Energy Justice or Prisoners of Property?

A Study of the Domestic Heat Transition in Occitanie, France

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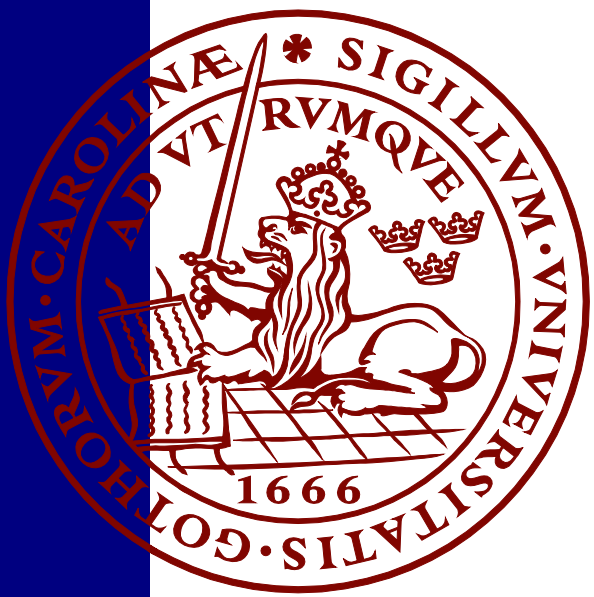

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Abstract

The domestic heat transition is pivotal for reshaping household energy consumption, representing a vital step for the EU and France in achieving their 2050 carbon neutrality targets. In France, this includes heat decarbonisation and deep retrofit, processes that are cost-intensive and raise questions of accessibility. Energy justice theory has the potential to unveil justice barriers and to address them. This thesis delves into Occitanie, France, examining the effectiveness of the MaPrimeRenov' subsidy program in facilitating accessibility to heat transition for property owners. Through qualitative data analysis of stakeholder interviews, barriers related to economic factors, administration, and information emerge. Notably fraud and challenges related to inefficient installation of heat pumps. While the French government has taken steps to address barriers, concerns persist regarding privatisation and lobbying. The analysis of the heat transition underscores the need for policies responsive to diverse contexts and household needs, providing insights for policymakers and stakeholders.

Keywords: retrofit, subsidies, stakeholder interviews, property owners, heat pumps

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List of Abbreviations

ADEME	The French Agency for Ecological Transition
ANAH	The French National Housing Agency
EDF	Electricity of France
EJ	Energy Justice
EU	European Union
DPE	Energy Performance Diagnostics
HP	Heat pump
MAR	Mon Accompagnateur Renov', the French system for counseling related to heat transition
MPR	MaPrimeRenov', the French subsidy system for heat transition
MTÉCT	French Ministry of Ecological Transition
RAPPEL	The network of actors against poverty and fuel poverty in housing
RGE	Recognized Guarantor of the Environment, label for sustainable contractors

1. Introduction

Heat is a matter close to people and their homes. More than being one of the most pressing needs for human safety and comfort during cold temperatures, heating is also one of the largest sources of global final energy consumption (Gaur et al., 2021; Meles & Ryan, 2022). In France, heating is the dominant end-use for households' energy consumption. The greater part comes from fossil fuels, in the form of natural gas and petroleum products (MTÉCT, 2022). Reducing emissions from heating is therefore a significant part of lowering the carbon footprint of the residential sector and combating climate change (Cebeza et al., 2022; McCarthy et al., 2023).

Lowering emissions from heating can be seen as a twofold transition. It includes decarbonising heat sources, but also retrofitting, which consists of increasing energy performance through renovations of the already built sector (Lowes et al., 2020; Royapoor et al., 2023). The purpose hence is not only to replace existing fossil fuel boilers, but also to reduce overall energy demand by improving thermal efficiency. This transition can be referred to as a domestic heat transition (McCarthy et al., 2023).

Both the EU and the French government are framing heat transition as a priority for emission reduction, but also a solution to address the widespread problem of energy poverty and energy vulnerability (European Commission, n.d.; French government, 2023). Over the last few years, the cost of energy has significantly increased due to Russia's war of aggression against Ukraine and the interconnection between fossil fuel and electricity pricing (Guan et al., 2023). This has led to many households dedicating a substantial part of their income to energy, and some not being able to reach a comfortable level of energy use in their home (European Commission, 2024a; Hanke et al., 2023; Lormeteau, 2021). Out of all French households, 11% count as energy poor and 26% feel cold in their homes. Even more are in positions of energy vulnerability, meaning they risk not being able to heat up their homes if faced with any changes in their expenses (Lormeteau, 2021). Addressing the demand side of energy use through increasing energy performance of buildings can be seen as a more efficient way to address energy costs than state funding to pay energy bills (Streimikiene, 2022). The domestic heat transition is therefore framed as a double solution to both lower emissions and decrease bills for households (Denise & Domergue, 2022; French government, 2023).

However, both retrofit and heat decarbonisation are very costly processes (Crowther et al., 2023; Lowes et al., 2020; Sunderland & Gibb, 2022). Against the context of energy poverty spreading in the

country, one might ask how these actions can then be accessible solutions. For a low-income property owner, planning for a heat transition might seem distant. If these households are expected to improve their energy performance, they need help carrying out renovations. To address these economic barriers and increase the number of renovations, the French government created a significant subsidy programme for property owners in 2020, called MaPrimeRenov' (MPR) (Denise & Domergue, 2022; French government, 2023). Through both financially supporting and accompanying property owners in their transition, the government aims to decarbonise the entire heating sector until 2050. With their subsidy being adapted to household income levels, the French system is considered one of the most extensive in the EU (Sunderland & Gibb, 2022).

Whether or not this subsidy programme is enough to reach these ambitious goals remains unanswered. Retrofit is known to come with many challenges (Gillard et al., 2017; Willand & Horne, 2018). Housing might be the sector where inequalities are demonstrated the most (Fondation Abbé Pierre, 2024). Without accurate design of programmes and targeted policies, inequalities related to heat transition could increase, since households with more money can pursue heat transitions, all while those in the biggest need remain locked into their housing situation (Gillard et al., 2017). Researching the social aspects of energy transition are essential, since it is touching upon the everyday lives of people (McCarthy et al., 2023; McCauley et al., 2013; Sovacool & Dworkin, 2015). How to design policies for a just and equitable energy transition remains a large question (Hanke et al., 2023).

To investigate whether the domestic heat transition in France delivers justice and a fair process for everyone, the energy justice (EJ) framework will guide this thesis. This to shine light on injustices related to heat transition and unveil potential barriers for property owners' participation. To narrow down the scope of the study, one administrative region in France has been chosen. Occitanie is one of the French regions with the highest ambitions related to energy transition (Région Occitanie, n.d.). The region also hosts a significant number of energy poverty and vulnerability (Fondation Abbé Pierre, 2023). Increasing energy performance of the residential sector in this region also has special importance when it comes to controlling temperatures during frequent heat waves (Région Occitanie, n.d.). Through pursuing fieldwork in Occitanie and listening to the experiences of local stakeholders connected to both property owners and current policies, barriers and opportunities to EJ could be unveiled. This to contribute to the possibility for everyone to take part of the transition and ensure the minimization of negative consequences for households.

1.1 Research aim and questions

The purpose of this study is to investigate the domestic heat transition in France through an EJ lens. This is especially interesting given the national objectives of reducing emissions and energy poverty simultaneously, which is seen as one of the key challenges to EJ (Newell and Mulvaney, 2013). Several works of earlier research have applied energy justice framework to issues of decarbonisation and heat transition, particularly from the United Kingdom (Calver et al., 2022; Calver & Simcock, 2021; Sovacool et al., 2019; Stewart, 2023). However, there are few studies in English looking into heat transition in France, and none were found that applied EJ theory to domestic heat transition. This thesis therefore humbly aims to fill this research gap. In doing so, the study also aims to describe the current subsidy framework, evaluate its implementation, and provide a critical view on the transition. The focus is directed to property owners, since these are the households affected by the subsidy and the households who have control over their own heating. The study aims to answer the following research questions:

RQ1: What are the mechanisms behind France's subsidy framework for heat transition?

