

THESIS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Civil servants as intermediaries contextualizing
policy for sustainable energy transitions

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ABSTRACT

Climate change requires fundamental transformations in how energy is produced and used. While technological developments on the supply side are critical, meaningful progress also depends on everyday decisions citizens make in their homes – whether in consumption patterns or investments in low-carbon technologies. To support such decisions, policy plays a crucial role in accounting for differences in citizens’ motivations, knowledge, resources, and contextual barriers that make individual action difficult. Public energy advising is one key informational policy instrument, in which civil servants contextualize the broad policy mission of reducing environmental impact of energy use by guiding citizens through technological and behavioral measures. However, the effectiveness of this instrument depends not only on its formal design but on how civil servants interpret and contextualize these missions in practice – an aspect that remains insufficiently understood.

This thesis explains how civil servants facilitate sustainable energy transitions when contextualizing policy missions. Conceptualizing them as public intermediaries, it investigates how they enact their mission and contribute to broader ecologies of intermediation. Empirically, it examines Sweden’s public energy advising program through a mixed-methods design combining document analysis, interviews, and surveys.

The findings show that civil servants make sustainable energy transitions tangible for citizens through locally adapted activities, balancing top-down governance with bottom-up needs to build trust and relevance. Their agency enables them to shape systemic conditions, creating interactions, capacities, and knowledge infrastructures through outreach, network-building, and policy feedback – when granted flexibility to do so. Situated within ecologies of intermediation, they complement private actors by offering commercially independent, broad, and context-specific support. Yet current missions emphasize technological measures over behavioral change, limiting the reach of energy advising mainly to homeowners able to invest in new technologies. To ensure just and inclusive energy transitions, policymakers must integrate sufficiency and demand reduction into civil servants’ missions. Overall, the thesis demonstrates that civil servants play a strategic role in empowering citizens and translating policy ambition into everyday action.

Keywords: civil servants, intermediaries, contextualization, energy transitions, policy, agency, energy advising, mixed methods

LIST OF APPENDED PAPERS

This thesis is based on the work contained in the following papers:

Paper I

Mignon, I. & Winberg, L. (2023). The role of public energy advising in sustainability transitions – empirical evidence from Sweden. *Energy Policy*, 177, 113525.

Paper II

Mignon, I. & Bastås, L. (2025). Agency of institutional intermediaries in transitions: A study of influences on intermediary practices. *Technological Forecasting and Social Change*, 217, 124171.

Paper III

Bastås, L. & Mignon, I. (2025). Comparing public and private intermediaries co-existing in ecologies of intermediation. *Environmental Innovation and Societal Transitions*, 56, 100972.

Paper IV

Bastås, L., Cardol, H. & Lantz, B. (2026). Assessing the demand-side of intermediation support in solar PV adoption. Under review in *Environmental Innovation and Societal Transitions*.

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1. INTRODUCTION

1.1. BACKGROUND

Climate change represents one of the most urgent and complex challenges of our time, demanding a fundamental transformation in how energy is both produced and used in society. While large-scale deployment of low-carbon technologies is gradually reducing the reliance on fossil fuels on the production side, global energy demand continues to rise (IEA, 2024b). Achieving sustainable energy transitions therefore requires not only technological changes on the supply side but also substantial efforts in reducing and managing energy demand to obtain the much-needed reductions in energy-related environmental impact (Sovacool et al., 2025). While demand reductions are necessary across all sectors, the residential sector remains a particularly important yet often overlooked part of these transitions (Raven et al., 2021). With the residential sector accounting for around twenty percent of global energy consumption (IEA, 2025), changes in how citizens use energy in their everyday lives can substantially reduce environmental impact (Schot et al., 2016). Specifically addressing residential energy use is essential not only for achieving net zero emissions by 2050 but also for ensuring balanced transitions that address both the supply and demand sides of the energy system (IEA, 2021).

Changing residential energy use can be challenging as practices such as heating homes, cooking, and using electrical appliances are deeply embedded in daily routines and not typically reflected upon. For individual citizens, changes that reduce their energy-related environmental impact include changing consumption patterns, improving energy efficiency, and adopting renewable and low-carbon technologies such as heat pumps or solar photovoltaics (PV) (Kaufman et al., 2021; Raven et al., 2021; Ryghaug et al., 2018). These measures all contribute to reductions in demand from a systems perspective, either by reducing the amount of energy used for a particular purpose or by producing renewable electricity that reduces the need for energy produced elsewhere. Citizens have different motivations, knowledge, and resources for engaging in such energy-saving measures (Broers et al., 2021; Mignon & Bergek, 2016a), and many face barriers such as financial constraints, limited information, or lack of time (Abrahamse et al., 2005; Starke et al., 2020). Reductions in residential energy use are thus not only reliant on rational choices by citizens, but also shaped by a wide range of internal and external factors, such as attitudes, resources, and contextual conditions (Kaufman et al., 2021). Therefore, government policies that consider both citizens' diverse needs and motivations and contextual factors are essential for supporting increased citizen engagement in sustainable energy transitions (Baum & Gross, 2017; Kaufman et al., 2021; Uyarra et al., 2025).

Policymakers have introduced a range of policy instruments to promote and support energy-saving measures from citizens (Rogge & Reichardt, 2016; Suzuki et al., 2023). These include financial instruments (e.g., taxes, subsidies, and incentives) that reduce financial barriers, regulatory frameworks (e.g., mandates and standards) that provide clear guidance for energy consumption and production, and informational instruments (e.g., energy efficiency labels, energy advising, and information campaigns) that address knowledge gaps and information asymmetries (Owens & Driffill, 2008; Rogge & Reichardt, 2016). Financial and regulatory

instruments have been widely studied and shown to be effective in stimulating energy efficiency and low-carbon technology adoption among citizens (Bergek & Berggren, 2014; Hoppe et al., 2023), but there is a call for more context-specific policy instruments (Uyarra et al., 2025). Here, informational instruments play an important role as they can be contextualized, meaning that policy implementation is adapted to local circumstances and tailored to citizens' realities (Simcock et al., 2014; Uyarra et al., 2025).

This thesis focuses on public energy advising, a key informational policy instrument through which civil servants provide citizens with customized and context-specific support to reduce the environmental impact from residential energy use, thus contextualizing their policy mission (Darby, 1999; Henryson et al., 2000; Uyarra et al., 2025). Although public energy advising is widely regarded as a promising way to support both technological and behavioral energy-saving measures (Raven et al., 2021; Zaunbrecher et al., 2021), its effectiveness is difficult to assess. First, the success of informational instruments depends on how advice is delivered, interpreted, and acted upon, unlike financial and regulatory instruments, whose outcomes can be measured in monetary or quantitative terms. The link between policy mission and environmental outcomes for public energy advising involves several interrelated steps: how civil servants interpret and implement their mission, how citizens respond to the advice, which energy-saving measures citizens subsequently adopt, and the resulting environmental effects (Darby, 1999; Halleck Vega et al., 2022). Second, because public energy advising is delivered by individual civil servants who adapt their work to local conditions, practices may vary considerably, potentially deviating from policymakers' intentions (Eriksson & Kjeang, 2021). Third, given that citizens receive energy-related information from many other sources, such as installers, private companies, non-governmental organizations (NGOs), internet forums, and peers (Hyysalo et al., 2022; Owen et al., 2014), it is difficult to isolate the specific influence of public energy advising on citizens' (Darby, 1999; Mahapatra et al., 2011a). These challenges underscore the need to better understand how public energy advising is interpreted and contextualized in practice.

To study public energy advising in practice, this thesis conceptualizes civil servants as intermediaries who operate between policy, citizens, and other actors in the energy system when contextualizing policy missions. Intermediaries are actors that facilitate change by brokering between two or more parties across different levels of the socio-technical system (Gliedt et al., 2018; Howells, 2006; Kivimaa et al., 2019). They are characterized by the 'relational work' (Moss, 2009) that occurs between actors and their interests, resources, and knowledge as well as regulatory frameworks, technologies, and scales of action (Howells, 2006; Kivimaa et al., 2019; Moss, 2009).

Various actors can function as intermediaries (e.g., public or private organizations, NGOs, or informal networks) and they can either have an explicit intermediary role or perform intermediation as part of their other work (Glaa & Mignon, 2020; Hyysalo et al., 2018; Kivimaa et al., 2019). Public energy advisors deliberately perform intermediation through activities such as providing technological guidance, linking stakeholders, and coordinating low-carbon investment processes (Aspeteg & Mignon, 2019; Bergek, 2020; Owen et al., 2014). As such,

they can be seen as examples of public intermediaries, which are increasingly gaining attention in the literature for their potential as a policy instrument (De Silva et al., 2022; Rossi et al., 2022; Talmar et al., 2022). Public intermediaries are designed to advance societal objectives that may not yield immediate market returns. They can provide neutral and trustworthy guidance, bridge diverse interests, and support long-term sustainability goals (Kant & Kanda, 2019; Moss, 2009). However, the defining characteristics of public intermediaries, and how they differ from private actors, remain underexplored.

Furthermore, scholars are increasingly highlighting the importance of examining ecologies of intermediation, which encompass the totality of intermediation performed within a particular context, such as supporting citizens in undertaking energy-saving measures (Stewart & Hyysalo, 2008). These ecologies consist of multiple complementary or competing actors who collectively fulfill intermediation needs by covering different parts of transition processes (Kivimaa et al., 2019; Soberón et al., 2022). However, these ecologies often emerge in a piecemeal and fragmented way in response to market changes (Hyysalo et al., 2022), resulting in potential coordination issues. Public intermediaries may therefore play a crucial role in covering missing gaps and ensuring coordination within these ecologies (Nordt et al., 2023; Talmar et al., 2022), but their role in ecologies of intermediation remains unclear.

1.2. AIM AND RESEARCH QUESTIONS

Against this background, the aim of this thesis is to explain how civil servants facilitate sustainable energy transitions when contextualizing policy missions. The thesis focuses on how public energy advisors interpret their policy mission, translate it into practice, and how their activities shape the effectiveness of energy advising as a policy instrument, in relation to both citizens and other actors.

This aim is broken down into the following three research questions:

RQ1: How can civil servants be conceptualized as public intermediaries?

RQ2: How do public intermediaries contextualize policy missions?

RQ3: How do public intermediaries contribute to ecologies of intermediation supporting citizens in sustainable energy transitions?

To address these questions, this thesis employs a mixed-methods approach, investigating public energy advising in the empirical context of Sweden. As a member of the European Union, Sweden is required to provide accessible and transparent energy advice to citizens, in accordance with the directives on renewable energy, energy efficiency, and energy performance in buildings. The national public energy advising program, funded by the government and implemented across Sweden's 290 municipalities, offers free and tailored advice to households, companies, and associations (Swedish Government, 2016). Although the program has served as a valuable source of information since the 1970s, it has long struggled with low visibility and varying implementation (Eriksson & Kjeang, 2021; Kjeang et al., 2017; Mahapatra et al., 2011a). It thus provides an insightful case of an informational policy instrument whose outcomes depend on individual interpretation and implementation by civil servants. To

exemplify the role of civil servants in ecologies of intermediation, the public energy advisors are compared with solar PV practitioners (e.g., installers, project developers, consultancies, and wholesalers), since solar PV is a widely accessible technology for citizens and one concrete energy-saving measure that reduces the environmental impact from residential energy use.

1.3. THESIS OUTLINE

This thesis consists of a cover essay and four appended papers. The papers constitute the foundations of the thesis, with the cover essay synthesizing their findings and situating them within a broader context. The cover essay consists of six chapters, where this first chapter introduces the topic and research objectives. In the next chapter, the theoretical framework is outlined, highlighting central concepts and relevant literature connected to this thesis. Chapter 3 presents the research design, study context, employed methods, and reflections on methodological choices and the research process. Chapter 4 summarizes the key contributions of the four appended papers and elaborates on their respective authors' contributions and publication processes. Chapter 5 synthesizes the findings of the papers in relation to each other and previous literature to answer the research questions and Chapter 6 discusses these findings to address the research aim. Finally, Chapter 7 provides implications for practice, theory, and policy, and Chapter 8 closes the thesis with conclusions and suggestions for further research.

2. THEORETICAL FRAMEWORK

This chapter presents the theoretical underpinnings of this thesis. It briefly introduces the field of sustainability transitions in which this thesis is positioned with a focus on citizen participation in sustainable energy transitions, followed by policies supporting such transitions. There, energy advising is described as one important policy instrument to facilitate and motivate energy-saving measures from citizens. It thereafter turns to the intermediary literature with a particular attention to public intermediation. It also includes a micro-level perspective on intermediation, giving a short account of agency in transitions, as well as an introduction to ecologies of intermediation. Lastly, these different theoretical aspects are synthesized and an analytical framework for this thesis is suggested.

2.1. CITIZEN PARTICIPATION IN SUSTAINABLE ENERGY TRANSITIONS

This thesis is situated within the field of sustainability transitions, a normative and transdisciplinary research community addressing grand societal challenges such as climate change, biodiversity loss, and resource depletion (Köhler et al., 2019; Markard et al., 2012). Sustainability transitions are understood as radical shifts of socio-technical systems (e.g., energy, water, mobility, buildings, and agrifood) toward more sustainable¹ modes of consumption and production (Geels & Schot, 2007). These processes are long-term and multi-dimensional, involving technological, institutional, behavioral, and cultural changes enacted by multiple actors, creating significant complexity (Köhler et al., 2019).

Energy transitions are positioned at the heart of sustainability transitions because energy powers all parts of society, providing essential services such as heating, lighting, and powering appliances. At the same time, today's energy systems remain heavily dependent on fossil fuels, a reliance that is widely recognized as unsustainable (IEA, 2024b). This creates a fundamental tension between ensuring universal and reliable access to energy and the imperative to decarbonize the energy system to avoid detrimental environmental consequences (Chapman et al., 2021). The UN Sustainable Development Goals therefore call for both affordable, reliable, and modern energy services and a substantial increase in renewable energy in the global energy mix (United Nations, 2015). Consequently, energy transitions need to balance the simultaneous needs of equity, security, and sustainability (World Economic Forum, 2023). Current energy transitions are following a pathway of technological substitution towards increased deployment of low-carbon energy technologies, yet lock-ins and inertia favor incumbent systems and energy sources, such as oil and natural gas (Chapman et al., 2021). Active transition management is therefore needed to accelerate change while maintaining energy security and affordability, ensuring just energy transitions (Goddard & Farrelly, 2018).

¹ In this thesis, sustainability is understood by the Brundtland definition as “meeting the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987).

The energy system can be conceptualized as a socio-technical system comprising networks of actors (individuals, companies, and other organizations), institutions (norms, regulations, and standards), material artefacts, and knowledge that interact to fulfill societal functions – such as providing energy (Geels, 2004; Markard et al., 2012). Energy transitions thus involve dynamic processes that reshape this system through technological, institutional, societal, and cultural changes (Geels & Schot, 2007). Such changes are required not only from industry and other large actors but also from the residential sector.

Historically, citizens have been viewed as having a rather passive role in energy transitions, as mere consumers of energy making rational choices among pre-defined options (Schot et al., 2016). Recent research, however, emphasize the role of citizens as active users of energy whose everyday practices shape transition pathways, with an emphasis on inclusion and participation in energy transitions (Ryghaug et al., 2018; Schot et al., 2016; Skjølsvold & Coenen, 2021). Following Schot et al. (2016), users are defined as “individuals or groups that use energy, including elements of the systems (for example, solar panels) necessary to produce and distribute energy” (p. 4). By seeing citizens as active users of energy instead of passive consumers, their participation in energy transitions can thus be understood to extend beyond purchasing decisions or bill payments and instead entail strategic actions such as home retrofits, energy efficiency measures, and low-carbon technology investments. The concept of energy citizenship captures this active, democratic engagement of citizens in shaping sustainable energy transitions (Devine-Wright, 2012; Ryghaug et al., 2018). It emphasizes that when engaging in various energy-saving measures, citizens become more aware of their energy use and in extension also of sustainability-related issues such as climate change, equity, and justice (Ryghaug et al., 2018).

Meanwhile, citizens are heterogeneous, with diverse motivations and capacities to make changes to their energy use. Some are driven by environmental concerns, while others make changes to increase comfort or reduce energy costs (Darby, 1999). Barriers to participation also vary, with financial constraints, lack of information, and structural limitations that can hinder action from citizens. Of particular interest are citizens at the risk of energy poverty as a result of low income, high energy prices, or poor energy-efficiency of housing, heating systems, and appliances (Ambrose et al., 2019; Halleck Vega et al., 2022; Reeves, 2016). For low-income households, energy efficiency measures which can be carried out without financial support and no-cost behavioral changes in energy use are critical (Darby, 1999).

Importantly, citizens do not typically reflect about how much and which type of energy they need, and must therefore actively be encouraged to do so (Schot et al., 2016). Here, policy has a vital role to play in encouraging citizen action. In particular, to achieve inclusive and just transitions, policy interventions must ensure that vulnerable groups are not left behind (Skjølsvold & Coenen, 2021). Indeed, well-designed policies can simultaneously address inequality and environmental goals (Chapman et al., 2021).

2.2. POLICIES SUPPORTING SUSTAINABLE ENERGY TRANSITIONS

Policy has been recognized as crucial for steering socio-technical systems towards sustainability and supporting transitions, such as decarbonizing the energy system (Alkemade et al., 2011; Jacobsson & Bergek, 2011; Köhler et al., 2019). Policy interventions are motivated by the presence of different types of failures that slow down or prevent transition processes, such as market failures (e.g., information asymmetries and externalities), structural system failures (e.g., weak networks, inadequate infrastructure), and transformational system failures (e.g., lack of shared visions or coordination for long-term change) (Weber & Rohracher, 2012). The rationale for policy intervention has evolved over time, from post-war science and technology policies stimulating R&D in low-carbon technologies, to (national) innovation systems policies in the 1980s aimed at accelerating innovation, and more recently transformative or mission-oriented policies emphasizing directionality and societal goals (Diercks et al., 2019; Mazzucato, 2018; Schot & Steinmueller, 2018). While science and technology and innovation system policies generally focused on national competitiveness and economic growth, transformative policies underline the importance of policy in steering change and mobilizing actors towards sustainability objectives (Diercks et al., 2019; Mazzucato, 2018). In the case of sustainable energy transitions, policy is thus crucial for setting the agenda and driving technological and behavioral change among all parts of society, including citizens.

As citizens are embedded in their local contexts, the potential pathways for sustainable energy transitions differ across places due to varying social, institutional, and material conditions (Coenen et al., 2012; Uyarra et al., 2025). Consequently, the effects of policies targeting citizens are shaped not only by the design of policy instruments, but also by how these instruments are contextualized, that is, interpreted and adapted within specific institutional and territorial settings (Hoppe et al., 2023). Rather than assuming policies will be taken up and implemented uniformly, their effectiveness depends on how well they align with local conditions, capacities, and practices (Uyarra et al., 2025; Wanzenböck et al., 2020). This calls for a shift from viewing policy as something merely implemented to recognizing the need for active policy contextualization and tailoring policy processes to context-specific particularities.

Given the complexity and context-sensitivity of energy transitions, a variety of policy instruments, objectives, and strategies are employed. Such variety is in line with the concept of ‘policy mixes’ (Kern et al., 2019; Rogge & Reichardt, 2016), emphasizing that achieving sustainable energy transitions require different policy instruments that interact and reinforce each other. To inform the design of specific policy instruments, it is thus necessary to acknowledge their coexistence with other instruments and shape them accordingly. The next section presents the main types of policy instruments targeting citizens in sustainable energy transitions, before delving deeper into the particularities of public energy advising.

2.2.1. DIFFERENT POLICY INSTRUMENTS TARGETING CITIZENS

There is a variety of policy instruments targeting citizens with the overarching objective of decarbonizing the energy system. These include financial, regulatory, and informational policy instruments that in different ways aim to contribute to reduced environmental impact from

citizens' energy use, for instance by stimulating deployment of low-carbon technologies and increased energy efficiency among citizens (Hoppe et al., 2023; Owens & Driffill, 2008).

Financial instruments provide incentives for reducing environmental impact, for instance by lowering the cost of investing in low-carbon technologies or economically punishing those who invest in polluting technologies (Stavins, 2003). These instruments include taxes, subsidies, and feed-in tariffs and they rely on market-based logics, i.e., that market actors respond rationally to price signals and invest where the cost of pollution abatement is lowest (Bergek & Berggren, 2014). Such instruments have played an important role in expanding renewable energy markets, for instance, financial support schemes have contributed both to declining solar PV costs (Kavlak et al., 2018) and to increased household adoption (Palm, 2018).

Regulatory instruments, by contrast, steer actions from companies and citizens through mandatory rules and standards, including bans, permits, and technological, emission, and performance standards (Bergek & Berggren, 2014). These measures can directly shape what companies and citizens are allowed to do, for instance, regulations enabling households to sell surplus electricity have supported the uptake of residential solar PV (Palm, 2018). Although some regulations are optional, non-compliance often entails penalties or other negative consequences (Bergek & Berggren, 2014), making them the 'sticks' compared to the 'carrots' of financial incentives (Hannon et al., 2023).

Informational instruments aim to encourage desirable behavior by improving access to relevant and comprehensible information, such as supporting citizens in reducing energy consumption or adopting low-carbon technologies (Delmas et al., 2013). Common instruments include energy efficiency labels (Wang et al., 2019), experiments for more energy efficient behavior (Zangheri et al., 2019), information campaigns (Palm & Lantz, 2020; Weiss & Tschirhart, 1994), and tailored energy advising (Henryson et al., 2000; Kjeang et al., 2017). Unlike financial or regulatory instruments, which directly alter costs or set formal requirements, informational instruments operate through a service-oriented logic: they provide knowledge and guidance rather than money, rules, or standards. However, insufficient information is rarely the only factor shaping citizens' behaviors and decision; social norms, political conditions, everyday routines, and cultural practices also strongly influence and can constrain how information is interpreted and acted upon (Owens & Driffill, 2008). For this reason, informational instruments are most effective when designed as part of a wider policy strategy rather than used in isolation (Rogge & Reichardt, 2016).

