of the new requirement. These answers partially help answering RQ3.

Brad:

[Long pause] Well it's so expensive the [PG&E] bill right now, so it's not a large percentage [of expenses] building it for the new construction, I don't think it is a bad thing at all, what I think of if it is necessary.

Ann-Lee:

it will pay off if you are there long enough, if you read the savings [...]. Even though we would not fully recuperate the price of the solar system, you could sell the house, you could increase the sales prices for your house, but you can also definitely save energy.

Mostly suburban respondents saw the mandate as economically unfeasible because the solar prices were not seen as competitive enough, and technology needs more development.

Bruce:

Right now the state is not ready for such a step, nevertheless I believe that we should let the market and businesses improve at this situation and maybe in the years to come we would have high efficiency and arguments to mandate solar [...]. If we allow those certain few intellectuals to do this work, then we will see what is going to happen in a while.

Most of the younger, urban residents (age group 18-24) expressed that they were supportive of the mandate, but while the factor of saving money in long-term was seen as positive, some of the respondents mentioned that the initial costs of installing solar panels as very high, especially if the system would have to be purchased outright.

Jennifer:

I think it is awesome, I mean for some people money is issue, so convincing to take that step is hard. It being just an automatic thing is just amazing.

Mikey:

[...] Price is definitely what people are cognitive of, and my personal feeling is you [put] solar on your rooftop, you decrease your energy bills over a course of time, but the hard thing with solar is it pays off in 5 on 10 years, so it is hard for people, myself included, put down 10 thousand dollars, it won't be a worthwhile investment until it pays off.

Older respondents (age groups from 65 and more) on the contrary, expressed their doubts about the pay off time due to their own lifespan. Long-term investment was seen as a negative factor in their receptiveness of the mandate as it would probably not pay off in their lifetime, therefore would not be worth the initial investments.

Barbara:

It is a cost issue. [...] I think here 50% of the people would not do it, because they do not have the money [...]. You see we are older, and it does not affect us. For me why invest that money, it would not pay, I won't live enough for it to pay back, but if I could get it for 5000 dollars I would be there tomorrow to put it up. Economic factor is the key.

When asked, why various economic factors play the biggest role in the perceptions of the solar mandate a few residents voiced that economic reasoning is the “common language” across the both ends of the American political spectrum, a “uniting” language that is the decisive element in private and public sphere decisions.

Allan:

[...] and then farmers they can be more and more towards it as solar pays for their electric bills. We did it for the environment and costs, and we wanted to get away from fossil fuels, and a lot of people are aware of that, because of those incentives. But farmers are doing it mostly for economic reasons, they probably know they are helping the environment too, but they would not be admitting it—admit that climate change is happening.

Mitchell:

We actually did a resolution [on climate change] here at the office of Education of Butte County, encouraging increasing solar and that climate change is happening, and putting emphasis on new energies, [...] but yet again money— the money is always an issue, so if you do it with that perspective, we can get that connected to climate change solutions.

Barbara:

And it's human to see that it profits you, we [Americans] all vote for what we think we profit by.

For summary of the subsection, I refer to Appendix 4.5.3.

Discussion

From the data that I have gathered, it is possible to see that although environmental concerns and benefits create positive attitudes towards the new requirement among many of the residents, it is not always enough to build larger support for it. This, in fact, goes in line with Palm (2018), Balcombe et al. (2013) and Schelly (2014) research on motives for and barriers against household photovoltaic energy adaptation. Although none of these cases deal with solar being mandated (the focus is mainly on the potential or already established users of solar) research suggests that environmental concerns and benefits are not sufficient for people to install the system. Much like Balcombe et al. (2013) and Palm (2018) research, various economic factors play a simultaneously big role in the adaptation process. An important motive for installments much like in my research is the possibility to save money by buying less from the existing grid, which would reduce costs in the long-term. This view was widespread across the more affluent, younger and expert respondents, Similar to the results of the previously mentioned papers, high investment costs was a prevalent argument against the mandate across many of the respondent groups, while long pay off time was seen as a barrier in the adaptation process for older residents (Balcombe et al. 2013).

Drawing from the existing theory, I can see that the economic reasoning narrative resonates with Foucault et al. (2008) and McNay's (2009) take on the neoliberal "Entrepreneur of the Self" identity. The authors argue that neoliberalism perpetuates a worldview where individuals are encouraged to see their lives as a sort of an enterprise, where the private property lies at the heart of it. In this sense, your personal life in neoliberalism is seen as successful only through your own ability of resource management and investment planning. The data also shows that the way residents mostly perceive the mandate is through material benefits that it would provide or restrict them from. Or similarly Anderson (1981) sees the reasoning of the neoliberal entrepreneur through the question of: what does a certain decision or choice portend to "freedoms" in their personal lives - does it shrink or increase them? In this regard, if our economic reasoning and choices provide more "freedom" in the private sphere of life (Anderson 1981) it means that only the economically most advantageous choices have the potential to gain positive public perception and last for years to come. Therefore, the receptiveness of mandating household solar power can be seen as highly dependent on the economic benefits it entails. In one way, understanding these factors of receptiveness gives a better comprehension of the types of policies that would have success among the majority of state residents, but it also creates a challenge on seeing issues as more than just embedded in economic reasoning. There might be solutions that do not possess the same combination of economic benefits, but might be much more efficient in climate change adaptation. And while the government has the power to decide what to implement or not, the kind of "unpopular" decisions can then lead to greater public mistrust towards the state. Therefore, I suggest for further research in order to understand how attitudes towards various policies reflect the economic reasoning that is at the base of neoliberal lifestyles, and how it further shapes the perception of the government.

5.4.State's role in mandating household solar energy

In the last subsection, I explored the various factors that influenced people's perception towards the new household photovoltaic mandate. While economic costs and benefits played the main role in residents' receptiveness towards the new requirement, I see this case as unique because the decision for solar panel adaptation is not an individual initiative, but mandated by the state of California. While the previous research by Palm (2018) and Balcombe et al. (2013) has focused on the attitudes of the potential household solar customers, this decision affects every new home-owner or person who intends to do a major renovation in California. In this sense, I found it crucial to explore how the residents perceive the role of government when it comes to a mandate that deals with the transition towards solar energy.

There were 21 residents that were for mandating and 8 residents that were against the new solar requirement. While the majority of the respondents supported this state decision, many of those narratives also incorporated arguments against the new law, therefore I saw it as an important factor for a further investigation.

As mentioned before, most of the supporters were young and/or urban inhabitants of the state and expert interviewees, nevertheless there were older respondents that were supportive of the mandate, too. Gender did not reveal any differences in the attitudes towards the state initializing this requirement (10 interviewees who identified as male and 11 who identified as female were for the new mandate). Meanwhile, certain education levels reflected better receptiveness towards state mandating household photovoltaic systems. Those who had a master's degree or higher always underlined their support for these kinds of decisions, nevertheless many younger respondents without any higher education also showed their approval.

Kelsey (18-24 year old resident of urban Chico) :

I think it is awesome, putting solar panels as a mandate [...]

George (55-64 years old PhD in Geography):

I think the state has to be the one who starts doing these things [...]

Support for mandating was augmented by a variety of factors. Most of the pro-mandate residents mentioned their concern for the environment and that the climate crisis was seen as a large-scale issue that was not possible to be improved without the involvement of the government. Many of the interviewees saw this also as an extensive transition towards more sustainable forms of energy on a household level.

Savannah:

I feel like the state should regulate because it is everyone's issue, climate change is a thing, so we can put forward whether you can decide whether or not to believe climate change is a thing, so we might as well make everyone involved.

Cheri Chastain:

California has pretty aggressive climate change targets and goals, so they need to back it up with some policies [...] we also need guidance from our officials. We need them to have backbones.

On the other side, there were eight interviewees across different age groups who were against the new law. Six of those identified as male, and two as female, so gender could possibly be an influence over the choice of being anti-mandate but this would require a far larger sample for statistical analysis. While education did not reveal any differences, it was the spatial context or place of residence that drew my attention the most. Seven out of eight interviewees that were against the mandate lived in the suburbs of the major towns of Butte county, while some of the respondents mentioned that rural inhabitants would have shared similar attitudes towards the state. Most of these respondents saw the government as interfering with their individual decisions on whether to adopt solar or not. In framing their arguments, personal choice and civil liberty was seen as put at risk with state interventions, which according to the respondents goes against people's individual freedom in the US.