RQ2: How do local stakeholders experience barriers to a just and equitable heat transition in Occitanie, France?

a. How are benefits and ills of the heat transition distributed for property owners in Occitanie?
b. How are experienced barriers to the heat transition recognised and addressed by public authorities?
c. How effectively does the governance framework ensure fairness and equity in the processes governing the heat transition?

2 Setting the Scene

2.1 Domestic heat transition

The following two sections will explain further what is being referred to as the domestic heat transition, transforming heating not only from the source but also from the demand side.

2.1.1 Heat decarbonisation

The French building stock is to reach carbon neutrality by 2050 according to current targets (French government, 2020). As heating is the main source of households' energy consumption, it is subject to decarbonisation (MTÉCT, 2022). In France, 41% of heating accounts from natural gas, 37% from electric heating and 13% petroleum products. District heating is only 4% and the remaining 5% are from other sources (MTÉCT, 2022). The French government has stopped subventions of new gas boilers from January 2024, and there has even been a discussion about forbidding new installations, as has been done for oil boilers (Hassan, 2023).

Heat decarbonisation can take numerous forms. Among the solutions are providing for district heating and biomass sources, geothermal techniques, solar heat, or inciting households to change their individual heating systems (IEA, 2023a; Lowes et al., 2020; Meles & Ryan, 2022). The latter can be for instance from gas or oil to a heat pump, electric radiators, or biofuels. This study will focus specifically on the heat transition that households can make for themselves, and not for example district heating. Thermal renovations and decarbonisation of individual heating systems are the solutions that households (property owners) can control directly, and that are highly supported in France (French government, 2023).

A solution embraced both in the EU and France is the utilisation of electric heat pumps (HP). HPs has been mentioned by the European Commission as a key technology for the EU to achieve their carbon neutrality goal by 2050 (Calver et al., 2022; European Commission, 2024b). A HP requires electricity to function, for example renewable energy, which gives it a big potential role in a renewable energy transition (Hassan, 2023; Lowes et al., 2020). A HP transfers calories from a refrigeration cycle, into functions such as space heating (Lowes et al., 2020; Meles & Ryan, 2022). Some can also provide cooling (Lowes et al., 2020). There are many different types of HPs, such as air-to-air, air-to-water or ground source (IEA, 2022; Lowes et al., 2020). HPs can also vary in scale, where some can be used for district heating and provide heat to a whole neighbourhood, and others are for individual houses or apartments (Lowes et al., 2020). The French government has a goal of increasing the installation of HPs in French houses by threefold until 2027, sometimes referred to as "rollout" (French government,

2024). HPs outsold fossil fuel boilers in France for the first time in 2022, compared to many other EU countries where fossil fuel boilers still outsell HPs (IEA, 2023b).

Moreover, several studies show that to lower demand and decrease energy bills, there is a need for other measures as well in addition to decarbonising heat sources (ADEME, 2024; Levesque et al., 2023; Négawatt, 2023). The authorities have shown awareness of the fact that some buildings need more actions taken to provide efficient and sustainable heating, such as renovation through retrofit.

2.1.2 Deep retrofit

Reducing emissions from heating can be done through addressing the energy performance of already existing buildings, also known as retrofit (Royapoor et al., 2023; Sovacool et al., 2019). Deep retrofit includes radical changes in older houses to reduce energy consumption, such as through insulating (facade, walls, or roof), improving ventilation or changing windows and doors (Aussilloux & Baïz, 2020; Dubois & Allacker, 2015). Deep retrofit is said to be more efficient to lowering emissions than only changing the heating appliance, sometimes referred to as a "shallow retrofit" (Hondeborg et al., 2023; Négawatt, 2023). Shallow retrofit might even create a situation of lock-in for households, since it does not have major energy gains and might drive households in the wrong direction (Dubois & Allacker, 2015). A more energy efficient building keeps heat for a longer time and will be more adapted to low power heating systems (Lowes et al., 2020; Sovacool et al., 2019). If done extensively, deep retrofit is said to have the same potential for carbon reduction as Carbon Capture and Storage, which demonstrates the large potential of buildings' role in climate change mitigation (Royapoor et al., 2019).

The French buildings stock is old, and many houses have low energy performance. This concerns the overall effectiveness of a house in terms of energy usage and environmental impact (Levesque et al., 2023). Since 2015, the French government has made renovation of buildings a priority (RAPPEL, n.d.a). Especially the houses built before 1974 and even more those built before 1948 (MTÉCT, 2022). After the second world war, the need for housing in parts of Europe was enormous and many buildings were built quickly without extensive insulation standards (Larcher, 2023; Royapoor et al., 2023). This type of housing that has the lowest energy performance is referred to as "thermal sieves" (passoir thermiques) in France. This means that heating or cooling disappears through the walls as water through a sieve (French government, 2024). One out of five of all residential buildings in France are classified as thermal sieves (MTÉCT, 2022b). In France, the Energy Performance Diagnostics of buildings is measured on a scale called DPE, where F-G are seen as thermal sieves, and A-B as low emission. Only 5% of the French building stock is diagnosed with A or B (MTÉCT, 2022b). The ambitions are high to

make the entire buildings stock low consumption (A-B) until 2050, according to the French law for green growth (Aussilloux & Baïz, 2020).

Thermal sieves emit a lot of GHG emissions due to their inefficient consumption and are very costly for their inhabitants (Denise & Domergue, 2022). Retrofit is therefore made a national priority both to lower emissions and help households (French government, 2021). The French government aims to induce renovations of 500 000 houses per year until 2025, half of them expected to be owned by low-income households (Aussilloux & Baïz, 2020). Retrofit would help many households escape high energy bills and the negative spiral of energy poverty and vulnerability (RAPPEL, n.d.b). Heat demand reduction through retrofit is also made a top priority on the European agenda as it is being demanded by the EU Renovation Wave and the Fit for 55 package (Lowes et al., 2020). In France, there is a discourse of "massification" of retrofit (Aussilloux & Baïz, 2020). Over the past 20 years, the French government has put into place several policies to incite retrofit, the last one being MPR in 2020, that replaces several earlier programmes (Aussilloux & Baïz, 2020).

2.2 The French subsidy framework

To ensure the heat transition and achieve targets, France has implemented a subsidy framework to help households pursue heat decarbonisation or deep retrofit. It is called MaPrimeRénov' (MPR), meaning "my renovation bonus". It provides financial support for property owners (Denise & Domergue, 2022). It is especially adapted to low-income property owners, aiming to address the cost of renovations through covering their expenses (Aussilloux & Baïz, 2020). It encourages both major renovations for substantial energy savings (deep retrofit), and smaller upgrades of heating systems (heat decarbonisation). The government allocates significant funding aiming to renovate millions of homes, reduce energy bills, and accelerate energy savings (MTÉCT, 2017; 2022b). To participate in the programme, one must reach certain conditions related to income level, use the property in question as a preliminary residency and only collaborate with renovation companies that have obtained the sustainability label called "RGE" (Aussilloux & Baïz, 2020). The subsidy is managed by ANAH, the national agency for housing in France. Throughout the process, local energy offices named in French "guichet France Renov'" have been installed to spread information in different local contexts (French government, n.d.). In Occitanie there are 31 local energy offices (Région Occitanie, 2024). Since the relevant households in this topic are property owners, the terms will be used interchangeably. The subsidy framework is complex and will therefore be described as part of the results section.

2.3 Occitanie

Occitanie is the fifth biggest region in France, and home to the two large cities Toulouse and Montpellier. Occitanie has a key policy as a "Energy Positive Region", where one of the main targets is to lower energy consumption by 40% until 2050 (Région Occitanie, n.d.). In Occitanie, the residential sector accounts for 29% of the regional energy consumption (AREC Occitanie, 2021). Typically, heating accounts for 60% of household consumption (AREC Occitanie, 2021). To lower emissions from the residential sector, the region focuses on heat transition among other actions (Région Occitanie, n.d.). Even though most of the regional heat consumption is electrical, gas and petrol together make one third of the consumption based on fossil fuels, which must be lowered for the region to reach their goal of net-zero emissions by 2050 (Région Occitanie, n.d.). This indicates among other things that many buildings have to be retrofitted. 52 000 houses have to be renovated per year until 2030, and all residential houses are to reach DPE level B or A until 2030 (Région Occitanie, n.d.).