In sum, financial, regulatory, and informational instruments each play distinct roles in shaping citizen participation in sustainable energy transitions. While financial and regulatory measures often rely on economic incentives or compliance mechanisms, informational instruments seek to influence decisions through knowledge provision and guidance. Importantly, informational instruments are often tailored to local contexts to support citizens in their everyday lives (Simcock et al., 2014; Uyarra et al., 2025). This is particularly true for public energy advising, which is seen as a particularly influential tool for bridging the gap between abstract information

about energy transitions and concrete action by encouraging citizen participation in making behavioral and technological changes to their energy use (Darby, 1999).

2.2.2. PUBLIC ENERGY ADVISING AS A POLICY INSTRUMENT

Public energy advising is a policy instrument that intends to support informed decision-making about energy-saving measure to reduce the climate impact from energy use (Darby, 1999; Eriksson & Kjeang, 2021; Mahapatra et al., 2011a). It is delivered by civil servants with the mission to provide context-specific advice to citizens(Eriksson & Kjeang, 2021; Reeves, 2016), as illustrated in Figure 1. By providing information, education, and tailored advice, civil servants make energy use visible and contextualize energy policy by translating national climate goals into tangible measures for citizens (Henryson et al., 2000; Uyarra et al., 2025).

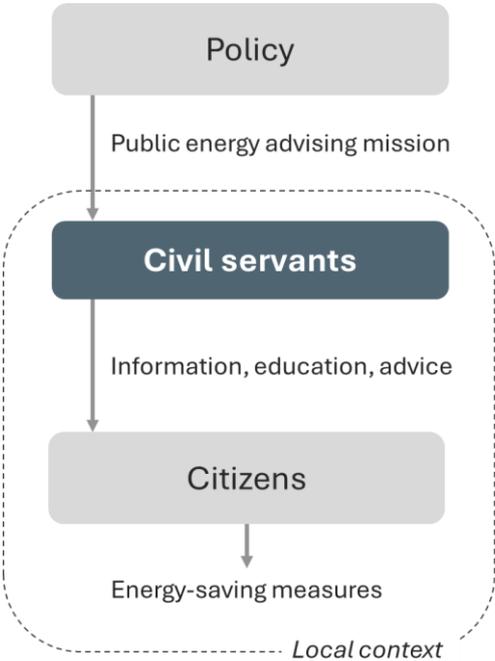


Figure 1. Schematic overview of civil servants with a public energy advising mission.

The local anchoring of public energy advisors gives them deep contextual knowledge about local conditions, challenges, and economic activities, strengthening their role as policy actors ‘on the ground’ who can tailor policy implementation to match local needs (Uyarra et al., 2025). This contextualization means that public energy advisors do not only implement national climate policies but also interpret and adapt them to local contexts, balancing political ambition with citizens’ everyday realities. In this way, they play a crucial role in contextualizing policy and facilitating behavioral and technological change at the local level (Raven et al., 2021; Zaunbrecher et al., 2021).

Public energy advising has been shown beneficial for supporting measures such as changing energy consumption behaviors (Darby, 1999; Gyberg & Palm, 2009), investing in energy-efficient technologies (Heiskanen et al., 2013; Henryson et al., 2000), constructing or retrofitting buildings to improve energy performance (Halleck Vega et al., 2022; Owen et al.,

2014), or becoming prosumers² by adopting solar PV systems (Karjalainen & Ahvenniemi, 2019). Public energy advisors also complement financial and regulatory policy instruments addressing various energy-saving measures, for example by informing citizens about available subsidies or clarifying new regulations (Hoppe et al., 2023; Sethi et al., 2020).

As a policy instrument, public energy advising needs to remain flexible and responsive to shifting objectives and technological developments in evolving energy transitions (Turnheim et al., 2020). As transition processes advance, goals are often reformulated, priorities change, and new technological options emerge, requiring public energy advisors to continuously update their activity portfolios, which denotes the set of measures and technologies that they promote (Zaunbrecher et al., 2021). Keeping these portfolios up to date is essential not only for maintaining technical relevance but also for sustaining citizen trust and engagement, as outdated or overly narrow advice risks undermining credibility and slowing the uptake of energy-saving measures. Moreover, when certain alternatives are omitted, public energy advisors may be perceived as gatekeepers who limit citizens' choices (Zaunbrecher et al., 2021). To avoid this, the design of public energy advising needs to be regularly revised so that portfolios align with evolving mission goals and emerging innovations that drive sustainable energy transitions rather than defaulting to familiar but limited solutions (Köhler et al., 2019).

Like all policy instruments, public energy advising must be evaluated to assess whether it fulfills its mission, ensure that public resources are used effectively, and justify continued political support and funding. However, evaluating the impact of public energy advising on sustainable energy transitions is inherently challenging, particularly compared to financial or regulatory instruments that generate more directly quantifiable outcomes such as reduced emissions or increased technology adoption (De Silva et al., 2022; Green & Staffell, 2021). Although public energy advising is recognized as a potentially powerful policy instrument, its impact is difficult to capture in terms of emissions savings because these savings depend on several interrelated steps: how civil servants interpret and implement their mission, how citizens respond to their advice, which energy-saving measures citizens ultimately implement, and the resulting environmental effects (Darby, 1999; Halleck Vega et al., 2022). As a result, client satisfaction is often used as a proxy for assessing impact of public energy advising (Mahapatra et al., 2011a; Mignon & Broughel, 2020). Yet, studies show mixed results regarding the effectiveness of public energy advising – some find positive effects on the adoption of energy efficiency measures (Achnicht & Madlener, 2014), while others report limited citizen engagement with public energy advisors, suggesting a relatively low potential to encourage citizen action (Feser & Runst, 2016).

Adding further complexity, it is difficult to isolate the specific influence of public energy advising on citizens' energy-saving measures (Darby, 1999; Mahapatra et al., 2011a). Citizens

² The term 'prosumer' was coined by Toffler (1980) to denote consumers producing electricity at home, for instance by installing solar PV systems on their roofs.

receive energy-related information from many other sources than public energy advisors, including professional energy advisors (Achtnicht & Madlener, 2014; Karjalainen & Ahvenniemi, 2019), installers (Galvin & Sunikka-Blank, 2014; Janda & Parag, 2013), non-governmental organizations (Owen et al., 2014; Salo et al., 2016), and even informal actors such as peers or neighborhood networks (Novikova et al., 2011; Nygrén et al., 2015) and grocery stores (Salo et al., 2016). Citizens also seek information on internet forums and platforms (Hyysalo et al., 2013). Yet, public actors are often more trusted than companies with economic incentives when recommending a certain solution (Simcock et al., 2014). Consequently, it is important that public energy advising is designed to complement other sources of energy advice to ensure relevance and effective use of public spending.

A last challenge to evaluation is that public energy advising is delivered by individual civil servants who may interpret and contextualize their policy mission differently depending on local circumstances. This can result in considerable variation in practice and outcomes, potentially deviating from policymakers' intentions, making it even more difficult to assess the overall effectiveness of public energy advising as a policy instrument (Eriksson & Kjeang, 2021; Mahapatra et al., 2011b). Meanwhile, the characteristics and extent of this variation in policy implementation remain unclear.

To sum up, given the difficulties in evaluating the environmental savings from public energy advising, understanding how civil servants interpret and contextualize their policy mission into practice is essential. To capture the dynamic process of policy contextualization and its contribution to energy transitions, this thesis turns to the literature on intermediation in transitions.

2.3. AN INTERMEDIARY PERSPECTIVE ON PUBLIC ENERGY ADVISING

Taking an intermediary lens to study public energy advising draws attention to the civil servants performing it. This lens provides several benefits that are elaborated in this section. First, civil servants can be conceptualized as intermediaries given their position between policymakers and citizens with the mission to transfer knowledge and information through various advising activities. A background about the intermediary concept and its use in a transition context is therefore presented. Moreover, civil servants can be understood as public intermediaries, which are regarded as tools to translate policy and described in the literature to have certain particularities. Insights can thus be drawn from the functions, roles, and activities of intermediaries to describe and explain what happens when civil servants contextualize policy. In addition, taking a micro-level perspective allows for increased understanding of practices and behaviors of individual civil servants. Lastly, the intermediary literature provides an ecology perspective to position civil servants as one of many actors providing intermediary support to citizens in sustainable energy transitions, conceptualized as ecologies of intermediation. This is helpful to address the difficulty in isolating the contribution of civil servants in relation to other support actors.

2.3.1. INTERMEDIARIES IN A TRANSITIONS CONTEXT

The intermediation concept emerged in the innovation literature to describe actors and processes brokering between various actors and solutions to support innovation processes and technological development (Bessant & Rush, 1995; Carlsson & Stankiewicz, 1991; Howells, 2006). Intermediation is characterized by the relational work and in-betweenness of service providers, users, and regulators (Moss, 2009), contributing with knowledge and technology transfer, matchmaking, and coordination (Spiro et al., 2013). The main assumption behind intermediation is that it enables and facilitates interactions that may otherwise not occur, in particular in dynamic settings such as innovation or transition processes (Stewart & Hyysalo, 2008).

Characterized by its in-betweenness, intermediation can occur between different types of entities at different system aggregation levels (Howells, 2006). This indicates that the scope and reach of intermediation benefits vary (Kanda et al., 2020). Much of the literature concerns bilateral interactions tied to individual projects, where intermediation happens between individual actors and their related activities, skills, and resources (Kanda et al., 2020). The most basic type of intermediation is one-to-one-to-one, for instance when intermediaries operate between a supplier and its customer (Howells, 2006). In transitions contexts, which are characterized by multi-dimensionality and multi-actor processes, there are also intermediaries that are involved in more complex relationships, such as many-to-one-to-one, one-to-one-to-many, many-to-one-to-many, or even many-to-many-to-many, representing collaborations and relationships that are both vertical and horizontal in the innovation system (Howells, 2006; Klerkx & Leeuwis, 2009). Such systemic intermediaries support system-level challenges such as articulation of options and demand, alignment of actors and possibilities, and support of learning processes (van Lente et al., 2003). Kanda et al. (2020) suggests three system levels of intermediation: in-between entities in a network, in-between networks of entities, and in-between actors, networks, and institutions. These classifications illustrate the varying scopes of action of different intermediaries which lead to different recipients of intermediation support (Mignon & Kanda, 2018).

Within the intermediary literature, two different perspectives for studying intermediation exist: some focus on intermediaries as actors or organizations and others on intermediation as a process (Howells, 2006). The first perspective draws attention to intermediaries as organizational bodies that engage in translating and transferring knowledge and technologies, and facilitating exchanges and interactions between actors and resources (Hyysalo et al., 2022). The second perspective directs attention at how intermediation is delivered, rather than who performs it. Following Hyysalo et al. (2022), the term intermediary is reserved to actors or entities mainly performing intermediation, whereas intermediation covers the activities involved regardless of the actors performing them.

Adopting the latter perspective, Hernberg and Hyysalo (2024) outline four modes of how actors engage in intermediation through various activities and tasks. First, *brokering* involves fostering connections among diverse actors and resources, while also bringing new participants into sustainability initiatives. The mode of *configuring* includes actively reshaping

technologies, materials, or social arrangements, thereby contributing directly to the development of innovative solutions. *Structural negotiating* involves influencing regulatory frameworks, policy decisions, and prevailing norms, which helps create space for alternative approaches and emerging actors. Finally, *facilitating and capacitating* includes establishing the conditions necessary for experimentation and learning, enabling stakeholders to express a range of perspectives and build the capabilities needed for transformative change (Hernberg & Hyysalo, 2024). Together, these modes reflect how intermediation happens in the everyday work of various actors.

Intermediation has been studied in diverse empirical contexts from various theoretical perspectives, including, but not restricted to, innovation management, innovation studies, systems of innovation, sustainability transitions, urban planning, diffusion of innovation, and energy research (see Caloffi et al. (2023) for an overview). These perspectives differ in what intermediation is supposed to contribute to, such as increasing companies' innovative capabilities, spreading academic knowledge to industry, or increasing uptake of new technologies. In this thesis, intermediation is viewed from a transition perspective where transition intermediaries are being increasingly acknowledged for facilitating and supporting transition processes (Gliedt et al., 2018; Kivimaa, Bergek, et al., 2020). As socio-technical transitions are characterized by a need for both technological, institutional, societal, and cultural change (Sovacool et al., 2025), intermediation plays an important role in bridging between actors, networks, and institutions, for instance between supply and demand, between new and established actors, or between national, regional, and local levels of transitions (Gustafsson & Mignon, 2019; Hodson et al., 2013; Hyysalo et al., 2022). Transition intermediation involves connecting diverse stakeholders, resources, and activities to foster collaboration, align visions and demands, and facilitating change toward more sustainable socio-technical configurations (Kivimaa et al., 2019). Ultimately, transition intermediation acts as a catalyst of change toward sustainability (Guy et al., 2012).

In the context of energy transitions, previous empirical studies have shown that intermediation plays a significant role in supporting demand-related changes. These include home energy retrofits (Owen et al., 2014), increasing energy efficiency in buildings (Kivimaa, Primmer, et al., 2020; Martiskainen & Kivimaa, 2018; Nordt et al., 2023; Parag & Janda, 2014), facilitating adoption of low-carbon technologies such as solar PV (Broers et al., 2023) and heat pumps (Hyysalo et al., 2018), and stimulating new markets for low-carbon technologies (Polzin et al., 2016; Rossi et al., 2022). Intermediation has proven beneficial in helping citizens navigate adoption processes by providing relevant information, coordinating various technology suppliers and other stakeholders, as well as guiding through administrative processes (Aspeteg & Bergek, 2020; Bergek, 2020). Moreover, intermediation can support citizens in articulating their needs by trying to identify what they actually want when considering technology investments (Bessant & Rush, 1995). This helps reduce the complexity for citizens, thus lowering the amount of work needed to make informed investment decisions (Hyysalo et al., 2022).

Intermediation can be performed by a wide variety of actors. These actors may either be deliberately set up to provide intermediation services (Marvin & Medd, 2004), or simply end up intermediating alongside their primary activities (Bergek, 2020; Kivimaa et al., 2019; Stewart & Hyysalo, 2008). Most often, intermediary studies focus on professional organizations or individuals with a specific mandate to provide intermediation services (Kivimaa et al., 2019), i.e. ‘intermediaries’. These can be public actors, such as government agencies and public organizations (Glaa & Mignon, 2020; Kivimaa, 2014), or private actors, such as consultant companies, building practitioners, innovation agencies, and industry associations (Bergek, 2020; Kivimaa et al., 2019). Additionally, intermediation can be provided in more informal ways, such as by peer communities and advocacy groups, or even through platforms, networks, or internet forums (Hyysalo et al., 2013; Hyysalo et al., 2018).

While much of the intermediary literature has focused on intermediation from private actors (e.g., consultants, installers, and market-based actors), recent research is drawing attention to the unique role of public intermediaries in improving the outcomes of public missions and funding while fostering transformative change (Caloffi et al., 2023; De Silva et al., 2022; Rossi et al., 2022). The next section delves into the particularities of public intermediaries.

2.3.2. PUBLIC INTERMEDIARIES

Public intermediaries represent the intersection of policy and intermediation. Several studies document how they have been deliberately established as policy instruments to address societal challenges (Schot & Steinmueller, 2018; Selviaridis et al., 2023), such as accelerating energy transitions (Polzin et al., 2016). Examples of public intermediaries include energy agencies, innovation funders, local governments, regional agencies, and research institutes and networks (Kivimaa, 2014; Klerkx & Leeuwis, 2009; Polzin et al., 2016).

There are several ways to distinguish public intermediaries from other types of intermediaries. One common approach is to address the organizational form, that is, whether the intermediation is performed by a public entity or a private company (Aspeteg & Bergek, 2020). Another way is to classify intermediaries by whether the source of funding is through public funds or private capital (Glaa & Mignon, 2020; Kivimaa, 2014; Rossi et al., 2022). Lastly, public intermediaries are distinguished based on governance structure, involving who assigns the intermediation mandate and whose interests it serves (Klerkx & Leeuwis, 2008a; Talmar et al., 2022). Regardless of approach, the public nature implies a position between public actors (e.g., government, research organizations), private actors (e.g., companies), and citizens, thus enabling both translating of policy objectives (from public to private) and bringing forward requests or demands (from private to public) (Klerkx & Leeuwis, 2009).

Public intermediaries are depicted using different terms in the intermediary literature. Many scholars simply refer to them as public (innovation) intermediaries (De Silva et al., 2022; Intarakumnerd & Chaoroenporn, 2013; Rossi et al., 2022), emphasizing their public nature. Others refer to them as institutional intermediaries, where the intermediaries are seen as institutions set up by policy bodies to reduce constraints in the transfer of resources, such as knowledge or finance, thus acting as credible brokers in the innovation system (Landoni, 2017;

Polzin et al., 2016; Yao et al., 2022). Kivimaa (2014) uses the term government-affiliated intermediaries to describe quasi-autonomous government agencies, government-owned companies, or government-initiated foundations that fall between traditional public and private sector actors. She argues that these actors can initiate and manage new policy or market processes and by acting as contact point or voice for new networks of actors, with the potential to make an important contribution to sustainability transitions. Lastly, Talmar et al. (2022) introduce the notion of policy-affiliated transition intermediaries to study how these actors change their portfolio of support services over time to advance transitions. While these terms have emerged to capture different nuances of public intermediation, this thesis adopts ‘public intermediary’ as an umbrella term for intermediaries with public governance, funding, or organization.

Public intermediaries are frequently portrayed as being driven by a commitment to the public good, closely aligned with policy objectives (Glaa & Mignon, 2020). Unlike private intermediaries, public actors can be explicitly tasked with advancing broader system-level objectives. This includes fostering stakeholder networks (Kanda et al., 2020; Rossi et al., 2022; Talmar et al., 2022), translating between local initiatives and various levels of governance (Beveridge & Guy, 2009; Ehnert et al., 2022; Hodson & Marvin, 2009), and supporting demand articulation (Klerkx & Leeuwis, 2009). Because such roles often do not generate direct profits, they are less likely to be taken on by private actors. In addition, intermediary actors involved in energy transitions must possess competence across multiple, often rapidly evolving, technological domains and understand their interdependencies. Maintaining such a broad and dynamic knowledge base is costly and challenging to sustain within a private business model (Hyysalo et al., 2022). Consequently, scholars highlight the need for public funding to support these essential intermediary functions and ensure their continuity (De Silva et al., 2022; Klerkx & Leeuwis, 2008a, 2009).

A frequently highlighted aspect of public intermediaries is their impartiality. Intermediaries in general are presented as seeking neutrality in the eyes of those they intermediate between in order to be regarded as reliable and legitimate (Klerkx & Leeuwis, 2009; Matschoss & Heiskanen, 2017). Neutrality can be understood as the lack of clear normative interests, beyond that innovation occurs, but intermediaries do often need to balance the ambition of neutrality with demands from their different stakeholders resulting in a certain degree of steering. These demands can be in terms of return-on-investment, bias towards matching with certain parties, or steering topics (Klerkx & Leeuwis, 2009). For public intermediaries, it is therefore valuable to distinguish between independence from commercial interests (Rossi et al., 2022) and political interests (Kivimaa, 2014) when assessing their neutrality. On the one hand, public intermediaries are frequently expected to remain impartial with respect to technologies and suppliers, refraining from endorsing specific brands or contractors (Kivimaa, 2014). Their lack of commercial ties often supports the perception of them as impartial and trustworthy (Rossi et al., 2022). Moreover, public intermediaries are sometimes tasked with long-term missions aimed at serving the common good rather than individual interests (De Silva et al., 2022; Rossi et al., 2022). On the other hand, some studies suggest that public intermediaries may be viewed as extensions of governmental agendas, potentially compromising their perceived neutrality

(Kivimaa, 2014; Klerkx & Leeuwis, 2009). In line with this, scholars have noted that reliance on public funding can constrain the autonomy of intermediaries, compelling them to align with the priorities of the funding bodies, which may in turn affect their legitimacy and impartiality (Kant & Kanda, 2019; Mignon & Kanda, 2018).

Additionally, studies have shown that individuals within intermediary organizations may go beyond the original remit and goals of the organizations they represent (Selviaridis et al., 2023). For instance, Talmar et al. (2022) argue that public intermediaries dynamically reconfigure their activities to deliver on their transitional promise, which results from the interaction between their policy mission, organizational structure, and agency of individual civil servants within the public intermediary organization. To fully understand how civil servants function as public intermediaries when contextualizing policy missions, a micro-level perspective is thus taken to address their individual agency.

2.3.3. MICRO-LEVEL PERSPECTIVE ON INTERMEDIATION

The micro-level perspective on intermediation highlights individual actors and their activities. It is more fine-grained than the meso level, which examines organizations and networks, and the macro level, which concerns broader societal structures and long-term system dynamics. While sustainability transitions research has traditionally emphasized macro-level dynamics (illustrated by widely used frameworks such as the multi-level perspective (Geels, 2002) and technological innovation systems (Bergek et al., 2008)), scholars increasingly highlight the importance of micro-level analysis to understand how actors, including intermediaries, actively shape socio-technical change (De Haan & Rotmans, 2018; Farla et al., 2012; Köhler et al., 2019).

Building on insights from social psychology, the micro-level perspective directs attention to what drives, enables, and constrains individuals and their behaviors in transitions (Bögel & Upham, 2018). Social psychology seeks to “examine psychological processes that can be observed in all human beings and that allow for social influences on individuals” (Aronson et al., 2010, p. 9, as translated by Bögel & Upham, 2018). Emphasizing this micro-level perspective in transition studies is important because a predominantly macro-level focus risks overlooking the everyday practices, behaviors, and decision-making processes that shape transition processes. It thus contributes to a more nuanced understanding of how individual agency influence, enable, or hinder broad systemic change (Upham et al., 2025).