Louise (35-44 old resident of suburban Oroville):

I guess it's good but as with all things people should have a choice [...] a choice to wear a helmet or wearing a seat belt not be a law or so. So, I don't know if they [the government] are going to mandate it, there should be some other initiatives or rebates, something other [...] not to force it.

Bruce (18-24 old resident of suburban Chico):

I think it is everyone else's business - people should decide whether to do it themselves, one way or another. [...] I have not [seen] the government being any help in that [...]

Mitchell (35-44 old resident of urban Chico):

Chico is a really kind of left-wing, progressive, diverse community, but the rural chunks that are outward tend to [...] be more conservative if you know what I am saying.

Sharon (65-74 year old resident of suburban Oroville) was the only interviewee who expanded more deeply on why suburban and rural county residents would be against the mandate. She underlined that while the solar mandate could reach a better approval among various contextual and sociodemographic backgrounds due to the environmental economic benefits it entails, generally speaking people in suburban and rural areas of California are against any kind of government control. This mistrust in the state, according to her, is created by a variety of factors that have developed over time: large number of small, private business owners (agricultural and other), disperse and low population, self-sustaining, individual attitude that goes against the government control.

Sharon:

I think there is a real mistrust, when you get to Northern California [...] we have 1/28th of the population, so people here feel like they don't count as much, we are agricultural, so we have a lot of small production here, we do not have a lot of corporations here like in Silicon Valley [...] people usually dislike that idea that you are not counted or your opinion does not matter, I don't trust in a lot of what they do, I think they work in their best interest to get votes — just to remain in power. So I am probably very typical in this thinking, I don't feel they really care because they dismiss us, because we don't really have a voice.

On top of that, the majority of the interviewees (including those who were pro-mandate) expressed some form of mistrust in the government when talking about mandating solar energy. What made most of these respondents lean towards being pro-mandate is the fact that the requirement itself entails the possibility to be less dependent on the current energy distribution utility (energy security), while providing long term savings (economic benefits). These factors therefore were crucial in decisions that were pro-mandate across some of the suburban and rural respondents as well.

Mikey:

You know that is tough, that is a loaded question. Voluntary versus mandatory. [...] should you be able to mandate? It is...that's a whole another question of civil liberties like I said it is a very layered question, but [...] mandating people generating their [own] energy at a local level is not necessarily a bad idea...but I am willing to draw that line that I would be ok with that specific subject matter being mandated, [...] but I understand the thing with the civil liberties and I don't need really see this in a category of affecting one's civil liberties.

Ann-Lee:

Ughh, mandated? [suspicious] Not really sure how I feel about the mandate, but then it gets into the more philosophical part of how I feel about the government and I don't like a lot of mandates in some areas[...]. But then again I also think that you know mandates change thinking [...] we ourselves had installed solar panels before and our savings have gone down so much in comparison to PG&E bills [...] so I do think it is important that we as a society start making these changes.

While polarization across various spatial contexts is certainly there, expert interviewee Rahul Young and Danny Cullenward saw the law as potentially successful among people from a variety of different backgrounds due to the very same qualities of it fostering the idea of a less dependent energy producer (in comparison to the current situation with PG&E) with the ability to ensure savings in the long run.

Rahul Young:

I guess I have two answers about that one is that it is very much American identity, identity around individualism [...] the things that restrict individual agency, people start by assuming that is bad, and I think that could be traced back to...who came first to America.

Danny Cullenward (written interview):

For residents of California, it probably does not matter if household solar energy installments are more expensive than utility scale, as it does not improve people's lives directly [...] also land use might be an issue for people, the place where utility solar is built [...] and overall what concerns utility scale solar is that regular people do not care about it, they do not see the direct benefit of it and perceive it as some kind of governmental project that is out of their reach. It is therefore much easier to build political support for household solar installments, as then people can see the material benefits that they can receive.

For summary of the subsection, I refer to Appendix 4.5.4.

Discussion

When it comes to government mandating laws, polarization of views is certainly prevalent among the Butte county inhabitants. Residents usually expressed mistrust in the state, because it was seen as skewing individual freedoms and choice. I see this yet again resonating with the idea of neoliberal individual being "Entrepreneur of the Self" (Foucault et al. 2008). If in a neoliberal system personal success is determined by your individual ability to plan investments and resources, then according to Huber (2013) the public authorities who have bigger power than an individual portend certain danger to the idea of free market. The enactment of new laws in the US is usually seen as a negative influence over liberties within the private life that is too costly and distorting the competitive spirit where everyone is on a level playing field (Huber 2013). These kinds of narratives were widespread among most of the interviewees, even those who were pro-mandate.

Nevertheless, I see this mandate as an exception in general public attitudes towards state requirements, as it ties to various values that the residents see as beneficial to the environment and individual economic situation, without intruding on their personal freedoms. First, most of the people who were in favour of the mandate saw this decision as a necessary step to tackle the climate crisis on a large scale and simultaneously a way to transition from the current, unsustainable energy practices. There was a large agreement on this being a crucial step for California as a whole because the state is widely known for various natural disasters and environmental issues that need to be reduced in the future. Based on interview data, improvement in environmental sustainability can be seen as something that individuals are interested in, but cannot achieve without large-scale public intervention, therefore the mandate is seen as an acceptable option. Those in doubts, saw the potential of energy security and long term savings that solar installments could create, which led them to be in favour of the new requirement. Huber (2013) argues that "the American Way of Life" (Huber 2013, 42) is embedded in intensive energy consumption from private cars to home ownership, and therefore particular attention should be attributed to the ways changes in these kinds of lifestyles are met by the public (Huber 2013). For example, increase in gasoline prices or tax rates in the realm of private utilities are seen as threats and met with large public dissatisfaction and sometimes even with protests, where one of the examples is the US trucker nationwide protests against increase in gasoline prices after the 1973 OAPC oil embargo (Huber 2013). While there are residents who are against the mandate, solar is also seen as having potential to increase energy security and continue the same individual lifestyles less dependent on the larger electric distribution utilities, while offering potential

savings in the long term that goes along the lines of “Entrepreneur of the Self” constantly looking for increased material freedom that is a widespread worldview among many respondents and potentially larger public. This could be explored by further expanding the sample size and comparing other counties or states in future research.

Finally, I would like to address the fact that doubts or dissatisfaction with the government mandating household solar systems was especially prevalent in suburban and rural contexts. These results reflect Gimpel and Karnes (2008) and Gainsborough’s (2005) research that sees rural and suburban residents in support of a reduced role of government in their lives. The desire for reduced or no state control and overall individualistic ethic is intertwined in a variety of factors from disperse living conditions, extensive property ownership, high self-employment and widespread of agricultural and small-businesses who saw government as intruding on their self-made lifestyle. Similar reflections on the possible influences on why rural residents have this kind of negative attitude towards the government was shared by one of the interviewees, Sharon. Nevertheless, I also recognize that only one of the residents identified as rural and pro-mandate, therefore it would be necessary to increase the sample size of rural residents to understand their attitudes towards the state mandating better. On top of that, Gainsborough (2005) argues that suburban residents share the same attitudes towards the government, but in a different spatial setting with rather detached and homogenous communities from the city core that usually have prolific amounts of resources and fewer cost issues that creates a different sense of what kind of support is needed for the society as a whole from the government, especially in terms of social welfare (Gainsborough 2005). While it was not explored more broadly during the interview process and could be a potential research interest in the future, there is no doubt that most of the suburban residents were against the new solar requirement that serves as a platform for further investigations of the influences over their views. More discussion surrounding suggestions in future policy planing can be found in Appendix 7.2.

5.5. *Gaps in Justice*: identifying the possible inequalities emerging from the new mandate

The last subsection deals with the potential issues that the solar rooftop mandate could portend to energy justice. To understand the inequalities that this new law could potentially create, I used McCauley et al. (2019) concepts on recognitional, distributional and procedural energy justice to create my interview questions and answer RQ4. The chapter is divided according to the type of justice that is being investigated.