Figure 1. Map of France indicating the position of Occitanie in red. Created with Mapchart.net.

While heating remains a significant concern, the primary focus regarding energy usage in the region is shifting towards coping with rising summer temperatures. As indicated on the map, Occitanie is situated in the south of France. Winters there are mild, and temperatures seldom go below -5°C. Still, this does not mean that winters cannot be experienced as cold indoors if one cannot afford heating (Fondation Abbé Pierre, 2024). However, protecting people from heat waves is an even bigger mission. The insulation problem of the thermal sieves is just as bad in the summer (Fondation Abbé Pierre, 2023). Average energy poverty in the region is 13.63 %, which is slightly higher than the national average (TerriSTORY, 2024). Many are therefore struggling to keep tolerable temperatures both in the winter and the summer. There are large differences in energy poverty levels between the departments

of the region. The department Hérault has 11.03 % and Haute Garonne only 9.49%. The neighbouring department Ariège has almost double the rate of 20.82% (TerriSTORY, 2024). This indicates that the region hosts a lot of internal inequalities, at the same time as they have ambitious targets related to heat transition. Looking into justice aspects here could therefore be of importance.

2.4 The need for just transition

A transition to sustainable heating solutions is needed in France, yet the associated costs pose a significant challenge for many households already struggling with heating expenses. Transforming household energy systems presents big opportunities as well as risks, since both are complicated processes. Earlier literature demonstrates that some households might experience negative consequences by new low-carbon innovation technologies as well as retrofit (Calver et al., 2022; Hanke et al., 2023; Sovacool et al., 2019). Negative outcomes of heat transition could be e.g. higher energy bills after new heating appliances are installed, gentrification and raised rents (Calver et al., 2022; McCarthy et al., 2023). Another example is that when many households switch to clean heating, gas prices can rise and those who are still connected to the gas grid will have to bear these costs (McCarthy et al., 2023).

Without caution, any sustainability transition might lead to increasing social injustices (Newell & Mulvaney, 2013; Sovacool et al., 2019). New policies might even push some groups of people into new situations of poverty (Sovacool et al., 2019; Stewart, 2023). In the transition to low-carbon technologies, there is a concern that transition will depend on who can afford it (Crowther et al., 2023). There is also an identified challenge of the behavioural and technological engagement of households to achieve the required changes (Royapoor et al., 2023). There are therefore matters related to heat transition that risk to deepen inequalities between societal groups (McCarthy et al., 2023). Moreover, heating is at the core of households' health and habits, and it is seen as one of the most difficult households' energy uses to change (Calver et al., 2022).

Questions such as "Who bears the cost of the transformation and who reaps the benefits?" are central in technological transitions to ensure safe and just outcomes (Gillard et al., 2016). Retrofit programmes ought to be designed and evaluated to reduce social risks in their outcomes (Calver et al., 2022; Royapoor et al., 2023; Streimikiene, 2022). Further analysis of different financial models and changes in habits and obligations of different actors, such as property owners, is mentioned to be of great value (Lowes et al., 2020). Especially for households that experience energy poverty (Streimikiene, 2022). To give everyone a fair starting point to transition, there needs to be more studies and policy attention towards aspects of EJ in decarbonisation policy. EJ is concentrated to assuring everyone has safe,

affordable, and sustainable energy (McCauley et al., 2013). This aim reflects the UN's Sustainable Development Goal 7 (United nations, n.d.). A first step to get there is to get an overview of current injustices and their causes (Hanke et al., 2023). There are signs that the French support programme is not advancing the transition fast enough (Aussilloux & Baïz, 2020; Denise & Domerge, 2022). I therefore chose to look more closely at the French example.

3. Theory

In the following section, I will explain the EJ theoretical framework with its three tenets as well as how it is interpreted for this thesis.

3.1 Energy justice

The Energy Justice (EJ) framework seeks to apply justice principles to energy transition and the policies behind it (Hanke et al., 2023; Jenkins et al., 2016; Sovacool & Dworkin, 2015). Applying the theory can be done to notice where injustices emerge and what can be done to address them. It becomes a key entry point for analysing socio-economic impact of energy policies, and thereby reducing potential negative effects (Lormeteau, 2021). The EJ framework combines natural and social sciences, providing for systems thinking that is necessary to address sustainability issues (Jenkins et al., 2016).

In this thesis, EJ will be used as an analytical tool to investigate potential injustices related to the domestic heat transition in France. This study will use the three tenet approach, distinguishing justice into distributional, recognition and procedural justice. The tenets can be especially useful when using EJ as an analytical tool (Jenkins et al., 2016; Sovacool & Dworkin, 2015). Nancy Fraser mentioned the advantage of differentiating the tenets in order to find their causes and solutions, since for example distributional injustices and non-recognition come from different sources (van Uffelen, 2022). However, the three tenets also compound each other, and it can be advantageous to look at moments when they interlink (Wood, 2023). Relating to environmental justice, Schlosberg said “one cannot simply talk of one aspect of justice without it leading to another” (Gillard et al., 2017; Schlosberg, 2004). In real life, a situation of injustice is not divided into distribution, recognition, and procedure. An EJ analysis should therefore take into consideration the holistic image of for instance an experience of injustice, and consider potential crossovers in the analysis (Wood, 2023).

Within EJ literature, there are many ways of defining justice, an ancient term (Jenkins et al., 2016). In EJ theory, justice is often seen as “fairness and equity” (Galvin, 2020). However, the word has other connotations within the environmental justice and civil rights movement that EJ stems from (Galvin, 2020). For example, justice for the subordinate groups that were or are still severely abused and deprived of their rights. Wood (2023) claims that if a theory does not carefully draw upon the concepts from which they come from, they might lose their meaning. As a researcher one must therefore stay close to a deep understanding of justice and not fall into conceptualisation (Wood, 2023).

The order of the tenets will be as follows: distributional, recognitional and procedural. Their order is based on the logic mentioned in Jenkins et al (2016). If an injustice is to be addressed, one must first identify the concern and see how benefits and ills are distributed, then investigate who is affected and recognised and last to see whether the process itself is fair (Jenkins et al., 2016). If a process truly relates to energy justice, all three tenets should be present as from the operationalizations below.

3.1.1 Distributional justice

Distributional justice distinguishes inequalities in relation to the allocation of positive and negative outcomes of energy policy, as well as the responsibilities that come with these (Hanke et al., 2023; Jenkins et al., 2016; McCauley et al., 2013). It indicates that every member of society should have the same access to energy goods and services (Jenkins et al., 2016; Royapoor et al., 2023). It also concerns how free an individual is to make decisions over their own consumption (Jenkins et al., 2016).

In this thesis, distributional justice takes form in the allocation of especially burdens in relation to heat transition. It helps investigate who experiences the transition as a burden, to distinguish and address these issues.

3.1.2 Recognition justice

There are many different definitions of recognition justice within EJ literature (van Uffelen, 2022). Nancy Fraser explained that misrecognition is wrong because it prevents people from participating equally “as peers in social life” (Fraser, 2000). If non-recognition is what happens when some groups cannot participate as peers to the rest, recognition then ought to be the actions or phenomena performed by public authorities to make everyone gain their best potential, from their needs, to participate in whatever matter is at hand. Recognition justice aims for everyone to be equally able to be represented and have the same political rights, without any cultural domination and disrespect (Hanke et al., 2023; Jenkins et al., 2016; van Uffelen, 2022). In a process, recognition justice looks towards whose needs are being recognized and the equal ability to participation (Gillard et al., 2017; McCauley et al., 2013; Royapoor et al., 2023).

In this thesis, recognition justice means that everyone can participate in the transition as peers, no matter who you are. If certain groups have special needs to participate, this ought to be recognised and addressed by public authorities to assure an equal transition.

