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A warmer way to do business

Customer-driven business model innovation in the Swedish district heating industry

Master's thesis in Management and Economics of Innovation

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Division of Entrepreneurship and Strategy

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Abstract

District heating currently supplies over 60 % of Sweden's total heating demand, making it a cornerstone of the country's energy system. Despite this central role, district heating companies face increasing customer scrutiny due to rising prices, evolving expectations, and growing competition from competing technologies, mainly heat pumps. Historically, the sector's natural monopoly characteristics have shielded it from competitive pressures, and its extensive municipal ownership has contributed to a limited focus on market positioning and customer perception. However, as scrutiny intensifies, there is an urgent need to reconsider how district heating companies operate, structure their business models, and engage with their customers.

This research investigated strategic business model innovation opportunities for district heating companies in response to these challenges. The research was carried out in collaboration with Norrenergi AB, a district heating and cooling company in the Stockholm region. The research applied an outside-in perspective, drawing on insights from interviews with customers, industry professionals, and experts to incorporate viewpoints beyond solely internal perspectives.

The findings indicate that the current value offering in the district heating industry is undifferentiated and therefore often fails to adequately meet the diverse needs that customer segments seek to fulfill when purchasing an energy solution. Additionally, concerns were raised about the industry's pricing structure, a lack of customer focus and engagement, and a perceived slowness in adapting to evolving customer expectations. The report recommends that district heating companies move beyond traditional segmentation schemes and adopt a jobs-to-be-done approach. This shift would enable the creation of more tailored value propositions for distinct customer profiles and guide the development of aligned value creation, delivery, and capture components. For theory, the report contributes with a systematic, outside-in approach to business model innovation, operationalized through a conceptual lens that follows a phased process based on the 4I methodology and integrates the jobs-to-be-done framework and business model patterns.

Keywords: Energy, District heating, District Cooling, Business model innovation, Business model patterns, Customer-driven innovation, Jobs-to-be-done

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Adam Broberg & Gustav Karlsson, Gothenburg, June 2025

Abbrevations

Below is the list of abbrevations that have been used throughout this report.

BMI	Business model innovation
BMP	Business model patterns
CAGR	Compound annual growth rate
DC	District cooling
DH	District heating
DHW	Domestic hot water
HP	Heat pump
JTBD	Jobs-to-be-done
LPRE	Large professional real estate company
NAV	Net asset value
NOI	Net operating income
SMRE	Small-medium sized real estate company
TOA	Tenant owned association

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1 Introduction

The following chapter introduces the topic, presents the problematization, and defines the aim and research questions of the report. Moreover, an introduction to the partner company in which the research was developed in collaboration with is included, followed by the delimitations made during the development of the report.

1.1 Background and problematization

Heating and cooling account for more than one-fourth of Sweden's total energy consumption (Boverket, 2025). Among the available heating technologies, district heating (DH), is the most prevalent, supplying approximately 60% of the total heating and domestic hot water (DHW) demand (Energiföretagen, 2025). DH operates by circulating hot water through underground pipelines, together forming a widespread grid, that connects centralized production facilities to industrial, commercial, and residential consumers (Marinova et al., 2008; Persson & Werner, 2012; Rezaie & Rosen, 2012). Since it emerged as a key component of Sweden's energy system in the 1960s, DH has indeed played a pivotal role, however, oftentimes without public light. In Sweden, biofuels are the dominant energy source for heating water in the DH system, accounting for the majority of total input (Energiföretagen, n.d.; Vilen et al., 2024). Other sources include electricity, municipal waste, industrial surplus heat, and, to a lesser extent, fossil fuels (Energiföretagen, n.d.; Persson & Werner, 2012).

Lately, however, DH has shifted from a principally invisible but widely supported infrastructure to one increasingly scrutinized by the public, ignited by significant price hikes during recent years (Energiföretagen, 2025). Rising biofuel costs, worsened by supply disruptions following Russia's invasion of Ukraine, along with increased competition for bio resources from high-paying sectors, such as transportation, have significantly increased operational expenses for DH companies (Pomeroy, 2022; Rydegran, 2024; Vilen et al., 2024). These rising costs have led to notable price increases for consumers, which in turn have contributed to the weakening of DH's previously strong market position, and a growing adoption of alternative energy sources such as heat pumps (HPs) (Werner, 2017).

Historically, DH companies have operated under limited market pressure. According to Sandoff and Williamsson (2015), extensive municipal ownership and the industry's natural monopoly characteristics have shielded DH companies from competition, resulting in a limited focus on market positioning and customer perception. However, the growing customer scrutiny and the growing adoption of alternative energy sources are accelerating the erosion of this protective environment. After nearly three decades of market liberalization, DH companies are now facing increasing pressure to develop adaptive business models that respond to heightened expectations for responsiveness, innovation, and customer centricity (Sandoff & Williamsson, 2015). Despite this, the industry shows reluctance to embrace business model innovation (BMI) (Lygnerud et al., 2021), underscoring the urgency of addressing this topic more systematically.

BMI is widely acknowledged as a key driver of long-term competitiveness, not just through new offerings, but by rethinking how value is created and delivered (Magretta, 2002; Teece, 2010; Zott et al., 2011). From an academic perspective, there is already a solid foundation of research on how the DH industry may evolve technologically (Lund et al., 2018), and which directions future business models might take to incorporate this (e.g., Lygnerud et al. (2023), Sandoff and Williamsson (2015), and Williamsson (2023)). However, these studies tend to adopt an inside-out approach, often using a technology-focused lens as the starting point for BMI. They also tend to rely heavily on internal industry viewpoints, rather than including external market perspectives. As such, these studies may overlook the need for an outside-in driven BMI that reflects shifting market demands and customer expectations. This aligns with Teece (2010), who emphasizes that a successful BMI requires more than an understanding of current technological trajectories, it requires a deep understanding of customer needs. This perspective is echoed by Frankenberger et al. (2013), who highlight that identifying customer shortcomings, unmet needs, and emerging expectations is fundamental while conducting BMI.

In essence, the recent wave of public scrutiny, increased competition, and seemingly outdated business practices underscores the urgency of DH companies to rethink their business models. By taking an outside-in perspective by assessing market dynamics and deeply investigating customer frustrations and the implications of addressing them, DH companies will be provided with novel insights. This will complement prior inside-out assessments and hopefully contribute to DH's competitiveness and resilience in a changing energy landscape.

1.2 Aim and research questions

Based on the background and problematization, which emphasize the need for DH companies to rethink their business models, this report adopts an outside-in perspective to BMI with a specific focus on the customer's perspective and perceptions. The aim of utilizing this approach is to identify strategic recommendations on how DH companies may tailor their offerings and internal configuration to remain competitive in the future heating and cooling market. In other words, the research aims to propose strategic suggestions on how the business models of DH companies can be innovated from their current stage. To address this aim, three research questions have been formulated to guide the research, displayed in Table 1.1.

Table 1.1: An overview of the research questions

Research question	Description
1	What are the current offerings and business model characteristics in the district heating industry, and how well do they align with customer needs?
2	What are the key competitive challenges and sources of customer dissatisfaction with today's offerings?
3	What initiatives could be implemented to better address competitive pressures, customer needs, and customer dissatisfaction?

1.3 Delimitations

The following three delimitations have been made to ensure the provision of a coherent report with sufficient depth.

Geographic scope: The research is targeting the Swedish DH industry, and the conducted interviews have consequently been carried out in the same region. However, the findings and suggested business model initiatives may have broader geographic relevance, particularly within the Nordics, where the industry dynamics are likely comparable.

Customer segmentation focus: Norrenergi AB, the company with which the research is made in collaboration with (see introduction in Subsection 1.4), is roughly segmenting their customers into the segments; private households, tenant-owned associations, residential property owners, and commercial real estate owners. This research focuses exclusively on tenant-owned associations, residential property owners, and commercial real estate owners, and thus, the segment of private households is excluded. For clarity, the following terminology will be used throughout the report: tenant-owned associations (TOAs), small-to-medium real estate companies (SMREs), referring to residential property owners, and large-professional real estate companies (LPREs), referring to commercial real estate owners.

Primary focus on district heating: District cooling (DC) is a growing offering currently offered by 40 DH companies (Energiföretagen Sverige, 2023). It functions both technically and structurally like DH, i.e., by circulating cold water through underground pipelines from centralized production facilities to industrial, commercial, and residential consumers (Werner, 2017). However, the total Swedish demand for DC corresponds to only 1/46 of the

DH demand, making it a comparatively small product (Energimyndigheten, 2025a). While the primary focus in this research will be on DH, DC is also considered, albeit to a lesser extent, due to its limited market size. Moreover, when the report refers to DH companies, it refers to all companies providing DH, some of which also produce and deliver DC. Hence, the use of "DH companies" does not imply that companies providing both DH and DC are excluded.

1.4 Partner company

The research was conducted in collaboration with *Norrenergi AB*, further referred to as the partner company. Norrenergi, located in Solna, is a local energy provider offering DH and DC to over 100,000 residents in the Stockholm suburbs of Solna, Sundbyberg, Danderyd, and Bromma, see Figure 1.1 and 1.2. The company is owned by the municipalities of Solna (2/3) and Sundbyberg (1/3) (Norrenergi AB, 2024b).

Figure 1.1: Norrenergi’s covered area with district heating (Norrenergi AB, 2025)

Figure 1.2: Norrenergi’s covered area with district cooling (Norrenergi AB, 2025)

Norrenergi is offering both DH and DC, and the total volume of sold and distributed heat and cooling is roughly 1 TWh and 0.06 TWh, respectively. The main production facility is Solnaverket, which is complemented by the reserve production site Sundbybergsverket. In addition, Norrenergi is complementing its production by purchasing heated water from the neighboring DH company *Stockholm Exergi* via the Haga transfer station (Norrenergi AB, 2024b).

Norrenergi strives to meet high environmental standards while ensuring long-term profitability, with a target of 95 % of its production coming from renewable fuels (biofuels or electricity from renewable sources) (Norrenergi AB, 2024a). Moreover, Norrenergi utilizes a significant amount of excess heat from the Bromma wastewater treatment plant, thereby making use of energy that would otherwise go unused. The wastewater is subsequently heated further in large-scale HPs. A detailed breakdown of Norrenergis energy sources for heat and cooling production is presented in Table 1.2.