Described and defined differently across theoretical fields, agency is understood here as “the ability to act with intention – as opposed to just reacting” (De Haan & Rotmans, 2018, p.278). While transition studies often address agency on an aggregated level, defined by actions of a groups of actors, scholars advocate for increased attention to the individual scale (Bögel et al., 2022; Bögel & Upham, 2018). Individual agency is defined as “the subjective experience and resulting actions of single persons” (Bögel et al., 2022, p.172). This perspective acknowledges individual actors as knowledgeable agents capable of reflecting on their circumstances and acting in ways that deviate from accepted rules, social norms, and technological conventions

(Garud et al., 2007). Consequently, agency allows actors to pursue internal strategies, covering goals to achieve, activities to engage in, and resources to deploy (Farla et al., 2012).

Still, individual actors are embedded in the institutional structures they operate within, which encompass regulations, technologies, norms, and cultural expectations (Fuenfschilling & Truffer, 2014). These structures not only constrain the possibilities for action but also provide the platform from which actors can initiate change (Farla et al., 2012). This is captured by the concept of embedded agency, which highlights that agency is both enabled and constrained by institutional structures (Garud et al., 2007). Recognizing this means acknowledging individual actors' agency in relation to their institutional context rather than in isolation. This is particularly relevant for public intermediaries, whose agency is shaped by their public mission and funding.

There are different views and assumptions about the level of agency and self-determination in the existing literature on public intermediaries. Some authors see them as passive policy implementers, with no or limited room for strategic choices and self-driven action (Backhaus, 2010; Parag & Janda, 2014). Janda and Parag (2013) suggested a middle-out approach to highlight the agency of middle actors occupying the 'middle' between the top (e.g., government) and bottom (e.g., citizens) in energy transitions, deliberately distinct from intermediaries. They argue that intermediaries, as traditionally understood, have less capacity to act as change agents than these middle actors (Parag & Janda, 2014). In contrast, other empirical studies acknowledge intermediaries as actors with agency, demonstrating how they are driven by intrinsic motivations and determinations to act with some entrepreneurial mindset, expressed through the ways they interpret policy, engage with various actors, and shape the narratives around low-carbon technologies (Kivimaa, 2014; Nordt et al., 2024; Polzin et al., 2016; Selviaridis et al., 2023). Consequently, intermediaries are not seen as passive but rather active participants whose values, ideas, and practices enable activities and influence outside their main scope, thus driving systemic change to energy transitions (Zaunbrecher et al., 2021). As Talmar et al. (2022) argue, intermediaries can even evolve over time, adapting their roles and strategies in response to shifting institutional landscapes. In particular, some scholars argue that public intermediaries, even if they fulfill a policy function, should have the flexibility to deviate from their policy mission and have some freedom to adapt their intermediation support (Klerkx & Leeuwis, 2009; Talmar et al., 2022). This thesis combines these perspectives, viewing intermediaries as active agents that operate from the middle-out with a certain degree of agency, but not making a distinction between intermediaries and middle actors.

By acknowledging the agency of public intermediaries, this thesis contributes to a more nuanced understanding of how civil servants contextualize policy in practice, and how this process is shaped by the interplay between institutional structures and individual agency (Avelino & Wittmayer, 2016). Yet, even in studies that describe intermediaries as agency-driven actors, it often remains unclear how much of this agency emerges from the individual intermediaries themselves, and how much of it is shaped or constrained by their institutional and organizational contexts. Because intermediaries are embedded within institutional structures, their actions can only be fully understood by examining how they relate to these

structures and other actors around them. Reflecting this, the intermediary literature increasingly emphasizes that intermediaries operate within ecologies of intermediation, where multiple actors coexist and interact in specific contexts (Barrie & Kanda, 2020). To grasp the contribution of public intermediaries to energy transitions, it is therefore necessary to analyze them not only from a micro-level perspective, but also from an ecology perspective that positions them in relation to other intermediary actors and activities supporting sustainable energy transitions.

2.3.4. ECOLOGIES OF INTERMEDIATION

The concept of ecologies of intermediation refers to the totality of intermediary actors and activities operating within a given context to meet intermediation needs, such as supporting citizens in sustainable energy transitions (Stewart & Hyysalo, 2008). This perspective emphasizes the relational and distributed nature of intermediation, where multiple actors coexist through complementary or competing activities to contribute to transition processes (Barrie & Kanda, 2020; Hyysalo et al., 2022; Kivimaa et al., 2019). Ecologies of intermediation typically involve actors with diverse missions, mandates, and degree of agency, connecting resources across multiple levels of socio-technical systems, resulting in great complexity (Soberón et al., 2022). While this diversity can be beneficial, it also introduces challenges such as overlapping responsibilities, competition, and power asymmetries (Glaa & Mignon, 2020; Hyysalo et al., 2022). These challenges frequently manifest as conflicts; both value conflicts rooted in actors' identities and ideologies, socio-cognitive conflicts arising from different understandings, or conflicts of interest linked to misaligned resource allocation (Upham et al., 2026).

From a demand-side perspective, ecologies of intermediation are critical for supporting citizen engagement in sustainable energy transitions, as citizens differ widely in their motives and resources when engaging in energy-saving measures (e.g., Bergek et al., 2013; Palm & Tengvard, 2011). As this diversity leads to variations in expectations and needs of intermediary support, meeting this diversity requires differentiated and complementary forms of intermediation. At the individual level, intermediaries often face trade-offs between responding to citizen expectations and aligning with other stakeholder interests, such as profit goals or policy missions (Aspeteg & Bergek, 2020). These tensions can lead to mismatches between what citizens expect and what intermediaries deliver, resulting in compromises in cost, time investments, or the level of control citizens can exert over the implementation of various energy-saving measures (Aspeteg & Bergek, 2020; Mignon, 2017). To address this, strategic differentiation within the ecology of intermediation offers a way forward, with actors specializing and complementing each other. Without such differentiation, the ecology risks overlapping target audiences that create duplication of efforts as well as ambiguous or changing mandates that blur responsibilities among actors (Klerkx & Leeuwis, 2008b). Yet, how the differentiation should be structured to reduce such risks remains unclear (Glaa & Mignon, 2020).

Adding further complexity, ecologies are not static but emerge dynamically in response to market demands and systemic gaps, often in fragmented and uncoordinated ways (Hyysalo et al., 2022). They evolve over time as actors reposition, shift focus, or disappear in response to changing transition dynamics (Hyysalo et al., 2022; Kivimaa, Bergek, et al., 2020). These dynamics make coordination of ecologies difficult, as actors often lack a shared vision or clear objectives, leading to fragmented efforts, misaligned priorities, or insufficient support to the beneficiaries of intermediation (Kanda et al., 2025; Soberón et al., 2022). If overlaps and competition between intermediaries are not addressed constructively, conflicts may hinder both transition processes and the effectiveness of intermediary work (Upham et al., 2026).

To overcome such challenges, scholars emphasize the need for stronger coordination within ecologies of intermediation (Soberón et al., 2022). As coordination requires actors with a holistic perspective, strong legitimacy, and the ability to mobilize system-level resources (Kanda et al., 2025), policy and public actors play an especially important role in coordinating these dynamic ecologies (Talmar et al., 2022). When ecologies of intermediation fail to meet intermediation needs, policy can intervene by tasking existing intermediaries with new actions or introducing new actors to fill emerging gaps (Hyysalo et al., 2022). In this way, policy helps monitor evolving transition processes, identify gaps, and ensure that intermediary support remains sufficient and effective (Kivimaa et al., 2019). Public intermediaries can thus be deliberately designed to address systemic gaps and ensure equitable access to support across diverse citizen groups (de Mello et al., 2024). In doing so, they can strategically contribute with improved coordination, better alignment of activities and relationships, reduced competition, enhanced credibility and impartiality, and more equitable access to intermediation services for those who rely on them (Glaa & Mignon, 2020; Klerkx & Leeuwis, 2008a; Soberón et al., 2022).

2.4. THEORETICAL SYNTHESIS AND ANALYTICAL FRAMEWORK

This chapter has outlined the theoretical foundation of this thesis, introducing concepts that together help position the empirical phenomenon and provide a coherent basis for addressing the aim and research questions. This section elaborates on how these concepts are connected and complement each other, resulting in an analytical framework for this thesis.

The overarching research field is sustainability transitions, with a particular focus on energy transitions. The energy system is conceptualized as a socio-technical system, requiring an increased pace of changes to technologies, cultures, and institutions to accelerate energy transitions. In particular, citizens, as energy users, have the potential to contribute to energy transitions, through both technological and behavioral changes. Within this system, policy serves as a governance tool to encourage citizen participation in energy transitions. Policy provides directionality to transitions through various policy instruments designed to achieve normative goals. Energy policy balances between the interconnected goals of affordability, security, competitiveness, and sustainability (IEA, 2024a). The primary sustainability goal is decarbonization of the energy system, with reduced energy consumption and increased deployment of low-carbon technologies.

This thesis focuses on public energy advising, which is an informational policy instrument delivered by civil servants with a policy mission to support citizens in reducing the environmental impact from energy use. The effectiveness of this informational policy instrument depends on how the policy mission is being implemented and contextualized. To study this, the thesis applies an intermediary lens, positioning public energy advisors as intermediaries operating between citizens, policymakers, and other actors in the energy system. This theoretical lens both provides insights into specific roles and activities of civil servants in energy transitions, as well as acknowledges that civil servants are only one type of actor within the ecology of intermediation supporting energy transitions. To further capture individual variations in policy implementation, this thesis adds a micro-level perspective to transitions and incorporates the concept of agency. This highlights how civil servants' intrinsic motivations and interpretations shape their work.

The combination of these theoretical concepts results in the analytical framework for this thesis. Borrowing from the middle-out approach suggested by Janda and Parag (2013), civil servants are filling a function in the middle, operating as public intermediaries between a top (policy) and a bottom (citizens). To support citizens in undertaking energy-saving missions, thus contributing to energy transitions, there are direct top-down policy incentives, such as regulations, taxes, and subsidies. Policymakers also provide mission and directionality to civil servants that they translate into intermediary support to citizens, guided by individual agency. Civil servants co-exist in the middle with other intermediary actors, constituting an ecology of intermediation that together provides the required support for citizens to engage in energy-saving measures. Given the local anchoring and interactions with citizens, civil servants also constitute a channel for feedback from the bottom-up. Figure 2 provides a visual illustration of this analytical framework.

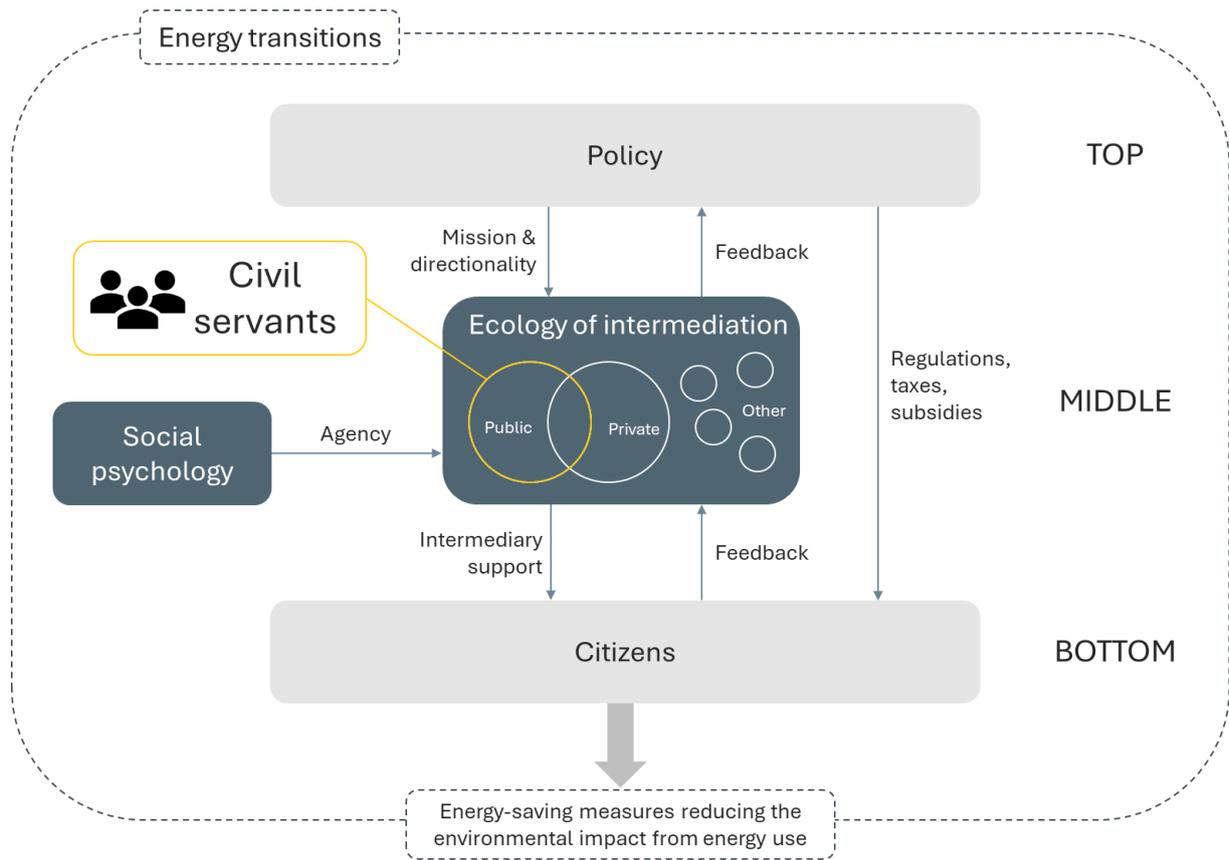


Figure 2. Analytical framework positioning the empirical phenomenon of civil servants as public intermediaries in the middle between policy (top) and citizens (bottom).

3. METHOD

This chapter presents the research project within which my research was conducted, as well as the overarching research design and methods used. The chapter concludes with reflections on the methodological choices. The purpose of this chapter is to outline the overall research process and methodology, with more details being provided in the methodology sections of each paper.

3.1. RESEARCH JOURNEY

Since starting my doctoral studies in April 2021, I have conducted the research underlying this thesis within a research project financed by the Swedish Energy Agency, entitled “Public energy advising as a policy instrument for a large-scale diffusion of solar photovoltaics – a study of the Swedish municipal energy and climate advising” (grant number 49379-1). The project ran between January 2021 and July 2025. The project aim was to add knowledge on how public energy advising contributes to facilitating the diffusion of solar PV by addressing both energy advisors and adopters of solar PV in two different work packages. The project group consisted of Ingrid Mignon, associate professor and project manager, Hanna Cardol, postdoc, Björn Lantz, professor, and me (Lisa Bastås).

The research project provided initial suggestions for studies and papers, but details about the scope and design of the studies have been adjusted and set as the project unfolded. For instance, it became evident early on that the scope of solar PV diffusion was too narrow when trying to understand the what, the how, and the why of public energy advising. The choice was thus made to broaden the scope and investigate the role of public energy advisors as part of bigger energy transitions and use solar PV as a case within the case, to illustrate the role of public energy advisors in relation to other advising functions (such as solar PV practitioners) and their target groups (such as households adopting solar PV). To some extent, this reflects the rapid development of the solar PV market, which has grown significantly since 2019 when the application for this research project was submitted.

The predefined setup provided a predictable research path that allowed for continuous progress, right from the start of my PhD, which suited me well. The overarching plan was to work on, and submit, one paper per year, including presenting at conferences. My main supervisor took more lead in the beginning to introduce me to research and journal processes, and my responsibility increased along the way – from starting with being in charge of the empirical part to designing, conceptualizing, and driving the entire research process. I presented my licentiate thesis in December 2023 based on one published, one submitted, and one work in progress paper. After my licentiate, I finalized the third paper and wrote on the fourth so they could be submitted before (and during) my parental leave between July 2024 and April 2025. During this time, two of the papers received revisions and were published, thanks to my main supervisor again taking lead. More details about the publication processes are available in Chapter 4. As the project ended in July 2025, I did not start up any new studies or papers after my parental leave but instead focused on writing this thesis.

3.2. RESEARCH DESIGN

Given the strong empirical focus of my research project, this thesis was designed as a case study centered on public energy advising. This design enabled an in-depth exploration of what happens when civil servants interpret and contextualize policy in practice. A case study approach is well suited for analyzing such real-world processes and for capturing the complexity of an empirical phenomenon (Eisenhardt, 1989; Yin, 2009).

When designing a research project, the methods chosen should reflect the aim and research questions (Maxwell, 2013). Given the explanatory aim of this thesis, it has taken a mixed-methods approach, using both qualitative and quantitative methods. This allows for leveraging the strengths of both qualitative and quantitative research and providing an expanded understanding of the phenomenon (Creswell, 2003; Greene et al., 1989). Mixed methods provide the benefit of triangulation and complementarity between data sources, allowing for studying both overlapping and different aspects of a phenomenon (Greene et al., 1989). A sequential exploratory strategy guided the research process, where initial qualitative studies explored the empirical phenomenon and informed the design and focus of subsequent quantitative studies, which in turn expanded upon the qualitative insights (Creswell, 2003). This strategy is suitable when higher priority is given to the qualitative component, which in this thesis allowed for an initial depth into the case studied.

The research was conducted in two main phases, with two studies in each phase, as illustrated in Figure 3. The first was an exploratory phase, aimed at investigating various aspects of public energy advising and its policy implementation. This was followed by a testing phase, designed to test hypotheses concerning public energy advising in relation to other intermediaries and their clients. The choice of research methods was aligned with the objectives of each phase.



Figure 3. Overview of the research design.

In the first phase, qualitative methods were employed as they allow for an exploratory approach and gaining a deep understanding of the phenomenon (Bell et al., 2018). Such methods are particularly suitable for capturing how context influences individual actors, as well as for understanding processes by which events and actions take place (Maxwell, 2013), which correspond to the second research question, about policy contextualization. Study 1 (a document study) and Study 2 (an interview study) thus provided rich empirical descriptions of the case, capturing individual nuances among the public energy advisors.

In the second phase, quantitative methods were used to obtain insights into other perspectives of the phenomenon. Adopting a descriptive approach, hypotheses were derived from the

qualitative findings and previous literature and tested, thereby enhancing the validity of the research (Greene et al., 1989). Study 3 (a survey study) set the support provided by public energy advising in comparison with solar PV practitioners and Study 4 (also a survey study) assessed the demand-side of said support, by investigating client satisfaction with both public energy advising and solar PV practitioners.

Table 1 presents an overview of the four studies, including purpose, research approach, type of study, as well as which research questions the studies address.

Table 1. Overview of the four studies and how they relate to the research questions.

Study	Purpose of the study	Research approach	Type of study	Research questions addressed
1	Map activities performed by public energy advisors.	Qualitative	Document study	RQ1, RQ2
2	Identify what influences differences in activities between public energy advisors.	Qualitative	Interview study	RQ1, RQ2, RQ3
3	Examine solar PV adoption support from public energy advisors and solar PV practitioners.	Quantitative	Survey study	RQ1, RQ3
4	Assess citizens' satisfaction with intermediation support from public energy advisors and solar PV practitioners.	Quantitative	Survey study	RQ3

Each study provided the empirical base for one of the appended papers, following the order of the studies (Paper I is based on Study 1 etc.). Figure 4 shows when the data collection and main analysis were performed for each study, as well as the publication processes of the corresponding papers.

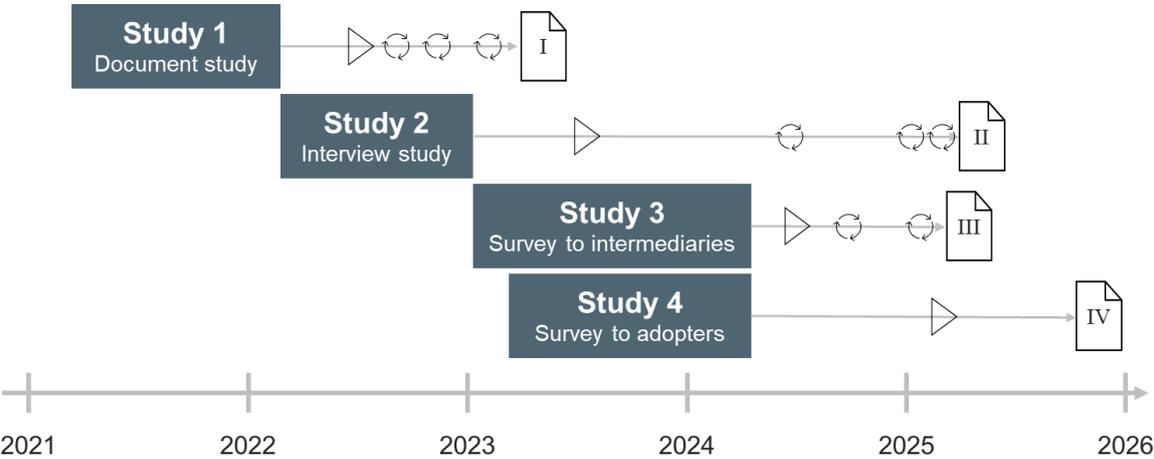


Figure 4. Timeline of studies and the corresponding papers, including times of submissions (triangle) and revisions (circle of arrows).

3.3. EMPIRICAL CONTEXT

This thesis studies the Swedish program of public energy advising, which is a publicly funded, free-of-charge, and commercially independent informational policy instrument aimed at reducing the environmental impact of energy use. Established in various forms since the 1970s³, the program is delivered by civil servants at the municipal level and coordinated nationally by the Swedish Energy Agency. With a mission to provide energy-related information and advice to households, associations, and small companies, the public energy advisors facilitate energy-saving measures that contribute to national targets such as reducing greenhouse gas emissions and increasing renewable energy investments (Swedish Government, 2016). The public energy advisors are civil servants operating at the intersection of national policy and local implementation, reflecting their role as intermediaries translating policy into citizen action. Figure 5 provides a schematic overview of how the public energy advising program in Sweden is structured.