The first tenet is distributional justice that sees energy justice as an inherently spatial concept, which combines both the physically unequal allocation of environmental benefits and harms and the unbalanced distribution of their related responsibilities (Walker 2009). Many of the respondents emphasized that the new mandate portends issues to the aspect of uneven responsibility allocation where the price lower economic classes have to pay for the obligatory installments is more burdensome than for the wealthy residents who have more available resources to ensure this adaptation. Interestingly, most of the expert interviewees emphasized that purchasing a house (which usually happens through housing developers) in California is already expensive, therefore this should not be a burden for most of the home buyers or renovators, as this law is intended to target middle class or wealthier home-owners. On top of that, the experts suggested that the mandate also has the option to enter a power purchasing agreement (PPA) with the developers or build community solar energy.

Mike:

The richer people will have easier time to adapt and the poor [...] they will have the most difficulties to go through this change and they are the ones most affected, they have no money to be able to afford solar panels.

Dustin Mulvaney:

I mean the bigger reality is like people cannot afford a home in California, you know often they [the more affluent residents] are making a decision between fancier countertops or rooftop solar, for many people who can afford homes in California the imposition of the mandate to be something to be a burden [...] Housing is expensive no matter what and that is what that cost of the rooftop solar system is not making or breaking households.

Cheri Chastain:

[But also apart from] upfront purchasing [...] there is power purchasing agreements.

Rahul Young:

But for me it is not a reason to turn down something [the mandate] so critical for us to do [...] I like [that] there is a way or the deal with community solar.

Contrary to the expert opinion, some of the younger, low or medium income respondents saw solar mandating panel installments as a cost burden that should not be ignored because it could lead to even larger housing crisis that is widespread in California.

Colton:

[...] I mean the primary problems with it would be the costs that would add up to new construction, so as the state developers and governments are trying to build millions of units of housing to try to address homelessness, to try to address increased rents and increased mortgages, this is going to add thousands of dollars to every new home construction.

Expert interviewee Cheri Chastain argued that although there are other options than paying outright, like power purchasing agreement, it does not entail the same economic benefits as buying the whole system without any lease. Meanwhile, expert Mandi McKey saw the potential in pooling resources for community solar, which has not been a popular method among the household solar users so far.

Cheri Chastain:

There is a ton of risk, PPAs build in some high dollar escalators, 5 dollar escalation every year, so if you look at it in 20 years, we have no clue how the future of California renewable energy will look like, we don't know how extensive it will be [...], so we might be locking in for a rate that theoretically could be way more expensive than just buying utility power.

Mandi McKey:

I personally love the idea of community solar project, to put money into it and then get benefits from, I mean we consider it as a company [Sierra Nevada Brewing co.], we are considered as a supporter of community solar project or you know try to invest in it.

Additionally, one of the interviewees, Noah, emphasized on the possible harms the solar mandate could create in energy standards caused by the distribution of expenses on certain home-owners (Jenkins and Hopkins 2019). He expressed that the high expenses of the household solar systems have much larger influence than presumed by the experts, and the high costs of the requirement would stop some of the home-owners/landlords to renovate a property, which could lead to lower energy

efficiency standards and therefore higher costs for energy in the future due to outdated household electric utilities.

Noah:

it's [the mandate] going to make home-owners and renters reluctant to renovations, so you will be living in deteriorating conditions, you're paying the power bill [that] is higher.

In lines with the last interviewee I would like to further debate the expert interviewee assumption that the new solar mandate targets only wealthy home-owners who can afford a new property or major renovation. I was interested in investigating whether there are other groups of people that might be overlooked but could be affected by this new mandate negatively. This assumption ties with the notion of recognitional justice that aims to reveal "the process of disrespect, insult and degradation that devalue some people and some places identities in comparison to others" (Walker 2009, 615). Recognitional justice goes beyond tolerance and asserts that individuals must be represented fairly, that they must be free from physical danger and that they must be presented with equal political rights (Schlosberg 2003). In this sense, one social group that many of the respondents mentioned as overlooked and potentially vulnerable within the new solar mandate's framework, was property tenants. In case of a major renovation, real estate owners would have to pay the additional expenses for obligatory rooftop PV panel installation. In this scenario, many of respondents saw it as an opportunity for the landlords to increase monthly rental prices without calculating the long term savings generated by the residential solar systems.

Louise:

[...] landlords raising a rent, that is not fair, they would just have to leave it that is part of their business. Especially in the long run, when the electric bill is going to be lower, there has to be some way to make it right. Because it is going to take a while for them to bounce back.

Noah:

Personally, I think this is just an excuse to jack the rent up, the renovation ends up increasing the prices, so this house needs solar panels, extra 50 bucks for you.

One of the interviewees, Pati had experience with a landlord that used solar installments a few years ago as a way to increase the rent without any benefits up until this moment.

Pati:

Interestingly enough, the owner of our senior mobile home property installed a million dollar solar system. 2-3 years ago, but the tenants do not get any benefits from it. He only pays for the common area expenses. [...] He can do whatever he wants so he put on this big solar system to reduce his expenses for common areas, but the tenants don't benefit, because the law does not require it.

Additionally, around a quarter of respondents saw that even though every new household has the opportunity to source their own energy through solar panels, California is also known to be one of the largest states in the US with a variety of climate types: from tundra to hot desert (Peterson, 2016). This potentially could restrict some of the residents to provide as much electricity, as in parts of the state that receive more daylight hours.

Leo:

It is great that the state does it, but it is also a huge state and it has many different counties and communities, as well as weather conditions, so it is a really good idea for some parts of California, but there are many parts of the state that have other conditions in terms of weather and landscape, so it is a very special place that needs to be.

Kate:

In a lot of places, especially in California, depending on where you live you don't really need solar, cause it is not that warm, warm enough to need it.

Further, I investigated the potential issues with procedural justice that were the focal point in the creation of a more equitable decision-making process where all the involved parties have the same rights and are treated in the same way (McCauley et al. 2013). In general, when it comes to mandates as such, most of the interviewees saw themselves as minor influences in the decision-making process where their state or federal election vote was the only way to influence these kinds of decisions. Nevertheless, some of the interviewees expressed that they do not see themselves being part of any decision-making process surrounding this mandate at all, as it is executed by a closed, independent state agency: California's Energy Commission that according to expert interviewee Danny Cullenward consists of 5 executives who share their ideas about the standards, communicating with civil society, stakeholders and other agencies. Some of the residents added that they had doubts on what kind of interests this agency represents.

Leo:

I have never engaged in these kinds of decision-making processes other than voting and then also the government has not asked about these types of things to me before.

Pati:

The state creates these agencies by appointments, these people are elected from within, all the energy commissions are stacked with oil and chemical insiders and executives, they are basically writing the policies that we are fighting against.

Some of the residents expressed that in future they would like to see their local communities have more say in the creation of these kinds of mandates through the county or neighbourhood representatives or certain organizations. Some of the residents said that this could potentially influence decisions of California Energy Commission (CEC), while others saw it more as a vision to dismantle the current structure and re-organize it more locally. Most of the residents saw this as currently impossible, but there were a few respondents who were part of some organization that could influence the current decision making process in meetings with CEC (some examples are representatives of Sierra Nevada Brewery, Sunrise Movement that deals with climate change issues among younger public, Chico State University and other academic affiliations).

Noah:

This should be part of the neighbourhood planning process or I think local municipalities [need to have] more freedom over their finances and things like property taxes, so I think local governments would like to have more initiative.

Allan:

That is what we are trying to move towards to, you know here we are creating a Climate Action plan [in Chico] [...] I think you are seeing a lot more demand, they [people of Chico]

are not letting just the government working, because they see that is not working out. And also — organizing local power, like Sunrise Movement to reach out [to the government].

For summary of the subsection, I refer to Appendix 4.5.5.