Table 1.2: Norrenergi's heating and cooling production in 2024 (Norrenergi AB, 2024b)

Energy source 2024	**Volume (GWh)**	**Share (%)**
Heating production (total 1044 GWh)		
Waste heat + electricity	532	51 %
Biofuels	205	20 %
Fossil fuels	10	1 %
Purchase agreement	297	28 %
Cooling production (total 63 GWh)		
Cooling machines	17	27 %
Waste cooling	26	41 %
Free cooling	20	32 %

2

Industry overview

This chapter presents an overview of the Swedish heating (i.e., space heating and DHW) and cooling industry, with a specific emphasis on DH in accordance with the main focus in this report. It begins by outlining the overall size and growth trends of the market as a whole. This is then followed by a discussion of the economic trends of DH, including pricing structures. The chapter then addresses the ongoing technical transformation of DH systems as well as the political and institutional factors shaping the industry. The aim is to equip the reader with the necessary context to understand the analysis presented in the subsequent chapters.

2.1 The heating and cooling market

This section examines the overall size and growth trends of the Swedish heating and cooling market. Notably, while private houses are delimited from the report's scope, data on aggregate national deliveries of heating, cooling, DC, and DH will include private houses to provide a comprehensive overview of demand patterns.

2.1.1 Heating and domestic hot water

In 2023, the total Swedish energy demand for heating (i.e., space heating and DHW) was 77 TWh, including houses, apartment buildings, and commercial properties (Energimyndigheten, 2025a). The distribution is fairly even, however, private houses represent the group with the individual largest share, close to 40 %, visible in Figure 2.1.

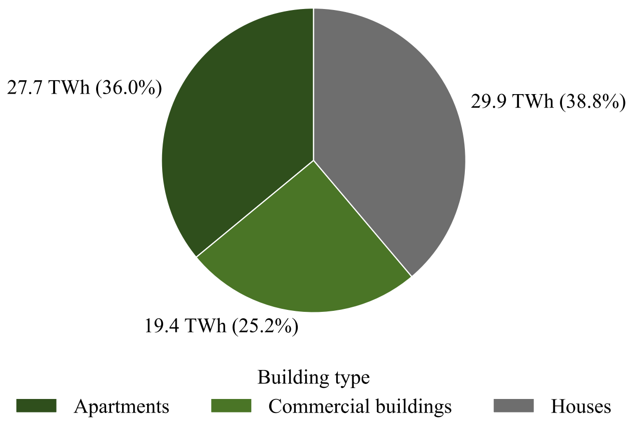

Figure 2.1: Heating demand in Sweden by building type 2023 (TWh) (Energimyndigheten, 2025a)

Of the total demand for heating, 59.5 % of the energy is provided by DH (45.8 TWh). When smaller private houses are excluded, DH represents an even higher share, precisely 86 % (20.25 TWh). The remaining share is covered by individual heating solutions, and electric heating (mainly HPs) represents the dominant share within this group. The breakdown of the energy source for apartments and commercial properties is visible in Figure 2.2.

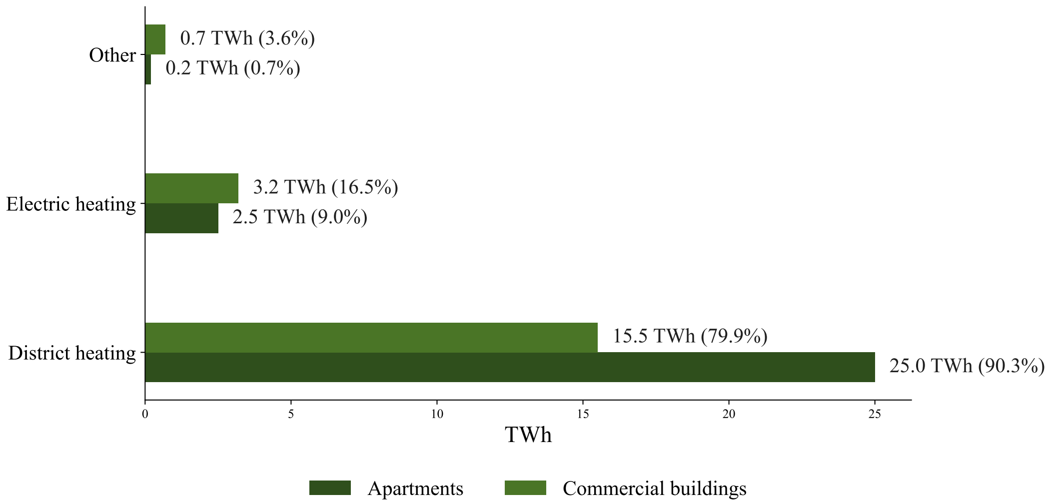

Figure 2.2: Heating sources in apartments and commercial buildings (TWh) (Energimyndigheten, 2025a)

The total space heating and DHW demand in apartment buildings and commercial properties has remained relatively stable, with a compound annual growth rate (CAGR) of 0.53 % between 2015 and 2023 (Energimyndigheten, 2025a). Despite population growth and continued construction of new buildings, rising average outdoor temperatures combined with increasingly energy-efficient building designs have moderated the growth of heating demand, which is likely to decline in the future (Vilen et al., 2024).

In line with this modest growth in the aggregate energy demand, the energy supplied by DH has also remained stable, with a CAGR of 0.51 % during the same period. In contrast, electric heating is experiencing significantly higher growth, with a CAGR of 3.12 %. This trend suggests that while DH is maintaining its current level, HPs are gaining substantial traction, even in the mature heating market. The shift appears to be occurring primarily from other individual heating solutions, such as oil and biofuel supplied ones, toward electric HPs. A more detailed breakdown of energy provision by heating method and their respective market shares is provided in Table 2.1.

Table 2.1: Energy use by heating method in apartment buildings and commercial properties (2015-2023), in TWh and share of total per year (Energimyndigheten, 2025a)

Year	**District heating TWh/(%)**	**Electric heating TWh/(%)**	**Other TWh/(%)**	**Total (TWh)**
2023	40.5 (86.0 %)	5.8 (12.3 %)	0.8 (1.7 %)	47.1
2022	38.7 (85.8 %)	5.4 (12.0 %)	1.0 (2.2 %)	45.1
2021	41.3 (84.6 %)	6.0 (12.3 %)	1.5 (3.1 %)	48.8
2020	37.8 (84.8 %)	5.4 (12.1 %)	1.4 (3.1 %)	44.6
2019	39.5 (84.8 %)	5.7 (12.2 %)	1.4 (3.0 %)	46.6
2018	40.8 (84.1 %)	5.6 (11.5 %)	2.1 (4.3 %)	48.5
2017	40.7 (84.1 %)	5.5 (11.4 %)	2.2 (4.5 %)	48.4
2016	40.8 (84.1 %)	5.5 (11.3 %)	2.2 (4.5 %)	48.5
2015	38.7 (86.2 %)	4.4 (9.8 %)	1.8 (4.0 %)	44.9

Aggregate sales data of HPs further reinforce the fact that electric heating has experienced strong growth in the Swedish market by industry standards. Installations of HPs are showing consistent growth since 2015, peaking at approximately 215,000 units in 2022 (Svenska Kyl & Värmepumpföreningen, 2024b) and a CAGR of 11.2 % between these years (2015 and 2022). The recent years' decline in installations has been attributed to the uncertain global economy and higher interest rates compared to the previous decade, which have affected private consumers and ultimately, the companies that serve them (Svenska Kyl & Värmepumpföreningen, 2024a). Nevertheless, units sold during 2024 are still high compared to 2015-2020. Complete data on HP installations are displayed in Figure 2.3.

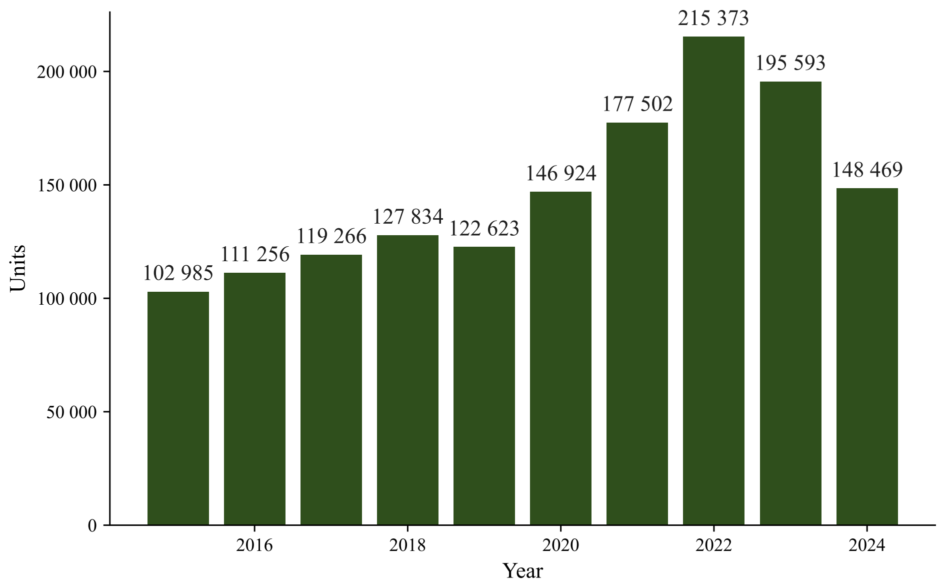

Figure 2.3: Annual installation of heat pumps (units) (Svenska Kyl & Värmepumpföreningen, 2024b)

Historically, DH companies have viewed HPs as a competing technology to be firmly opposed, actively comparing their offering to highlight competitive advantages, without showing any openness to collaboration or joint operation (Lygnerud et al., 2021). However, a shift appears to be underway, driven by changing customer preferences. Some customers who previously relied solely on DH are increasingly adopting HPs as their primary heating source while still using DH for peak demand periods, referred to as a hybrid heating setup (Energiforsk, 2020; Lygnerud et al., 2021; Lygnerud & Yang, 2024; Song et al., 2023). This tendency to install HPs while retaining DH for redundancy and complementary purposes is also reflected in the previously shown increase in annual HP installations, which exhibited a higher CAGR than the delivered heating energy itself.