3.1.3 Procedural justice

Procedural justice concerns the access to distributional processes that for instance allocates resources and determines compensation of harms (McCauley et al., 2013). These should be equitable for every

concerned actor (Hanke et al., 2023; McCauley et al., 2013; Jenkins et al., 2016). It can be explained as due process and good governance, access to information, transparency, accountability, and informed consent (Brandstedt et al., 2024). Gross (2007) also stresses that all actors are given adequate information and that there is impartiality of the decision makers. Everyone's access to full information is a highly relevant aspect to procedural justice, in order for everyone to be aware of their possibilities (Gross, 2007; Jenkins et al., 2016). Especially in the case of heat transition, since it is a very technical topic, and households rely heavily on the information that is provided to them.

In this thesis, I will therefore narrow down the scope of procedural justice to mainly due process, adequate information, and impartiality of decision-makers. I am aware that these are only a few aspects of a fair process, but I refrain from analysing participation in decision making and citizen expression, since that is not within the scope.

4. Methodology

4.1 Research design

The study was made with a method of semi-structured interviews with local stakeholders. The interviews were conducted during a period of fieldwork based in Montpellier, France from January to April 2024. Learning directly from the area where the phenomena is happening provides opportunities that the library or classroom cannot provide (Hammett et al., 2015; Silverman, 2017). Being in the field can also help defining important actors and getting in touch with them. To approach the relevant actors, snowballing sampling was done. This method can be efficient to get the relevant contacts (Bryman, 2012). Each interviewee gave suggestions to other contacts, as well as inquiries to the topic itself through suggestions of material. This made the functioning of the interviewees close to "key informants" (Bryman, 2012). When interviewees have this role, there is a risk that they can "steer" the research (Bryman, 2012). For example, who you first speak to matters because they will guide you to the people they know. However, since the interviewees were chosen for their position and relevance to the topic, bias should have been avoided. I have chosen to conduct qualitative interviews for this study since my topic aims to understand how different actors in a certain area experience the domestic heat transition. Qualitative data collection is suitable for a topic that aims to understand how people experience situations (Silverman, 2017). When involving a variety of stakeholders, a qualitative method is suitable to gain in-depth insights of the many perspectives at hand (Bryman, 2012).

It was important to me that the topic was related to contemporary issues in the region. The topic therefore took form after speaking to the first informants. Energie Solidaire is an NGO that stems from the energy producer Enercoop, which is a renewable citizen energy provider. They were created to contribute to alleviating energy poverty (Energie Solidaire, n.d.). I knew they were closely engaged in energy and social change topics, so I was positive to meet them early in the process; they provided insights on which issues to explore and whom to engage with. Within sustainability science, listening and collaborating to different stakeholders and looking into "real-world" problems is of high importance, to create efficient research for sustainability outcomes (Lang et al., 2012). Below is a table demonstrating the interviews that were conducted for the study.

Table 1. Interviews and observations conducted for this thesis (Author, 2024)

Interview set A: Local NGO's				
Date	Location	NGO	Interviewee	No.
6 January 2024	Montpellier	Energie Solidaire	Regional project manager	i1
21 February 2024	Paris (online)	Energie Solidaire	National project manager	i2
27 February 2024	Perpignan	Habiter en Terre Catalane	Director of NGO	i3
28 February 2024	Perpignan	Habiter en Terre Catalane	Social worker	i4
9 March 2024	Montpellier	Fondation Abbé Pierre	Project manager	i5
Interview Set B: Public actors				
Date	Location	Organism	Interviewee	
15 February 2024	Montpellier (online)	Région Occitanie	Head of energy transition	i6
19 March 2024	Toulouse (online)	Région Occitanie	Head of housing and renovation	i7
22 March 2024	Paris (online)	National Housing Agency (ANAH)	Public servant	i8
29 April 2024	Montpellier (online)	Regional council	Elected politician	i9
Interview Set C: Researchers				
Date	Location	Organism	Interviewee	
7 March 2024	Rennes (online)	Rennes University	Researcher	i10
6 March 2024	Brussels (online)	Regulatory Assistance Project	Researcher	i11
Interview Set D: Local energy offices that receive households				

Date	Location	Organism	Interviewee	
4 March 2024	Cahors (online)	Local energy office, Quercy Energies	Household energy advisor, project manager and engineer	i12
26 March 2024	Montpellier	Local Agency for Energy and Climate	Household energy advisor	i13
4 April 2024	Ariège (telephone)	Local energy office	Household energy advisor	i14
6 April 2024	Muret (telephone)	Local energy office	Household energy advisor	i15
Observations				
Date	Location	Description		No.
29 February 2024	Montpellier, city hall	"Café Climat" about subsidy MPR		o1
21 March 2024	Toulouse, online	Webinar about subsidy MPR		o2

4.2 Data collection

The actors above were considered to have lived important experiences of the transition. The different categories represent different types of interviewees. Group A consists of NGOs related to social justice and housing and have knowledge about the local difficulties of the situation. Group B are public actors present in the decision-making and planning of the renovation programmes. Group C has an academic perspective on the heat transition. Group D, which might be the most important group, work directly in contact with households that are in the process of doing retrofit, guided by the local energy offices. A naturalist approach was used when assuming that the answers were direct representations of the interviewees' experiences. Semi-structured questions left space for the interviewees to explain their situation and adjust the topic if they wished, in contrast to a structured interview (Bryman, 2012).

The interview questions were written in ways to approach contemporary issues relevant to the theory. Asking the research questions directly to interviewees should be avoided (Silverman, 2017). Therefore, the interview guide in Appendix 1 was inspired by the three-tenet framework, guiding the questions to get answers relatable to a theoretic understanding of EJ. However, the interviewee selection includes a large variety of actors from different sectors and the interviews sometimes had in-depth tendencies. The questions were therefore also adapted to each actor. All interviews were recorded either with an external microphone or a tool recording the screen. Transcription was done using IA

Speech-to-text provided by Google. The interviews were conducted in French, and the data was kept in French to keep the nuances of the answers. Two observations were done, where I participated in public information spreading events. I took field notes during the presentations and the data was mostly used for the general comprehension of the subsidy system, and the descriptive RQ1 answered in chapter 5.1.

4.3 Qualitative data analysis

The interview data was thematically coded to organise the answers and respond to each RQ. Thematic analysis is one of the most common qualitative approaches for analysing interviews (Braun & Clarke, 2006; Bryman, 2012). In a thematic analysis, the transcripts are read several times, and themes and subthemes are identified from the data (Bryman, 2012). The software NVivo was helpful to organise the coding. The thematic analysis was done inductively, letting the material speak and gather and identify what themes were the most present.

A theme can be described as a key idea or pattern from the data that relates to the research question and says something about the gathered interviews (Braun & Clarke, 2006). It can be seen as "stories" that are identified when searching across the data set (Braun & Clarke, 2006). It draws patterns and meaning from the data that ties back to the aim and theory of the research (Braun & Clarke, 2006; Bryman, 2012). When coding data thematically, the researcher has a large role and one should reflect upon possible unconscious biases (Braun & Clarke, 2006; Olmos-Vega et al., 2023). Since I was coding through my interpretation of the theory, there might have been themes that I did not identify. However, I aimed to only reflect what was said without imposing my own ideas. This makes a description-focused coding, that aims to understand the answers and solely "report back" what the interviewee said (Braun & Clarke, 2006; Bryman, 2012).

4.4 Epistemological reflections

This thesis aims to identify different experiences and recognize the dilemmas of the situation, stemming from the fundamental question "What is going on here?". Knowledge has been created through listening to other people's experiences. This to the aim of achieving a more realistic description of current circumstances in the chosen region. The philosophy of science of critical realism acknowledges reality as profound and existing, whether we are there to observe it (Fletcher, 2017). There are facts that are independent from our knowledge, which differs from the purely positivist or constructivist approach. It is not through human observation that phenomenon exists, neither are they all cognitively constructed. Instead with a critical realist approach, we aim to understand the situation through theory, analysing the social problems at hand and suggesting possible outcomes for change

(Bryman, 2012). Critical realism can be a useful tool for searching for causality and finding the roots of problems. In this way, theory makes us come closer to the real nature of things, and to see the truth and what can be done about it (Fletcher, 2017).