Discussion

Based on the interview data, it is clear that the new household solar mandate portends several justice issues in the future. Expert interviewees expressed that the new requirement has certain drawbacks, but overall supported mandating household solar energy, as it targets residents who can afford housing or a major renovation. The solar requirement was not seen as something that the households with the intention to renovate or buy a new house would not be able to afford. Knowing that outright purchasing of a household photovoltaic system varies from 9 000 to 30 000 US dollars based on interview data, I still see these expenses as very high, especially for those who are intending to do a major renovation, where the households potentially do not have the same dispositions as new homeowners. I would also like to argue that the expert interviewee assumption on this not being a money issue to determine whether someone would build a house or not has to be challenged. Knowing that California is in a housing crisis, I see this mandate as having potential to exacerbate it. While I cannot estimate how much precisely, many interviewees saw the obligatory expenses as very high and something they would not be able to afford personally, in case their houses would require renovation. As this research aims to encompass the voices of all residents, there is a need for an economic assessment that would estimate how the new law would exacerbate the current housing crisis in California. However, there are some opportunities already out there for households who cannot afford solar systems, but would like to be part of the energy transition movement. A successful example for support of low-income communities in the state of California is GRID alternatives, which is the nation's largest nonprofit solar installer that does free solar installations for households qualifying as low-income (GRID Alternatives 2020). In addition to that, the company teaches hands-on solar panel installment training to connect people to clean energy jobs, and supports community solar project development and implementation (Grid Alternatives 2020). This could be one of the ways to ensure energy transition and improve energy efficiency standards for households that cannot afford a PV system themselves. It is one way to help low-income communities that are interested in renovations, to also improve on their energy efficiency standards, while ensuring energy transition to more sustainable alternatives.

Closing remarks on the potential routes for the future development of the new solar requirement can be found in Appendix 5.

6. Conclusion

6.1. Contribution of the study

The global energy system is currently based on fossil fuels – finite resources that are detrimental not only to our environment, but global economic stability and energy security. As already recognized, this requires an extensive transition to newer, low carbon energy alternatives. In California, the state administration has been pushing for renewable alternatives for decades. Starting this year it has become the first state in the world to mandate alternative energy on a large scale. And while the efforts are laudable, it is crucial to ensure that future energy governance does not reproduce the same injustices across the sociodemographic spectrum that a dependence on fossil fuels has perpetuated for years. In this sense, I see my thesis as providing a more critical perspective on the energy transition, which tends to be misrecognized as intrinsically just and better than the current dependency on fossil fuels in numerous ways (Healy and Barry 2017; Piggot et al. 2019). While it is certainly better than the current fossil fuel system, it is not without challenges. Through the interviews with residents of Butte county and the field experts, I have examined the current understanding on the factors that shape residential attitudes towards solar energy by employing a “bottom up” approach of interviewing state residents. This approach highlighted the potential barriers and motives behind mandating residential solar technologies. Additionally, my thesis has sought to delve deeper into the residential attitudes towards the role of government in the adaptation process. Thus has not been common in the research to date, but has the potential to be more relevant in the future should more states across the world decide to implement policies that require renewable energies. I see these two aspects as contributions to the fields of energy policy and just energy transition. Lastly, the residential and the expert interviewee discourse on mandating residential solar energy has also given valuable insight into the potential injustices that the new mandate portends, which can be used as a suggestion for potential improvements of the new requirement itself, as well as a framework for further policy planning in the realm of energy transition, not only in California, but hopefully also in other states of the US and countries. Finally, I hope that this project serves as groundwork for empowerment of the Butte county community and can be used as a source for further discussion on the potential injustices emerging from the new mandate with the local political authorities.

6.2. People’s attitudes towards regulated household solar energy technologies

This subsection is devoted to answering my research questions. Through the Butte county resident and expert interviewee narratives, this thesis has revealed a variety of factors that shape attitudes towards the new solar mandate. In Butte county’s context the crisis by the 2018 Camp Fire and power shut downs initiated by the regional electricity distributor Pacific Gas & Electric (PG&E) has created a momentum among the residents of the county to look for alternative forms of energy governance and supply. These include a shift towards state-owned energy distribution companies, greater use of renewable energies through household solar systems or islandable housing, as well as restructuring of the current distributor PG&E. In this sense, the crisis has worked as a catalyst of change as there is an increasing discussion among residents on the possible energy transition to low carbon alternatives, like household solar systems. Meanwhile, when it comes to receptiveness towards the new mandate, the majority of the residents were positive about the new requirement, as it offered residents the potential to be more in charge of energy production and consumption and opened the possibility of complete autonomy in the future. While environmental benefits and concerns played an influential role in the support for the mandate, it was the economic benefits of the household solar systems that was seen as the other key element in the outlook towards the new solar mandate. And albeit most of the residents found the state's role in mandating household solar energy as a necessary

strategy due to the previously mentioned factors, mistrust towards the state as a decision-maker in energy governance was still prevalent in the discourse, specifically among the suburban respondents. This reflects Foucault et al.(2008) take on neoliberal individual being entrepreneurial self and Huber's "American Way of Life" where solar as a technology is perceived to provide an opportunity to increase the level of individuality and material freedom in private life. By understanding these factors of influence, it is possible to distinguish the potential future challenges when it comes to making alternative energies a requirement. If economic reasoning and the potential for energy security and sovereignty lie at the heart of the receptiveness, it can serve either as the *modus operandi* in further energy transitions in the context of Butte county or be a potential barrier when implementing laws that do not resonate with these values, but is seen as more effective, inclusive and beneficial in energy transition or climate change adaptation processes. Finally, the residential and expert interviewee discourse on the new solar mandate shed light on the potential injustices that the mandate could evoke. California is a climatically diverse state, which means that residential solar energy might not work as efficiently everywhere. The new mandate does not challenge the assumption that the solar installments would be more onerous for lower economic classes, in comparison to the affluent residents. And as a result, there is no additional support for these residents to fulfill the mandate. It thus becomes an economic burden on households who might not be able to afford it and could then end up breaking the laws. Further, tenants are potentially vulnerable to have no say if solar is installed by home-owners, leading to increased rental prices or inertia from property owners to upgrade housing efficiency standards. Finally, the interviewees saw themselves as excluded in the creation and decision-making process of the requirement. By exposing the potential issues created by the new mandate, I see this as a way to highlight the areas of improvement and ameliorate the current energy transition in order to make it more resilient and inclusive.

6.3.Future research and limitations

By using various theoretical frameworks in Human Ecology, I have understood that the receptiveness of Butte county resident and expert interviewee towards mandated residential photovoltaic energy is indeed greatly influenced by its potential to ensure energy security and economic benefits. In this sense, it does not only disclose that the neoliberal and self-entrepreneurial spirit is strong among the residents, but makes us see that the new solar mandate itself reflects a strategy that attempts to solve the current unsustainable energy practices by feeding into the individualistic desires of increased energy security, self-sufficiency and determination in private life, now also in the realm of energy. This is an opposite response to the collective action that many authors (Kunze and Becker 2015; Sovacool 2016) suggest is needed for transformative change in society as it entrenches the individualistic neoliberal modes of being. What may seem from the surface as increased energy sovereignty or state pushing for more individual control over energy production, consumption and distribution on a deeper level has the potential to disregard the various socioeconomic conditions when transitioning to new energy systems, which is at the heart of the notion of energy sovereignty. In my study, I have found that the new requirement can be detrimental for some members of the society either by the direct economic burden placed on them or failure to recognize the vulnerable groups of people within the implementation process. This is further induced by the prevailing powerlessness among the residents to influence these kinds of injustices. If these kinds of solutions are at the core of California's energy transition in the future, the "lens" of justice is a critical feature to help re-think the ways the new mandate or other new requirements might be adverse for some members of the county community or even the state of California. In order to continue empowering the local communities, I see the next step in the line of research is to delve more deeply into the investigation of initiatives and policies that could offer support for those in need or explore the

alternative routes in solar adaptation within the mandate's legislative framework that need larger attention. One of the examples that has received only a slight public attention, but fits into the new requirement is the community solar energy projects. It would be important to explore the effectiveness of this alternative and the public receptiveness towards it in order to broaden my perspective on what kind of solutions resonate within the county.