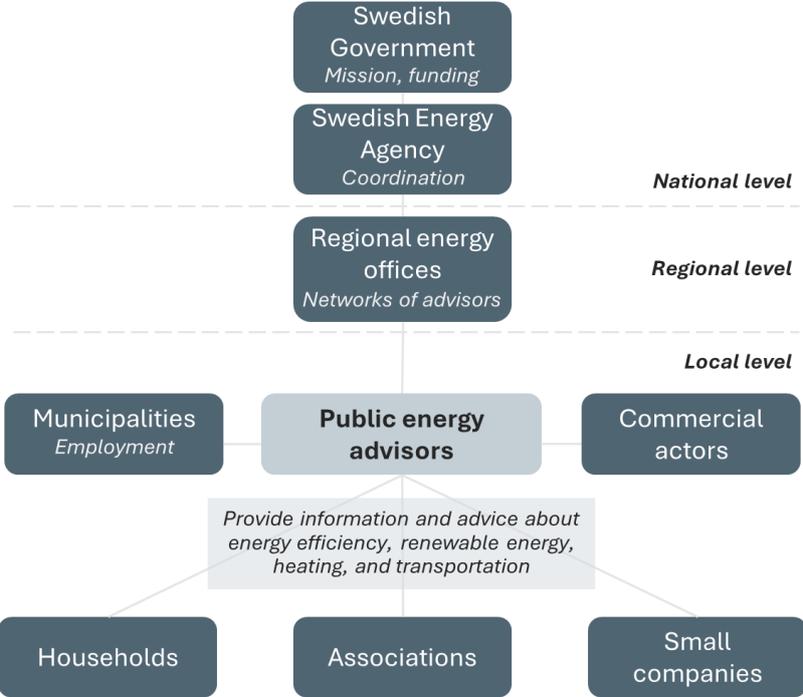


Figure 5. Schematic overview of the public energy advising program in Sweden.

Sweden’s public energy advising program is particularly relevant for studying civil servants contextualizing policy for six main reasons. First, Sweden is recognized as a leading country in energy transitions (World Economic Forum, 2023), with ambitious climate targets such as 100 percent renewable energy production by 2040 (Swedish Government, 2018). The program complements financial and regulatory policy instruments by offering information and advice, making it a key part of the policy mix.

³ See Kjeang et al. (2017) for an overview of the historical development of the service.

Second, Sweden's public administration model reinforces the neutrality and trustworthiness of civil servants. Governed by general labor law rather than a separate civil service statute, Swedish civil servants operate independently from the government, enhancing their legitimacy in roles targeting citizens, such as public energy advising (Olsson & Sjödin, 2025).

Third, while the public energy advising program operates within a national policy framework, municipalities have flexibility in how they organize and deliver the advising. Advisors may work part-time in one municipality (combined with another municipal or regional position) or as part of a group of advisors in a cluster of municipalities, and everything in between (Eriksson & Kjeang, 2021). As of June 2023 (when the main data collection efforts were finished), 186 advisors served 288 out of Sweden's 290 municipalities, distributed over 118 (groups of) municipalities, offering a rich context for analyzing how policy missions are locally implemented.

Fourth, the program is structured in two- to three-year project cycles with continuous evaluation to receive funding for subsequent project periods. This allows for continuous improvement and policy learning. This dynamic setup has enabled the research project to contribute insights to ongoing evaluations, making the case empirically relevant for refining policy designs. For instance, the latest evaluation concerned the structure of the public advising program, suggesting dividing it into a national advisory service that responds to incoming inquiries and a municipal service focusing more on strategic outreach (see Energimyndigheten, 2024).

Fifth, Sweden has a growing solar PV market, making it suitable for exploring public intermediaries in relation to private actors, as is done in Study 3 and 4. The focus on solar PV is motivated by it representing one concrete way in which citizens can reduce the environmental impact from their energy use. National subsidies and rising electricity prices have driven an increased demand for solar PV, yet its adoption still lags behind national targets (Falk & Hagsten, 2025; IEA PVPS, 2023). Swedish solar PV adopters are heterogeneous and require different types of information in their adoption processes (Palm & Eriksson, 2018). While private intermediaries operate in market-driven context, public energy advisors are publicly funded and tasked with specific policy missions, implying differences in the information and advice they provide.

Finally, studying Sweden's approach offers comparative insights into how public intermediation can be optimized across different governance contexts. While Sweden's model of public energy advising is well-developed, similar approaches exist across Europe. In the European Union, member states are obliged to provide locally adapted energy advising services that contribute to goals on renewable energy, energy performance in buildings, and energy efficiency in accordance with the Renewable Energy Directive (Directive (EU) 2023/2413), the Energy Performance in Buildings Directive (Directive (EU) 2024/1275), and the Energy Efficiency Directive (Directive (EU) 2023/1791). In line with these directives, countries such as Austria, Belgium, Denmark, France, Germany, Greece, and Portugal, have adopted local energy advising schemes similar to Sweden's.

3.4. STUDIES AND THEIR METHODS

This section provides an overview of the methods for data collection and data analysis used in the four studies. More details are provided in the methodology sections of each paper.

3.4.1. STUDY 1: DOCUMENT STUDY

Study 1 is a document study with the main objective to create an initial understanding of the empirical field, by mapping activities of public energy advisors. Document studies are an efficient and cost-effective way of collecting rich empirical data, with the added advantage of documents providing stable empirical insights, unaffected by researcher intervention (Bowen, 2009). The choice of performing a document study was motivated by the convenient access to reports from all energy advisors, thus enabling insights from the entire population of public energy advisors.

Study 1 is based on secondary data in the form of activity reports that the public energy advisors write at the end of each project period. The data was collected in spring 2021 and consisted of 129 activity reports from the public energy advisors for the project period 2018-2020. The reports cover activities and results for the project period and are a requirement from the Swedish Energy Agency to be granted funding for the next project period. The 129 reports represent the whole cohort of energy advisors in Sweden during that period.

The reports were analyzed through an inductive, thematic approach, following the Gioia methodology (Gioia et al., 2013) in order to identify activities performed by the energy advisors. This methodology was chosen due to its promise of enhancing qualitative rigor by its systematic approach to generating new concepts and ideas in inductive research. This entails conducting the data analysis in three steps. First, the data was coded exploratively to generate first-order concepts, capturing repeatedly reported activities by the public energy advisors. Second, patterns were identified among these concepts by identifying contrasts and replication, resulting in second-order themes that categorize the reported activities. Lastly, the second-order themes were distilled into aggregate dimensions that account for the overarching focus of the activities, i.e., if they target the energy users, the advisors themselves, or the broader energy system.

While Study 1 provided the single empirical foundation for Paper I, it is limited by its reliance on secondary data which was collected with another purpose in mind than being used in research. As the reports are self-reporting documents written as an evaluation of the project period to the funding agency, it is possible that the data included holds bias. The reports may offer selective, interpreted, or partial accounts of events rather than definitive records (Bowen, 2009). Nevertheless, having access to reports from all public energy advising projects enabled cross-comparison and benchmarking between the public energy advisors, allowing for comprehensive insights about the activities performed, reducing the potential impact of individual dishonest reports. In this thesis, the document analysis is complemented with an interview study (Study 2) to triangulate the findings with other qualitative research methods (Bowen, 2009).

3.4.2. STUDY 2: INTERVIEW STUDY

Study 2 was designed as an interview study aimed at providing deeper insights into what influenced the observed differences in advising activities from Study 1.

Study 2 is based on 22 semi-structured interviews with public energy advisors conducted between April and September 2022. The respondents were purposefully selected based on the reports in Study 1, with one from each region in Sweden, except the capital region which had two respondents. The regional approach was chosen to cover the variety across the country as this may affect the contextualization of the policy. The selection was made to account for potential differences due to the geographical context of the respondents (e.g., organization form of their energy advising projects, number of municipalities in their projects, and rural or urban areas) as well as demographic characteristics (e.g., gender, educational background, and experience). This type of purposive sampling is common to obtain sufficient data that allows for rich descriptions of the studied phenomenon (Onwuegbuzie & Collins, 2007).

The interview guide was developed based on insights from Study 1 and included questions on the operationalization of advisors' tasks, planning and prioritization, municipal organization, networks, and the drivers, barriers, and enablers influencing their work. A semi-structured format was used to allow flexibility and enable elaboration on emerging topics, while still maintaining alignment with the research focus to facilitate comparison across respondents (Bell et al., 2018). One interview was conducted in person, while the remaining interviews were held digitally. The interviews lasted between 45 minutes and 2 hours and 45 minutes, and all were recorded and transcribed.

To analyze the interview data, a cross-case approach was employed, treating each advisor as an individual case. This approach is useful for identifying similarities and differences and forces researchers to go beyond initial impressions (Eisenhardt, 1989). The analysis proceeded in three steps. First, an initial content analysis was conducted to generate first-level codes by identifying both influences on the respondents (e.g., motivations and reasoning for their activities) and their practices (e.g., activities and priorities in implementing their mission). Second, these codes were grouped into aggregated categories, informed by the analytical framework for Paper II (see Section 4.2). Finally, the cases were compared in terms of influences and practices to identify patterns of contrast and replication.

3.4.3. STUDY 3: SURVEY ON THE INTERMEDIATION PERSPECTIVE

Study 3 sought to examine public energy advisors in relation to solar PV practitioners, thus highlighting similarities and differences between public and private intermediaries in the context of solar PV adoption support. It relatedly addressed how these actors coexist in the ecology of intermediation supporting citizens' solar PV investments.

Data for Study 3 was collected through an online survey to public energy advisors and solar PV practitioners. To design the survey, previous empirical research on intermediaries in innovation and sustainability transitions was reviewed to identify common assumptions about the similarities and differences between public and private intermediaries (see Section 2.3.2 and

Paper III). These assumptions were operationalized into four item categories: driving forces, neutrality, perceived strengths, and scope. The items were structured as five-point unipolar rating scales, typically ranging from “To a very low extent” to “To a very high extent”. The survey also included background questions addressing respondents’ educational background, position, experience, and contact with citizens. To minimize common method bias⁴, some items were reverse-scored and others had differently quantified labels (Jordan & Troth, 2020; Podsakoff et al., 2003).

As the survey was based on previous qualitative research, particular attention was paid to validity which refers to the accuracy of measurements, or more specifically whether a measurement measures the concept that it was designed to measure (Bell et al., 2018). The survey was refined through a two-stage pre-testing process (Hox, 2008). First, a small panel of academic and practitioner experts assessed face validity by reviewing whether the items adequately reflected the underlying constructs and whether they were relevant, reasonable, unambiguous, and clear (Taherdoost, 2016). This was followed by a pilot test with five knowledgeable practitioners outside the sampling frame, which informed further adjustments based on respondents’ interpretations and potential question-related issues (Hox, 2008).

The survey was distributed in June-October 2023 and January 2024. The main distribution strategy relied on endorsement from sources perceived as credible by the targeted respondents (Rochford & Venable, 1995), which proved more effective for public than private intermediaries. For public intermediaries, public energy advisors received the survey via email from regional development managers at Sweden’s 15 regional energy offices between June and July 2023, including one reminder, yielding a 49% response rate (92 out of 186).

For private intermediaries, data was collected in three steps. First, from June to August 2023, the survey was distributed via the Swedish Solar Energy Association’s newsletter, which reached 2 700 employees across 330 member companies. Despite this seeming like a suitable endorsement channel, few responses were obtained. Second, the survey was posted in a solar PV installer forum with 1 300 members, from September to October 2023, but again, response rates were low. These two mass-distribution methods likely suffered from low personalization and message visibility (Sauermann & Roach, 2013). Consequently, in the third step, a more targeted approach was adopted. Individual email addresses were collected from the Swedish Solar Energy Association’s member list, focusing on employees at installation companies, project developers, consultancies, and wholesalers. In January 2024, 319 individuals received personalized invitations, resulting in 56 responses (18%). The final private intermediary sample comprised 72 responses.

⁴ Common method bias is described as “variance that is attributable to the measurement method rather than to the constructs the measures represent” (Podsakoff et al., 2003, p.879) and is one of the main sources of measurement error in survey research.

To ensure sample representativeness, non-response bias⁵ was assessed by comparing responses from early and late participants, based on the assumption that late respondents resemble non-respondents more closely (Armstrong & Overton, 1977). This comparison, conducted using responses submitted before and after a mid-period reminder, revealed no significant differences, suggesting that nonresponse bias was unlikely to have influenced the results.

To analyze the data, descriptive statistics were first used to explore patterns within each respondent group. Due to violations of normality and homogeneity of variances, confirmed by significant Shapiro-Wilk and Levene's tests, Mann-Whitney U tests were subsequently applied to assess differences between the respondent groups across individual items. This non-parametric method is appropriate when assumptions of normal distribution and equal variances are not met (Zimmerman, 1987).

3.4.4. STUDY 4: SURVEY ON THE DEMAND-SIDE PERSPECTIVE

While the first three studies have been conducted solely within the frame of this thesis, Study 4 is part of a bigger collaborative effort within the research project to gather insights into the demand-side of intermediation. It addressed satisfaction of citizens, organizations, and companies with the support provided by both public and private intermediaries to identify potential differences, and provided empirical material to several scientific articles. In this thesis, only the part about citizen satisfaction is included.

Data for Study 4 was collected through a survey constructed to test hypotheses about citizens' perceived value and satisfaction with intermediation support from both public and private intermediaries. Borrowing from the marketing and service literature, the commonly used SERVQUAL scale (Kuo et al., 2009; Parasuraman et al., 1991; Springer & Tyran, 2022) was adjusted to fit the context of solar PV support. To validate the adapted SERVQUAL scale, the survey underwent two rounds of pilot testing, first with a small group of academics and practitioners with expertise in the area, and second, with a small group of representative respondents.

The survey was distributed in June-July 2023 to private households in Sweden that had applied for a direct capital subsidy for solar PV investments between 2009 and 2021, in total 46 507 citizens. After a midway reminder, 16 888 responses were collected (36% response rate). All these respondents had received intermediation support from private intermediaries, and out of these, 1 368 (8,1% of the total responses) had also received support from public intermediation.

The analysis consisted of two steps. First, a confirmatory factor analysis (CFA) was performed to validate the hypothesized factor structure. This process focused on two key aspects: convergent validity, which assesses whether each factor is well represented by its associated

⁵ Non-response bias is commonly described as the risk of error caused by the possibility of those who respond to a survey differing in various ways from those who do not respond.

items (Hair et al., 2010), and discriminant validity, which evaluates whether the factors are sufficiently distinct from one another (Fornell & Larcker, 1981). The convergent validity was assessed as acceptable based on factor loadings' standardized estimates (the majority surpassing 0.7 which exceeds the ideal recommendation threshold 0.5), composite reliability (all exceeding the recommended 0.8), average variance extracted (surpassing 0.5), and Cronbach's Alpha (widely above lower limit of 0.8) (Fornell & Larcker, 1981; Hair et al., 2010). The discriminant validity was evaluated by ensuring the square roots of average variance extracted for each construct were higher than their respective bifactor's correlation coefficients, which they were for all factors except one (Fornell & Larcker, 1981). Thereafter, the research model and its associated hypotheses were tested using structural equation modeling (SEM) with maximum likelihood estimation (Fisher et al., 2014).

Non-response analysis was conducted in two steps. Responders and non-responders were compared on key demographics such as residential county, building type, application timing, amount requested, and age. While statistical tests showed significant differences, as expected due to the large sample size (Lantz, 2013), effect sizes were generally small. For example, Cramér's V values for county (0.092) and building type (0.087) indicated minor differences. Responders tended to apply later and for smaller amounts, with small-to-medium effects (Cohen's $d = 0.271$ and 0.152). Qualitative feedback from phone calls, emails, and letters suggested reasons for non-participation included dissatisfaction with survey wording and general reluctance to take part in surveys.

3.4.5. SUMMARY OF EMPIRICAL MATERIAL

Altogether, the data collected in these four studies constitute the foundation for the four appended papers in this thesis. Table 2 provides a summary of all the empirical material as well as the methods used to analyze the data.

Table 2. Summary of empirical material obtained in the four studies.

Study	Data collection method	Data source	Data analysis method
1	Secondary data	129 activity reports from public energy advisors covering the project period 2018-2020	Thematic analysis
2	Semi-structured interviews	22 public energy advisors	Cross-case, content analysis
3	Online survey	164 responses: including 92 public energy advisors, 72 solar PV practitioners (installation companies, project developers, consultants, and wholesalers)	Mann-Whitney U-tests
4	Online survey	16 888 responses from private households having applied for solar PV investment subsidy between 2009-2021	Confirmatory factor analysis, structural equation modeling

While the individual studies provide insights for the appended papers, the combination of all empirical material allows for addressing the broader research questions in this thesis. Note that

not all data was used in the papers, but there were also insights obtained from the empirics that did not fit into the frames of each paper.

3.5. METHODOLOGICAL CONSIDERATIONS AND LIMITATIONS

As with all research, this thesis comes with several methodological considerations that are worth mentioning. First, the choice to use a sequential exploratory, mixed-methods approach was motivated by the opportunity to first delve deep into the phenomenon and subsequently test assumptions and hypotheses quantitatively. This allowed for viewing public energy advising from different perspectives and levels of detail, thus enhancing the explanatory power of the thesis. In addition, the use of quantitative methods in the mainly qualitatively dominated field of sustainability transitions has allowed for methodological contributions to the research community. Lastly, the variety of data collection and analysis methods has given me the opportunity to try different methods during my PhD process, thus strengthening my learning process as a researcher.

Yet, this research comes with several limitations. First, while the empirical focus on Sweden enables deep insights about the phenomenon, it limits generalizability to other empirical contexts. In addition, I primarily departed from one type of actor (i.e., public energy advisors), thus not considering other civil servants active in the ecology of intermediation for supporting citizens in energy transitions. I also account for citizens differently in the different studies: while Studies 1-3 include aspects from the target groups for public energy advisors, namely households, small companies, and associations, Study 4 only accounts for households, and only the small share that applied for a subsidy for their solar PV investments and followed through with their investments, i.e. only adopters, leaving out the non-adopter perspective. Meanwhile, in this cover essay, I aggregate the household perspective into citizens, with the underlying understanding that citizens are private individuals that can undertake energy-saving measures in their homes. Moreover, while the choice of studying intermediary support for solar PV adoption in Study 3 and Study 4 enabled comparison with a private counterpart for public energy advising in terms of solar PV practitioners, it covers only parts of the services that public energy advisors are offering. Solar PV practitioners do not intend to fill the exact same function as public energy advisors in an ecology of intermediation. Public energy advisors and solar PV practitioners also cover only parts of the ecology of intermediation for solar PV support in Sweden, and I have not taken other actors, such as peers, into account. Finally, this research provides a cross-sectional account of public energy advising in Sweden, not considering longitudinal changes that may have occurred during the length of my PhD process. Together, these limitations provide examples of factors that limit the claims I can make in this thesis. They also open avenues for future research, which are elaborated in Section 8.2.

Despite these limitations, there are several ways to increase the trustworthiness of research. In quantitative studies, trustworthiness is typically assessed in terms of reliability and validity, with specific statistical methods to be performed (Bell et al., 2018). However, evaluating the quality of qualitative research is less straightforward and often requires different criteria (Grodal et al., 2021). One widely accepted framework is that of Lincoln and Guba (1985), which proposes four dimensions of trustworthiness: credibility, transferability, dependability, and

confirmability. These dimensions align conceptually with concerns about reliability and validity but are tailored to the interpretive nature of qualitative research.

Although this thesis employs a mixed-methods design, the emphasis on qualitative methods within the sequential exploratory strategy merits a focused discussion on qualitative quality criteria. Therefore, reflecting on the credibility, transferability, dependability, and confirmability of all methods helps to ensure the robustness and transparency of the research process.

Credibility refers to how believable the findings are, that is, whether the results offer a reliable and accurate account of the studied phenomenon (Bell et al., 2018). In this thesis, credibility was strengthened through the use of multiple methods, enabling triangulation between both qualitative and quantitative data sources (Bowen, 2009). This allowed for a more nuanced and robust understanding of the various aspects of public energy advising.

Transferability concerns the degree of generalizability of the findings and whether they can be applied to other contexts. This is a common challenge in qualitative research, where depth is often prioritized over breadth (Lincoln & Guba, 1985). While this study focuses on public energy advising within the Swedish context, limiting its transferability, care has been taken to provide rich descriptions of the context, both in the individual papers and this cover essay. Consequently, insights generated may still be relevant and informative for similar settings where civil servants are used as a policy instrument to support citizens in energy transitions, such as Austria, Belgium, Denmark, France, Germany, Greece, and Portugal.

Dependability relates to the consistency between data, analysis, and conclusions (Bell et al., 2018). This was addressed by systematically documenting all methodological steps and by presenting and testing the research findings at academic conferences and seminars. Furthermore, the peer review process during publication served as an additional layer of scrutiny, reinforcing the dependability of the results.

Lastly, *confirmability* refers to the objectivity of the researcher in conducting research and interpreting the data (Bell et al., 2018). To enhance confirmability, close collaboration with my co-author(s) was maintained throughout the research process. In particular, the coding of qualitative data was initially conducted independently, followed by joint discussions to align coding strategies and minimize individual bias. Moreover, early findings were discussed in a reference group for the research project, to obtain second opinions on our interpretations.

As a final comment, I have used Microsoft Copilot and ChatGPT for copy editing purposes. They were primarily employed to improve clarity and coherence of the written text, and all conceptual development, analytical reasoning, and empirical interpretations remain my own.

4. SUMMARY OF APPENDED PAPERS

This chapter summarizes the four papers included in this thesis and describes my contribution to each of them. The papers provide different perspectives on policy contextualization by civil servants acting as public intermediaries, using different empirical perspectives and theoretical framings. Paper I takes a policy lens and highlights that public intermediaries perform different activities and take on different roles, indicating varying policy outcomes. Paper II goes deeper and describes multiple influences on public intermediary practices, emphasizing individual agency in policy implementation, integrating insights from transitions and social psychology. With the obtained deeper understanding of public intermediaries, paper III puts public intermediaries in relation to private intermediaries and examines how they co-exist in ecologies of intermediation, using the case of solar PV adoption support. To further nuance the picture of public intermediaries, paper IV provides the demand-side perspective by assessing households' satisfaction with public and private intermediation support. Table 3 provides an overview of the appended papers.