4.5 Ethical considerations and positionality

Reflection upon positionality is essential in all research to ensure transparency and consideration of how the role of the researcher may affect the results (Holmes, 2020; Olmos-Vega et al., 2023). A research project like this thesis has built-in subjectivity in several ways related to e.g. the choice of the topic, method, and theory. Sustainability science is inherently normative (Olmos-Vega, 2023). Looking into accessibility to transition stems from values such as equity and care. I personally stand for an environmentalist, feminist, and anti-capitalist perspective. The questions asked to the interviews might have been related to my subjective understanding of the situation. However, through acknowledging these biases and keeping a transparent inductive methodology, I aimed to uplift the answers of the interviewees, rather than impose my own assumption.

Although I speak French fluently and have lived in the country for several long periods, I still come from the outside and my experiences are formed from a Swedish context. Since I have not extensively experienced insufficient heating systems or energy poverty myself, I tried to reflect only what the interviewees said instead of imposing my own assumptions. Being non-native in French, I acknowledge the possibility for misunderstandings and nuances lost in translation, though recording and transcription ensured the collection of all vital information. Adhering to ethical principles, I secured oral consent from interviewees for recording and quoting their responses, opting to anonymize identities and retain only their professional roles. The research adhered to the ethical guidelines set forth by the Swedish Research Council, with consent obtained for referencing organisations by name.

5. Results and analysis

The following section describes the results from the interviews and observations, with references to each interview and translated citations. The first section answers to the more descriptive RQ1, explaining the mechanisms of the French subsidy system. The second part includes the thematic analysis, answering to RQ2 of what barriers exist to a just and equitable heat transition for property owners in Occitanie. The third part includes the EJ analysis, going deeper and answering to the EJ-related RQ2 (a-c).

5.1 The French subsidy framework

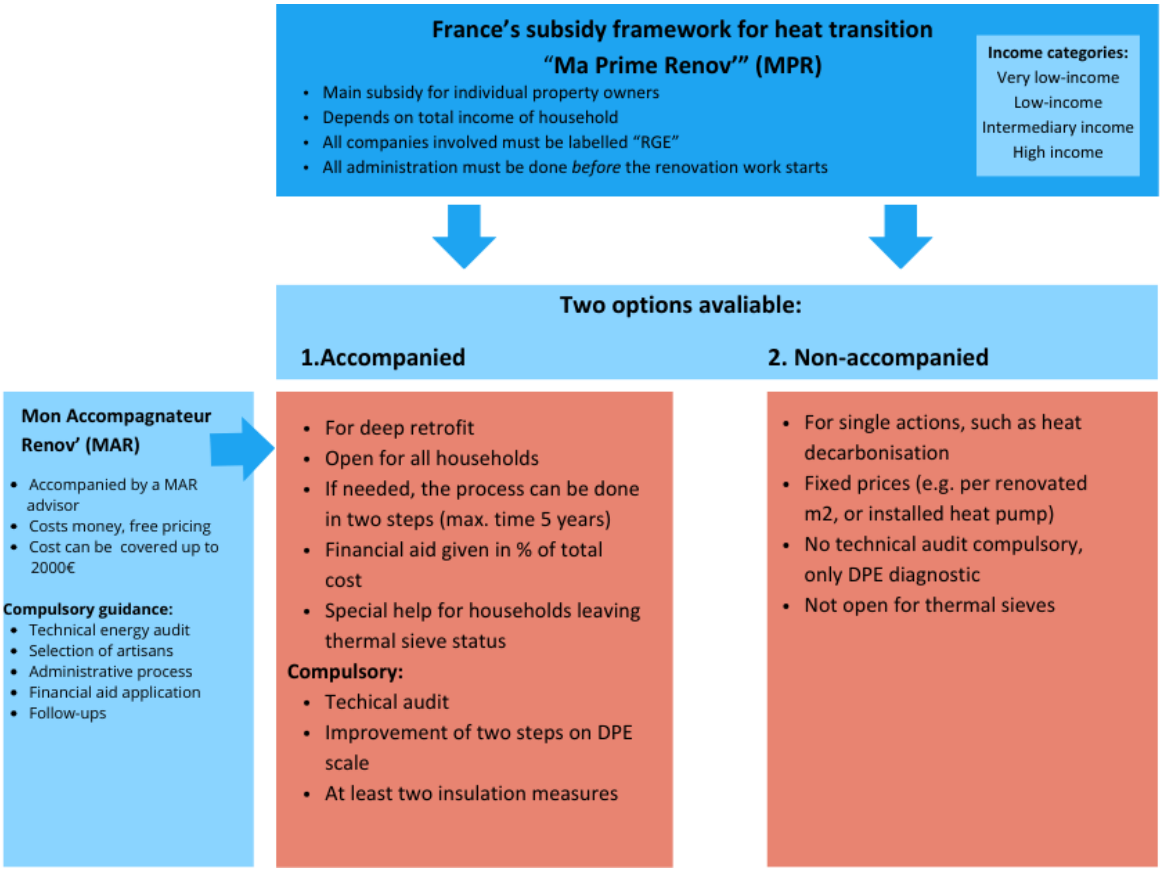

Figure 2. Illustration of the mechanisms behind the French subsidy framework for heat transition. Author's own figure.

The figure above illustrates the current subsidy framework MPR as it is functioning in 2024. The information was retrieved from observations during two public information sessions, one by the city of Montpellier and one by the city of Toulouse (o1, o2). It contains the necessary steps to be eligible for MPR, and the two different options available. Today, property owners in France can choose to either go through with a deep retrofit and therefore choose the option that obliges to be accompanied

by an advisor that is labelled Mon Accompagnateur Renov' (MAR). These can be for instance architects or consultants. Or the household can choose to go for smaller single actions, without the need to have an advisor. The household must find the MAR advisor on their own since local energy offices must stay neutral.

The figure shows that the subsidy is extensive, for example the subsidy can be given in relation to the total cost. However, to get subsidies for a deep retrofit, there are many guidelines and obligations, such as a full technical audit and collaboration with a MAR advisor. The MAR advisors help in exchange for a cost. The household can get this cost covered up to 2000 euros, however the cost might be higher due to free pricing. If a household wants to do a "shallow" retrofit, and only change the heating system, they must have a higher DPE level, since it is not available for thermal sieves.

How this framework and its earlier versions have been experienced locally will now be reflected in the following results section. More information of the subsidy systems' functioning, and specific descriptions of income levels is available on the French government's website (French government, n.d.).

5.2 Experienced barriers

The following text illustrates the barriers experienced by local stakeholders. The barriers have been identified through a thematic analysis from interview data. They are divided into three main categories: economic, administrative and information barriers.

5.2.1 Economic barriers

Living in a house with low energy performance

The buildings with the lowest energy performance should be addressed first, following the logic of earlier mentioned targets and policies. It is frequent that the houses that need the most work are owned by those who have the least resources (i12, i5, i2). Living in a house that consumes a lot of energy can lead to a vicious cycle of reinforcing energy poverty, where individuals cannot afford neither heating nor improving their energy performance (i4, i5, i12). They are in these cases locked into their property of low efficiency and high consumption, as mentioned in the quote below.

> Some are taken hostage by their properties. At one point, they might have been able to buy a house, but later they didn't have enough money left to renovate it. They later suffer from poor insulation and high energy prices. (i5)

Moreover, some households have fallen into poverty *because of* the standard of their property. Especially those with the combination of heating from electric radiators and bad insulation or living in a thermal sieve (i4, i5). In France, the electricity prices went up by 8-10 % in January 2024, depending on different electricity contracts (EDF, 2024). These groups are therefore in a position where they would need retrofit to improve their situation but cannot afford it. If economic burden remains a barrier, those living in thermal sieves will continue to pay significant amounts of money for their heating (i4).

> In a thermal sieve, all heating disappears through the walls, roof or windows. (i4)

Especially vulnerable groups are elderly in rural areas, those who have inherited property or those who might once have been able to buy, but later could not afford to renovate or improve it (i11, i12, i5, i4).