To continue with, it is important to recognize that my research reflects views of only a few of the Butte county residents and solar energy experts in California. In order to make my research more robust in the future, it is important to expand the sample size and visit other counties or states to broaden the vision on the key factors that form residential attitudes towards the new mandate and what other elements of (in)justice could potentially emerge. When expanding the sample size, particular attention should be placed on the context of place in shaping residential attitudes and should be further explored, as there were almost no rural residents interviewed. Similarly, I believe it is necessary to investigate the factor of race and origin more profoundly, as most of the residents in my thesis interviewed identified as white. Finally, more research needs to be done concerning the public involvement in the development of the new solar requirement or other energy policies that affect individuals. It is highly necessary to investigate the ways residents of Butte county and California overall can influence the future decision-making process. I see all of this future research agenda as a continuous path towards empowerment of local communities and policy makers in the realm of energy transition, where the focal point is not solely the shift towards more sustainable energy alternatives, but a socially emancipatory project that can resonate around the world on different scales.

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Appendix 1

This appendix showcases the interview guide.

Interview Guide

Dear interviewee, my name is Krisjanis Rudus. I am a master's student in Human Ecology at Lund University (Sweden). My research seeks to investigate people's attitudes towards regulated household solar energy technologies with a focus on rooftop photovoltaic panel mandate that is active from this year (2020). I would like to invite you to participate in around 30 - 40-minute-long interview. Before participating, I would like to ask for your written/verbal consent for participation in the further interview. This interview will be anonymous. You can withdraw at any given point, and you are entitled to not give answers to certain questions if you may decide so.

This interview is carried out as it is the main element of data collection for my master's thesis in Human Ecology at Lund University, Sweden. The research focuses on energy transition in California (United States) and current views among state residents on alternative forms of energy with a focus on solar panels, energy justice, energy governance and overall perceptions of daily energy use habits.

The data of this interview will be used as the base material for the discourse analysis of my thesis project work. The results will be available for public access at Lund University student paper database.

If you are interested in the topic and/or want to know more, you are welcome to leave your e-mail below and I will contact you when the thesis has been made available online on University's website. You can also contact me at kruduss@gmail.com should any questions regarding this interview appear.

Thank you for participating!

Before we start the interview, I would like to ask you about some basic demographic information that you can fill out down below or answer verbally.

Respondent from _____

Background Information

What is your age?

18-24 years old

25-34 years old

35-44 years old

45-54 years old

55-64 years old

65-74 years old

75 years or older

What is your gender?

Male

Female

Please specify your ethnicity:

White

Hispanic or Latino

Black or African American

Native American or American Indian

Asian / Pacific Islander

Other _____

What is the highest degree or level of school you have completed? If currently enrolled, highest degree received?

Less than high school education

High school graduate, diploma or the equivalent

Bachelor's degree

Master's degree

Professional degree

Doctorate degree

Employment Status: Are you currently...?

Employed for wages

Self-employed

Out of work and looking for work

Out of work but not currently looking for work

A homemaker

A student

Military

Retired

Unable to work

Employment sector: Please, state which employment sector (if applicable) you belong to:

How much total combined money did all members of your household earn in 2019?

\$0 – \$9,999

\$10,000 – \$19,999

\$20,000 – \$29,999

\$30,000 – \$39,999

\$40,000 – \$49,999

\$50,000 – \$59,999

\$60,000 – \$69,999

\$70,000 – \$79,999

\$80,000 – \$89,999

\$90,000 – \$99,999

\$100,000 or more

Industry Sectors in the US
Goods-producing, excluding agriculture
Mining
Construction
Manufacturing
Services-providing excluding special industries
Utilities
Wholesale trade
Retail trade
Transportation and warehousing
Information
Financial activities
Professional and business services
Educational services
Health care and social assistance
Leisure and hospitality
Other services
Federal government
State and local government
Agriculture, forestry, fishing, and hunting(4)
Agriculture wage and salary
Agriculture self-employed
Nonagriculture self-employed
Examples are provided by the US Bureau of Labour Statistics. Available at: https://www.bls.gov/emp/tables/employment-by-major-industry-sector.htm

How many people reside in the household?

1

2

3

4

5

6

7

8 or more

Do you own or rent the place you live at?

own

rent

other form of ownership: _____

How long have you lived here?

1 year or less

1-5 years

5-10 years

10-15 years

15 years or longer

Interview questions

(Q1) General Questions on knowledge/experience with residential solar energy and receptiveness

Key Question: Have you heard of the rooftop solar mandate?

If not or the respondent want to get more information, he/she is provided with background information below:

At the end of last year the California Energy Commission (CEC) made an aggressive step towards implementation of net zero energy buildings by passing a law that will require all new house and multifamily residencies of three stories or fewer, along with all major renovations, to be built with solar panels starting year 2020 (CPUC 2018; Roberts 2018). California, therefore, has officially become the first state in the world to pass a regulation that obliges new households or major renovations to have rooftop solar panels (Hsu 2018). Th mandate itself offers the home-owners three options — either paying for solar panels outright, leasing them, or entering a power purchase agreement with developers; another option is for communities to pool resources instead of installing solar on individual homes (Chappell 2018; CPUC 2018). Installation costs of residential rooftop solar energy systems are expected to start from 9,500 US dollars upwards with no specific options for rebates or initiatives.

1. When did you find out about it? How did you find out about it?
2. Have you also been affected by this mandate? Do you have to install new solar panels on your house?
3. Have you heard others talking about this implementation?
4. Have people around your neighborhood/community/town had solar panels installed on their rooftops before this mandate?
5. Have you yourself installed them? Has it happened before the mandate or it is largely due to this occasion?
6. Why did you/or why do you think your neighbors decide on doing that if it happened before the mandate?

(Q2) Acceptance of the new regulations

Key question(s): What do you think about this new mandate? Do you feel like such a change in energy regulations is necessary for you?

1. Do you think that California is ready for such a step? What about the United States as a whole? Would you say this is a progressive decision for your state to make?
2. Do you feel like such activities, as transitioning towards alternative energy forms should only be voluntary initiatives or they must be mandated, like it happens currently with the solar rooftop mandate?
3. Have there been any initiatives created by the state or the federal government before in order to enhance the process of changing the energy system ?

(Q3) Environmental beliefs and concern/Economic reasoning

1. Why do you feel like this would not/would be necessary in context of Butte county and overall, in California?

(Q4) Ownership structures and public engagement

1. Do you feel like you have gotten enough support from the state beforehand for this law to be mandated in 2020?
2. How much of this process should be the state's responsibility, and how much of it is a personal initiative/agenda?
3. Have you read up or have previous knowledge on what kind of effects these kind of changes to residential solar energy would bring?
4. What about Butte county: do you feel like the local community would like to engage more in such decision-making process?
5. Do you feel like it is a cohesive community? Why so?
6. Have you ever been involved in participatory planning events (regarding energy)? What was your experience with this?

(Q5) Income

1. How much do the costs play role in this adaptation process?

(Q6) Crisis and Change (Added during field work)

1. What is your opinion on PG&E (Pacific Gas & Electric)?
2. How do you feel about the power shut downs?
3. What do other people say about PG&E? what are the current discussions on the company?
4. How does the future look like for PG&E?
5. What kind of changes could happen to the utility governance in California?

Solar mandate, energy justice and beyond

(Q7) Recognitional Justice

Key question: Which groups of people would the struggle the most with implementation of such a law?

- Who would you say would have the easiest time to adjust to these changes? Where do you see yourself in this?
- How would this affect single income families? People who are currently renting houses (not owning them)?
- Is it fair for households to pay this amount of money for installments and maintenance of this type of rooftop solar panels?

- Are households responsible to cover full costs of this mandate? If not, who is? How it can be changed?

(Q8) Procedural Justice

Key Question: Who do you think is responsible for the creation of such a mandate?

1. In future, who should be responsible for these kinds of decisions: is it an individual ambition or is it better if the state manages these kinds of responsibilities after all?
2. Do you think that personal action is necessary to ensure more sustainable future for your community?
3. How do you see future decision-making process?
4. Do you feel like the Butte county is doing its best in order to ensure the quality of life for the residents? What about the state of California? Do you feel like this is a positive decision or it has certain drawbacks?