2.1.2 Cooling

No comprehensive data on the total cooling demand (encompassing all cooling sources) in Sweden has been identified. However, the total delivered DC in 2023 was approximately 1 TWh (Energimyndigheten, 2025a). Hence, the market size for DC is considerably smaller compared to DH (1/46). As shown in Figure 2.4, commercial buildings account for the majority of the consumption, followed by industries and houses. Compared to DH, DC has exhibited stronger growth, with a CAGR of 1.08 % since 2015, compared to 0.53 % for DH. Åslund (2019) argues that the increased demand for DC can be attributed to a heightened focus on maintaining a stable and comfortable indoor climate, particularly in commercial buildings and industrial settings.

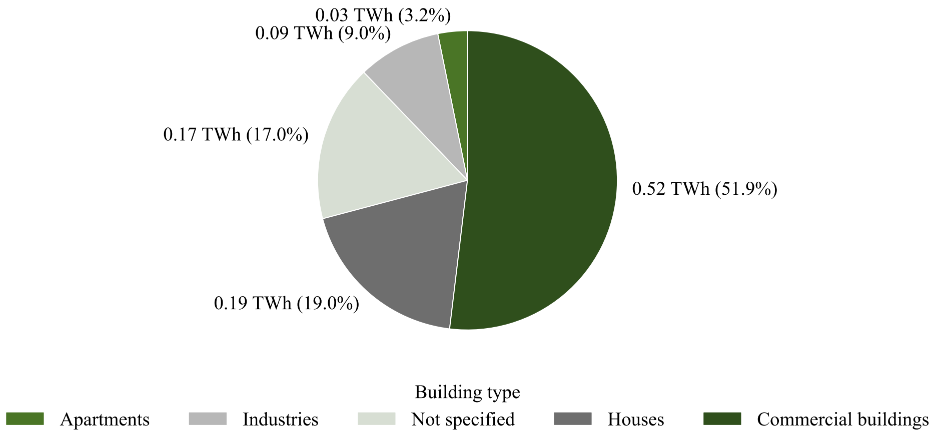

Figure 2.4: District cooling demand in Sweden by building type 2023 in TWh (Energiföretagen Sverige, 2023)

2.2 District heating's economic and financial trends

The first DH network in Sweden, which laid the foundation for its prominent role in the Swedish heating market today, was established by Karlstad Municipality in 1948 (Vattenfall, 2025). During the following four decades, DH systems were constructed in most urban communities across the country and were predominantly owned and operated by municipalities (Werner, 2017). Today, DH is available in 285 of Sweden's 290 municipalities (Energimyndigheten, 2023), and there are in total 175 DH companies in Sweden operating them (Energimarknadsinspektionen, 2021). While the majority remain municipally owned, alternative ownership structures exist, including private companies, joint municipal/state ventures, and member-owned entities. According to Energimarknadsinspektionen (2021), around 64 % is municipally owned, 22 % is private companies, and the remaining 14 % is either joint municipal/state ventures or member-owned entities.

As outlined in the background and problematization, many customers have expressed dissatisfaction with the recent price increases communicated by DH companies. This trend is supported by data presented in a report by Lundin (2025), which shows rising prices in recent years within and is summarized in Table 2.2. There are notable differences in how steep the price increases have been between municipally owned and privately owned DH companies, with the latter having raised their prices more aggressively on an annual basis.

Table 2.2: District heating price and annual change (2021-2024), in SEK per MWh (Lundin, 2025)

Year	Private owned price	Private sector increase (%)	Municipality owned price	Municipality increase (%)
2024	1066	19.2 %	869	12.7 %
2023	894	11.3 %	771	5.9 %
2022	803	1.8 %	728	1.1 %
2021	789	-	720	-

Although DH prices have risen each year, they still do not fully capture the increase in the price of the main energy source for DH, biofuels (Energimyndigheten, 2025a). Meanwhile, income from burning waste and selling electricity (using combined heat and power plants) has stayed fairly steady. Table 2.3 illustrates the development of average fuel sourcing costs in SEK per MWh. It should be noted that for electricity, only wholesale market prices are included; additional network charges are not accounted for. From the data, it is notable that the average annual price increase for wood chips, refined biomass, and by-products between 2022 and 2024 is approximately 24 %. This figure is significantly higher than the corresponding price increases applied by both municipally and privately owned DH companies, and data published by Energimarknadsinspektionen (2025) indicate that this discrepancy has contributed to a widespread decline in aggregate profitability across the DH sector. The industry's aggregate operating margin fell from 12.0 % in 2021 to 2.2 % in 2023.

Table 2.3: Purchase prices by fuel type (2015-2024), in SEK per MWh (negative numbers in parentheses) (Energimyndigheten, 2025b; Statistics Sweden (SCB), 2024)

Fuel type	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Wood chips	186	181	180	189	199	201	195	208	298	366
Refined biomass	286	273	266	277	294	311	319	353	475	567
By-products	159	151	152	159	168	172	165	171	233	317
Electricity					388	207	642	1194	517	361
Household waste							(162)	(176)	(171)	(188)
Industrial waste							(166)	(165)	(157)	(164)
Imported waste							(171)	(160)	(154)	(155)

2.2.1 Pricing logic

Pricing levels are, by nature, shaped by the structure and logic of the pricing model. According to a report by the consultancy Sigholm (Borglund, 2020), 86 different pricing models have been identified as employed by the companies in the DH industry. However, these pricing models generally revolve around three core components, which are composed and combined differently, as described by Li et al. (2015):

- **Connection fee** for new customers (i.e., the cost of connecting a building to the DH grid)
- **Power/capacity related cost**, covering the maintenance and operation of production facilities and distribution infrastructure
- **Energy cost**, associated with heating or cooling the water

The connection cost is typically a one-time fixed fee negotiated individually with each customer (Wickström, 2024). It depends on the cost of connecting the building to the grid, which is an aggregated cost from factors such as the distance to the grid, the installation's complexity, and the system's required capacity (maximum power) (Li et al., 2015).

The power component, also known as capacity cost, is based on the customer's historically maximum measured power usage, or the estimated one, typically in kW or MW, and reflects the capital cost of the infrastructure needed to meet peak demand (Lygnerud & Yang, 2024). The DH companies mainly assume the maximum power without influence from the customer.

The energy component is variable and is generally charged per kWh. Over the past decade, it has become standard practice to differentiate the energy price seasonally to follow the demand pattern and the cost of fuel supply. The most common arrangement is to charge the highest rates during winter, moderate rates during spring and autumn, and the lowest rates in summer (Lygnerud & Yang, 2024). In some cases, even time-of-use tariffs have been introduced, with elevated prices during peak hours (morning and evening) to reduce system strain and encourage load shifting (Lygnerud & Yang, 2024).

In addition to the three price components emphasized by Li et al. (2015), technological advances have also enabled the development of performance-based tariffs aimed at improving system efficiency. An example is flow-based pricing (e.g., m^3/MWh), where customers are charged based on the volume of water used per unit of heat delivered (Leoni et al., 2020). High flow rates typically indicate inefficiencies, such as elevated return temperatures that stain system performance (Månsson et al., 2019). A related design is the bonus-malus system, where pricing is dynamically adjusted according to system performance metrics. For example, customers who maintain low return temperatures may receive a discount, while those who exceed set thresholds incur penalties (Leoni et al., 2020; Månsson et al., 2019). A summary of the aforementioned price components and their characteristics is compiled in Table 2.4.

Table 2.4: Summary of pricing components, pricing style, and pricing basis in the district heating industry

Component	Pricing style	Pricing basis
Connection fee	One-time cost	One-time cost covering the connection cost to the grid
Power/Capacity	Maximum power used	Maximum measured heat demand per time unit (kW)
Energy	Seasonal	Heat/cold (energy) consumption (kWh), seasonally adjusted unit price
	Time-of-use	Heat/cold (energy) consumption (kWh), time-dependent unit price
	Marginal price	Heat/cold (energy) consumption (kWh), production cost-based dynamic pricing
System efficiency	Flow-based	Water volume per heat unit (m^3/MWh)
	Bonus-malus system	Performance-based (e.g., return temperature)

2.3 District heating's technical transformation

The widespread presence of DH in Sweden today can largely be attributed to the major expansion of the DH network between the 1970s and 1990s, which was driven by the need to meet rising energy demands during a period of extensive residential construction (Lygnerud, 2018). Unlike earlier built DH systems that relied on steam, the Swedish systems adopted pressurized water, initially at temperatures around 100 degrees Celsius as the primary heat carrier (Lund et al., 2014). The aim was to improve overall energy efficiency by having, instead of individual, often oil-driven, boilers, a large central production facility with a diverse fuel supply of usually oil, coal, and wood fuels (Lund et al., 2014; Lygnerud, 2018).

Since the large construction boom of Swedish DH systems, technological improvements have focused mainly on two key areas (Lygnerud, 2018):

- **Lowering distribution temperatures**, reducing both the supply and return temperatures
- **Replacing fossil fuel-based energy sources**, transitioning toward renewable and recycled heat

The aim behind the former focus area is primarily to reduce heat losses and to enable integration of energy sources with lower supply temperatures. Today, the supply temperature in focus in the Swedish grids has an average supply temperature of 86 degrees Celsius (Tidningen Energi, 2024). The rationale behind the second focus area is to reduce the industry's carbon dioxide emissions, and has resulted in oil and coal being replaced with primarily bio-fuels, hot waste-heat from industries or incineration, and large-scale HPs. Today, fossil fuels play a minor part in the total energy supply and are primarily used during peak periods (Lygnerud, 2018; Werner, 2017). The development is visible in Figure 2.5.