Household's costs

Many interviewees have experienced that economic burdens remain a large barrier and are the most negative outcome for property owners that take part in the heat transition (i2, i12, i3, i7, i13, i14, i5, i9). Not many property owners can afford to perform the retrofit actions that would be necessary for them to optimise their heating and get less expensive and more sustainable houses (i2, i12, i3, i7, i13, i14, i5, i9). A deep retrofit can cost between 22 - 50 000 euros or more (i9, i13). For those that get access to the subsidy programme MPR, the subsidy does not cover all costs, and depending on the income level of the household, there are remaining costs to pay (i2, i12, i7, i13, i14, i8, i5). As the quote below illustrates, this can be a barrier to many.

> Even if the household is just supposed to pay 10% of the total cost, it can be 5000 euros out of 50 000 euros, those 5000 euros might be impossible to find. (i13)

In many cases, households also need to forward the costs before getting the subsidy, which is also impossible for many (i12, i13). This leads to a situation that many of those who need retrofit, still can't afford it even though they are subsidised.

5.2.2 Administrative barriers

Inertia of paperwork

Several interviewees mentioned that the paperwork for the subsidy is complex and time-consuming (i12, i2, i5, i9). To receive the money, all the paperwork must be done (i13). This can lead to situations

where households are forced to wait long periods before being able to start improving their home (i13). So, in addition to the above-mentioned economic difficulties of the household, there is an inertia of the administrative process that can lead to long waiting times, during which households continue to pay for the high energy bills that they are trying to escape (i7, i9s).

Moreover, a big part of the process is online on the government's website, which can be a barrier for those that are not used to digitalised processes (i10, i11). Far from everyone handle administrative tasks with ease (i2, i10, i8). There is a difficult bureaucratic language and technical process, as the quote below indicates.

> There is a saying that if you get one comma wrong, your application will be denied. (i2)

There is a risk of a well-educated middle class having higher opportunities to get hold of financial aid and take part in the process, since they know where to look and how to do the paperwork (i11).

Cognitive load

For the households experiencing hardship such as poverty, illness, or degradation, planning for retrofit and improving their situation might be increasingly difficult due to the complexity of their situation (i12, i5). The reasons are more than economic (i12). For example, having the mental space to plan a renovation, as mentioned in the quote below (i12, i5, i4, i6).

> Life is not simple. We all have our issues. Some might have children who are sick and in this case, it would also mean that when we come home from work, they have to open the computer again and take care of a renovation process, which means calling different companies and going through technical details. This is far from evident for everyone. (i12)

There is a big emphasis from several interviewees on the cognitive load that comes with organising the retrofits (i12, i13, i4, i9). It is not only from planning it financially, but also e.g. imagining future projects and contacting the right contractors to pursue the renovations (i12, i7, i2).

Lack of multidisciplinary approaches

Some informants mentioned that there are professionals that are supposed to guide households in their processes, such as the MAR advisors, that do not have the right balance between technical, social, and administrational knowledge (i14, i5). Some advisors are engineers but lack the social aspects of understanding the difficulties of for instance energy poor households (i5). Others are great administrative workers, but do not have the capacity to make a correct energy audit (i14). All advisors

are supposed to make visits to the houses that they work with, to make a correct audit for the renovation, but not all of them do this (i3, i4, i12, i14).

> Some will be purely administrative, others will be more technical, and from my point of view, there is a lack of technical expertise on the part of some advisors which can be damaging. (i14)

This gives room for incorrect retrofit that leads to inefficient renovations. Several actors said that multidisciplinary solutions are most suitable (i5, i15).

Frequent changes in policy

Yet another administrative barrier is the fact that the political measures that control the heat transition are subject to very frequent changes (i12, i13, i7, i8). The national agency for housing (ANAH) changes the rules very often, as they try to improve or change the budget of the system (i13, i2, i7, i8). This becomes a risk, since the changes and difficulties of distinguishing the right information creates a fatigue that might lead to unfinished applications. Even the actors who work with these programmes every day experience the administrative tasks as difficult to keep up with, since the rules change so often (i13, i14). For households, this can be very frustrating, especially if they change when you are in the middle of a renovation process (i12). According to an interviewee, ANAH should instead leave the time for local stakeholders to appropriate the policies and create stability (i13).

5.2.3 Information barriers

Information access

A significant obstacle for many households is how to get hold of the correct information. Some people are "invisible" to the system, meaning that they are not applying for the subsidies or getting in contact with the right people, because they simply haven't heard about it (i4). Getting the right information to these people is a big challenge, especially if they are not used to digital tools (i10, i4, i8).

Fraud

When households do not get the right information, the interviews have shown that there is a risk of becoming subject to fraud and dishonest companies in the sector of heat and energy retrofit (i2, i4, i5, i7, i8, i9, i10, i12, i13, i14, i15). There are many renovation processes and especially actions for heat decarbonisation that have been done incorrectly without enough technical adaptation to the specific house. This has led to some households getting an even less energy efficient home in the end (i5, i12,

i14). The governmental service responsible for combating financial circuits (TRACFIN), is said to have warned the government that about 400 million euros from the subsidy has gone to fraudulent actors, often abroad (i15, Le Figaro, 2024). Public finances have been exploited by salesmen who claim to be thermal engineers (i15). One interviewee from a local energy office mentioned how this kind of financial interest have affected the choice of insulation material.

> I see tendencies where contractors don't mind proposing polystyrene insulation on old stone houses, and the regulations don't forbid it. It's clearly in their interests or because of the lobbies of material sellers. It's important to know that technically, it's against the law to use polystyrene on stone masonry, and yet today this happens. (i14).

These tendencies have led to many households getting retrofit actions that are not adapted to their house, such as the wrong type of insulation installed or an unsuitable electric HP (i13, i7).

Lack of trust

The high frequency of fraud has led to many households being suspicious of the heat transition (i7, i12, i8, i14). Simultaneously, the number of local, honest contractors who do the renovation measures are decreasing. One of the criteria to get hold of the financial aid MPR is to be engaged with a contractor that is labelled by the state as a "sustainable retrofit company" (RGE) (i7). However, several experiences show that many of the fraudful actors still had the RGE label (i7, i13). This has made the number of local contractors decrease, since many have lost motivation to stay within a market where they compete with unserious actors (i7). This makes it increasingly difficult for households to find suitable contractors to help with their renovations, and they must employ companies that come from far away and are not aware of the local context of for example their type of house (i7).

> A lot of people I meet do not have any trust left. They might say "the neighbour fell into a scam, and he now has his boiler in the corridor and his insulation caught fire". Yes, today some people have insulation in the attic that's catching fire. For example, because the right protection hasn't been put in. This is typically the scheme of a company that comes and blows its insulation into the attic without having been in the house before. They didn't know that protection was needed because the technical audit was made over the phone. (i7)

As the quote above indicates, many households have heard their neighbours getting subject to fraud, for example even having their insulation catch fire due to unserious installations (i7). This lack of trust is said to be one of the biggest barriers for households to go through with retrofit (i7, i14, i12).

5.3 Energy justice analysis

In the following section, the results will be analysed through an EJ lens starting with distributional justice followed by recognition and procedural justice. The analysis is done in relation to the definitions of the tenets in chapter 3.

5.3.1 Distributional justice

The following section will discuss the distributional justice aspects of the heat transition, tying back to RQ2 (a). The interviews have shown that the barriers are often distributed in an accumulative way. This can mean that the households that are having economic difficulties, also experience burdens relating to administration and information. Groups that were especially mentioned were elderly, sick and energy poor. The households that are experiencing the barriers are also often those that need to improve their heating situation the most, and therefore end up being put at risk from engaging in the transition. Especially regarding large expenses, fraud, and getting worse energy performance in the end.

This can be illustrated with an example from the interviews. In earlier years, to get the subsidy from MPR there was an obligation to increase the energy performance of the house by 35%. An accessible way to do this was to install an air-to-air HP, that immediately moved your house from F to D on the DPE scale according to the measurement criteria (Denise & Domergue, 2022, i3). These HPs can sometimes be reversible and provide air conditioning, which is very attractive in the region especially for households that have bad insulation and suffer terribly from heat in the summer (i12). However, if a HP is installed in a poorly insulated house, it will not always work efficiently (Négawatt, 2023). The HP will have to be used extensively to provide enough heat, and the energy bills can become expensive (i5).