(Q9) Distributional justice and technological factor (scale, type) + NIMBYSM/Place attachment

1. What do you think about the aesthetic changes that the installments would create for your house? Why?
2. How does the diversity of landscapes and climate of California play the role in the adaptation process?

[End of interview]

If you have questions towards, you are welcome to ask.

Interview created using theoretical framework from:

- Devine-Wright, P. 2007 “Reconsidering public attitudes and public acceptance of renewable energy technologies: a critical review.” *Beyond Nimbyism: a multidisciplinary investigation of public engagement with renewable energy technologies* 15.
- McCauley, D., Ramasar, V., Heffron, R.J., Sovacool, B.K., Mebratu, D. and Mundaca, L. 2019. “Energy justice in the transition to low carbon energy systems: Exploring key themes in interdisciplinary research. *Applied Energy* 16-921.
- Snap Surveys. 2014. “Demographic question examples.” Accessed December 10, 2019. <https://www.snapsurveys.com/blog/5-survey-demographic-question-examples/>.
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Appendix 2

This appendix gives a deeper insight on background and context of the US energy statistics and politics.

2.1. US household electricity consumption

The use of electricity is prevalent in almost all American homes, where it accounted for 44% of residential sector energy use in 2017 (EIA 2019d). Natural gas, which is used in almost 60% of homes, accounted for 43% of household energy consumption in 2017, but overall, around three fourths of the US residents use two or more energy sources to sustain their places of residence (EIA 2019d). Renewable energy sources in total accounted for around 13 % of the residential sector energy use, while solar energy, that is investigated in this research, delivers around 31% of the total renewable energy share in this sector (EIA 2019e). Even though the numbers are low, household solar systems are projected to have a yearly growth of more than 7% (Center for Sustainable Systems 2019). Overall, since the 1990s, residential sector energy consumption has remained steady, which is attributed to improvements in energy efficiency standards, better insulation of the homes and population migration to regions with lower heating that decreases the overall energy demand (Center for Sustainable Systems 2019).

2.2. Energy legislation in the US after 1970s

This shift in energy regulations in the US can be largely ascribed to the decade's energy crises (Van Doren 2016). One of them was the 1973 Oil Embargo from the Organization of Arab Petroleum Exporting Countries (OAPEC) (IEA 2019). This created an oil-supply disruption in the US and other Western nations, which led to major price increases and global energy crisis (IEA 2019). In response to this, The US Congress passed The Energy Policy and Conservation Act in 1975, which supported larger national energy generation and supply, reduction in energy demand from foreign sources and optimizations in energy efficiency and alternative energy programmes (IEA 2019; The Energy Policy and Conservation Act 1976). Later in 1977, the Department of Energy (Figure 3) was established to introduce federal energy laws and regulations that supported affordable energy and competitive markets at the same time (Cornell Law School 2017). Around the same time, the most influential state agency in the energy industry, The Federal Energy Regulatory Commission (FERC) was created as part of the Department of Energy (Cornell Law School 2017). Up until this day, the commission overviews natural gas, electricity and oil markets in the USA and manages the transmission and selling of these energies (except, oil), administers licenses and responds to environmental issues that emerge (Cornell Law School 2017). In most recent times, one of the biggest federal legislations developed is the 2007 Energy Independence and Security Act (IEA 2019). Its main purpose was to strengthen the US energy security standards, to boost the production of renewable fuels, to augment the efficiency of utilities, buildings, and vehicles, as well as to advance research on and deploy greenhouse gas capture and storage options (Energy Independence and Security Act 2007). Whereas in 2009, under Barack Obama's administration, American Recovery and Reinvestment Act was introduced to increase energy efficiency and renewable energy programmes, which included various energy tax incentives and grants for state and local governments (Amadeo 2020).

2.3. Polarization on energy politics in the US

The republican rhetoric is more conservative and mostly against the shift in energy systems because the party sees it as a potential threat to jobs in the fossil fuel industry, the expenses for renewable energy systems are very high and there are many technical issues that these alternatives would portend to diversification of the country's electric grid (Brown and Hess 2016). Meanwhile, the majority of the Democratic party sees it as a way to reduce greenhouse gas emissions, diversify energy sources for different utilities and companies with a possibility to keep the employment rates the same but by

the alternative energy industry. The transition is seen as possible through enabling various incentives and policies that help low-income communities to adjust to the future changes (Brown and Hess 2016).

2.4. California's energy transition legislation

In 2005, the state adopted Energy Action Plan II that focused on minimizing California's contributions to climate change (EIA 2019f). The plan incorporated long-term goals to reduce state-wide greenhouse gas emissions and strategies on climate change mitigation and adaptation (EIA 2019f). The state also has its cap-and-trade system for trading emissions allowances, as well as Low Carbon Fuel Standard, implemented in 2007, that targets to decrease the carbon intensity of the state's transportation fuels by incorporating fossil fuel substitutes that demonstrate lower emissions (EIA 2019f). Currently, California is involved in dozens of lawsuits against the federal government, led by the president Donald J. Trump, in order to protect some of the environmental and energy transition policies that the current government has set to revoke (Lavelle 2018; Lavelle 2019). For example, in September 2019 the presidential administration repealed the state's authority to enact the nation's most rigorous vehicle emission regulations, which has led to a legal fight between California and the federal government (Lavelle 2019).

2.5. California's solar energy statistics

Most of the utility-scale solar plants are based in the state's southeast that has desert landscapes, but the plants are also dispersed throughout the state (EIA 2019f). When counting together small-scale (for example, household rooftop solar systems) and utility-scale photovoltaic systems, these accounted for almost 20% of the state's net energy generation in 2018 (EIA 2019f). Interestingly, this amounted to nearly 40% of the nation's total solar energy generation the same year (EIA 2019f). With the combined capacity of 20,000 megawatts the installed solar systems entail, the state currently ranks as the highest solar power generating state in the nation (EIA 2019f).

2.6. Butte county energy profile

Residential electricity consumption in 2011 was estimated to be around 3 300 kWh (kilowatt hours), which is around 30 % more than California's average of 2 400 kWh (CED 2014). This trend has been steady from the period of 2007 – 2011 (CED 2014). Currently, Butte county supplies around 97.4% of its hydroelectric energy generation capacity, but only around 0.1% of solar energy (CED 2014). There were 146 newly approved solar PV installations in the unincorporated area of Butte County in 2015, totaling approximately 1,190 kilowatts (kW) of solar PV potential (DDS 2016).

2.7. More on polarization in the US energy politics

Another recent example is the Green New Deal: a legislation package that aimed to shift and increase federal investments into low carbon alternatives in the realm of energy, as well as accelerate developments in green infrastructure and develop social programs throughout this energy transition. The resolution failed to be approved due to a yet again strong opposition of the Republican party (Gardner 2019). Despite the fact that the US has a history of large party disagreements when it comes to energy transition, reforms surrounding change of energy practices in the US are more prevalent on state level, especially in the states controlled by Democrats, but these legislations are often also backed by Republicans (Brown and Hess 2016). One of the examples is the state of California that I will introduce in the next subsection.

2.8. Current energy issues and future prospects in the US

As it can be seen from the statistical data, the use of fossil fuels is prevalent in the US, but according to Huber (2013) and Miller (2010) non-renewable resources have always been at the heart of the American economics, therefore access to abundant amounts of inexpensive energy is crucial to ensure a stable economic situation in the country. Not only that, but fossil fuels have made the US one of the cheapest free market economies when it comes to electricity rates, which has been known as a major contributor to the electrification of the country, and overall economic growth (Miller 2010). However, over the past years the country has seen a variety of issues that are contingent on this dependency. One of the most prominent concerns is the rapid rise in the electricity rates, natural gas and crude oil prices largely due to recurrent events of low supplies, leading to exorbitant price levels (Miller 2010). All of this is further induced by continuous conflicts in the Middle East that have a serious effect not only on the American oil market and prices, but is reflected in an increased public anxiety over foreign resource dependability (Huber 2013; Miller 2011). US citizens are also concerned about outdated power transmission lines, potential terrorist attacks on energy infrastructure and the lack of energy resource diversity (Miller 2011). These events have rekindled public interest in “energy independence” or potential ways to ensure more trustful energy supplies in long-term without potential conflicts with other nations (Bazilian et al. 2013; Houser and Mohan 2012). According to the United States Energy Association (USEA 2002) and The National Research Council (The National Research Council 2010) these are all seen as the contemporary challenges for economic stability, energy security and the environment, which can be tackled with long-term strategies that mainly accentuate the advancement in energy technologies, diversification of energy supplies, modernization of the current energy systems and other goals (Figure 3).