Table 3. Overview of appended papers.

Paper	Title	Authors	Status	Research question(s) addressed
I	The role of public energy advising in sustainability transitions – empirical evidence from Sweden	Mignon, I. & Winberg, L.	Published in <i>Energy Policy</i> , March 2023.	RQ1, RQ2
II	Agency of institutional intermediaries in transitions: A study of influences on intermediary practices	Mignon I & Bastås, L.	Published in <i>Technological Forecasting and Social Change</i> , April 2025.	RQ1, RQ2, RQ3
III	Comparing public and private intermediaries co-existing in ecologies of intermediation	Bastås, L. & Mignon, I.	Published in <i>Environmental Innovation and Societal Transitions</i> , February 2025.	RQ1, RQ3
IV	Assessing the demand-side of intermediation support in solar PV adoption	Bastås, L., Cardol, H. & Lantz, B.	Under review in <i>Environmental Innovation and Societal Transitions</i> , submitted in February 2025.	RQ3

4.1. PAPER I

4.1.1. SUMMARY

Paper I examines the role of public energy advisors in Sweden and their contribution to sustainable energy transitions, focusing on their daily work. It departs from the energy policy literature, where public energy advisors are recognized as being a powerful policy instrument designed to offer neutral and commercially independent advice on energy efficiency and renewable energy. However, due to changing client demands, technological developments, and increased competition from private and digital sources, the role of public energy advisors is evolving. The paper thus addresses the need to understand what public energy advisors do to

facilitate and stimulate actions from their target groups that contribute to reduced energy consumption or increased investments in renewable energy technologies.

Based on a qualitative analysis of 129 activity reports from Swedish public energy advisors (2018-2020), the paper identifies a wide range of activities, categorized into user-centered, advisor-centered, and system-centered, depending on the target recipients of the activities. Table 4 provides a description of these different activities.

Table 4. Overview of activities performed by public energy advisors.

Activities	Description
User-centered activities	Target energy users and encompass tailored advising (e.g., home visits and one-to-one consultations), educational events (e.g., seminars and workshops), and general information dissemination (e.g., information campaigns and digital content).
Advisor-centered activities	Outreach and promotional efforts to increase their visibility, and competence development to keep their skills up to date.
System-centered activities	Building coalitions, creating networking platforms, contributing to knowledge infrastructure, and participating in local policymaking

We distinguish between direct roles, which target energy users specifically, and indirect roles, which enhance the quality and legitimacy of the service as well as increase the general awareness of energy issues in society. Moreover, we emphasize that user- and advisors-centered activities are on an actor level, aimed at (groups of) individual actors, whereas system-centered activities target system functions, such as networks and institutions.

The paper highlights that public energy advisors play both direct and indirect roles in energy transitions and that the diversity in their roles and activities constitute an important potential for policy. Their ability to translate national policy into local action and to function as systemic intermediaries engaging in strategic networking and building a knowledge infrastructure is particularly valuable. However, the diversity of roles and activities also raises challenges for evaluation and coordination. The findings suggest a need for clearer role definitions, enhanced support structures, and further research into the effectiveness and legitimacy of public energy advising.

In sum, Paper I provides a comprehensive overview of how public energy advisors in Sweden contribute to sustainable energy transitions through a diverse set of activities. It emphasizes their evolving role as both local providers of context-specific support and systemic intermediaries and calls for greater attention to their strategic value and needs for support in policy design and evaluation.

4.1.2. MY CONTRIBUTION AND PUBLICATION STATUS

Paper I was co-authored with Ingrid Mignon, who is the first author. This was the first paper of my PhD process and Ingrid took the lead in problematization and conceptualization. My main responsibility was to analyze the secondary data that Ingrid had obtained from the Swedish Energy Agency just before I started. The writing process was collaborative and learning-oriented.

An early version of the paper was presented at the 7th Network of Early Career Researchers in Sustainability Transitions (NEST) Conference in Lyon in May 2022. Following this, we submitted the manuscript to Energy Policy in June 2022, where it was desk-rejected on the grounds that the topic was considered outside of the journal's scope and not interesting enough. Believing these reasons to be unconvincing, we appealed against the decision with detailed justification. The editor subsequently agreed to allow a revise and resubmit, provided that we addressed the stated concerns. We resubmitted the manuscript in August 2022, and after two rounds of revision, one major and one minor, the paper was accepted and got published in March 2023.

4.2. PAPER II

4.2.1. SUMMARY

Paper II sets out to explore reasons for the diversity in activities performed by public energy advisors as identified in Paper I. It addresses the call in sustainability transitions literature for increased attention to the micro-level perspective and the roles and practices of individual actors. It focuses on public intermediaries, which are civil servants tasked with contextualizing policies to local settings⁶. Positioned between national policy frameworks and local contexts, these public intermediaries play a critical role in translating national goals and visions into concrete action at the local level. While they are often portrayed as passive and neutral policy implementers, emerging research suggests that public intermediaries may also function as change agents with their own motivations and strategies, thus exhibiting individual agency. However, the extent and nature of this agency remain insufficiently explored. Paper II therefore aims to understand what influences the practices of individual intermediaries in the process of operationalizing their policy mission. To this end, the Swedish public energy advisors are investigated as they are actors with a formal role of implementing energy-related policies at the local level.

By integrating perspectives from transitions and social psychology, the paper develops an analytical framework that conceptualizes top-down, middle-out, and bottom-up influences on intermediary practices. From a transitions perspective, public intermediaries are assumed to be influenced by top-down factors (policies, task specifications, funding, governance) and bottom-up factors (citizen demands, local specificities), due to their mission to intermediate between the system level and the local level. To complement this, the framework incorporates middle-out influences drawing on social psychology to capture intrinsic, individual-level elements such as personal motivations, knowledge, and preferences that shape how intermediaries enact their roles.

⁶ The paper uses the concept “institutional intermediaries” but for the sake of coherence of this cover essay, the paper summary sticks to “public intermediaries”. See Section 2.4 for a discussion regarding how public intermediaries are being referred to in the literature.

The analytical framework was applied to the analysis of interviews with 22 public energy advisors. The findings show that public intermediaries are indeed shaped not only by top-down influences like government missions and bottom-up influences like client needs, but also to a high extent by middle-out influences such as their own motivations, preferences, and expertise. These middle-out influences indicate a high level of individual agency. Moreover, the analysis reveals that middle-out influences mediate top-down and bottom-up influences, thereby significantly shaping how policy objectives are operationalized in practice.

Furthermore, the paper shows that public intermediaries assign various levels of importance to the different levels of influence, which shapes the types of activities they pursue. This resulted in the identification of six distinct intermediary practices with different focus points and main influences. While some advisors showed a clear preference for certain practices, most advisors combined or adapted their practices to situational needs. Consequently, the policy outcome may vary across contexts. Table 5 provides an overview of the different practices.

Table 5. Overview of practices of public intermediaries (adapted from Mignon & Bastås, 2025).

Practice	Description	Main influence level	Main influence
Goal-oriented	Focused on fulfilling top-down policy goals and reporting requirements.	Top-down	Rules and regulations
Holistic	Guided by intrinsic motivations to maximize long-term impact and energy savings.	Middle-out	Interests and motivations
Experimenting	Characterized by creativity and trial-and-error approaches to outreach and engagement.	Middle-out	Preferences
Learning	Emphasizing knowledge acquisition and legitimacy-building, especially among newer advisors.	Middle-out	Resources
Expertise-oriented	Centered on deep technical knowledge and problem-solving.	Middle-out	Preferences
Client-oriented	Driven by responsiveness to client needs and preferences.	Bottom-up	Client demand

The differences in public intermediaries’ middle-out influences and practices entail both opportunities and risks. The diversity of perspectives and practices among public intermediaries holds potential for answering the varying needs and demands from a heterogeneous group of citizens. Meanwhile, the same diversity may lead to experienced inequality and lack of legitimacy by citizens in specific municipalities if the services do not match their expectations.

In sum, Paper II highlights the importance of agency of public intermediaries and its impact on policy implementation. It emphasizes the need for policymakers to account for the multiple influences shaping public intermediaries’ practices and to leverage their heterogeneity to maximize policy impact.

4.2.2. MY CONTRIBUTION AND PUBLICATION STATUS

Paper II was also co-authored with Ingrid Mignon, who is the first author. We started the writing process with the ambition to have equal contributions and an author list in alphabetical order to support my progression in publishing journal articles. I took primary responsibility for data collection and analysis, and we jointly developed the problematization and conceptual framing.

An early version of the paper was presented at the NORSI Research Conference in Stockholm in January 2023, where we received insightful suggestions from Professor Thomas Magnusson about incorporating a social psychology perspective. Recognizing its relevance, we integrated this perspective into the theoretical framework, with Ingrid leading the conceptual development. We then targeted the high-ranked journal *Technological Forecasting and Social Change* and submitted the manuscript in June 2023.

After a year of waiting, we received review comments requesting a major (and risky) revision. My main contribution to this revision was reframing the problem and strengthening the presentation of findings and Ingrid did the main conceptual improvements, as this coincided with me going on parental leave. With my input, Ingrid reworked the theoretical contributions in two rounds of major revision before the paper being conditionally accepted after minor fixes. Before the final submission, we revisited the authorship discussion and agreed that Ingrid would be the first author.

4.3. PAPER III

4.3.1. SUMMARY

The point of departure for Paper III was that public energy advisors are only one type of actor supporting citizens in energy transitions. There is an ecology of intermediation constituting both public and private actors as well as NGOs, peers, and internet forums that provide citizens with information, advice, and support about energy-related decisions. While ecologies of intermediation are increasingly acknowledged for their role in accelerating transitions, previous research has highlighted that they often provide fragmented and uncoordinated intermediation support, which can hinder the diffusion of low-carbon technologies and slow down sustainability transitions (Hyysalo et al., 2022; Kivimaa, Bergek, et al., 2020). This fragmentation is problematic as it leads to inefficiencies in knowledge and support infrastructure, creates overlaps and tensions among intermediary actors, and reduces the effectiveness of transition processes.

Paper III addresses the distinction between public and private intermediaries, as previous research has discussed it as a potential source of tension in ecologies of intermediation (Glaa & Mignon, 2020; Kivimaa, 2014; Klerkx & Leeuwis, 2008a). While private intermediaries are commonly understood as having a business purpose, assumed to pursue commercial or financial goals (Aspeteg & Bergek, 2020; Mignon & Kanda, 2018), scholars have different ways of distinguishing public intermediaries. Some authors distinguish between public and private intermediaries based on organizational form, i.e., whether the intermediary is a public organization or a company. Others categorize intermediaries based on their source of funding,

delineating whether funding for intermediary activities comes from public or private sources. Less frequently, authors classify intermediaries as public or private based on governance structure, considering whether the organization(s) deciding the intermediary's mission is public or private and whose interests the intermediary is serving. If the governing institution comprises both public and private organizations, the intermediary may be referred to as hybrid. The paper thus makes a point of distinguishing public and private intermediaries based on their organizational form, funding, and governance.

The empirical context of Paper III is adoption of solar PV, where public and private intermediaries co-exist within an ecology of intermediation and are assumed to differ in their roles. However, these assumptions have not been empirically tested on a larger scale. There is a lack of understanding about how these two intermediary types co-exist, whether they provide overlapping or complementary support, and what tensions or synergies arise from their interaction. Paper III thus aims to examine how public and private intermediaries co-exist in the ecology of intermediation for solar PV adoption support in Sweden.

The paper takes assumptions from previous research indicating overlaps and tensions in ecologies of intermediation in adoption support from public and private intermediaries and tests them quantitatively. These assumptions regard differences in rationale, value provision, target groups, timing of adoption support, type of adoption support, specialization, and degree of influence, resulting in seven propositions. These are:

- P1.** *Public and private intermediaries have different rationales for providing adoption support.*
- P2.** *Public and private intermediaries provide different values to their recipients.*
- P3.** *Public and private intermediaries target different adopter groups.*
- P4.** *Public and private intermediaries target adopters at different stages of their adoption processes.*
- P5.** *Public and private intermediaries provide different types of support activities.*
- P6.** *Public and private intermediaries have different degrees of specialization in their adoption support.*
- P7.** *Public and private intermediaries have different degrees of neutrality in their advice to adopters during the adoption process.*

A survey was constructed to test these propositions and sent to Swedish public energy advisors and private solar PV practitioners (installers, project developers, technical consultants, and wholesalers). Based on the responses from 91 energy advisors and 72 solar PV practitioners, the paper provides support for all seven propositions and identifies both differences and complementarities.

First, public and private intermediaries were shown to have complementary rationales for providing adoption support (P1). Public intermediaries are driven by long-term societal goals and policy missions whereas private intermediaries prioritize profitability, client satisfaction, and personal development. Both public and private find it very important to provide tailored advice for citizens.

Second, they report having different value propositions (P2). Public intermediaries emphasize price competitiveness, reflecting that their services are free of charge. Private intermediaries perceive expertise, service quality, and legitimacy as significant attributes for their value proposition. Meanwhile, both report process rapidity, location, and commitment as important.

Third, public and private intermediaries target different adopter groups (P3). While public intermediaries have greater emphasis on households and associations, private intermediaries report significantly more clients from companies.

Fourth, they express complementarity in what stage of the adoption process they mainly support (P4). Public intermediaries engage citizens early in the adoption process when citizens have no previous intention or just recently started considering adopting solar PV (pre-decision phase). In contrast, private intermediaries focus on supporting citizens with their investments once they have decided to adopt (post-decision phase). Both public and private report that they are active during the in-decision stage of the adoption process, when details about the investments are decided.

Fifth, public and private intermediaries report preferences of different support activities (P5) that align with the different adoption stages. Public intermediaries provide general information and education whereas private intermediaries offer technical, investment, and administrative support, including follow-up and confirmation.

Sixth, they report differences in specialization (P6). Private intermediaries report a high degree of specialization, following naturally from them being solar PV practitioners. In contrast, public intermediaries have a low degree of specialization, also covering a range of other energy-related issues.

Seventh, public and private intermediaries are not equally neutral (P7). Private intermediaries report a significantly higher influence on citizens' choice of both technical solutions, solar PV products, and service providers than public intermediaries.

Together, the findings show that public and private intermediaries provide different, but complementary, support to citizens. They base their offers on different rationales and value proposition, target different citizen groups, and offer support in different stages of the adoption process, indicating a good level of alignment. While the study does not account for the complete ecology of intermediation supporting citizens investing in solar PV, it suggests that the differentiation between public and private intermediaries is better aligned and more complementary than previously reported (Glaa & Mignon, 2020).

4.3.2. MY CONTRIBUTION AND PUBLICATION STATUS

Paper III was co-authored with Ingrid Mignon, with me being the first author. In this paper, I took lead and integrated learnings from the first two paper processes in developing the paper.

While Ingrid stood for the original idea, I took main responsibility for deriving propositions, designing the survey, and collecting and analyzing the data.

This paper has had a quite different journey than Papers I and II. A lot more effort was invested prior to data collection to suggest propositions and construct the survey. Thereafter, the data collection process was long and tedious due to difficulties in engaging solar PV practitioners in responding to the survey. It was also interrupted by the writing of my licentiate kappa in the fall of 2023. An early version of the paper was presented at the 14th International Sustainability Transitions (IST) Conference in Utrecht, the Netherlands, in August 2023 with only data on public intermediaries. When all data was finally collected and analyzed, the manuscript was submitted to Environmental Innovation and Societal Transitions in June 2024, and the revision process was swift. We received one major revision in September 2024 and a minor revision in February 2025, which Ingrid managed with my input as this was during my parental leave. The paper was published in February 2025.

4.4. PAPER IV

4.4.1. SUMMARY

Paper IV differs from Papers I-III as it studies intermediation from a citizen point of view, using the case of residential solar PV adoption, rather than from the intermediaries’ perspective. It thus takes a demand-side perspective on intermediation, which has been underexplored in intermediation literature that typically focuses on the supply side. By seeing intermediation as a service, attention is drawn to how citizens perceive and value the received intermediary support, not just how and why the service is delivered by the intermediaries. Importantly, previous studies have identified a potential mismatch between the intermediation support offered and what citizens actually value or expect. However, the specific support attributes causing this mismatch are unclear.

The paper investigates how citizens investing in solar PV in Sweden perceive the value of intermediation support from public and private intermediaries, and how different support attributes influence their satisfaction. While the transitions and intermediary literature provide an important basis for understanding intermediation services, they rarely discuss criteria for evaluating and assessing what citizens perceive as generating value from the support they receive, or their resulting satisfaction. The paper thus draws from the marketing literature where considerable research has focused on assessment criteria for (customer) satisfaction. There, scholars have created and refined the SERVQUAL scale to evaluate perceived value and satisfaction with support services from the customer perspective, based on a set of attributes (Parasuraman et al., 1991; Parasuraman et al., 1988; Springer & Tyran, 2022). The attributes include information resources, reliability, responsiveness, assurance, and empathy, and they are described in Table 6.

Table 6. Attributes of intermediaries supporting citizens.

Attribute	Description	Importance for citizens
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Information resources	The information and knowledge the intermediary possesses.	Getting access to information that improves decision-making, for instance by reducing complexity.
Reliability	The intermediary's capacity to deliver accurate and consistent intermediation support	Trusting that the support received is reliable and useful.
Responsiveness	The intermediary's capacity to address citizens' inquiries promptly and effectively and their ability to manage requests in a timely manner.	Having ease of access and approachability.
Assurance	The intermediary's expertise, confidence, and trust conveyed to citizens	Trusting the knowledge and competence of intermediaries in their respective domains.
Empathy	The intermediary's capacity to personalize interactions by paying close attention to citizens' requirements and communicating in a manner that resonates with them	Feeling heard and understood.

By adapting the SERVQUAL model to the context of intermediation, the paper hypothesize that the attributes information resources, reliability, responsiveness, assurance, and empathy positively influence perceived value (H1-5), which in turn affects citizens' satisfaction with the intermediation services (H6). Testing these hypotheses using structural equation modeling on a large survey (16 888 respondents) shows that all attributes influence perceived value except responsiveness for public intermediaries (which had a negative effect). Perceived value strongly predicts satisfaction for both intermediary types. For public intermediaries, trustworthiness and reliability as well as type of information provided are more valued, whereas adopters value private intermediaries more based on how they deliver the information (i.e., with empathy, assurance, and responsiveness). The findings highlight the importance of aligning support attributes with citizen expectations to improve satisfaction and reduce mismatches.

4.4.2. MY CONTRIBUTION AND PUBLICATION STATUS

Paper IV was co-authored with Hanna Cardol and Björn Lantz, and I am the first author. My main responsibility has been the conceptualization and framing of the paper, with Hanna overseeing hypotheses, survey construction, and data collection, and Björn running the analyses. The main writing has been a collaborative process between me and Hanna, with a lot of discussions back and forth to fit the quantitative research to a mainly qualitative audience.

A previous version of the paper was presented at the 15th International Sustainability Transitions (IST) Conference in Oslo, Norway, in June 2024 in a track about transition intermediaries. The participants of the conference track were encouraged to submit to a special issue in Environmental Innovation and Societal Transitions on ecologies of intermediation, which we did in February 2025 after finalizing the manuscript. The manuscript is currently under review.

5. SYNTHESIS

In this section, I combine insights from the four appended papers to answer the three research questions: (1) How can civil servants be conceptualized as public intermediaries?, (2) How do public intermediaries contextualize policy missions?, and (3) How do civil servants contribute to ecologies of intermediation supporting citizens in sustainable energy transitions?

5.1. CONCEPTUALIZING CIVIL SERVANTS AS PUBLIC INTERMEDIARIES

Addressing the first research question, civil servants can be conceptualized as public intermediaries based on several distinct aspects. Departing from the analytical framework shown in Figure 2, the civil servants studied are positioned and act between a top (policy) and a bottom (citizens), emphasizing the in-betweenness that characterizes intermediation (Moss, 2009). However, the findings add more complexity to this in-betweenness by addressing different dimensions of top and bottom. Paper II provides a directionality of influence on civil servants by describing top-down influences as policies, task specifications, funding, and governance, and bottom-up influences as citizen demands and local specificities. Together, these emphasize that civil servants function as intermediaries from the middle out, embedded in certain institutional structures. Moreover, Paper I demonstrates that civil servants are active on both an actor level, supporting citizens through relational work, and a system level, by bridging between local, regional, and national levels. This also emphasizes the role of civil servants as intermediaries.

Further, to conceptualize civil servants as public intermediaries, Paper III provides a structure for distinguishing them from other intermediary types based on their public governance, funding, and organization. This provides a meso-level perspective on civil servants, emphasizing organizational characteristics that together result in their public nature. Meanwhile, the analytical framework in Figure 2 stresses that to understand public intermediaries, attention also needs to be paid to the micro-level and individual characteristics of civil servants as these can result in intra-organizational variations. Together, organizational and individual characteristics capture external and internal factors of civil servants that influence their role as public intermediaries contextualizing policy. This section elaborates on these characteristics.

5.1.1. ORGANIZATIONAL CHARACTERISTICS OF CIVIL SERVANTS

The thesis highlights three main organizational characteristics of civil servants that affect their ability to contextualize policy by acting as public intermediaries: their policy mission, the public funding, and how they are organized.

The first organizational characteristic of civil servants is the *policy mission* established by policymakers, which gives them the remit to function as intermediaries between citizens, policy, and commercial actors. This mission sets the boundaries of their daily work, specifying what they should and should not do. To start with, it provides guidance on topics and target groups, what activities to focus on, how to prioritize, and how their work is being evaluated. As shown in Paper II, the mission from the state, complemented by guidelines and evaluation frameworks from the national energy agency, is central to how the energy advisors plan and

prioritize their work. This illustrates how policymakers at national, regional, and municipal levels policymakers are influencing advisors' tasks, target groups to serve, and topics and activities to emphasize.