> We have seen situations where a household had someone install an air-to-air heat pump, but they were no longer using it because it had become too expensive. They suffered from the cold and instead used their old electric radiators. The heat pumps were installed only to get the money from ANAH and to get that 35% energetic gain. We have said now that we will only help if there is insulation work done at the same time. (i5)

Fraudulent contractors often offer their services with lower prices than their competitors (i15; i7). This means that if a household wants to improve their energy performance, but at the lowest price possible, they might choose an option that puts them at risk (i7; i13). This has put many people in difficult

situations, such as debt. Some that were already suffering from high gas prices before, now have instead high electricity prices, and still bad insulation (i5, i12).

> I am sure that in 10 years, we will be called up to come and finance work to remove inefficient air conditioners and reversible heat pumps. (i5)

This shows an example of distributive injustice where those that have the least resources might be put at risk from the transition. To summarise, the transition depends on households' capacity to approach the administrative process, get the right information and be able to afford it all. Without functioning support systems, the households in difficult situations might never escape their high energy bills and lower their emissions from heating. At best, they change from fossil heating to electrical heating, without lowering demand or increasing efficiency.

5.3.2 Recognition justice

The following section will discuss the recognition justice aspects of the heat transition, tying back to RQ2 (b). Recognition justice investigates whose needs are recognised by the authorities, and whether the burdens are addressed. Focus is directed towards how the interviewees have experienced the authorities' recognition of households' barriers.

Economic barriers

When it comes to economic barriers, the subsidy programme MPR was indeed first created to help low-income households decarbonise their heating systems, addressing some of the barriers mentioned in 5.2 (i8). The subsidy is adapted to low-income households and is distributed in function of the household's income. The less money you have, the more help you can get (i3, i8). Therefore, it can be seen as recognising the needs of low-income groups to access more resources (i8). Statistics from ANAH and experiences of local energy offices show that very low-income households are the major group receiving the financial aid (ANAH, 2022; i8, i14). This shows that even though the remaining costs are a barrier, low-income households are still participating and getting financial help to improve the energy performance of their houses.

However, as mentioned above, there are still significant remaining costs that are too high for some households. One local energy advisor said that only 20% of the households that they are in contact with go through with their renovations due to economic reasons (i15). When there is no other option, households would have to take loans to renovate (i5, i13). Getting a loan from a bank when you do not have a lot of money can be difficult (i13, i5). The region Occitanie only provides loans for the remaining

costs for houses with joint ownership, and not for individual ones (i7). Today there are no specific loans for retrofit for very low-income households (i13).

Administrative and information barriers

The administrative barrier for households to approach the subsidies has partly been addressed. The national guidance programme MAR has been implemented to help households throughout the entire process (i8). This was said to be a solution to all non-economic burdens related to administration, information, and fraud (i8, i14). The new programme opens the retrofit market to private actors, to get more advisors available (i9). These can help households decide on technical aspects of the renovation as well as administrative tasks to get the subsidy (i13).

This might seem as a positive change, but some actors experienced it as removing already implemented public structures that were very appreciated (i12, i9, i7). Before the national MAR programme started, some regions already had a regional advice programme in place. Occitanie was one of the regions that provided the best advice for individual households (i12, i9, i7). However, since the beginning of 2024, this support is now solely provided through the national programme MAR (i7, i13). When this changed, the transition was abrupt for some households (i12, i13). The MAR counselling is an additional cost (i13). When it was managed by the region it was free (i12). The year 2024 is left as a transitioning year, and after that the local energy offices will see whether they can even stay and give neutral information to households, or if the whole market will be privatised (i9). The change in counselling has therefore tilted local structures and made the counselling mandatory and an additional cost. Whether or not it helps to remove the administrative and information barriers remains to be seen in coming years.

5.3.3 Procedural justice

The following section will discuss the procedural justice aspects of the heat transition, tying back to RQ2 (c). The following section reflects mainly upon access to information and impartiality of decision-makers, as mentioned in the definition of procedural justice in section 3.1.3. There are two main issues related to procedural justice that ought to be discussed, these are private interests and lobbying.

Private interests

With the entrance of private companies in the market of counselling related to heat transition, the financial interests of companies must be taken into consideration. When an advisor also runs a business, there are aspects that might affect the counselling. Such as wanting to sell a specific material

even though it is not suitable (i12) or advisors not wanting to make home visits in rural areas because it is not profitable (i12, 115). The public services for retrofit through the local energy offices were implemented at the time when fraudulent actors were highly present in the market, to provide neutral counselling and control (i9). These local energy offices are now sharing their position with new, private actors. One actor exclaimed their opinion in the quote below, although it is not just "any company", but those having the MAR label.

> Our big disappointment is that the government is taking this route and making the counselling compulsory but deciding that it can be any company who does it. (i12).

Having private companies take on this role is a big responsibility in terms of driving the massification forward. Advising is of utmost importance for households to go through with a correct transition, as mentioned in the section above. Some interviewees perceived economic competition as good (i3). For example, one actor mentioned how there were advisors earlier that were insufficient, and now that the market is open to private companies, the old advisors had to "shape up" to get clients' interests and stay competitive (i3). Although many companies might focus on efficiency, it does not change the fact that they have different financial structures that aim to be cost-efficient. This might stand in the way of the impartiality of the advisor, and therefore the access to households' full information.

Lobbying

I will now discuss what may be the most pertinent aspect of what is perceived as an issue related to procedural justice. Lobbying was mentioned by many actors as important in the heat transition and policymaking (i12, i3, i4, i12, i13, i9). The main lobbying groups were related to nuclear power, insulation materials and HP industry (i9, i14). If lobbying in favour of HPs influences the French government's stance on HP rollout, priorities such as enhancing thermal efficiency, alleviating energy poverty, and reducing GHG emissions may not receive adequate attention during the transition. It can even be putting households at risk. Many actors mentioned the government's tendencies towards nuclear, as in the quote below.

> We really see an orientation from the government towards electrification that behind has a programme of revitalisation of nuclear, that is very very present in France. (i12)

Decarbonisation of heating can be done in many ways in the region, such as district heating, replacing natural gas with methane and passive solutions (i12, i3). Nuclear counts as decarbonised in many contexts (i13, i12). However, the attention is directed mostly towards electrification and "consuming better" and instead of consuming less (i13). This might take away attention from sufficiency or

measures to lower demand, that normally is at the core of retrofit and energy performance (i12, i13, i4, Royapoor et al., 2019). The fact that HPs consume a lot of electricity if installed inefficiently might not be a problem, if nuclear energy is seen as an infinite and sustainable resource. Viewing nuclear solely as a clean energy source may overlook its social context, including injustices associated with uranium mining and nuclear waste storage challenges (Newell & Mulvaney, 2013). The inclination of the current government towards revitalisation of national nuclear power therefore goes hand in hand with full electrification of heating systems.

> It is not about whether or not nuclear power is bad. It is about consumption. Energy production will always pose problems, even renewables. That is why we should focus more on sufficiency and consuming less. (i13)

There is therefore a tendency of the French government to support electrification of heat systems that goes well in line with potential ambitions to revitalise French nuclear power. This might influence sustainability outcomes since focus is not directed towards getting more efficient buildings and therefore reducing emissions and energy poverty. This can be seen as affecting the impartiality of current procedures.

5.4 Final discussion

The thematic analysis and application of the EJ framework has provided for a unique perspective on the heat transition in Occitanie. Several injustices related to the transition have been identified, and practical examples illustrated through the results. To tie down the discussion of a thematic analysis, one can ask what the overall stories of the themes reveal about the topic (Braun & Clarke, 2006). The analysis has provided a critical view on the current circumstances for property owners in Occitanie. It demonstrates that if policies are put into place without easing several barriers, there will be households that risk (1) not getting the efficiency measures they need, and at worst (2) experiencing negative outcomes. This in the form of fraud or misinformation leading them into debt, higher energy bills or lower energy performance in the end. This thesis highlights the need for future policymakers to be aware of the barriers to a just and equitable heat transition in Occitanie. In the following discussion, I will investigate three main topics related to property owners lock-in, governance and the complexity of transitions.