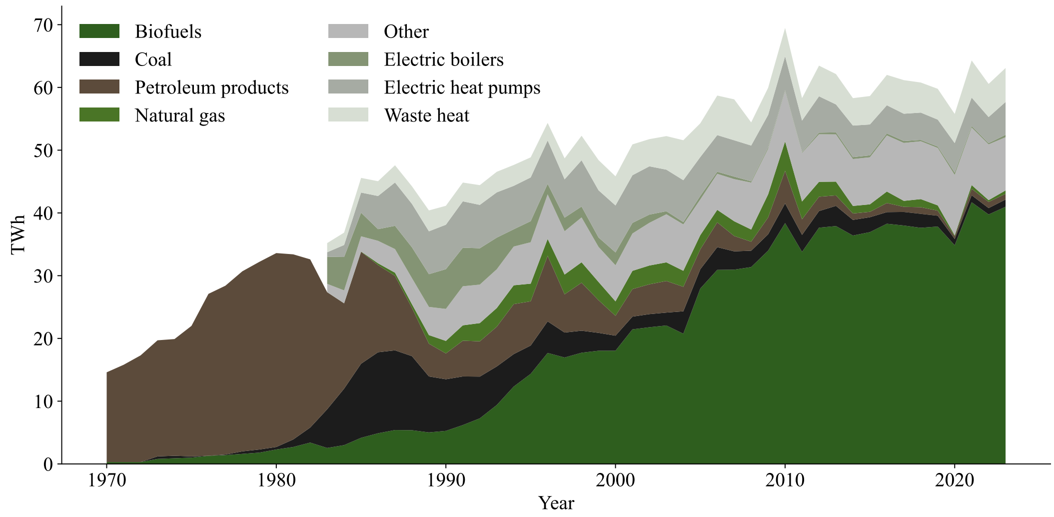

Figure 2.5: Supplied energy for district heating production from 1970 (TWh) (Energimyndigheten, 2025a)

While the focus on reducing the distribution temperatures continues, recent research on future DH systems has started to emphasize new ideas on system design and actor constellations, which may be enabled in future low-temperature DH systems with supply temperatures below 50 degrees Celsius. Traditionally, DH has been considered efficient due to its production-focused value chain, where a central DH company acts as the energy producer serving passive consumers, benefiting from economies of scale. In contrast, newer approaches advocate for the involvement of a broader range of actors and system components, aiming to collectively participate in supplying heat to the grid. Thus, new actors such as prosumers, or low-temperature waste heat suppliers, and the inclusion of local thermal storage units are frequently mentioned as prospective actors in future DH networks (Boesten et al., 2019; Lindhe et al., 2022; Lund et al., 2021; Pakere et al., 2023; Yao et al., 2024).

Despite recent innovative ideas, Lygnerud (2018) argues that most developments in the industry remain incremental, primarily continuing to focus on improving and expanding the already well-established DH systems. The transition from today's considered high-temperature grid to novel low-temperature grids has been assessed as both technically challenging and economically burdensome. Lygnerud (2018) even suggests that a lock-in effect related to existing infrastructure and energy supply chains can be observed among DH companies. As a result, new technologies, despite being technologically feasible, are not implemented or tested on a larger scale. However, there are indications that the industry has begun to initiate innovative trials and experiments on a smaller scale. For example, Gadd et al. (2024) has collectively presented 284 innovative DH cases in which various elements of the novel concepts have been explored. Nevertheless, the majority of these cases remain in the pilot or testing phase, indicating that a significant gap still exists before such technologies become fundamental applied features of the Swedish DH companies' technological toolkit.

2.4 District heating's political and institutional aspects

Another factor contributing to the gap between initiatives and their practical implementation lies in regulatory and institutional frameworks. Until the 1990s, most DH networks in Sweden were owned and operated by municipalities. However, this model came under scrutiny during the 1990s, as many municipalities faced financial difficulties and saw the divestment of energy companies as a way to finance other investments (Ericsson, 2009). The situation was further influenced by the 1996 deregulation of the energy sector, which required municipalities to manage energy companies more commercially. This included the clear separation of DH operations and financial reporting from other municipal responsibilities (Ericsson, 2009).

Following deregulation, the DH industry underwent several additional institutional changes that changed the playing field for DH companies and introduced new challenges in adapting their operations. Concerns about price developments after deregulation ultimately led to the introduction of the national *District heating law (Fjärrvärmelagen)* that came into effect in 2008, aiming to protect consumers (Lygnerud, 2018). Among several consumer protection initiatives, a board was established with the purpose of mediating disputes between consumers and DH companies. Lygnerud (2018) argues that the law was construed in a way that raised a negative perception of DH, which may be a significant reason why the *Swedish Ministry of Economy* ordered an analysis of a potential DH price regulation in 2012. However, in 2013, it was revealed that agreeing on a fair price point in the Swedish heterogeneous market would be very complicated, and a price regulation was not established (Holm, 2013).

In response to the increased scrutiny of DH companies and the price discussion, the industry voluntarily initiated a price dialogue. The forum aims to involve customers and thus improve transparency in the DH company's pricing process, which follows a pre-determined yearly agenda with certain toll gates (Lygnerud, 2018). Today, 36 out of the country's 175 DH companies have decided to join the dialogue (Prisdialogen, 2024).

Lastly, it is currently debated whether one driver behind the growing consumer interest in HPs originates from the energy performance regulations introduced by *Sweden's national board of housing, building, and planning (Boverket)* (Boverket, 2025; Nordin & Akhondi, 2025; Törnblom & Almgren, 2024). Under current rules aligned with the *European energy performance of buildings directive*, a building's energy performance, and thus its energy classification, is assessed not based on the total energy used, but on the amount of energy imported into the building, i.e., the purchased energy required to meet its heating, cooling, and electricity needs (Boverket, 2025; European Commission, 2025). Some politicians and debaters, e.g., Nordin and Akhondi (2025) and Törnblom and Almgren (2024), suggest that this measurement tends to favor HPs, which use electricity within the building and thereby keep the amount of measured imported energy low relative to the heat output that an HP ultimately yields. Consequently, buildings equipped with HPs receive better energy classifications, which can affect property value, access to green financing, and compliance with building regulations, compared to similar buildings heated with DH.

3

Theoretical background

This chapter presents a collection of theoretical concepts on which the report is based. The selected theories are intended to support the direction of the research, namely, adopting an outside-in perspective on BMI in the DH industry, with a particular emphasis on the customer's perspective and perceptions, to ultimately suggest business model improvements. First, the chapter introduces the umbrella concept of the research, namely, business models. Next, the jobs-to-be-done framework is presented to establish a method for understanding customer needs. Finally, the concept of BMI is examined to clarify what it entails and how it can be implemented. Together, these three theoretical components form the foundation for the conceptual framework used as a central analytical tool throughout the report. This framework is introduced at the end of the chapter.

3.1 Business models

The business model concept became prevalent during the dot-com bubble in the mid-1990s as a way to communicate complex business ideas to investors. Since then, research on the subject has been extensive (Zott et al., 2011). Interestingly, there is no single explicit definition of the term, so the concept tends to be misused or confused (DaSilva & Trkman, 2014). Among the various definitions, Magretta (2002) describes it as a narrative that explains how an enterprise operates, while Chesbrough and Rosenbloom (2002) emphasizes the empirical logic that links the technical potential to the realization of economic value. Casadesus-Masanell and Ricart (2010) argue that a business model reflects a company's realized strategy, shaping its operation, and creating value for its stakeholders. Meanwhile, Osterwalder and Pigneur (2010) defines it as the rationale behind how an organization creates, delivers, and captures value.

Despite these variations, there is some consensus that business models aid in describing, analyzing, communicating, managing, and designing value-creation systems of companies or business units (Magretta, 2002; Zott et al., 2011). Although the definition of value creation systems is, in itself, also a topic discussed, a common breakdown of the concept is that it could be subdivided into four core components; value proposition, value delivery, value creation, and value capture (Chen et al., 2021; Lüdeke-Freund et al., 2018; Teece, 2010; Tongur & Engwall, 2014; Zott et al., 2011):

1. *Value proposition:* Defines a set of benefits and solutions a company offers to its cus-

tomers (Osterwalder & Pigneur, 2010). It addresses a core question: *"Why should a customer choose this product or service over alternatives?"* It may include tangible outcomes such as cost savings, convenience, performance, or durability, as well as intangible aspects such as brand identity, status, user experience, or sustainability (Osterwalder & Pigneur, 2010). Importantly, value propositions can vary between customer segments and often evolve along with market trends or technological advances (Teece, 2010).

2. *Value delivery:* Refers to the methods, actors, and infrastructure used to bring the value proposition to customers (Chen et al., 2021). This includes the entire supply chain, logistics, distribution channels, customer support systems, and communication strategies. Effective value delivery ensures that the promised benefits are reliably and consistently realized by the customer, and often involves partnerships, technology platforms, and multichannel approaches to increase reach and responsiveness (Chen et al., 2021).

3. *Value creation:* Encompasses how value is created and includes the internal processes, capabilities, technologies, and external partnerships that work together to produce the product or service (Tongur & Engwall, 2014). Thus, activities such as product development, manufacturing, marketing, data management, resource integration, and innovation strategies are considered. Both internal teams and external collaborators (e.g., suppliers, co-creators, joint ventures) may contribute to creating new forms of value, often enabled by ecosystems, digital platforms, or modular business architectures.

4. *Value capture:* Focuses on how a company retains part of the value it creates to achieve financial sustainability and profitability (Tongur & Engwall, 2014). This involves defining pricing strategies, revenue models, and cost structures. It also includes mechanisms to retain customer loyalty and protect intellectual property.

Given that business models articulate the essence of how a business operates, they are widely used by both academics and practitioners to study entrepreneurial ventures and corporate innovation (Baden-Fuller & Morgan, 2010). To support such studies, business model frameworks, also referred to as business model conceptualizations, are commonly employed as analytical tools. These structured perspectives help visualize how a company creates, delivers, and captures value (Demil & Lecocq, 2010). As there is no universally accepted definition of the business model concept, a variety of conceptualizations have emerged. Three widely used examples include the *activity system framework* by Zott et al. (2011), which focuses on interconnected activities within and beyond the firm, the *magic triangle* by Gassmann et al. (2014b), which simplifies the business model into four core questions *Who, What, How, and Why?*, and the *business model canvas* by Osterwalder and Pigneur (2010), a visual tool that breaks down value creation into nine distinct building blocks. However, in this report, none of these frameworks will be applied directly. Instead, the analysis will be grounded in the four aforementioned core components, or business model components; value proposition, value delivery, value creation, and value capture.

3.2 Jobs-to-be-done

The fit between the value proposition and the customer is pivotal in a business model, as the value proposition represents the fundamental reason a customer perceives the offering of a company as valuable (Richardson, 2008). The idea that a company should view itself as a value creator, delivering value to customers rather than merely producing goods, is not new. As early as 1960, Levitt (1960) argued that firms should see themselves as customer-satisfying entities. Drucker (1985) similarly emphasized that the best source of business improvement lies in examining the interface between actual customer needs and perceived customer needs. Addressing this divergence has been highlighted by many management and business scholars. The act of identifying and addressing customer needs as the first step in BMI has been repeatedly described as a cornerstone of successful innovation management and business design (Abrell & Durstewitz, 2016; Christensen et al., 2016).