The mission also requires civil servants to remain impartial and free from commercial interests in the advice they offer, which differentiates them from commercial actors. Paper III studies this impartiality by comparing influence on citizens' choices, finding that public energy advisors exert significantly less influence than private actors, reflecting this required commercial independence. Paper I and II further illustrate this by noting that the energy advisors are prohibited from recommending specific companies or brands, instead they are supposed to provide neutral information about available options.

While the mission provides clear guidance on priorities and commercial independence, it also underscores civil servants' dependence on public administration and politics. Paper II reveals that the energy advisors are bound to follow priorities by local policymakers, meaning that they sometimes cannot engage in national projects. This follows previous research underlining that dependence on politics can limit civil servants' agency and affect perceptions of neutrality and legitimacy (Kant & Kanda, 2019; Mignon & Kanda, 2018). Although civil servants are expected to be commercially independent and impartial in citizen interactions, they may still be influenced by political agendas (Kivimaa, 2014; Matschoss & Heiskanen, 2017). This creates a risk that citizens perceive public intermediaries as biased or promoting government interests (Kivimaa, 2014; Klerkx & Leeuwis, 2009). Ultimately, the dependence on public governance calls for continuous reflection on how policy missions shape civil servants' roles, responsibilities, and the level of trust and legitimacy they hold in the eyes of citizens.

The second defining characteristic of civil servants is their reliance on *public funding*, which comes with accountability requirements to demonstrate compliance with the policy mission as the funding originates from tax money. This funding enables civil servants to prioritize system-wide goals over short-term profits, as noted in previous research (De Silva et al., 2022; Rossi et al., 2022). Paper III shows that while private actors prioritize activities that generate profit, such as design and installation of solar PV systems, public intermediaries can focus on early stages of adoption when general (and neutral) information is crucial, in line with Glaa and Mignon (2020). Without having to constantly engage in profit-seeking activities, civil servants can instead focus on activities leading to systemic change, such as building networks and platforms for knowledge transfer between various stakeholders and stimulating demand articulation (van Lente et al., 2003). Paper II illustrates how public energy advisors help citizens understand connections between different energy-saving measures and guide them in prioritizing actions in a logical order. Public energy advisors also plan their own activities strategically to ensure that their efforts deliver the greatest possible benefit for the energy system.

Nevertheless, the thesis demonstrates that the public funding structure can create tension between accountability and long-term planning. While the policy mission provides long-term and stable direction, funding is typically project-based, lasting two to three years. On the one

hand, regular evaluations are beneficial to ensure effective use of public resources. On the other hand, the need to demonstrate tangible results within each funding cycle may lead advisors to prioritize short-term initiatives over systemic impact, which is exemplified by the goal-oriented practices in Paper II. Moreover, short project periods also risk high staff turnover, which can result in the loss of valuable competence and legitimacy built up by individual intermediaries (Mignon & Kanda, 2018). This tendency toward short-term planning is problematic given that previous research emphasizes that intermediation aiming at systemic impact requires long-term policy strategies and financial stability to maintain legitimacy and effectiveness (Hernberg & Hyysalo, 2024; Hodson & Marvin, 2009; Rogge & Reichardt, 2016). Balancing evaluation needs with incentives for long-term planning and institutional stability is therefore essential.

The public funding further allows civil servants to provide their services free of charge, enhancing accessibility and inclusivity compared to fee-based alternatives. Paper III identifies this as a key reason citizens seek public energy advice, while Paper IV shows that free services, when effective, can lead to marginally higher satisfaction than paid ones, reflected by the stronger relationship between clients' perceived value and satisfaction with public intermediation services than with private intermediation services. Moreover, being free of charge can lower barriers for citizens to seek energy advice, especially for low-income households that cannot afford private services. This aligns with research suggesting that citizens overall have a low willingness to pay for energy advice services, as they may be uncertain about whether the advice is worth the time and effort spent to seek it (Ringel et al., 2022). Public intermediaries' stronger focus on households than companies, as shown in Paper III, thus reinforces their role as an accessible policy instrument for the wider public.

The final organizational characteristic is the *decentralized organization* of civil servants, being a national service that is distributed across the country. The thesis highlights that while the national guidelines for public energy advising are the same, the local organization varies which influences their networks and local contexts. The public energy advisors are employed by the municipalities in different constellations, ranging from a team of advisors in one municipality to one advisor covering multiple municipalities, as described by Eriksson and Kjeang (2021). In Study 2, the respondents were asked about their organizational belonging within their respective municipalities, which ranged from being placed in the environment department, to urban planning department, service department, culture and recreation department, or even municipal executive department. Some were even part of the regional energy office's organization. This affected their local networks and opportunities for synergies with other activities.

Moreover, the background questions in Study 3 included whether the energy advisors worked part time with another municipal role, which was the case for a third of the respondents. These part time roles included sustainability, environment, and energy strategists, as well as environmental and building inspectors. The qualitative findings show that having a part-time role can open up for synergy effects, in particular for advisors also working as strategist as they can use their energy advising knowledge and network to inform municipal strategy work, which is something they as energy advisors most often do not have mandate to do. Altogether, this

implies that public energy advisors have access to different municipal resources and networks. Also, while employed on a municipal level, the energy advisors' main platforms for continuous support and exchange of ideas are their regional clusters, led by regional development leaders at the energy offices. Paper I highlights that these regional networks are highly important for the energy advisors, particularly since many advisors are alone in their role in their municipalities. The regional networks can provide both collaboration opportunities as well as help with planning and prioritizing.

Furthermore, this thesis highlights that geographical distribution provides civil servants with different local conditions to deal with. Being locally embedded allows for extensive contextual knowledge, with the possibility of supporting citizens taking their local context into account. Paper I underlines that the local position allows energy advisors to perform a large share of their activities face to face with citizens. This has shown to be beneficial for increasing trust and legitimacy (Bush et al., 2017; Hodson et al., 2013). In particular, Paper II highlights that when energy advisors cover municipalities that are far apart, the number of in-person events in each municipality is limited. Local circumstances thus affect what types of activities civil servants engage in. Moreover, the findings highlight that the demand for energy advising fluctuates across municipalities. During Study 2, contrasting experiences among energy advisors were revealed. One advisor described being overwhelmed by inquiries, including from citizens outside their municipality who were dissatisfied with the service from their local advisor. This advisor had gained substantial legitimacy, both among citizens and within the municipal organization, due to their recognized expertise. In contrast, another advisor reported that their municipality had chosen not to reapply for funding for energy advising, citing insufficient public interest in the service. This fluctuating demand reflects the varying local circumstances civil servants meet in their daily work and emphasizes the need to take a place-based approach to policies promoting transitions (Uyarra et al., 2025).

5.1.2. INDIVIDUAL CHARACTERISTICS OF CIVIL SERVANTS

The thesis also identifies three individual characteristics that shape how civil servants navigate organizational conditions: educational background, work experience, and motivation.

To start with, civil servants have varying *educational backgrounds* which equip them with different perspectives and areas of expertise. As shown in Paper III, most public energy advisors hold higher education degrees, spanning a variety of disciplines. While not explicit in Paper III, the data from Study 3 shows that the most common background is energy engineering, followed by environmental engineering and environmental sciences. Other advisors come from disciplines such as mechanical, electrical, civil, and industrial engineering, as well as engineering physics, biology, agronomy, and teaching. Notably, about 20% of the advisors do not have higher education degrees but instead have vocational education in energy and housing, or substantial work experience in the energy sector. This diversity demonstrates that there is no single educational pathway required to become an energy advisor. Rather than being a limitation, Paper II argues that this variation is a key strength, as it enables the energy advising service to draw on a broad spectrum of knowledge and skills to address the complex and varying needs of citizens.

Second, civil servants have different *work experiences*, leading to varying knowledge and skill sets developed over time that affect their preferences. While ongoing competence development and the breadth of citizen inquiries allow advisors to develop broad expertise, Paper II reveals that some advisors tend to specialize in particular topics. For example, one respondent with previous work experience in the solar PV industry was recognized as “the solar PV expert” among the other advisors, becoming the primary go-to person for the others when facing complex questions in that area. This specialization means that although the energy advisors are positioned to offer broad support, their individual portfolios and expertise can shape the advice citizens receive. As a result, the energy advisors may function as filters or even gatekeepers, directing citizens toward certain measures or technologies based on their own strengths and interests (Sovacool et al., 2020; Zaunbrecher et al., 2021). This raises important questions about consistency and impartiality in public energy advising services, highlighting the need for balancing individual expertise with equitable access to information for all citizens.

Lastly, civil servants have different *motivations* guiding their work. Paper II shows that the energy advisors feel most rewarded when engaging with topics they are passionate about, receiving positive feedback from citizens, or contributing to a better planet. These intrinsic motivations often shape how energy advisors prioritize their activities, consciously or unconsciously steering their efforts toward areas that align with their interests and values. This tendency suggests that personal motivation actively influences the direction and focus of the energy advisors’ work. As De Haan and Rotmans (2018) argue, the strategic actions by value-driven actors, such as making certain solutions available to society or phasing other solutions out, are crucial in driving transformative change. Meanwhile, there is also the risk that some individuals are less motivated. Although the findings emphasize a general (and normative) tendency for civil servants to exceed expectations, there is also the risk that some less motivated individuals provide advice that does not contribute much to technological and behavioral change from citizens. In the worst case, advisors may misuse their position to provide advice that is incorrect or misaligned with the mission which risks lowering the legitimacy of energy advising as a policy instrument. Thus, recognizing and understanding motivations is important, as this can both enhance the effectiveness of public energy advising and introduce variation in how the policy mission is interpreted and pursued.

5.1.3. SUMMARY

To summarize, civil servants can be conceptualized as public intermediaries primarily because their organizational characteristics position them between citizens, policymakers, and market actors. On an organizational level, they operate within frames defined by policy missions and public funding, underscoring their public nature and accountability. Their decentralized organization further enables local contextualization of national goals, allowing civil servants to adapt policy goals to specific local needs. These organizational characteristics capture intermediary-specific features at the meso-level and help explain how civil servants’ roles are shaped by the public structures within which they work.

Complementing this, the individual characteristics highlight the micro-level agency of civil servants and draw attention to how they pursue strategies regarding goals, activities, and resources (Bögel & Upham, 2018; Farla et al., 2012). Their different knowledge, skills, and experiences provide varying degrees of agency to act as public intermediaries within – and occasionally beyond – the organizational frames within which they are embedded (Garud et al., 2007). These differences illustrate that intermediary work is not predetermined by organizational structures alone but is also shaped by how individual civil servants interpret and enact their roles. Table 7 summarizes these characteristics and outlines their implications for how civil servants contextualize policy.

Table 7. Overview of characteristics of civil servants and their implications for policy contextualization.

	Characteristic	Implications for policy contextualization
Organizational characteristics	Public governance	Topics and activities Commercial independence and legitimacy
	Public funding	Long-term perspective Free of charge
	Public organization	Strong local connection Access to networks
Individual characteristics	Educational background	Area of expertise
	Experience	Knowledge and skills Preferences
	Motivation	Value-driven prioritization

Together, these characteristics enable civil servants to contextualize national policy to citizens' realities while also gathering input from citizens and providing local insights back to policymakers, as demonstrated in Paper I. In doing so, they support policymakers in understanding the challenges citizens face in energy transitions and contribute to policy development processes on different levels (Beveridge & Guy, 2009; Kivimaa et al., 2019; Matschoss & Heiskanen, 2017). This dual role of bridging between top-down steering and bottom-up demand reflects their position as transition intermediaries (Kivimaa et al., 2019), suggesting that they are not only passive policy implementers but also actors with agency and capacity to steer interactions and accelerate transition processes (Janda & Parag, 2013; Parag & Janda, 2014).

Conceptualizing civil servants as public intermediaries clarifies how they differ from other types of intermediaries and policy instruments. From an intermediary perspective, what makes civil servants unique are their public governance, commercial independence, and strong local connection following their decentralized organization. From a policy perspective, their defining characteristic compared to other policy instruments is that they are individuals with agency and intrinsic motivations, with the main policy impact being achieved through direct interactions with citizens. The intermediary concepts emphasizes this relational nature (Moss, 2009), where legitimacy is built on interactions between the intermediary and its stakeholders. Indeed, the relational aspect of civil servants seems to support citizens' receptiveness to information and their willingness to consider changes in energy-related behavior, as also discussed by Backhaus (2010). Civil servants thus have a vital role in making policy more tangible for citizens. This is illustrated by respondents in Study 2 who reported that as public energy advisors, they can show

citizens that municipal civil servants are not only “grey and boring”, but actually valuable sources of knowledge and advice. Thus, it can strengthen the legitimacy of not only the public energy advising service, but also other policy efforts to engage citizens in energy transitions.

5.2. POLICY CONTEXTUALIZATION BY PUBLIC INTERMEDIARIES

Having conceptualized civil servants as public intermediaries by identifying different characteristics, this section addresses how public intermediaries contextualize policy missions to answer the second research question. First, it identifies how the organizational and individual characteristics from Section 5.1 interact and build up civil servants’ ability to contextualize policy. The second part of this section describes how policy is being contextualized through everyday activities and practices of civil servants.

5.2.1. INTERACTION BETWEEN CHARACTERISTICS

When contextualizing policy missions, civil servants’ organizational and individual characteristics identified in Section 5.1 interact in ways that result in variation in how policy is interpreted and contextualized in practice. Paper II demonstrates this interaction through the analytical lens of top-down, middle-out, and bottom-up, which together shape the intermediary practices of civil servants.

Organizational characteristics largely reflect top-down and bottom-up influences, which are external to the civil servants themselves. Top-down influences include the policy mission, guidelines, and directives issued by national, regional, and municipal policymakers. These elements define the institutional frame within which civil servants operate and establish expectations for their roles and responsibilities. Bottom-up influences, in turn, stem from citizens’ needs and demands and contextual specificities. Together, top-down and bottom-up influences provide both opportunities and constraints, forming the structural environment in which civil servants translate policy into action.

Individual characteristics align with middle-out influences, which Paper II identifies as central to explaining variation in intermediary practices. Civil servants differ in their knowledge, interests, experiences, and motivations, which shape how they interpret the policy mission and how they choose to act within the boundaries set by external influences. These varying points of view affect not only the strategies civil servants pursue but also the extent of agency they exercise in prioritizing activities, allocating resources, and engaging with citizens and other stakeholders. In this way, middle-out influences function as a mediating layer between the structural conditions imposed by top-down and bottom-up factors.

The findings from Paper II demonstrate that middle-out influences are determinant for how public energy advisors contextualize their policy missions in practice, drawing attention to factors that drive, enable, and constrain civil servants and their behaviors in transitions (Bögel & Upham, 2018; Upham et al., 2021). Individual interpretations of the policy mission lead to differences in how civil servants manage potential tensions between policy expectations and citizen needs. Moreover, middle-out agency enables civil servants to negotiate, reinterpret, and sometimes stretch the boundaries of the policy mission (Hernberg & Hyysalo, 2024). As

previous research suggests, this agency is embedded (Garud et al., 2007), meaning that while civil servants can shape and respond creatively to external conditions, they remain constrained by institutional structures and local circumstances.

This embeddedness highlights civil servants' position in-between policymakers and citizens. Their intermediary role involves navigating and balancing the expectations, demands, and interests of multiple stakeholders (Moss, 2009; Parag & Janda, 2014). The findings show that civil servants can go beyond the initial remit and policy mission by adapting their support activities over time to respond to evolving citizen needs and demand in energy transitions (Selviaridis et al., 2023; Talmar et al., 2022). Consequently, the way in which policy is contextualized is shaped by the dynamic interplay of organizational structures and individual agency, with middle-out influences mediating top-down and bottom-up influences, as emphasized in Paper II.

5.2.2. CONTEXTUALIZATION IN PRACTICE

The thesis demonstrates that civil servants contextualize policy missions in diverse ways when adapting their daily work to local circumstances and citizen needs. Rather than following a uniform approach, they engage in a wide range of activities that can be grouped into distinct practices, which are elaborated upon below.

First, Paper I identifies the broad set of activities that civil servants perform when contextualizing their policy mission, highlighting that these activities serve different purposes. Many of the activities directly target citizens and their energy use, such as providing information, education, and tailored advice. These activities reflect their formal mandate to support households, small companies, and associations in reducing the environmental impact from their energy use (Swedish Government, 2016). Similar activities are widely recognized in the literature as facilitating energy-saving measures from citizens (Darby, 1999; Salo et al., 2016). Some of these activities are reactive, like responding to inquiries, while others are more proactive, such as organizing seminars or running information campaigns. Through these efforts, civil servants operate in the intermediation mode of facilitating and capacitating, which means providing opportunities for others to act through knowledge and learning-related activities (see also Hernberg & Hyysalo, 2024; Stewart & Hyysalo, 2008). Such activities reflect bilateral intermediation (Howells, 2006), where the energy advisors connect citizens with relevant knowledge, resources, and networks to support informed decisions.

Second, Paper I shows that civil servants also engage in activities aimed at strengthening their own role, such as competence development and outreach. Given the rapid pace of technological and regulatory change in energy transitions, advisors must continuously update their expertise to remain credible and effective. This is particularly important because they often act as “gatekeepers”, shaping which technologies and measures citizens consider (Zaunbrecher et al., 2021). Advisors also work to increase the visibility of their service, though strategies vary: some actively pursue outreach, while others – especially those overwhelmed with inquiries – rely on word-of-mouth. The extent to which energy advisors engage in outreach reflects the demand for their services, which is shown to be fluctuating unpredictably, both geographically

(across municipalities) and temporally (time of the year). For instance, during an energy price spike in Sweden in autumn 2022, inquiries to the public energy advisors surged dramatically as citizens became more aware of energy costs. This temporarily reduced the need for visibility efforts but simultaneously raised awareness of the energy advising service for the future. Indeed, Paper II underscores that outreach remains critical for reaching groups who are unlikely to seek energy advice on their own but could still benefit from energy-saving measures.

Third, the thesis highlights that civil servants operate not only at the actor level (targeting citizens or themselves) but also at the system level, engaging in activities that facilitate broader energy transitions. Paper I describes how public energy advisors create networking platforms enabling interactions between multiple actors, build knowledge infrastructure, and inform local decision-makers on energy-related strategies. These activities reflect a brokering intermediation mode (Hernberg & Hyysalo, 2024), advancing collaboration and networking across multiple actors and governance levels (Bessant & Rush, 1995; Hargreaves et al., 2013). Advisors also use insights from citizen interaction to influence local policy development, advocating for citizen needs (Kivimaa, 2014; Kivimaa & Martiskainen, 2018). In doing so, they address system-level challenges such as volatile regulations and subsidies for low-carbon technologies (institutional challenges) or the strong dependency in the energy sector on a few dominant actors limiting consumer choice (interaction challenges) (Mignon & Bergek, 2016b; Negro et al., 2012). These efforts correspond to the intermediation mode of structural negotiating, which involves shaping regulatory and institutional conditions to enable citizen engagement (Hernberg & Hyysalo, 2024). Notably, such system-level activities extend beyond their formal policy requirements, indicating an underrecognized dimension of civil servants’ role that should be recognized and leveraged. Figure 6 illustrates these actor- and system-level activities.

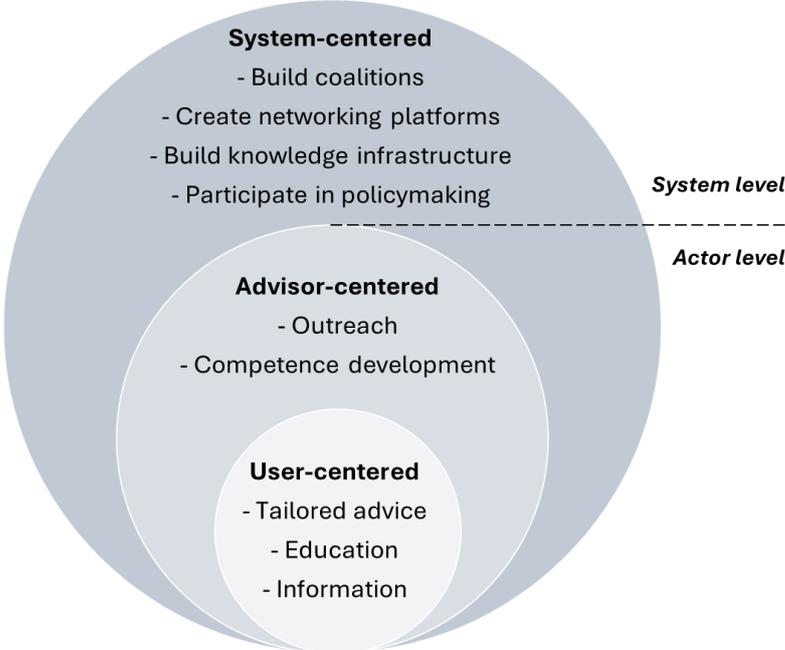


Figure 6. Types of activities performed by civil servants (adapted from Mignon & Winberg, 2023).

While these activities describe what civil servants do in their daily work, Paper II goes further by identifying how and why they engage in them, revealing six distinct practices of policy contextualization: goal-oriented, holistic, experimenting, learning, expertise-oriented, and client-oriented practices. These practices differ in the types of activities involved and motivations driving them, as presented in Section 4.2.1. The categorization reflects the relative importance of different levels of influences, which is whether energy advisors are primarily driven by top-down rules and regulations, bottom-up demands from citizens, or middle-out preferences, interests, and motivations.

Client- and expertise-oriented practices both emphasize user-centered activities, such as tailored advising, but differ in their underlying motivations: client-oriented practices respond to bottom-up demands, whereas expertise-oriented practices are shaped by advisors' own knowledge and preferences, reflecting an emphasis on middle-out influences. Experimenting and learning practices, driven by middle-out influences such as preferences and resources, focus on advisor-centered activities, often involving outreach to strengthen legitimacy and broaden their impact. Holistic practices emphasize system-centered activities, such as network-building and collaboration, whereas goal-oriented practices concentrate on meeting predefined targets, such as delivering a set number of seminars or advisory sessions for specific target groups. Goal-oriented practices assign the greatest weight to top-down influences among all practice types. While some advisors clearly favored one approach, most combined several practices, adapting their strategies to the local context and situational demands, thus actively contextualizing their policy mission.