Prisoners of property

If support programmes for heat transition do not recognise and substantially address the experienced barriers, some groups might risk becoming “prisoners” of their own property. This means that instead

of being able to change their heat consumption, they might stay in a stagnant position of high bills and poor energy performance. This despite the transition at times is being said to be “for them”, as the subsidy programme is directed towards these income groups and to alleviate energy poverty. As mentioned by Dubois & Allacker (2015), there is a risk of lock-in of households when pursuing shallow retrofit. This was seen also in this thesis, in how some households who installed a HP ended up with “only” changing their heat system, and not going through with the deep retrofit they needed. For them to access the transition, substantial and well-adapted counselling ought to be present. Energy transition policies should allow for energy poor households to have an active role in transition (Hanke et al., 2023). However, the process of heat transition, and especially deep retrofit, seems to be complex due to the mentioned barriers, and current counselling programmes are inadequate. To put this burden on households that are already in difficulties might seem unrealistic as a strategy to reach a completely low-emission building stock until 2050. Since thermal sieves remain private property, strategies must be improved to reach these households.

There is a risk that the government cannot achieve their targets to lower emissions of the buildings stock or help the households living in thermal sieves with current policies. As mentioned in earlier literature, households might be put at risk by transitions (Sovacool et al., 2019). Unfortunately, this has been the case in the heat transition in Occitanie. As mentioned by Sovacool et al. (2019), HPs might backfire for especially low-income households, which has been demonstrated in Occitanie as well. There is therefore a major difference between stated ambitions and required implementation, as also mentioned in the case of heat transition in the UK (Crowther et al., 2023). Getting an overview of current injustices can be a first step in the right direction (Hanke et al., 2023).

Governance

This thesis set out to analyse the EJ aspects of the domestic heat transition, however along the way issues of close relevance to the policy landscape were also revealed. The political tendencies towards privatisation of the retrofit market in general, including counselling for households, might be contributing to further injustices. This is because households’ best are not at the core of the transition, but instead lies in the hands of market forces. In a sector as sensitive as housing, this might be problematic (Willand & Horne, 2018). To address barriers, scale up the heat transition and achieve emission reduction targets, policies with a social agenda at its core are needed (Newell & Mulvaney, 2013). Without it, the buildings with the worst energy performance will not be improved, because the people owning them do not have the means to participate in the transition. Unlocking the potential of

households and helping them make good decisions will help move heat transition forward and reduce energy poverty (Streimikiene, 2022).

With the current trend in privatisation, the future might seem pessimistic for policies framing EJ. For example, the nationalisation of the counselling programme shows that the support systems that could have potential to bring recognition justice to the transition, are going towards nationalisation and privatisation, instead of being public, free, and local. This can be seen as part of the current French governments' neoliberal governance. The analysis has shown that these political tendencies might be worrying if all three EJ tenets are to be ensured, especially in relation to procedural justice and good governance in relation to energy projects.

Complexity of transitions

To ensure a safe and efficient heat transition, the different needs of each individual household must be recognised (Crowther et al., 2023). When the French government aims to make the whole building stock low-emission, they step not only into infrastructure, but into homes. Since this concerns private property, elevating the burden for households becomes necessary not only for justice perspectives, but also for the efficiency of quickly lowering emissions from buildings. To ensure a just transition, EJ assessment should be done before developing energy systems or changing demand (Sovacool & Dworkin, 2015). The results show that this has not been the case.

The analysis shows the complexity of sustainability transitions; however, this does not mean that a transition should not take place. An interviewee (i7) said that "There is a difference in being too quick, and not being precise enough", when asked if the transition had moved too quickly. In the context of climate change and energy poverty, time is a scarce resource. However, heat transition ought to be well designed and socially aware, to fairly distribute benefits and ills of the transition (Crowther et al., 2023). Issues related to procedural justice might affect recognition and distributional justice aspects, which is shown in how wider governance aspects affect the outcomes and changes in policies that affect household barriers. This awareness can come from stakeholder consultation as done in this thesis. From the fieldwork, many important experiences were brought up. Looking critically at sustainability policies is essential to move towards transitions that are both sustainable and equitable. This might show the need for sustainability science and interdisciplinary approaches, looking at transitions as socio-technical and recognising the need to listen to many different stakeholders to contribute to policies that move the work forward.

Limitations

There are several limitations to this thesis. First, interviewing property owners directly would have been highly relevant. In this work, I did not reach households directly, instead I interviewed key informants that were involved in the sector and that have been active in the relevant processes over the last few years. For further research, dialogue with households would be of utmost interest. A strength of the selection is the wide scope of different actors, and the different backgrounds that still had similar experiences with the transition. Second, since I have a background in social sciences and not thermal engineering, there might be limitations regarding the technical functioning of heating systems and retrofit. For further research a multidisciplinary team would be ideal. Third, many interviewees preferred meeting online even though I was present in the field. This might remove some of the benefits of meeting face to face mentioned in section 4.1. Last, the subsidy system is constantly changing, which might have made room for knowledge gaps in technical and legal terms.

Further research

Further research ought to focus on property owners' experience with the coming privatised counselling programme in France. It could also benefit from reflecting the perspectives of contractors within the retrofit sector. Especially in Occitanie, where the region makes efforts to revitalise the local market. Many stakeholders brought up the highly sensitive position of tenants with private landlords, especially those living in thermal sieves. This would also be a relevant topic for future research. This study has been made in a local context to a specific subsidy system. However, the European building stock is old, and renovation is a key pillar in the EU green deal (Dubois & Allacker, 2015). The scale of the heat transition in all of Europe requires thoughtful evaluation of current policies and support systems for heat decarbonisation and retrofit. The results from Occitanie might therefore be useful also for generalisation to other geographical areas.

6. Conclusions

In this thesis, I have investigated the domestic heat transition in the French region Occitanie through an EJ lens, investigating the current subsidy framework for property owners. From the results, it has become clear that the heat transition is a major political project. The French subsidy framework is extensive, in the sense that low-income households, if involved successfully in the process, can get a significant part of their expenses covered. However, the results show that there are still barriers that block household transition to sustainable heating systems and energy efficient houses.

The barriers are related to economic factors, administration, and information. The economic barriers mainly concerned paying the remaining costs or advancing the costs. The administrative barriers were related to the complexity of paperwork and cognitive load. The barriers related to information were the possibility of fraud and misinformation. The latter might have been the most important and context specific result. It reveals that a multitude of households have been put at risk through the heat transition in Occitanie, being subject to fraud by actors profiting from the extensive subsidy system. This has resulted in households getting insufficient technical audits, heating systems that are not correctly adapted to their house, and the wrong kind of insulation.

The EJ analysis revealed that distribution of burdens is often accumulative, meaning that those who experience financial difficulties might also get worse information and encounter difficulties with administration. The French authorities have recognised several of the barriers through adapting the subsidy system and introducing a national counselling programme. Although these actions were made to ensure technical efficiency and more deep renovations, the subsidy is still experienced as difficult to access. In terms of procedural justice, injustices related to privatisation and lobbying have questioned the efficiency of how the transition is governed.

The final discussion touched upon how households might become imprisoned by their properties if not getting the right support, questioning current governance strategies and emphasises the complexity of sustainability transitions and the need for social awareness in policymaking. Several injustices were unveiled from the EJ framework and the analysis. The thesis has therefore highlighted several challenges to EJ in Occitanie and on a larger scale in France.

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8. Appendices

Appendix 1: Interview guide.

Type of questions	**Questions**
Opening questions	• What is your name and role?
Energy justice related questions:	
Distributional justice	• Who can access low-carbon heat technologies? • Who can access a home with good energy performance? • Who is living in a thermal sieve? • Who can benefit from the subsidies that are available? • Who is struggling in this process ?
Recognition justice	• Are public authorities aware of who needs help and the problems that are in place? • What is being done to help those who are struggling? • Is it working?
Procedural justice	• What are the main barriers for households to renovate or change the heating system? • What are the main barriers to participation? • Who can decide over their heat systems and energy performance?
Closing questions	• What do you see as possible solutions to the situation? • Do you know anyone else that I could contact and discuss with?