Christensen et al. (2016) note that although companies often possess vast amounts of customer data and employ a variety of analytical tools to detect patterns and correlations, these methods frequently fail to reveal genuine customer behavior. As they argue, such approaches tend to miss the core of what customers are trying to achieve, or, as they define it, the real 'job' customers are purchasing a product or service to perform. A 'job' in this context is the shorthand of what an individual truly seeks to accomplish in a specific situation (Christensen et al., 2016), and as Christensen et al. (2007) originally put it, *"when we buy a product, we essentially 'hire' it to help us do a job"*. In line with this, Ulwick (2002), Goffin et al. (2012), and Slater and Narver (1998) have collectively stressed that the most promising innovation opportunities stem from the discovery of latent or hidden customer needs, those that are difficult for customers to articulate or may remain completely unexpressed.

Based on this insight, both Ulwick (2002) and Christensen et al. (2007) developed frameworks that place the customer's 'job' at the center of the innovation process, each referring to their approach as jobs-to-be-done (JTBD). Although the respective JTBD frameworks differ slightly in detail, they share a common objective; to provide a structured methodology for understanding customer behavior by identifying the 'job' the customer is trying to get done, which incorporates functional, emotional, and social jobs (Christensen et al., 2007; Ulwick, 2002). Functional jobs refer to the practical tasks the customer wants to complete, emotional jobs involve how the customer wants to feel, and social jobs relate to how the customer wants to be perceived by others (Christensen et al., 2007).

The notion of JTBD could, if implemented correctly, have implications for companies' way to segment their customers. If the customers' jobs are the focal point of analysis, market segmentation should be based on the underlying tasks or jobs customers are trying to accomplish. Traditional segmentation schemes, commonly based on product characteristics (e.g., category or price) or customer demographics (e.g., age, gender, or income level), tend to be static, while customer behavior often changes in ways that these variables fail to capture (Christensen et al., 2007). Thus, a JTBD perspective enables a more dynamic and needs-driven segmentation approach, allowing companies to better align their offerings with what truly drives customer decision-making.

3.3 Business model innovation

Just as research and development activities are commonly associated with innovation, a company can also view its business model as a domain for innovation (Chesbrough, 2007). Increased research and emphasis on the concept of a business model have, according to Zott et al. (2011), resulted in BMI being recognized as one way to improve firm performance, thus adding BMI to the array of different innovation activities that a firm can perform. Aligned with this view, Chesbrough (2010) argues that developing an innovative business model can be just as valuable as creating new technology. Although challenging, Zott et al. (2011) argue that BMI is essential for companies to achieve a sustainable competitive advantage, as a new business logic can be harder for competitors to replicate compared with novel products or services.

However, an exact definition of BMI varies between scholars. Amit and Zott (2012) has defined the BMI as a process in which a firm adds new activities, links activities in a novel way, or alters which party performs an activity. Osterwalder et al. (2005), conversely, suggest it occurs when companies experiment with or modify one or more building blocks in their business model canvas. Furthermore, Geissdoerfer et al. (2018) argue that BMI can range from incremental to radical transformations, impacting the entire business model or specific components of the value creation system (i.e., the value proposition, value creation, value delivery or value capture) or interrelations in the value network between the focal firm and its suppliers, customers, or other partners. In essence, since the business model concept does not have one unique definition, neither does BMI. However, summarizing different interpretations, this thesis will adopt the approach that business model innovation is conducted when a firm addresses its way of proposing, creating, delivering, or capturing value, i.e., any of the business model components.

3.3.1 Phases of business model innovation

Although there is substantial research highlighting the importance and impact of running BMI, few studies have explored it as a structured process with clearly defined phases (Frankenberger et al., 2013). To fill this gap, Frankenberger et al. (2013) introduced a framework called 4I, which views BMI as a sequential process composed of four distinct steps:

1. *Initiation*: This phase involves recognizing the need for business model innovation. Frankenberger et al. (2013) argue that firms should actively monitor customer behavior, collect feedback, and analyze trends to assess whether their current model remains aligned with market expectations. In line with this, Amit and Zott (2012) contend that the first question a company should ask in a BMI process is *"What customer needs will the business model address?"* Finally, understanding the broader challenges facing the industry is equally crucial, as these barriers often shape the feasibility and success of BMI efforts (Chesbrough, 2010).

2. *Ideation*: The creative phase, which involves the generation, exploration, and evaluation of potential business model ideas, where findings from the prior phase serve as a foundation. It may involve brainstorming, experimentation, or benchmarking against competitors (Frankenberger et al., 2013).

3. *Integration*: The step focuses on aligning and refining the most promising ideas from the previous phase with the existing structures and processes of the firm. As the business model is a boundary-spanning concept, including all partners and customers having a relation to the focal firm, it entails that all stakeholders need to support the new business model, otherwise, it will not work (Frankenberger et al., 2013).

4. *Implementation*: Put the new business model into practice by deploying a trial-and-error approach. Includes handling of internal resistance, change management, and performance monitoring (Frankenberger et al., 2013).

Although the 4I framework follows a linear structure, iterations between *integration* and *implementation* occur frequently. If a business model does not perform as expected, companies often return to the *integration* phase to adjust before retrying *implementation* (Frankenberger et al., 2013). However, despite these iterations, the overall process remains structured and systematic, ensuring a methodical approach to BMI.

3.3.2 Business model patterns as a supportive tool

The 4I process evidently provides a structured outline of how BMI can be executed. Nevertheless, BMI is regarded as a complex and tiring practice for organizations (Dodgson et al., 2014). Dodgson et al. (2014) point out that because business models often involve multiple stakeholders forming complex network structures, resulting in complex interdependencies and dynamics, tools for visualizing and organizing BMI ideas are essential for effective implementation. Zott and Amit (2010) shadow this view, arguing that the BMI process requires a conceptual toolkit in its execution to support effective design, and Schneider and Spieth (2013) call for more practical tools, artifacts, or methods to facilitate BMI in real-world settings. To address these calls, different tools have been proposed to provide tactics for running an efficient and successful BMI. The common denominator for these tools is first that they offer a reference language that fosters dialogues (Amit & Zott, 2012), second that they offer a simplified representation of the concept of a complex business model, and thirdly that they offer representations, verbally and graphically, of how BMI could be managed (Dodgson et al., 2014).

One such tool, which will be used in this report to facilitate the BMI process, is the artifacts referred to as business model patterns (BMP), originally coined by Abdelkafi et al. (2013). Abdelkafi et al. (2013) describe BMP as reusable and proven solutions to common challenges in BMI processes, and business models of companies are often a combination of several patterns. Gassmann et al. (2014a) later popularized the use of BMP as a distinct tool in BMI, arguing that the use and recombining of existing BMPs is a key strategy, referring to the approach as creative imitation. They further argue that innovation lies in understanding, translating, recombinating, and transferring successful and suitable patterns to one‘s industry context, and that there is no need to reinvent the wheel (Dodgson et al., 2014).

BMPs are seemingly argued to be a powerful tool to support BMI, and several researchers have assembled a set of patterns to be used, which also have produced a somewhat muddled field with a lack of consistency and stringency (Remane et al., 2017). To address this, Remane et al. (2017) compiled BMPs from 22 original articles and six review articles, including Abdelkafi et al. (2013) and Gassmann et al. (2014a), resulting of more than 300 patterns. Many of these patterns overlapped or were strongly interlinked, leading to the development of a consolidated database of 182 distinct patterns for BMI that can be used as a systematic tool to support the BMI process. An illustration of how each pattern were described and presented by Remane et al. (2017) is displayed in Table 3.1.

Table 3.1: Example of a business model pattern compiled in the publication *The Business Model Database: A Tool for Systematic Business Model Innovation* by Remane et al. (2017).

Pattern name	*Razors/blades*
Alternative names	*Cellphone, razor and blade*
Description	Offer a cheap or free basic product (razor) together with complements (blades) that are overpriced and thereby subsidize the basic product.
Examples	Gillette, Nespresso, Amazon Kindle
Sources	Gassmann et al. (2014a), Johnson (2009), Johnson (2010), Linder and Cantrell (2000)

In addition to enhancing consistency within the BMP domain, Remane et al. (2017) examined each of the 182 compiled patterns and linked them to the best corresponding business model component (i.e., value proposition, value creation, value delivery, and value capture). In doing so, they closed the loop and clarified the connection between BMI, BMP, and the definition of a business model. To enable this, they introduced a 12-dimensional taxonomy in which each pattern is assigned exactly one characteristic per dimension. Each of the 12 dimensions is explicitly associated with either one of the four business model components or with an overarching category that spans across the business model components. This overarching category includes two dimensions; hierarchical impact and degree of digitization. The hierarchical impact dimension, introduced by the authors based on insights from Amshoff et al. (2015) and Strauss and Frost (2014), distinguishes whether a pattern affects the entire business model (prototypical) or only specific building blocks (solution). Although included for completeness, this overarching category is not further exploited in the remaining of this report, which instead will utilize the mapping to each of the four business model components. Likewise, the report does not focus on the specific characteristics of each dimension, but rather uses the taxonomy to identify which business model component each pattern is declared to affect. Table 3.2 provides an overview of the taxonomy.