Importantly, these findings demonstrate that public energy advising is not a standardized policy instrument with predictable outcomes. Instead, civil servants interpret and contextualize the policy mission in diverse ways, exercising agency within their institutional constraints. This challenges the view of civil servants as passive policy implementers and positions them as active intermediaries who shape policy outcomes through contextualized practices aligned with personal interests and motivations (Talmar et al., 2022; Upham et al., 2025).

5.2.3. SUMMARY

To summarize, civil servants contextualize their policy mission in diverse ways by navigating external top-down directives and bottom-up demands through their individual agency. This interplay results in a middle-out approach to policy contextualization, where organizational and individual characteristics interact: while policy missions and funding set the institutional boundaries, civil servants exercise agency in interpreting goals and mobilizing resources, shaping how contextualization of policy missions unfolds in practice.

The varying influences lead civil servants to choose to engage in different types of actor- and system-level activities, emphasizing that civil servants do not only provide individual advice to citizens but rather showcase a versatility in activities that strengthens their contribution to sustainable energy transitions. This results in six distinct practices of how civil servants adapt their daily work to their local contexts: goal-oriented, holistic, experimenting, learning, expertise-oriented, and client-oriented practices. Together, these practices and their associated

activities constitute a flexible toolbox that energy advisors draw on depending on the situation and individual preferences. Figure 7 illustrates how middle-out influences mediate top-down and bottom-up pressures, resulting in these practices.

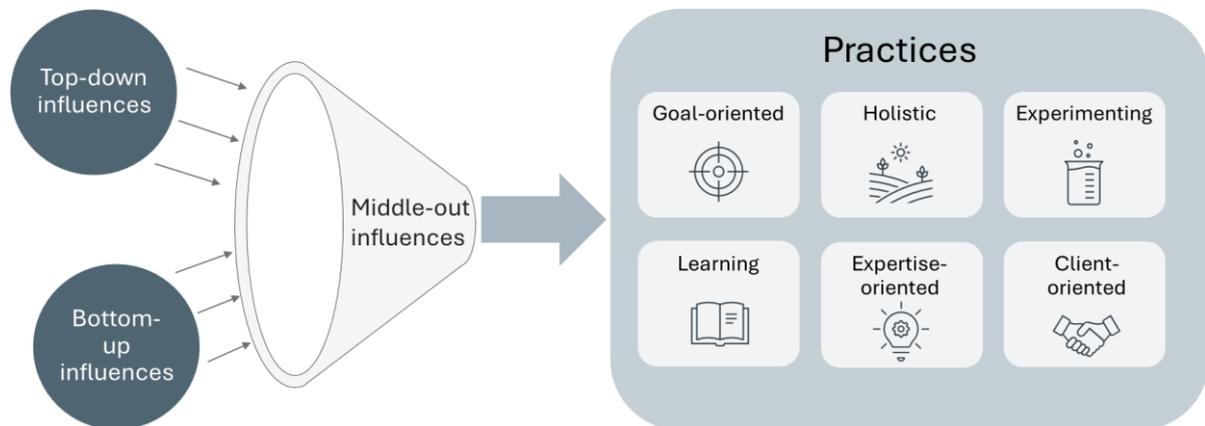


Figure 7. Visualization of how middle-out influences mediate top-down and bottom-up influences, resulting in six distinct practices.

Importantly, this variation in practices demonstrates that public energy advising is not a standardized policy instrument, but a dynamic process shaped by agency and local contexts. While diversity in practices can be a strength, enabling outreach to heterogenous citizen groups, it also raises concerns about uneven service provision. This underscores the need to have top-down steering that ensures that citizens receive a certain standard of energy advice, while allowing flexibility to capture the systemic impact from engaged civil servants that exceed their policy expectations.

5.3. CIVIL SERVANTS' CONTRIBUTION TO ECOLOGIES OF INTERMEDIATION

Having explored how civil servants function as public intermediaries when contextualizing policy, this section broadens the perspective and examines their role within ecologies of intermediation supporting citizens in sustainable energy transitions, thus addressing the third research question. As outlined in the analytical framework in Figure 2, citizens receive intermediary support for engaging in energy-saving measures from different actors within an ecology of intermediation. To answer the research question, the section first presents how public and private intermediaries coexist within the ecology of intermediation for solar PV in Sweden. Thereafter, dimensions of strategic differentiation are identified that shape their respective roles and highlight their unique values.

5.3.1. COEXISTENCE WITH PRIVATE ACTORS

The thesis emphasizes that civil servants co-exist with private actors in the ecology of intermediation providing support to citizens investing in solar PV systems. The findings show that public energy advisors and solar PV practitioners have similar reasons for supporting citizens. Paper III shows that despite operating under different mandates, they share a common orientation toward supporting citizens effectively. Both actor groups prioritize high-quality services, strong knowledge bases, and client satisfaction as central to their work. While private intermediaries place relatively greater emphasis on these aspects, particularly client satisfaction

and technical expertise, public intermediaries also rate them as highly important. This is triangulated by the qualitative findings from Paper I and II where client satisfaction emerged as a central priority for public energy advisors. In Paper I, the advisors report that the people who receive their advice are in general very satisfied, which makes them strive to reach out to more people. Paper II shows that their client-oriented practices stem from intrinsic motivation and a genuine desire to help. This suggests that satisfaction is both a clear consequence and motivation for civil servants. This convergence implies that, although their approaches and incentives differ, public and private actors are guided by a similar commitment to delivering value to citizens. Such alignment is reassuring for the overall quality of intermediation and reflects findings in previous research that intermediaries, even when commercially motivated, often prioritize client interests over profitability (Mignon & Broughel, 2020).

Meanwhile, the findings indicate that public and private intermediaries fulfill distinct roles for citizens. Paper IV illustrates that citizens primarily turn to private actors when considering solar PV investments, as all 16 888 respondents had been in contact with solar PV practitioners but only eight percent had also contacted public energy advisors. This is not surprising as the solar PV practitioners not only provide information and advice but most often also sell and install the solar PV systems. This reflects the maturation of the Swedish market for solar PV (IEA PVPS, 2023), implying that market actors can handle most of the requisite intermediation. This echoes findings from Finland, where the ecology of intermediation for solar PV is well-developed but still requires adaptation to ongoing technological development (Hyysalo et al., 2022).

Nevertheless, Paper IV shows that citizens investing in solar PV value services from both public and private actors, but for different reasons. Public intermediaries are more valued for attributes relating to what type of support they provide whereas private ones are more valued for how they deliver the support. This suggests that public intermediaries still have a role to play for supporting citizens with solar PV installations, only a different one than private actors.

5.3.2. STRATEGIC DIFFERENTIATION IN ECOLOGIES OF INTERMEDIATION

The thesis identifies three key dimensions where public and private intermediaries diverge in their roles within the ecology of intermediation: degree of influence, degree of specialization, and timing of support activities. These distinctions shape how citizens experience support received through their decision processes and reveal complementary patterns that indicate strategic differentiation within the ecology.

First, public and private intermediaries differ in the *degree of influence* they have on citizens' solar PV investment decisions. In Paper III, private actors report significantly greater influence on citizens' decisions compared to public, reflecting their contrasting remits. While civil servants are required to maintain commercial independence due to their policy mission, solar PV practitioners are market actors whose advice may be shaped by product portfolios and sales incentives. The risk of commercially driven recommendations is that citizens may be pressured to undertake unnecessary measures or install oversized solar PV systems. The low-influence approach of civil servants thus plays an important counterbalancing role by providing advice that is not commercially driven, helping citizens make informed decisions and thus reinforcing

trust and legitimacy in the advising process (Matschoss & Heiskanen, 2017). However, limited influence can also be a drawback. Some citizens may prefer clear guidance and recommendations to reduce information overload and indecision, even when these may be driven by commercial interests. This has been shown to be particularly true in situations of complex information and multiple options that is often the case with residential energy investments (Hyysalo et al., 2022). Thus, while civil servants can balance commercially driven recommendations, their ability to support decision-making may be constrained when citizens seek stronger, more directive guidance than public mandates allow, as mentioned by respondents in Study 2.

While Paper III suggests that private intermediaries exert more influence on citizens' decisions, Paper IV shows that citizens investing in solar PV report satisfaction with private intermediary support. This suggests that influence on citizens' decisions may not be inherently problematic. Rather, effective intermediation may require balancing impartiality with strategic advocacy to help citizens move from intention to action concerning energy-saving measures (Matschoss & Heiskanen, 2017). Still, commercial independence remains an important feature of civil servants in gaining trust from citizens (Klerkx & Leeuwis, 2009; Rossi et al., 2022).

The second dimension of differentiation within an ecology of intermediation is the *degree of specialization*, which concerns the breadth and depth of expertise of intermediary actors. Paper III demonstrates that public energy advisors provide advice about a broader range of energy-related topics than private actors, reflecting their mission to promote sustainable practices broadly rather than focusing on a single technology. This generalist orientation enables them to address diverse citizen needs but limits their depth in specific areas. For instance, Paper II underlines that civil servants help citizens navigate the complexity of energy-related decisions by offering a holistic perspective and thus help them prioritize energy-saving measures in a logical and effective order, such as recommending demand-reducing measures before investing in solar PV systems. In contrast, solar PV practitioners exhibit a higher degree of specialization. Their business models incentivize focusing on specific technologies and customer segments, allowing them to strategically build legitimacy, technical expertise, and networks to secure market shares. This specialization is reflected in private intermediaries reporting stronger engagement with companies than public ones.

The overarching pattern is thus that public actors tend to have broad, generic competencies, whereas private actors specialize in specific technologies, reflecting their different missions and resource strategies. The interplay between these generic and specific roles is strategically significant within the ecology of intermediation. While private intermediaries are shown to support citizens with tailored and technology-specific expertise (van Tuijl et al., 2025), public intermediaries play a critical complementary role by equipping citizens with sufficient knowledge to evaluate offers critically and identify potential commercial biases. In this way, the combination of breadth and depth across intermediary types creates a more robust support system for adoption of solar PV.

Following this, the last differentiation within ecologies of intermediation is seen in the *timing and type of support activities* in relation to citizens' decision-making processes, which mirrors the degree of specialization. As shown in Paper III, public intermediaries concentrate their efforts in the pre-decision phase, offering general information and educational activities that help citizens understand their options before committing to a specific measure or investment. For solar PV, public intermediaries thus intervene at a point where neutral information and advice is most valuable and when citizens may still ultimately decide not to adopt, meaning their support does not directly generate economic returns (Glaa and Mignon, 2020). Private intermediaries, in contrast, place greater emphasis on the post-decision phase, where they provide services related to designing and installing the solar PV system once a decision to invest has been made. In this stage, customized services are most in demand and economic value is most readily captured (Bankel and Mignon, 2022; Schoettl and Lehmann-Ortega, 2011). Additionally, both groups report substantial involvement in the in-decision phase, where citizens compare alternatives and seek reassurance. This temporal division indicates a differentiation that reduces competition and overlaps, and supports a more efficient ecology of intermediation, particularly regarding the use of public resources (e.g., Rossi et al., 2022).

These patterns of differentiation are observed at an organizational level and based on self-reported practices. As Paper I and II highlight, significant variation exists within the public energy advising organization, suggesting that a spectrum of breadth may indeed be observed within each intermediary group, as also shown by Bergek (2020). Nevertheless, the Swedish ecology of intermediation for solar PV support appears to provide both depth and breadth, which is a necessary condition for comprehensive citizen support.

5.3.3. SUMMARY

The thesis demonstrates that civil servants are not isolated actors supporting citizens but operate alongside private actors within an ecology of intermediation. Both groups share the ambition to provide high-quality, knowledge-based, and satisfactory support to citizens. However, they are strategically differentiated in the degree of influence they have on citizens, their degree of specialization, and the timing of their support activities. These differences reflect complementarities that reduce competitive tensions and enable a more coherent support system, as illustrated in Figure 8.

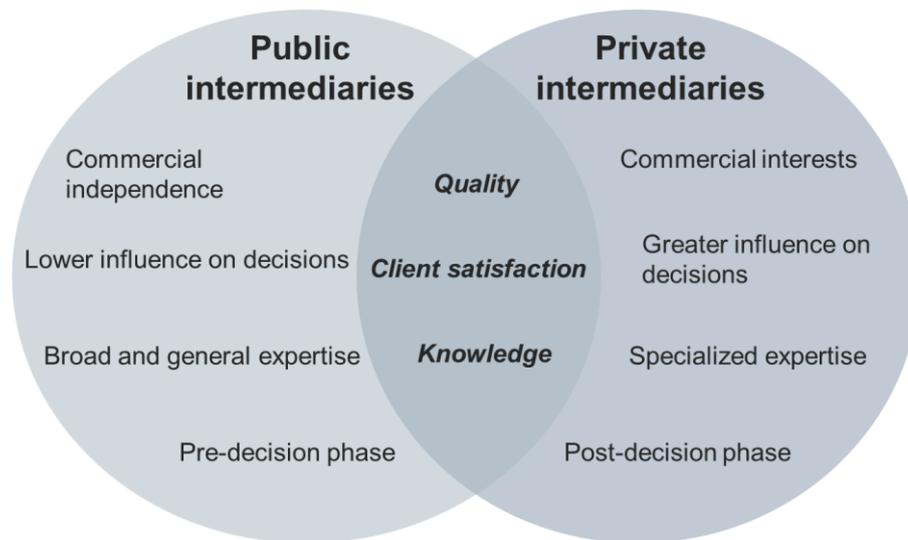


Figure 8. Illustration of complementarity and strategic differentiation of public and private intermediaries (adapted from Bastås & Mignon (2024)).

Civil servants' primary contribution to ecologies of intermediation lies in offering broad and commercially independent information and advice which helps citizens make informed decisions about their energy use that are aligned with common good interests rather than purely market-driven incentives. By engaging mainly in the early phases of investment processes, they assist citizens in articulating demand, which is an essential intermediary function (Klerkx & Leeuwis, 2009). This contrasts with private actors, who are valued for their expertise and support concerning specific technological investments and are more active in later phases of investment processes.

While solar PV is a mature technology with strong private-sector involvement, civil servants' generalist, low-influence approach plays a critical role in empowering citizens to identify commercial biases and hold private actors accountable. Beyond solar PV, civil servants promote diverse ways for citizen participation in energy transitions, including energy efficiency measures and behavioral changes. Through outreach and education, they broaden citizens' understanding of energy issues, whereas private actors focus on technologies they sell or promote. Although this thesis centers on the public-private distinction in Sweden's ecology of intermediation for solar PV support, the observed patterns suggest that civil servants adapt their role to citizen needs in relation to established market actors.

6. DISCUSSION

This section addresses the aim of the thesis, explaining how civil servants facilitate sustainable energy transitions when contextualizing policy missions. Their overall contribution lies in how their support enables citizens to change their energy use, thereby reducing environmental impact. This contribution unfolds in three parts: first, civil servants make abstract policy goals tangible for citizens; second, they contribute to systemic change through outreach, network-building, and advocacy; and third, they empower citizen participation by enabling various energy-saving measures and strengthening energy citizenship.

6.1. MAKING ENERGY TRANSITIONS TANGIBLE FOR CITIZENS

The first contribution of civil servants to sustainable energy transitions is that they make energy transitions tangible for citizens. When contextualizing policy missions, they translate abstract sustainability goals into concrete actions that citizens can implement in everyday life. National sustainability goals are often broad and visionary but offer limited guidance on how citizens can contribute to them. Civil servants bridge this gap by contextualizing these goals and promoting hands-on energy-saving measures, making transitions actionable and relevant at the household level. In doing so, they highlight that sustainable energy transitions progress incrementally, one implemented measure at a time, showing that all citizens can meaningfully engage to reduce demand-related environmental impact.

This contextualization is enabled by civil servants' local embeddedness. Meeting citizens in their own contexts allows civil servants to establish trust and legitimacy, which is critical for the effectiveness of public energy advising as a policy instrument (Matschoss & Heiskanen, 2017; Uyarra et al., 2025). Through contextualization, civil servants connect national goals to the realities of local housing stock, energy prices, and infrastructural conditions, ensuring that recommendations feel relevant and attainable rather than remote or overly general. Through their relations with citizens, civil servants thus make policy visible and approachable.

In addition, civil servants operate within ecologies of intermediation and adapt their activities to the presence of other actors and information sources that also influence citizens' energy decisions. They strategically differentiate their role in relation to other actors, in ways that complement, rather than replicate, what other actors do. By offering impartial and commercially independent support, they can fill gaps that market actors do not address, especially for citizen groups with limited financial resources or weak links to commercial providers. In this way, they help broaden access to support and can contribute to more just and inclusive transitions, particularly in contexts where market-driven initiatives tend to favor those with higher incomes or stronger purchasing power.

The way civil servants strategically differentiate themselves from other actors points to a broader potential: they could take on a more explicit coordinating role within the ecology of intermediation. Such coordination involves reducing overlaps and tensions between actors, facilitating knowledge exchange, and strengthening systemic capacity through demand articulation and network building (Kanda et al., 2025; Soberón et al., 2022). Civil servants already possess many of the attributes needed for this role, including strong legitimacy, a

holistic perspective, and the ability to mobilize system-level resources (Kanda et al., 2025). This positions them well to coordinate intermediation support. However, for this potential to be realized, coordination needs to be clearly integrated and supported within policy missions; it cannot rely solely on the initiative of particularly engaged individuals.

Citizens' expectations also shape the role civil servants take on. Today, citizens have far greater access to information than when the public energy advising program was launched in the 1970s. They draw on online sources, peers, and private actors, creating an environment where civil servants add less value as all-encompassing experts and more as trusted generalists who help citizens verify information, navigate complexity, and avoid commercially biased advice. Because the policy instrument relies on voluntary engagement from citizens rather than regulatory obligations, its effectiveness depends heavily on relational work – listening, reassuring, following up, and tailoring advice to individual needs. At the same time, better-informed citizens place higher demands on accuracy, requiring civil servants to continuously update their technical and policy knowledge. This simultaneous demand for relational depth and technical credibility underscores that effective advising cannot depend solely on personal commitment but requires structural support to ensure consistency and legitimacy across the public energy advising program.

Taken together, these findings highlight the value of a hybrid program design that combines the strengths of contextualization and centralized expertise. Locally embedded advisors are essential for relational, trust-based engagement and for ensuring that national missions are meaningfully contextualized. Centralized support structures, in turn, can ensure high-quality technical updates, provide specialized support, and ensure that individual advisors are equipped with the knowledge they need without requiring them to master every technical detail themselves. Such a model aligns with theoretical calls for context-sensitive policy instruments for transitions (Rogge & Reichardt, 2016; Uyarra et al., 2025) and strengthens civil servants' ability to offer complementary, system-level value within ecologies of intermediation. By helping citizens navigate abundant but uneven information and make well-informed decisions, civil servants do more than just conveying information – they make sustainable energy transitions tangible, accessible, and anchored in local realities.

6.2. SHAPING SYSTEMIC CONDITIONS FOR ENERGY TRANSITIONS

The second major contribution of civil servants lies in their ability to shape the systemic conditions under which sustainable energy transitions unfold. Their work extends beyond project-level citizen interactions: through proactive outreach, network-building, and advocacy in local policy processes, civil servants help create interactions, capacities, and knowledge infrastructures on a system level that enable action from citizens (e.g., Negro et al., 2012). These activities are not formally required but are driven by strong sustainability values and a commitment to supporting citizens. By linking actors, knowledge, and resources across different levels of the energy system, civil servants foster systemic change in ways that distinguish them from private intermediaries. This reinforces earlier arguments that public intermediaries provide broader societal benefits because they are not guided by commercial interests (Kanda et al., 2020).

This systemic impact emerges because many civil servants exercise individual agency to extend their work beyond what is formally specified in the policy mission. Their actions sometimes result in outcomes that exceed the original anticipations of the policy instrument from policymakers, illustrating a middle-out approach to policy contextualization in which civil servants mediate between top-down goals and bottom-up citizen needs. As a result, the effectiveness of public energy advising as a policy instrument depends not only on the program's formal design but also on how civil servants interpret and contextualize their roles in practice, echoing previous research (Hedegaard Sørensen & Paulsson, 2020).

However, relying on individual motivation introduces governance challenges. Not all civil servants go beyond their mandate, and variations in engagement can lead to uneven service quality, potentially undermining the legitimacy of the public energy advising program. This creates a tension: the policy instrument benefits from flexibility that allows civil servants to adapt and take initiatives, yet its overall credibility requires minimum standards to ensure consistency across municipalities. The challenge is therefore to design governance arrangements that balance steering with room for agency – enabling and encouraging those who take initiatives while ensuring that the service as a whole remains trustworthy and legitimate. This aligns with Talmar et al.'s (2022) argument that allowing intermediaries to dynamically reconfigure their support activities enhances their contribution to transitions.

Realizing this systemic potential requires stability and longevity in governance arrangements (Hodson & Marvin, 2010; Kanda et al., 2020). The findings suggest that uncertainty about future funding periods and shifting mandates can discourage civil servants from engaging in long-term relations or systemic initiatives – precisely the areas where systemic impact grows over time. Short project cycles thus risk constraining the very agency that makes civil servants valuable. Long-term targets and stable program structures would signal political will (Reichardt et al., 2016) and give civil servants the mandate and legitimacy to function as change agents. Such stability would reduce uncertainty for both civil servants and citizens, and strengthen expectations about the role of civil servants in not only facilitating sustainable energy transitions but also in accelerating them.