Table 1. The US long-term strategies in the field of energy (Source: adapted by author from USEA (2002) and The National Research Council (2009))

Strategy	Description
Strategy 1	Deploy the latest energy technologies to ensure higher energy efficiency standards, reductions in greenhouse gas emissions (specifically, in construction, energy intensive industries and transportation).
Strategy 2	Explore new ways to diversify energy supplies through nuclear technologies, carbon capture and storage.
Strategy 3	Expand and modernize electrical transmission and distribution systems (the power grid, for example).
Strategy 4	Increase funding in private and public research to advance energy technologies.
Strategy 5	Implement more sound energy policies and incentives across various scales.

2.9. Butte county historical development

Historically, the county has been home to the Maidu tribe, who settled in Mooretown ridge by Feather river, North of modern day Lake Oroville around 1500 B.C. (Figure 4). The area experienced major transformation during California’s discovery of gold in the mid-19th century also known as the Gold Rush, which attracted thousands of people to the area of the county (Butte county 2018). Butte county

is one of California's 27 original countries, where its establishment dates back to 1850 (Butte county 2018). After a decrease in gold reserves, Butte county experienced vast agricultural development that is still one of the key economic sectors here nowadays, generating approximately 700 million US dollars gross value to the county every year (Butte county 2018). Main crops grown here are rice, walnuts, almonds and olives (Butte county 2018).

Appendix 3

This appendix clarifies the use of critical discourse analysis in my research project and delves deeper into the ethics of the interviewing process.

3.1. The use of critical discourse analysis in thesis project

CDA would serve as a great starting point to understand the current ways of seeing energy mandating influenced not only by respondents' family members, friends and local interactions, but also political ideologies embedded in the narratives of interviewees that they might not even be aware of. By doing discourse analysis as an outsider, I will then attempt to question the taken-for-granted knowledge in the gathered narratives. This is particularly relevant in the analysis of responses around the issue of energy justice, as CDA could help disclose any existing unequal power relations that are created by the discursive practices among the various sociodemographic groups interviewed (Jørgensen and Phillips). With this in mind, I could then provide discussion on the potential challenges and new perspectives that can be attributed to household solar energy mandating. Ultimately, this would help lead the research to what Jørgensen and Phillips (2002, 64) describes as "social change along the lines of more equal power relations in communication processes and society in general". Therefore, I believe that by exploring the residents' attitudes, critical discourse analysis could potentially contribute to an increased social understanding and empowerment within the framework of just energy transition.

3.2. Ethics on field: interviewing process

According to academic standard of conducting semi-structured interviews, all respondents were asked for their consent to participate in the study, thoroughly informed about the purpose of the study and about the possibilities to be anonymous (except key informants) (Harrell and Bradley 2009), to refuse to answer to certain sensitive questions and/or to withdraw from the research completely (Brinkmann and Kvale 2009). The participants were also given the author's research contact information for further questions and possible feedback. That also involved offering to provide participants with a summary of the research results at the completion process of the project.

Appendix 4

This appendix gives a summary on each analysis chapter subsection. Originally included in the main body of work, due to word limit summary has been placed in the appendix.

5.1. Crisis as a catalyst of change: summary

Crisis is indeed a catalyst for change from Butte county resident outlook. The old transmission system ignition and power shut downs as safety measures are the two defining factors that have made residents look out for changes in the energy governance. Some residents see it as a potential for public or state authorities to overtake the electricity distribution process, some rely on their individual power whether by supplying themselves with power generators or investigating the opportunities to invest in systems that would make their house off grid. Finally, the rest of the respondents see this as an opportunity to restructure the current model of the distribution company. While some scenarios of change, such as state-owned utility, happen only on a discursive level, others can be materialized

already now, so the emergence of the new model is largely dependant on who will be the agents that have enough eagerness and power to create a new way to imagine California's energy landscape: from smaller to more impressive resolutions that are yet to be seen.

5.2. In search of energy security: summary

After already having established that individual solutions, like rooftop solar with complementary systems are seen as future energy governance alternatives, I was interested in understanding how receptive the interviewees are towards the new solar mandate. More than a half of respondents saw this new mandate as a gateway to energy independence, nevertheless the experts and some of the respondents insisted that having solar on their rooftops would not ensure that completely. To be an independent energy producer, there are much higher investments to be made. Nevertheless, even with the consideration of this aspect, solar for many of the respondents was a new means for energy diversity that was also environmentally friendly and at some point it would allow them to be disconnected from the larger grid. In this sense, the increased interest among county residents in being decision-makers when it comes to energy, resonates with the concept of energy sovereignty or the individual rights to have their own saying over energy production, distribution and use. Therefore, I see energy security and sovereignty as quintessential elements in energy transition policy planning, since with the example of rooftop solar mandate, they resonate with many of the county residents, and potentially larger public in California that should be explored by expanding the sample size in future research.

5.3. *Money talks*: economic reasoning as the key element in rooftop photovoltaic adaptation process: summary

In this subsection, I have delved deeper into the possible factors that shape the interviewee attitudes towards the new law. While many of the respondents consider environmental concerns and benefits as an important factor in support of the new requirement, it is never explicitly mentioned without the economic benefits and challenges attached to it. Among most of the affluent residents, there was a support towards the mandate as it was seen as a environmentally friendly long-term financial investment, which allows it to be less dependent on the current PG&E electricity rates. Younger respondents saw the mandate as potentially burdensome due to the limited available resources that they would have if they were to invest in new housing. Older residents saw the long-term investments as a negative factor, as they would not receive the benefits of the solar energy due to their lifespan. In the case of Butte county, economic benefits have the biggest role in the receptiveness towards the new mandate. Knowing the factors that influence the public receptiveness allows for better understanding of solutions that consider both the public preferences and ensures transition to more sustainable energy alternatives. However, the urgency of energy transition may not always be in the state of equilibrium with the public desires, which is to be considered in future policy-making.

5.4. State's role in mandating household solar energy: summary

Overall, most of the respondents were in favour of mandating household energy. These were mostly young and or urban residents or people with graduate degrees or higher. Main factors for that are the environmental concerns and the ability to transition to more sustainable forms of energy that the mandate would create on a larger scale. Around a quarter of the respondents were against the mandate, mainly mentioning mistrust in state as their main argument. These participants were predominantly from suburbs of the major cities in Butte county. In addition, many of the interviewees that were pro-mandate shared the same perception of mistrust towards the government and mandating, but their final response in favour of the mandate was influenced by the economic benefits and energy security that the installation of the solar panels would ensure. The expert interviewees see these as important

elements to build a larger political support for a mandate, as it builds on direct material benefits on an individual level. Finally, I argue that the overall mistrust towards the government is part of the neoliberal entrepreneurial identity that sees the state as skewing the free market landscape. It is especially prevalent in suburban and rural contexts. Interestingly, while the new solar requirement is seen as government intervention into personal choices among a large proportion of the respondents, the combination of environmental benefits and particularly the potential energy security and energy independence makes it largely accepted by the public or seen as an exception when it comes to mandating. As already emphasized in the previous subsection, these can be seen both as favourable angles when it comes to presenting energy transition to the public in the future, but also becomes an issue of finding the balance between effective climate solutions and public desires.