Table 3.2: Overview of the 12-dimensional taxonomy by Remane et al. (2017), showing how each business model pattern is classified by one characteristic per dimension, mapped to business model components or to the overarching category

Dimension (D)	**Characteristics per dimension (number of patterns per characteristic)**
Overarching	
D1: Hierarchical impact	Prototypical pattern (87), Solution pattern (95)
D2: Degree of digitization	Purely digital (55), Digitally enabled (35), Not necessarily digital (92)
Value proposition	
D3: Product type	Physical (12), Financial (7), Human (5), Intellectual property (36), Hybrid (10), Product type not specified (112)
D4: Strategy for differentiation	Quality (9), Customization (8), Combination (13), Access/convenience (6), Price (22), Network effects (11), No impact on differentiation (113)
Value creation	
D7: Sourcing	Make (17), Buy (11), No impact on sourcing (154)
D8: Third parties involved	Suppliers (9), Customers (12), Competitors (3), Multiple parties (18), No impact on third parties involved (140)
D9: Value-creation process	Research and design (7), Supply (5), Production (8), Multiple steps (11), No impact on creation process (151)
Value delivery	
D5: Target customers	Specific new customer segment (10), Lock-in existing customers (9), Other companies (B2B) (7), No impact on target customers (156)
D6: Value-delivery process	Brand and marketing (7), Sales channel (20), Sales model (9), Customer relationship management (3), No impact on delivery process (143)
Value capture	
D10: Revenue model	Sell (15), Lend (20), Intermediate (18), Advertising (12), No impact on revenue model (117)
D11: Pricing strategy	Premium (11), Cheap (9), Dynamic (12), Non-transparent (8), No impact on pricing strategy (142)
D12: Direct profit effect	Increase revenue (42), Reduce cost (15), Multiple effects (11), No direct profit impact (114)

3.4 Conceptual lens

A conceptual framework can be defined as a structured representation of theoretical concepts and relationships within a system, often visualized through maps, diagrams, or models to improve clarity (Ludviga, 2023). Given the research aim to propose strategic suggestions on how the business model of DH companies can be innovated, a challenge that evidently has been perceived as complex and difficult to perform and structure, the conceptual framework in this report will function as a guide for understanding and navigating the complex BMI process in the DH industry. As such, it synthesizes the key theoretical concepts introduced earlier in this chapter and uses them to interpret the data gathered while addressing the research questions, ultimately to answer the research aim. For consistency and to stress its analytical role, the framework will be referred to as a conceptual lens throughout the rest of the report, with the ambition to underscore the intent to use the theory as a means of driving the gathering of empirical data, and subsequently to interpret it.

The lens used in this report is inspired by Remane et al. (2017), who propose using their BMP database in conjunction with the execution of the 4I process (Frankenberger et al., 2013). However, in this report, the final phase in the 4I process, the implementation, is intentionally excluded, as it focuses on operational deployment and falls outside the defined scope of this report. To enhance the lens's ability to capture outside-in and customer-oriented dynamics in line with the report's aim, the JTBD framework is integrated. This addition ensures that the lens maintains a strong customer focus by supporting a more accurate understanding of customer behavior, needs, and expectations.

By combining the sequential 4I process with the two theoretical conceptualizations, the JTBD framework and BMPs, the lens will serve two core functions in the construction of the report:

1. *Temporal function*: The lens provides a linear process logic built around the three initial phases in the 4I process. Each phase has a specific objective and builds on the previous one, supporting the progression toward the overall aim of the research to propose strategic business model initiatives. The research questions and their sequence have been shaped to follow and reinforce this function.

2. *Analytical function*: The lens provides analytical guidance by combining the JTBD framework with BMPs. The JTBD framework will help uncover what customers are truly trying to achieve, and BMP will serve as a practical tool for translating insights into concrete, reusable, and proven solutions, which could subsequently be mapped into specific business model components to facilitate the ability to incorporate initiatives in companies' contemporary business models.

Together, these two dimensions will form the backbone and structure for the research, as they support both the design and the structuring of how insights are analyzed. The application of the conceptual lens is summarized in Table 3.3.

Table 3.3: Illustrative table explaining the conceptual lens and its components, based on Christensen et al. (2007), Frankenberger et al. (2013), Remane et al. (2017), and Ulwick (2002)

	1. Initiation	**2. Ideation**	**3. Integration**
Objective	Understand the characteristics of current business models by industry companies, and contemporary customer needs	Identify business model improvement areas, and generate refinement hypotheses based on insights from the initiation phase	Translate hypotheses from the ideation phase to implementable concepts, ultimately supporting the creation of a reformed business model
Role and outcome of applying the jobs-to-be-done framework	Identify and define distinct customer profiles and their jobs-to-be-done	Reveal gaps between the current value proposition and the customer's jobs-to-be-done	Ensure alignment between proposed business model changes and the customer's actual needs (i.e., jobs-to-be-done)
Role and outcome of using the business model pattern database	Identify and map patterns currently in use, thereby characterizing the industry	Stimulate creative exploration and idea generation by identifying business model innovation opportunities in the form of patterns	Provide a structured foundation for integrating compatible patterns into a reformed business model

4
Methodology

This chapter presents and demonstrates the methodology employed in the development of this report, detailing the research approach, research process, data collection methods, data analysis approach, and lastly, key considerations related to research quality.

4.1 Research approach

This report adopts a qualitative research design, which is well-suited to explore potential business model initiatives from an outside-in perspective. Bell et al. (2019) emphasize that a qualitative approach prioritizes non-numerical data, such as words, narratives, and patterns, making it particularly effective for capturing diverse stakeholder perspectives and ultimately conducting a thorough investigation of an object. Moser and Korstjens (2017) further support the qualitative choice by contending that qualitative research explores and provides deeper insights into real-world problems, and compared to employing a quantitative research design, it answers the hows and whys instead of how many or how much (Tenny et al., 2022).

Moreover, a case study was conducted, focusing on a specific industry, i.e., the DH industry. Case studies are a methodological research approach used to develop a deep understanding of a contemporary phenomenon within a bounded system (Coombs, 2022). While case studies are limited in terms of external validity and generalizability, they enable a rich, in-depth examination of a specific context (Bell et al., 2019). As this report is developed in collaboration with the partner company Norrenergi AB and specifically targets the DH industry, a case study was deemed appropriate.

4.2 Research process

The research process was structured into two phases; a data collection phase and a data analysis phase, as illustrated in Figure 4.1 and described in the upcoming sections 4.3 and 4.4. While each task within the phases informed and refined subsequent tasks, thus primarily generated a process with a sequential order, the complete process remained flexible. New insights could be incorporated to revisit and refine earlier data and findings, ensuring an iterative learning approach. Hence, while the tasks primarily followed a sequential order, iterations frequently occurred.

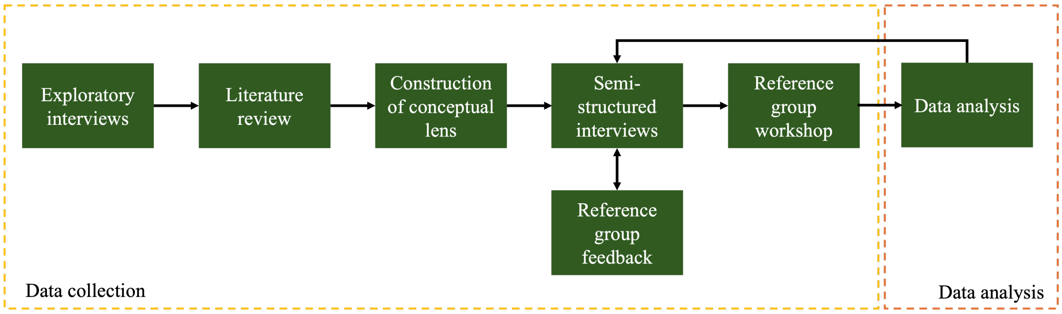

Figure 4.1: Overview of the research process

4.3 Data collection

This report includes both primary and secondary data. Primary data refers to first-hand information collected directly from sources, while secondary data consists of existing information obtained from external sources (Bell et al., 2019). Primary data in this report were collected through the interviews and reference group interactions, and secondary data were collected primarily through literature review and by studying publicly and non-publicly available industry documents.

4.3.1 Interview data

Interviews are widely recognized as a fundamental method in qualitative research (Bell et al., 2019), and this study is no exception. Interviews served as the primary data source, aimed at collecting novel insights that had not previously been disclosed or synthesized. Two interview formats were used during the research process: unstructured interviews with representatives from the partner company and industry experts, and semi-structured interviews with a range of stakeholders, designed to systematically address the research questions. The unstructured interviews were exploratory in nature, intended to generate first-hand insights into the DH industry and the specific case context. These early insights helped scope the study and define its direction.

For the exploratory interviews, non-random purposive sampling was employed, meaning that respondents were selected based on deemed relevance to the research topic (Bell et al., 2019). In addition, snowball sampling was used as the sampling method, where stakeholders at the partner company recommended relevant individuals within the organization. While this method does not yield generalizable results, it is well-suited for exploratory research as it facilitates early contacts and offers a broad understanding of the subject matter (Bell et al., 2019).

For the semi-structured interviews, a generic purposive sampling strategy was primarily applied. This approach involves selecting participants strategically based on their potential to provide rich, relevant, and diverse insights into the research problem (Bell et al., 2019).

Participants were chosen based on their involvement in projects and topics closely aligned with the study's objectives. This enabled the inclusion of a wide range of perspectives, with particular emphasis on customers. While customer insights were central to the research aim, they were complemented by interviews with representatives from various DH companies, including the partner company, as well as independent industry experts.

The semi-structured interviews began with general questions to understand the respondent's background, followed by a briefing on the study's objective to establish a shared foundation. The conversation then transitioned into a more focused dialogue centered on the research questions. This format aligns with the nature of semi-structured interviews, which are guided by predefined themes or questions but allow flexibility in the sequencing of topics and the use of follow-up questions based on the natural flow of conversation (Denscombe, 2021). This approach supports both consistency and depth in data collection (Bell et al., 2019). As outlined in Section 3.4, the study's conceptual lens played a central role during this phase of data collection. The three research questions and their order were designed to ensure that all necessary data were systematically captured to ultimately address the study's overarching research aim. Accordingly, interview guides were developed to support the conversations while leaving room for spontaneous exploration of emerging topics. The interview guides are included in the appendix.

Since a limited number of interviews does not support in-depth analysis or generalization (Denscombe, 2021), multiple semi-structured interviews were conducted with different stakeholder groups, as previously noted. As there is no universally agreed-upon number of interviews in qualitative research, Bell et al. (2019) suggest that interviews should continue until data saturation is achieved, that is, when no new insights are emerging. In this study, data saturation was considered reached after 23 semi-structured interviews. All interviews are listed in Table 4.1.

All semi-structured interviews were recorded and transcribed using appropriate software, with participants' informed consent obtained in advance. Both researchers were present during the interviews to ensure shared interpretation and to make sure that all intended topics were covered.