6.3. EMPOWERING CITIZEN PARTICIPATION IN SUSTAINABLE ENERGY TRANSITIONS

Lastly, civil servants empower citizens to be active participants in sustainable energy transitions, through various energy-saving measures that reduce their energy-related environmental impact. The overall contribution of civil servants to sustainable energy transitions is thus realized through citizens' actions after receiving their support. By offering tailored, impartial advice and proactive outreach, they lower barriers to engagement and raise awareness among citizens who might not otherwise undertake energy-saving measures. This relational and educational role fosters energy citizenship (Ryghaug et al., 2018) and exemplifies intermediation as both facilitating and capacitating (Hernberg & Hyysalo, 2024). Civil servants do more than transfer knowledge; they actively support citizens in developing their own

understanding and agency concerning energy-saving measures. In doing so, they also contribute to demand articulation, helping citizens clarify needs and priorities before selecting measures.

However, the findings indicate that the empowerment provided today largely centers on technological solutions, such as upgrading heating systems, installing solar panels, or switching to more energy-efficient appliances. This means that civil servants primarily reinforce a ‘technological substitution’ pathway of energy transitions, which assumes that sustainability challenges in the energy system can be resolved mainly through replacing existing technologies with low-carbon alternatives (Chapman et al., 2021; Geels & Schot, 2007). This is also reflected in those who engage with public energy advisors: client groups tend to be relatively homogenous and affluent. For instance, Paper IV shows that residential investors in solar PV were predominantly older, well-educated men, consistent with previous research indicating that energy-saving measures are often led by men with higher education levels and income, frequently driven by interest in low-carbon technologies (Achtnicht & Madlener, 2014; Karjalainen & Ahvenniemi, 2019). As a result, citizens in detached homes with financial resources are overrepresented among those who benefit from public energy advising. This creates a potential distributional skew and raises the risk of rebound effects, where financial savings from technological substitution are redirected to other (energy) consumption, potentially offsetting environmental gains (Berkhout et al., 2000) and yielding welfare improvements rather than sustainability impact (Gillingham et al., 2016).

Meanwhile, this technological orientation mainly addresses how current energy practices can be more energy efficient and less dependent on fossil fuels – it does not fully address the challenge of an increasing global energy demand. Instead of only supporting more efficient energy use, civil servants can add important value by steering technology-oriented citizens toward behavioral changes to their everyday routines that reduce energy use. Since technologies such as solar PV systems can serve as stepping stones to more engaged energy citizenship (Ryghaug et al., 2018), civil servants are well positioned to guide citizens from technology investments only toward reflection on overall energy demand. Such sufficiency-oriented approaches are crucial complements to efficiency-oriented technological solutions, as they shift the mindset to avoiding consumption completely rather than how consumption can be made more sustainable. Indeed, the most sustainable energy is the energy we do not use.

A technology-centric approach also raises concerns about justice and inclusion. Upfront costs and time requirements of low-carbon technology investments exclude many citizens, with significant differences between homeowners and renters in what types of investments are feasible. Although low-carbon technologies often lead to reduced operational energy costs, these savings are available only to those who can afford the initial investments (Halleck Vega et al., 2022). Low-income households that would benefit most from lower energy bills often lack the resources to invest and must rely on low- or no-cost measures to reduce their consumption (Reeves, 2016).

While behavioral changes have a lower threshold for engagement than technological investments because they are low-cost and accessible to broader citizen groups, they are harder

to sustain over time since they must be integrated into everyday routines and require continuous effort to maintain energy and cost reductions. This makes it challenging for civil servants to motivate citizens not only to change behavior but also to stick to them over time. Importantly, because energy is a derived demand consumed to enable other activities in the pursuit of comfort and convenience (Aune et al., 2016), energy use is shaped by the interaction of everyday practices, cognitive norms (e.g., beliefs, understandings), and material culture (e.g., technologies, buildings) (Stephenson et al., 2010). This means that lack of information is rarely the only barrier to behavioral change; prevailing norms and expectations about what constitutes ‘a good life’ can also reinforce unsustainable consumption patterns (e.g., Owens & Driffill, 2008). Civil servants can therefore play a meaningful role in encouraging citizens to reflect on their consumption patterns and engage in sufficiency-oriented practices, especially given their commercial independence which allows them to promote demand-reduction measures that private actors may avoid. In doing so, they can influence how citizens understand energy and what they view as sustainable living, thereby contributing to evolving energy cultures and broader societal perspectives (Edmondson et al., 2019).

However, a changing of energy cultures requires more than committed civil servants – it demands political ambition and support (Aune et al., 2016). Civil servants operate within institutional structures shaped by local and national priorities, and even highly motivated individuals are constrained by these structures. This suggests that civil servants could have greater impact on sustainable energy transitions, but only if they are backed by clear political will and ambition (Reichardt et al., 2016). Policy does not only play a crucial role in facilitating and motivating change; it also provides normative direction, shaping what kinds of transitions are viewed as desirable (e.g., Diercks et al., 2019; Sovacool et al., 2025). Today, sustainable development is often framed as balancing environmental, social, and economic goals, with continued economic growth largely taken for granted. But what if civil servants were mandated to support citizens in pursuing a ‘good life’ with lower energy and material use, even when this does not contribute to economic growth – especially in high-consumption Western contexts?

Such a shift would allow civil servants to focus more explicitly on the social and environmental dimensions of sustainability, complementing rather than competing with market actors’ economic imperatives. Realizing this vision depends on political ambition: a deliberate choice to empower civil servants to promote sufficiency, justice, and meaningful citizen participation as central components of sustainable energy transitions.

7. IMPLICATIONS

Based on the above findings, this section provides implications of this thesis. First, it presents practical implications, both for the empirical case of public energy advising in Sweden and generalizations to energy advising in general. This is followed by theoretical implications for the literature on intermediation and transitions. Lastly, this thesis has implications for how policy should recognize and leverage the individual agency of civil servants contextualizing policy to support citizens in sustainable energy transitions.

7.1. PRACTICAL IMPLICATIONS

This thesis offers several practical implications for the empirical context of public energy advising in Sweden, while also providing insights that are relevant for energy advising programs in other settings. The findings show that citizens are generally satisfied with the services provided by public energy advisors in Sweden, particularly valuing the content of their services and their impartiality. As exemplified by the citizens investing in solar PV in Paper IV, public energy advisors are appreciated for offering general, impartial information that supports informed decision-making.

Importantly, this thesis highlights that public energy advisors play a key role as transition intermediaries facilitating sustainable energy transitions, not only through their direct advising activities, but also through broader systemic contributions. Their diverse practices, shaped by individual agency, allow them to engage in network-building, knowledge infrastructure development, and even local policymaking. The categorization of activities into user-, advisor-, and system-centered, the six identified practices, and the analytical framework of top-down, middle-out, and bottom-up influences provide a conceptual language for understanding and discussing the varied roles of public energy advisors. This shared terminology can facilitate coordination and increase knowledge and experience sharing.

The findings emphasize that local connection is a key strength of the Swedish public energy advising program as it allows for contextualization of policy missions, consistent with previous research (Halleck Vega et al., 2022). Furthermore, the findings suggest that demand for energy advice varies across regions and over time, being fluctuating and unpredictable. This implies that a one-size-fits-all model of energy advising is not sufficient. Instead, it should be organized to enable contextual flexibility. Meanwhile, not all energy advice requires local contextualization, and it may be inefficient to maintain detailed expertise among all energy advisors. Other countries have addressed this by offering centralized energy advising services such as national hotlines (Mahapatra et al., 2011a). These have the benefit of aggregating knowledge about broad topics in the same place, but they lack the relational and place-based benefits of local advising. A hybrid model, combining centralized, streamlined resources with local services for tailored advice, may offer a promising way forward. However, if such a model is pursued, it is important that knowledge is not overly centralized. Local advisors must retain sufficient expertise to provide high-quality, context-specific advice and to function as a vital link between citizens and policymakers – a role this thesis has shown to be central to their effectiveness. Maintaining this balance ensures that civil servants can continue to deliver tailored advice while informing policy development with insights from local realities.

Broadening the scope, this thesis also contributes to a more general understanding of energy advising as a policy instrument, particularly within the European context. While energy advising is commonly recognized for its role in supporting individual energy-saving measures (e.g., Abrahamse et al., 2005; Halleck Vega et al., 2022; Owen et al., 2014), this thesis highlights the systemic impact of energy advising. Public energy advisors contribute to sustainability transitions not only by supporting citizens, but also by shaping local energy cultures, facilitating institutional learning, and bridging gaps between policy and practice (Kanda et al., 2020; Kivimaa et al., 2019). It is thus a policy instrument that could be increasingly deployed in other countries.

Although Sweden's public administration is unique in its structure and governance, the findings suggest that civil servants tasked with an energy advising mission play a crucial role in contextualization national goals to local realities, ultimately leading to reduced environmental impact from energy use in the residential sector. They navigate this role through middle-out influences, balancing top-down governance with bottom-up citizen needs. This middle-out approach and ability to adapt is likely relevant in other settings where civil servants operate under varying institutional arrangements.

Contextualization also enables civil servants to emphasize the relational dimension of energy advising – a dimension that is increasingly important in the today's digital era, where citizens can easily access information through the internet and AI tools. Civil servants can help citizens make sense of abundant and sometimes conflicting information, asking the right questions, clarifying priorities, and ensuring that decisions align with broader policy objectives. They thus act more as guides than experts, complementing private actors supporting citizens within ecologies of intermediation.

Finally, the thesis demonstrates that when energy advising is heavily focused on technological solutions, civil servants play a crucial role in maintaining commercial independence. This allows them to complement private actors, who may be driven by short-term market incentives. To ensure complementarity with private actors immersed in various technological solutions, civil servants thus need to stay up-to-date with new and improved technologies as energy transitions evolve (Zaunbrecher et al., 2021). Paper III shows that one main advantage of public energy advisors, in relation to private actors, is their ability to offer services covering a broad range of topics. As argued, this breadth is less likely to be covered by private actors given that it is a costly business model (Hyysalo et al., 2022). Assigning this breadth to civil servants thus ensures that citizens have access to comprehensive, unbiased support, which is an insight that holds relevance even beyond the Swedish context.

7.2. THEORETICAL IMPLICATIONS

The thesis has four main implications for theory: taking a micro-level perspective on intermediaries in transitions, advancing understanding of public-private complementarities in ecologies of intermediation, incorporating a demand-side perspective on intermediation, and demonstrating the value of a quantitative approach in a field dominated by qualitative research.

First, this thesis contributes to the sustainability transitions literature by accentuating the micro-level perspective on intermediation, focusing on the agency of individual civil servants. While the field has traditionally emphasized macro-level perspectives (Köhler et al., 2019), this research shows that public intermediation is shaped by the interaction of multiple influences. By integrating insights from transition studies and social psychology, the findings explain how civil servants' intrinsic motivations, preferences, and resources (middle-out influences) mediate top-down governance and bottom-up needs and demands. This interplay results in diverse practices for contextualizing policy (see Table 5), demonstrating that agency is embedded within institutional structures yet exercised strategically (Fuenfschilling & Truffer, 2016). These insights strengthen arguments that intermediaries are not passive policy implementers but rather active change agents leveraging their position in the middle to stimulate socio-technical change (cf. Parag & Janda, 2014).

Second, this thesis advances the understanding of how public and private intermediaries co-exist within ecologies of intermediation. Papers III and IV show that civil servants complement private actors by offering broad, commercially independent support that contrasts with the specialized, technology-focused services of private intermediaries. Public governance, funding, and organization enable characteristics such as neutrality, breadth, and long-term orientation that private actors rarely prioritize due to cost and market incentives (Hyysalo et al., 2022). This distinction aligns with previous research differentiating between narrow and broad intermediation (Bergek, 2020; Stewart & Hyysalo, 2008). Within ecologies of intermediation, such complementarities reduce overlaps and tensions, particularly since policy interventions are intended to address market failures that private actors alone cannot resolve (Weber & Rohracher, 2012). Paper III illustrates this through strategic differentiation in scope, timing, and degree of specialization, where public intermediaries focus on early-stage, holistic advice, while private actors dominate later, technology-specific phases. Despite these differences, both prioritize quality, client satisfaction, and knowledge, supporting recent research recognizing private actors, such as solar PV installers, as important transition intermediaries (van Tuijl et al., 2025). These insights underscore the importance of policy mandates to public intermediaries to ensure the availability of broad intermediary support, equipped with both the remit and the tools to deliver these services in dynamic ecologies of intermediation (Talmar et al., 2022).

The third theoretical contribution is the introduction of a demand-side perspective to intermediation research. While most studies focus on the intermediation offered by different types of actors, this thesis draws attention to the recipients of intermediation by assessing citizens' satisfaction support from public and private intermediaries. Paper IV shows that citizens generally value support from both public and private intermediation, with trustworthiness and reliability being particularly prominent for public actors. However, these results must be interpreted cautiously. The sample comprised citizens who had completed solar PV investments, meaning all had interacted with private actors, while only a small share (8.1 %) had also contacted public energy advisors. Satisfaction with public intermediation services thus reflects a narrow context and does not capture broader advisory services beyond solar PV. This thesis therefore provides initial evidence of alignment between intermediation services

and client demand but calls for further research into expectation-satisfaction dynamics and into other technologies and behavioral measures.

Finally, the thesis responds to calls for methodological diversity in sustainability transitions research (Köhler et al., 2019) by incorporating quantitative methods in Papers III and IV. While the field is dominated by qualitative approaches, these studies demonstrate how the use of quantitative methods provides new insights by testing assumptions and hypotheses about issues derived from qualitative inquiry. By framing the quantitative results in a way accessible to a qualitative audience, the thesis demonstrates that numbers and models can complement interpretive insights, thereby illustrating the value of both qualitative, quantitative, and mixed-methods approaches in transition studies.

7.3. POLICY IMPLICATIONS

The policy implications of this thesis cover four interrelated areas: acknowledging civil servants' agency and heterogeneity in policy contextualization, balancing top-down steering with flexibility for local adaptation, setting directionality for just and inclusive transitions, and leveraging civil servants as relational policy instruments and feedback channels.

The main implication for policy is that civil servants are individuals with agency, not passive implementers of policy, which introduces variation in policy outcome. Civil servants' diverse backgrounds, motivations, and local connection result in significant heterogeneity in how their policy mission is contextualized, as evidenced by the varied activities and practices identified in Papers I and II. This diversity offers clear opportunities: it equips civil servants to respond to the needs and preferences of heterogeneous citizen groups (Bergek et al., 2013). However, it also introduces risks. Variation in practices, combined with geographical distribution, may lead to inequalities in service provision and uncertainty about what citizens can expect, potentially undermining legitimacy of civil servants as a policy instrument. There is also a risk of good practices not being shared to a sufficient extent between the advisors. To mitigate these risks, coordination and knowledge sharing across geographical boundaries are essential to ensure consistency while preserving flexibility.

Second, the thesis suggests that policymakers should not expect full control over policy implementation but rather balance top-down steering with flexibility for local adaptation. When interpreting and adapting their mission based on local conditions and personal motivations, civil servants sometimes go beyond their remit and contribute to system-level changes. Consequently, it is difficult to assess the outcome of policy implemented by civil servants a priori, and the outcome may thus differ from policy intention. Following Talmar et al. (2022), the thesis argues that the choice of support activities should be delegated from policymakers to intermediaries to not miss out on potential benefits resulting from their individual agency. As understanding of, and adaptation to, the local context may increase the impact of policies (e.g., Hodson & Marvin, 2009), policymakers need to balance between steering with flexibility by setting clear objectives and evaluation standards while allowing room for adaptation. Excessive rigidity risks losing the systemic benefits that emerge when civil servants exercise agency, but too much freedom risks inconsistency.

Third, the thesis highlights that top-down steering is determinant for what direction of sustainable energy transitions civil servants follow, which in this case emphasizes a ‘technological substitution’ pathway (Chapman et al., 2021; Geels & Schot, 2007). Particularly, different actors and social groups hold diverging views on what constitutes a desirable transition pathway (Köhler et al., 2019), and policymakers thus have great responsibility in shaping the directionality of transitions. A technological substitution orientation tends to favor affluent households in detached homes and risks rebound effects where efficiency gains lead to increased consumption elsewhere (Berkhout et al., 2000). To avoid reinforcing inequalities and support just energy transitions, policy could instead incorporate sufficiency-oriented goals, promoting reduced energy use rather than continuous efficiency upgrades, and explicitly address energy poverty. Civil servants are well positioned to advance these goals through behavioral advice and outreach to underrepresented groups. However, the political nature of policymaking can lead to short-term populism and vote-seeking, which may hinder long-term, inclusive transition planning from policymakers. Indeed, some respondents indicate that their local governance was particularly steering the energy advisors towards promoting technological solutions. National policymaking must therefore set bold, inclusive targets and embed sufficiency in missions to ensure coherence across governance levels.

Finally, this thesis emphasizes that civil servants are important as relational policy instruments and feedback channels. They give policy a face through their direct interaction with citizens. Unlike other types of policy instruments, such as subsidies, regulations, or digital informational campaigns, public energy advising is delivered through human relations, fostering trust and legitimacy. This makes civil servants uniquely positioned to capture the experiences, needs, and demands of citizens and channel them back to policymakers. In doing so, they serve as an important feedback mechanism, helping to identify where policy interventions are working, where they fall short, and where added support may be needed. This is true not only for public energy advisors, but likely also for other types of civil servants implementing national goals on a local level, such as urban planners, social insurance workers, and innovation advisors. Leveraging this function requires institutional recognition and mechanisms for systemic feedback integration.

8. CONCLUDING REMARKS

This section provides conclusions of the thesis as well as suggestions for future research.

8.1. CONCLUSIONS

This thesis set out to explain how civil servants facilitate sustainable energy transitions when contextualizing policy missions. It was guided by research questions that conceptualize civil servants as public intermediaries to clarify how they contextualize policy missions and operate within wider ecologies of intermediation. Drawing on a mixed-methods case study of Sweden's public energy advising program, the findings show that civil servants facilitate sustainable energy transitions in three main ways.

First, when contextualizing national sustainability goals to local realities, civil servants make these abstract goals tangible for citizens. They do so through a diverse portfolio of activities, ranging from tailored advice and outreach to systemic networking. Their local anchoring enhances trust and legitimacy, enabling engagement in both technological and behavioral change. It also positions them strategically within ecologies of intermediation to ensure that citizens receive efficient and sufficient support to engage in energy-saving measures.

Second, civil servants shape systemic conditions necessary for energy transitions, by creating interactions, capacities, and knowledge infrastructures. Their agency allows them to engage in proactive outreach, systemic networking, and advocacy which extend beyond their prescribed tasks, resulting in systemic impact beyond what policymakers originally anticipated. Yet this agency is embedded within institutional structures, meaning that civil servants must navigate and renegotiate pressures from top-down governance and bottom-up citizen needs. They do so through a middle-out approach, where influences such as motivation, expertise, and preferences mediate external pressures and enable adaptive responses. This embedded agency explains the observed heterogeneity in practices and highlights the need for governance that balances steering with flexibility to fully capture the systemic potential of civil servants.

Third, civil servants empower citizen participation in sustainable energy transitions, ultimately reducing the environmental impact from energy use through various energy-saving measures, both behavioral and technological. They lower barriers to action, support informed decisions, and promote energy citizenship through impartial advice and relational work. While current missions emphasize technological substitution as transition pathway, the findings underscore their potential to advance sufficiency and inclusion, provided they have policy mandates and support to do so.

In sum, civil servants bridge the gap between national policy ambitions and citizen realities. As public intermediaries, their agency and relational work are essential for policy instruments that adapt to local contexts and effectively mobilize diverse groups of citizens. This thesis illustrates that demand-side contributions to sustainable energy transitions rely not only on policy strategies but also on the cumulative effect of many small, everyday actions. No one can do everything, but everyone can do something.

8.2. LIMITATIONS AND FUTURE RESEARCH AVENUES

This final section outlines the key limitations and identifies avenues for future research. First, while this thesis highlights the importance of local connection for civil servants, it does not systematically assess how geographical context influences service delivery or citizen satisfaction. Future studies could compare different regions within Sweden. Expanding the geographical scope even further, future research could compare European countries to investigate how member states interpret and implement EU directives on energy advising. Such comparative research would provide valuable insights into how governance structures, funding models, and cultural factors influence the effectiveness of public intermediation and the pace of energy transitions.

The focus on solar PV introduces additional limitations. The thesis examines only part of the ecology of intermediation supporting citizens in energy transitions when comparing public energy advisors and solar PV practitioners. While the findings indicate strategic differentiation between these actors, solar PV is a rather mature technology, and the ecology supporting its adoption is also maturing (Hyysalo et al., 2022). Moreover, solar PV represents only one dimension of citizen engagement in energy transitions. Future research could therefore broaden the scope to map the full ecology of intermediation supporting citizens in sustainable energy transitions, including not only other types of civil servants and private actors, but also less formal sources of intermediation, such as peers and internet forums (de Villafranca et al., 2025; Palm, 2017). In mature markets, intermediation often shifts from (organizational) actors to digital platforms (Hyysalo et al., 2022). Expanding the scope beyond technology adoption to include behavioral change and energy sufficiency, which are decoupled from commercial interests, would also contribute to providing a more comprehensive understanding of how citizens are supported and how policy can ensure equitable access to intermediary services.

Another promising avenue is to deepen the understanding of the demand-side of intermediation. Paper IV initiated this exploration by assessing citizen satisfaction with intermediation support, but further studies are needed to uncover what citizens expect from different intermediation services, and how these expectations shape their satisfaction and engagement. Investigating the dynamics between expectation and satisfaction could reveal mismatches between what citizens seek and what intermediaries deliver, offering insights into how to improve service design and delivery in ecologies of intermediation.

Lastly, this thesis has studied civil servants' contextualization of a specific mission, but future research could lift the perspective to transition governance. The findings show that top-down governance strongly influences implementation, raising questions about how policy missions are formulated and how they shape intermediary practices. Future studies could examine how political intention and directionality translate into practice and how policy missions can be designed to accelerate sustainable energy transitions while ensuring justice and inclusion. This includes exploring governance arrangements that balance clear directionality with flexibility, enabling civil servants to adapt to local contexts without compromising policy coherence.

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