5.5. *Gaps in Justice*: identifying the possible inequalities emerging from the new mandate: summary

Overall, the new mandate portends several issues when looking through the three tenets of energy justice. On a recognitional level, many residents see the mandate as expensive and potentially exacerbating the housing crisis in California. The experts saw the outright payments for the PV systems as a small increase in housing prices that mostly targets wealthy residents. In case the new home-owners or residents did not have the resources for the full payment, the alternative option of power purchasing agreement was seen as less rewarding economically among the experts. Community solar was seen as a potential option for future energy transition on a household level. In my vision, low income communities that would be interested in energy transition and increased energy efficiency standards in the future, but cannot afford renovation, could benefit from the help of GRID alternatives. Further, tenants were seen as the most vulnerable group in the mandate adaptation process, as they have no power to deduct the savings from their monthly rents in case of a major renovation. Tenants were also seen as potentially suffering if the price for the installments was seen as too high among the renters, which would lead to stagnation in housing efficiency standard improvements and therefore overall increase in electric bills in long-term. The residents also mentioned that the new law has disregarded the influence of California's diverse climate conditions as the amount of sunlight energy received varies depending on the place, which then translates into the electricity provided and money saved. Moreover, almost all of the residents felt that they have no or little influence over the decision-making process when it comes to this kind of mandate. A few of the respondents expressed that the solution to that would require larger involvement or complete control of local governments, associations or organizations.

Appendix 5

This appendix speaks on future trajectories after recognizing several justice issues of the new solar mandate.

One of the aspects to consider is the climate of California. As the state is divided in a wide spectrum of climate zones, I would like to argue for certain area exceptions, as currently the law considers only areas with large tree density and other zones that could be characterized with too much shade majority of the day (CPUC 2018). Another way to tackle this issue would be special incentives that could help out home-owners or renovators in the areas where climate conditions are less sunny throughout the year with large effects on the produced amount of energy and savings made in long-term. To continue with, tenants were seen as the most vulnerable group in the mandate adaptation process, due to the possibility of being excluded from the long-term economic benefits that the adaptation of the new requirement would create. On the contrary, home-owners who are resentful towards the new mandate due to the costs could avoid renovating their house, which in turn would lead to lower energy efficiency standards and higher expenses for energy in the future. Jenkins and Hopkins (2019) defines living in energy inefficient homes and facing high electric bills as an energy poverty issue that has been prevalent in the UK, but in connections to low income and reduced ability to improve energy

standards at home. Similarly to the research paper, I see this as an issue of energy policy (Jenkins and Hopkins 2019). I reckon that the executive agency, California Energy Commission (CEC), has the task to include specific support systems that prevent tenants from energy poverty. This could be done through certain inspections on energy standard upkeeping or analysis of the saved resources on household solar that should be reduced from the tenant yearly rent, for example. Further, when it comes to decision-making, I see potential problems with the public interest representation in CEC decisions, considering that the agency consists of a small group of executives that are in touch with various stakeholders. This in fact is an opportunity for organization of local representatives in the form of neighbourhood associations, movements or agreements on various scales that could represent their voices in the outreach with CEC.

Appendix 6

This appendix gives a deeper insight and clarifications of the theoretical framework and concepts.

6.1. Butte county spatial definition

I consider Butte county a rural area with one major urban agglomeration and prevalent suburban communities. While the majority of Butte county's population lives in the towns of Chico, Oroville and Gridley, only Chico classifies as a US Census Urban Area with more than 50 000 inhabitants, with rest of the county defined as rural accordingly (US Census Rural California 2018). On top of that, the main economic driver of the county is agricultural production and the administrative unit is also a member of Rural County Representatives of California that advocates for interests of small, rural counties (RCRC 2019). While there is no data on suburban areas of the major towns in Butte county, during my field visit, the interviewees expressed that areas like Durham, Barber and Canyon Oaks (a gated community), outside Chico, as well as Oroville Foothills and Kelly Ridge East and southeast of Oroville were all considered to be suburban.

6.2. Types of crises

Crises take up different forms: some appear to be accidental, which means that they are caused by natural or 'external' forces, like a tropic storm, crop failure or the recent Covid-19 pandemic (Utting et al. 2012). Then, there are also determined crises, which are established by crisis-tendencies or oppositions linked with particular social forms, for example crises of capitalism (Utting et al. 2012). One among a few categories is climate crisis that is related to the consequences from the impacts of climate change (Bergman-Rosamund et al. 2020). This thesis work reveals many forms of crises within Butte county that will further be analysed as drivers of perceptual change within the interviewed residents.

6.3. More information on barriers for residential solar panel adaptation among prosumers

The majority of prosumers have also mentioned the alteration of daily routines and habits due to the specific sunlight hours as a potential barrier in the adjustment procedures (Balcombe et al. 2013; Palm 2018). According to Balcombe et al. (2013) there is also an overall mistrust in solar microgeneration that stems from difficulty to find an authoritative source of information about the positive effects that the installation would imply, as well as lack of institutional assistance for these new technologies that make consumers suspicious of their choice to install solar panels (Balcombe et al. 2013; Palm 2017).

Appendix 7

This appendix gives a broader discussion on the analysis section, with complimentary thoughts in discussion chapters and deeper overview of California's 2018 Camp Fire.

7.1. Further discussion on crisis as a catalyst of change

Going back to the theoretical framework, I see the events of transmission line failures and power shut downs as crisis *of* a system (Utting et al. 2012), which in comparison to a crisis *in* a system (one that leads back to the previous order), reveals failures of the existing crisis management models, that can further escalate in change of governance demanded by society (Utting et al. 2012). While the Camp Fire was stopped, CDFFP discovered PG&E as the responsible for the ignition of fires. On top of that, the company introduced power shut downs as the only known means to cope with fires in the future, which signifies a crisis *of* the electricity distribution and management system.

7.2. Potential future outlook on energy transition in the spatially polarized Butte county

Knowing that views on mandating have significant differences across various spatial contexts, it can be seen as a potential issue for future decision-making processes in the energy transition. Based on the interview data, such factors as energy security and economic benefits were seen as potentially successful elements for positive attitudes towards mandating across the whole spectrum of voters, therefore specific focus in future investigations should be paid to these aspects, especially when intending on building larger political support. I see this as particularly problematic in energy transition process, as large-scale public success is highly dependant on individual energy security and economic profits that creates issues in the development of strategies that are more effective in climate change mitigation and adaptation or more sustainable in energy transition, but might not entail the previously mentioned benefits that reflect and speak to the bigger public in the US.

7.3. Camp Fire 2018 and societal reactions

The 2018 Camp Fire lasted for around 3 weeks, killed 85 people and destroyed around 19 000 homes, businesses, and other infrastructure (Eavis and Penn 2019). It was also recognized as the year's most expensive natural hazard where the damage is estimated to be 16.5 million US dollars (Eavis and Penn 2019). In 2019, the California Department of Forestry and Fire Protection (CDFFP) concluded an investigation with a discovery that the electrical transmission lines that belonged to the state's largest electricity utility Pacific Gas & Electric (PG&E) caused the fires. The Department explained that it was a technical malfunction of an outdated electrical system that ignited itself (Eavis and Penn 2019) This led the fire victims filing lawsuits against the company amounting to about 25 billion US dollars, which has ultimately led to the bankruptcy of PG&E. According to Bozuwa (2019) and Eavis and Penn (2019) PG&E that supplies about 16 million residents in Northern and central California, has been criticized by the consumers and legislators for their inertia surrounding the reduction of fire risks caused by the network of transmission lines and conductors already for years. The current company solution in the fight against the possible fires is mandatory power shut offs with a short time notice (sometimes less than 24 hours) that has left up to 2.7 million residents in 2019 without electricity for four days or in certain places even longer (Reyes-Velarde 2019). Due to these drastic solutions, PG&E has been widely criticized by the current governor Gavin Newsom who has also threatened to turn the company into a customer-owned cooperative run by state and local governments. As a reaction to the unfolding events, there has been a growing momentum among the affected residents to search for alternatives to the current investor-owned model that lies in between the lines of publicly or state-owned energy systems, renewable energy alternatives and decentralization (Reyes-Velarde 2019). Simultaneously, some other residents search for immediate solutions in forms of power generators for use on such occasions as these (Miranda 2019), while

others look for more long-term investments in ‘islanding’³ their house through solar rooftop systems, power batteries and generators (Sylvia 2019).

³ ‘Islanding’ refers to a state of a generator that continues to feed the circuit with power (for example, a house), even after power from the electric utility grid is no longer present (Islanding 2019).