Table 4.1: List of interviewed respondents*

Respondent category	ID	Role	Date	Duration
Partner company	PC1	Strategic business developer	2025-03-12	122 min
Partner company	PC2	CFO	2025-03-12	86 min
Partner company	PC3	Market analyst	2025-03-13	58 min
Customer	C1	Technical real estate developer	2025-03-11	62 min
Customer	C2	Energy coordinator	2025-03-12	58 min
Customer	C3	Administrative manager	2025-03-14	39 min
Customer	C4	Technical manager	2025-03-18	29 min
Customer	C5	CEO	2025-03-18	62 min
Customer	C6	CEO	2025-03-20	48 min
Customer	C7**	Head of technical installations	2025-03-20	58 min
Customer	C8	Energy specialist	2025-03-24	29 min
Customer	C9	Technical project reviewer	2025-03-24	85 min
District heating company	DHC1	CCO	2025-03-05	43 min
District heating company	DHC2	Corporate strategist	2025-03-17	29 min
District heating company	DHC3	Product manager DH & DC	2025-03-17	65 min
District heating company	DHC4	Market developer	2025-03-19	69 min
Industry expert	IE1	Former university researcher	2025-02-26	63 min
Industry expert	IE2	Researcher at independent research and knowledge company	2025-02-28	88 min
Industry expert	IE3	University researcher	2025-03-03	28 min
Industry expert	IE4	University researcher	2025-03-04	107 min
Industry expert	IE5	Researcher at institute	2025-03-05	45 min
Industry expert	IE6	Group manager	2025-03-17	58 min
Industry expert	IE7	Researcher at independent research and knowledge company	2025-03-17	58 min

* Each row represents a unique interview with a unique interviewee. All interviews, except those conducted with the partner company, were held with different companies or organizations
** Jonas Tannerstad at Örebrobostäder AB. Tannerstad has specifically agreed to participate under the condition that the name and organization are explicitly stated.

4.3.2 Reference group interactions

Between March 3rd and May 5th, weekly meetings were held with a reference group at the partner company to share emerging findings and receive valuable input and advice. This feedback occasionally prompted the revision of earlier insights or adjustments to upcoming interviews. Members of the reference group, all working at the partner company, were selected based on recommendations from the supervisor at the partner company to ensure a balance of topic expertise and a degree of neutrality, as they had not been extensively involved in the earlier exploratory discussions and could therefore contribute fresh perspectives. The reference group also participated in the workshop that marked the conclusion of the data collection phase. The workshop aimed to validate and refine the interview findings by fostering discussion and generating shared insights. Holding the workshop at the end of the semi-structured interview phase supported the data analysis, as the group members contributed their perceived key takeaways and critical themes. The session resulted in a shared consensus on the major themes, which the researchers subsequently used as a foundation for the analysis.

The reference group format closely resembles the focus group method commonly used in qualitative research (Bell et al., 2019). According to Bell et al. (2019), focus groups are a form of group interview involving several participants, typically at least four, where the emphasis is on discussing a set of fairly well-defined topics. While the group setting and size were similar to those of a focus group, the reference group meetings were generally more open-ended. Participants received a brief overview of the collected data before each meeting, or, in the case of the workshop, the full empirical findings, which were then discussed openly. This approach was intended to avoid directing participants too narrowly and instead foster a collaborative environment where participants could share their insights and ideas freely.

4.3.3 Documentation

In addition to interviews and reference group interactions, which served as the primary data source for this report, documents, both publicly and non-publicly available, were also incorporated as secondary data. As Bell et al. (2019) highlights, organizational and industry documents play a vital role in case studies by providing background information, following strategic developments, and offering contextual insights that complement primary data collection, which was the aim of this research.

The non-publicly available documents used in this report included internal company materials, industry reports, and consultancy reports. These documents provided in-depth knowledge and shared similarities in subject matter, scope, and direction. The publicly available documents used included website content from commercial DH companies, industry statistics, and white papers. These sources provided a broader industry perspective and supplemented the analysis of the DH sector's ongoing transformation. As noted in Denscombe (2021), documents offer effective and accessible data, making them a valuable complement to interviews.

4.4 Data analysis

In this research, interview transcripts and interview notes were continuously analyzed and coded, as suggested by Bell et al. (2019). The decision to code and analyze the interviews shortly after they were conducted was based on Burnard (1991), which emphasizes the importance of evaluating notes early to avoid losing details and smaller insights. The coding process involved breaking the data down into components, which were then assigned labels (Bell et al., 2019). Subsequently, the recurrences and connections between interviews were studied, which subsequently formed themes that served as the building blocks for discussion and conclusions (Bell et al., 2019).

During the coding process, the established themes were continuously refined and reviewed to ensure they accurately represented the data and remained consistent throughout the research. In addition, as aforesaid, reference group interactions were held to incorporate external views and opinions, which backed the creation of the key themes. Altogether, this iterative process involved adjusting, combining, or even discarding themes based on the depth and relevance of the supporting data. Some findings were filtered out because they were considered outside the scope of the research or did not align with the core research themes.

As noted in Section 3.4, the data analysis was guided by the conceptual lens developed for this research. This lens played a pivotal role in structuring the analysis by integrating relevant theoretical frameworks in the JTBD framework and BMP database, with empirical findings. Its analytical function helped organize and interpret the gathered data systematically, ensuring that emerging insights were not only grounded in theory but also relevant and applicable to the practical context of the DH industry. In this way, the lens supported a balanced approach, linking academic stringency with practical relevance.

4.5 Research quality

Bell et al. (2019) argue that the quality of qualitative research can be divided into reliability and validity. Reliability refers to whether the results of a report are repeatable, while validity refers to the truthfulness of the conclusions drawn from the research (Bell et al., 2019). These two aspects can be divided into external and internal components. External reliability refers to the extent to which other researchers can replicate the study‘s findings using the same methods, while internal reliability measures how consistently different observers agree on their recordings. Internal validity evaluates the credibility of the study‘s causal inferences, and external validity assesses whether the findings can be generalized to other settings (LeCompte & Goetz, 1993).

Several measures have been enforced to mitigate risks that could compromise the quality of the report. First, triangulation was applied throughout the data collection to ensure that the results matched the observations. In addition, both researchers were present during the interviews to strengthen both the external and internal aspects of reliability and validity. However, a key threat to external reliability is that several interviews were conducted with the partner company or its current customers, who may be influenced by the company’s existing communication and value deliveries. To mitigate this risk, interviews have also been conducted with other DH companies and researchers without direct connection to the partner company or its operations.

5

Empirical findings

This chapter provides a synthesis and analysis of the empirically gathered findings from the performed interviews. It is structured into five subchapters that follow the temporal function established by the conceptual lens and further reinforced by the research questions. First, the current value proposition offered by the Swedish DH companies is examined, followed by insights into the underlying jobs that customers are attempting to address when selecting an energy supplier. Subsequently, exploration of contemporary areas of customer dissatisfaction with the DH, insights from the HP industry, and opportunities in addressing customer dissatisfaction and competitive forces are presented.

5.1 Current value proposition in the Swedish district heating industry

This subchapter presents the value proposition currently offered by DH companies. An overview is provided in Figure 5.1, with further elaboration in the subsequent sections that are structured around the distinction between core and non-core business activities. The figure should be interpreted as a spectrum; activities positioned further to the left generally represent the most central, or core, value proposition for DH companies, while those to the right are typically further from their core business. It is important to acknowledge that the classification of activities as core or non-core varies between companies and depends on contextual factors. As such, the categorization in the figure should be viewed as a snapshot of how offerings are commonly positioned today.

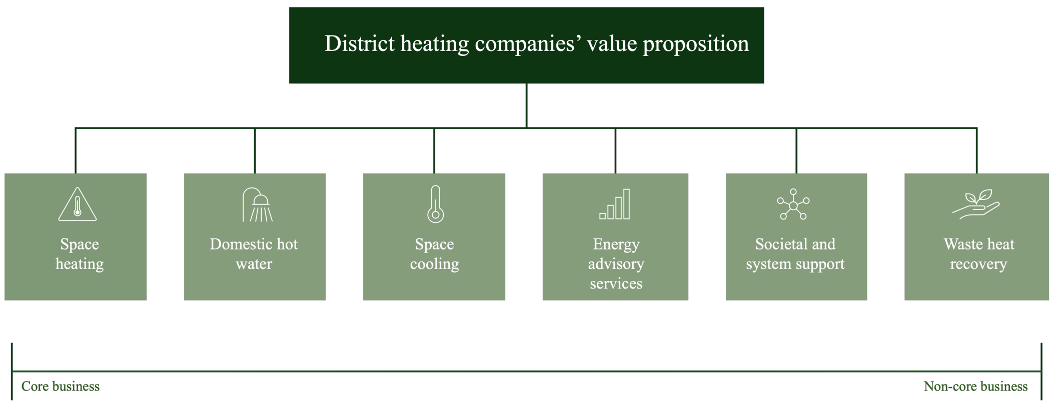

Figure 5.1: Current value proposition provided by district heating companies

5.1.1 Core business

The interviews confirmed that the core of the value proposition remains the provision of space heating, domestic hot water, and space cooling. These value propositions are enabled by providing hot or cold water to the customers sub-central, a technical unit typically located within the building that acts as the interface between the district energy network and the internal building systems. However, the interviews also revealed that DH companies often frame their offering in terms of the physical product, hot or cold water, rather than the functional outcome it enables, such as thermal comfort or space heating/cooling. In other words, the emphasis tends to be on what is delivered rather than the value it provides from the customers perspective.

Regarding the product, DH companies emphasize their reliability in delivering it, focusing on minimizing operational disruptions and ensuring ease of sub-central construction, which contributes to rare system downtime. This focus on stability and reliability was articulated mutually by DH representatives and customers:

"As a district heating company, we want to compete on more than just price, such as stability and security."

(DHC2)

"It's stable, and you know that it works."

(C3)

This widespread trust in DH as a well-functioning and effective energy solution is echoed by several respondents, reinforcing its role as a keystone in the energy supply:

"Customers fundamentally like district heating."

(IE4)

In addition to its reliability, DH is described as a low-maintenance system, especially compared to alternatives such as local HPs. Several respondents emphasized that DH requires significantly less frequent servicing, monitoring, and repairs. This reduces the burden on property owners and facility managers and contributes to more predictable budgeting and easier cost estimates, where the outcome often comes close to the estimation:

"From a management perspective, it is safe and convenient; the sub-central requires very little maintenance, and the district heating company is responsible for both the grid and production. As there is essentially no production on the customer's side, this contributes to low risk and low cost for customers."

(DHC1)

Industry experts and customers alike underscore that one of the strengths of DH lies in its minimal user intervention:

"Having a system that is secure, generally requires low customer involvement and has long maintenance cycles is a strength."

(IE2)

"District heating is a good product. It is readily available and provides a simple heating solution for our buildings."

(C2)

Although reliable and user-friendly distribution of heating and cooling remains the foundation of the DH companies' value proposition, environmental performance is becoming an increasingly central part of the offering. Several respondents, both customers and experts, positioned DH as the most sustainable heating option available:

"Our fundamental view has always been that district heating is the most sustainable heating method, as waste heat and bio fuels stand for a large part of the supply."

(C6)

5.1.2 Non-core business

DH companies are expanding their roles beyond supplying reliable hot and cold water, aiming to be recognized as service providers. One prominent area of development is the offering of advisory and service-oriented solutions aimed at helping customers optimize energy use on a local building level but also contribute to a more efficient system-level energy utilization, and interact with DH and DC systems more efficiently and intuitively. These non-core offerings often include equipment training, energy advisory services, efficiency consultations, and in some cases even digital tools for data extraction and real-time monitoring. Such services enable customers to better understand their energy consumption patterns, identify opportunities for improvement, and enhance the operational performance of their systems. While these initiatives, according to the data, typically generate only modest revenue compared to heat distribution, they typically function as value-added services intended to strengthen customer relationships, improve user experience, and foster long-term trust.

Beyond providing direct services to customers, several representatives also highlighted the tendency of DH companies to advocate for their broader societal role and importance. This includes emphasizing the industry's contribution to alleviating pressure on the electricity grid by meeting thermal energy demands without drawing on electrical capacity:

"On a societal level, district heating can free up local capacity, allowing electricity to be used for other purposes."

(DHC1)

In some municipalities, DH companies even generate electricity in their production facilities through combined heat and power plants. A respondent argued that:

"District heating is absolutely necessary in many smaller towns to ensure sufficient electricity supply."

(IE1)

Other approaches were also discussed, including waste heat recovery by utilizing excess heat from industries, waste incineration, and large-scale HPs powered by renewable electricity. This approach minimizes energy waste and reduces the overall environmental impact. As emphasized by the respondents, these contributions are recognized:

"District heating has significant societal responsibility, with low footprints and minimal environmental impact."

(C2)

However, while these societal contributions are significant, communicating them effectively remains a challenge. Several respondents noted that benefits such as grid stabilization and waste heat utilization are often difficult to quantify and, therefore, difficult to package as concrete customer value. The difficulty of translating systemic benefits into customer-perceived value was raised as a common concern among DH companies:

"Unfortunately, these are difficult to measure and communicate, not only to customers but also to other groups, such as policymakers."

(DHC2)

5.2 Customers' jobs-to-be-done

This subchapter presents the underlying jobs that customers seek to fulfill through the purchase of an energy solution from a supplier. Building on the theoretical foundation of the JTBD framework, the chapter categorizes and contrasts the functional, emotional, and social dimensions of JTBD across the customer segments, or as later referred to, to align with the terminology used in the JTBD framework, customer profiles; TOAs, SMREs, and LPREs. The findings are summarized in Table 5.1. Subsequently, a synthesized perspective is provided to highlight how these customer profiles differ in their approach to purchasing an energy solution.

5.2.1 Functional jobs

Starting with functional jobs, while all three customer profiles seek to ensure a comfortable indoor climate, subsequently referred to as the core jobs to get done, the type of energy they demand differs. TOAs and SMREs require primarily space heating and DHW, whereas LPREs also voice the requirement of space cooling, which is deemed necessary to provide a comfortable climate in commercial settings or for process cooling.

Beyond these core energy needs, the degree of operational involvement and interaction with the technical system differs significantly between profiles. TOAs have relatively simple functional requirements, characterized by minimal technical complexity and limited hands-on involvement. The respective board's core responsibility is to maintain the residents satisfied and monitor and plan necessary repairs and building investments. As clear communication with residents is an essential part of the board's obligation, they value systems and procedures that are rarely problematic. Thus, they prioritize an energy system with low-maintenance requirements, that is stable and requires low technical knowledge, and that is predictable economically. Their demand for real-time data or system signals is generally low, as they do not perceive active management as part of their role.

SMREs, on the other hand, often operate with a semi-professional or fully professional organization, typically engaging in more structured processes related to budgeting, tenant negotiations, and long-term planning. As a result, forecasting and the ability to communicate cost implications become relevant aspects of their job. The level of involvement in the system varies from low to moderate, depending on the size of the organization, internal resources, and managerial expertise. Some SMREs demonstrate interest in data access and operational control, while others prefer a setting similar to what TOAs seek.

LPREs, contrarily, are nearly always fully professional entities, often publicly listed or municipally owned. They operate under regulatory oversight and with high stakeholder expectations, and have developed internal processes and routines in regards to and indoor climate control and monitoring, demonstrated by an industry expert:

"Large real estate companies almost always have their own professional staff and therefore generally show little interest in involving their provider in questions related to internal equipment and operations"

(IE2)

Several LPRE referred to themselves as energy optimizers, with an explicit goal of more from a historical low involvement in these questions to become professionals; as one respondent explained:

"We are no longer passive users, we aim to be active users constantly aiming to optimize our energy consumption"

(C7)

In their aim to become energy professionals, they constantly track data on energy consumption and its corresponding CO_2 emissions. Value is, thus, derived from their internal capability to actively supervise and fine-tune their energy performance. This optimization is ultimately pivotal to their core job of increasing the net operating income (NOI), as it directly impacts the net asset value (NAV) and indirectly the market capitalization.

Lastly, LPREs emphasize ownership or direct control over technical infrastructure and equipment, such as sub-centrals, viewing these assets as key resources in their heat consumption, which is central to their business models. Although some SMREs express similar intentions, others lean more toward the thoughts of TOAs, who generally indicate lower preferability in owning equipment.

5.2.2 Emotional jobs

TOAs and their respective boards typically seek predictability, simplicity, and minimal responsibility when choosing an energy system. Their emotional job is to achieve peace of mind, avoid unexpected disturbances, and feel confident in their decisions. A system that 'just works' is the ideal state. Their risk aversion is high, and they are unlikely to pursue any strategy that introduces operational complexity or uncertainty.

LPREs, on the other hand, have internal competencies and resources that lower their sensitivity to risk, and they find value in having a collaborative and innovation-driven relationship with their energy supplier. Emotional satisfaction comes not from avoiding surprises, but from co-developing advanced solutions, being taken seriously as energy experts, and receiving support in pursuing their long-term efficiency and value-creation strategies. They expect their energy supplier to be responsive, open to dialogue, and willing to share both opportunities and risks.

SMREs, once again, span the middle ground. Some reflect the emotional jobs of TOAs, particularly smaller companies with limited resources, by seeking simplicity and reliability. Others, more aligned with LPREs, seek partnerships and show a willingness to take calculated risks for potential long-term gains. The emotional jobs here often hinge on organizational maturity and ambition.

5.2.3 Social jobs

While the TOAs express commitment to adhering to sustainable directives and legal requirements to avoid dissatisfaction of tenants and authorities, they generally show little interest and priority in exceeding these obligations. In contrast, the more professionally managed the customer profile, the greater the emphasis placed on sustainability and environmental impact, as these factors are viewed as reputational assets. Consequently, LPREs tend to prioritize social aspects related to sustainability and have often proactively incorporated ambitious sustainability goals into their corporate strategies. This was particularly evident from one customer:

"What is most important to us, obviously alongside maintaining profitability, is reducing our CO_2 emissions."

(C6)

Following the previously observed pattern, SMREs views are positioned between the other two profiles. SMREs generally consider sustainability important, not least for reputation reasons. However, the extent to which they go further and proactively exceed legal requirements varies depending on each company's vision and leadership. In summary, energy suppliers can become a strategic partner in supporting customers with strong sustainability ambitions in achieving their goals.

Table 5.1: Summary of functional, emotional, and social dimensions of the jobs-to-be-done across the three customer profiles

	Functional jobs			Emotional jobs		Social jobs
Profile	**Core needs**	**Operational control**	**Data and system signals**	**Supplier relationship**	**Desired risk aversion**	**Sustainability focus**
Tenant owned associations	• Heating and domestic hot water • Minimal technical engagement • Support transparent communication with residents	• Very limited technical responsibility • Preference for hands-off operation	• Low demand for real-time system data • Prioritize system simplicity and economic predictability	• Seek low operational involvement • Emphasize reliability and ease of access • Expect prompt supplier support when needed	• High risk aversion • Prioritize peace of mind and avoiding disruptions • Aim to prevent unplanned expenses	• Fulfill mandatory sustainability requirements • Limited drive to exceed compliance
Small-medium sized real estate companies	• Heating and domestic hot water • Low to medium engagement in system operations • Support budgeting and strategic planning	• Operational control varies with organization size • Influenced by available in-house competence	• Mixed preferences for data and signals • Some value data for forecasting and analysis	• Depending on internal capabilities and ambition • Range from low involvement to collaborative engagement	• Risk appetite varies across profiles • Balance simplicity with opportunity for optimization	• Increasing awareness of sustainability's reputational value • Engagement depends on the company vision and leadership
Large professional real estate companies	• Heating, cooling, and domestic hot water • High operational involvement aligned with internal processes • Enable energy optimization strategies	• Advanced internal technical capabilities • Prefer ownership and control of key infrastructure	• Strong demand for real-time operational data: – Energy consumption – Power level – CO_2 emissions • Used continuously for internal performance tuning	• Seek strategic and innovation-oriented partnerships • Expect supplier responsiveness in responding to new demands	• Comfortable with calculated risks • Use risk to drive long-term value creation • Expect mutual risk-sharing with the supplier when conducting joint innovation projects	• Core part of brand and strategy • Need a supplier that is interested in supporting ambitious sustainability goals • Monitored and communicated to stakeholders

5.2.4 Four overarching differentiating themes

During the breakdown of the three customer profiles' JTBD, four overarching differentiating themes emerged, offering a new perspective on how these profiles differ from one another in relation to the themes. These themes complement the established functional, emotional, and social dimensions, contributing to a more comprehensive understanding of what each profile prioritizes when purchasing an energy solution. The themes were identified through respondent reflections, following discussions about the JTBD of specific customer profiles, and through insights gathered during the workshop with the partner company. During these dialogues, a preliminary mapping of the JTBD was presented as a platform. The outcome is visualized in Figure 5.2 and subsequently explained.

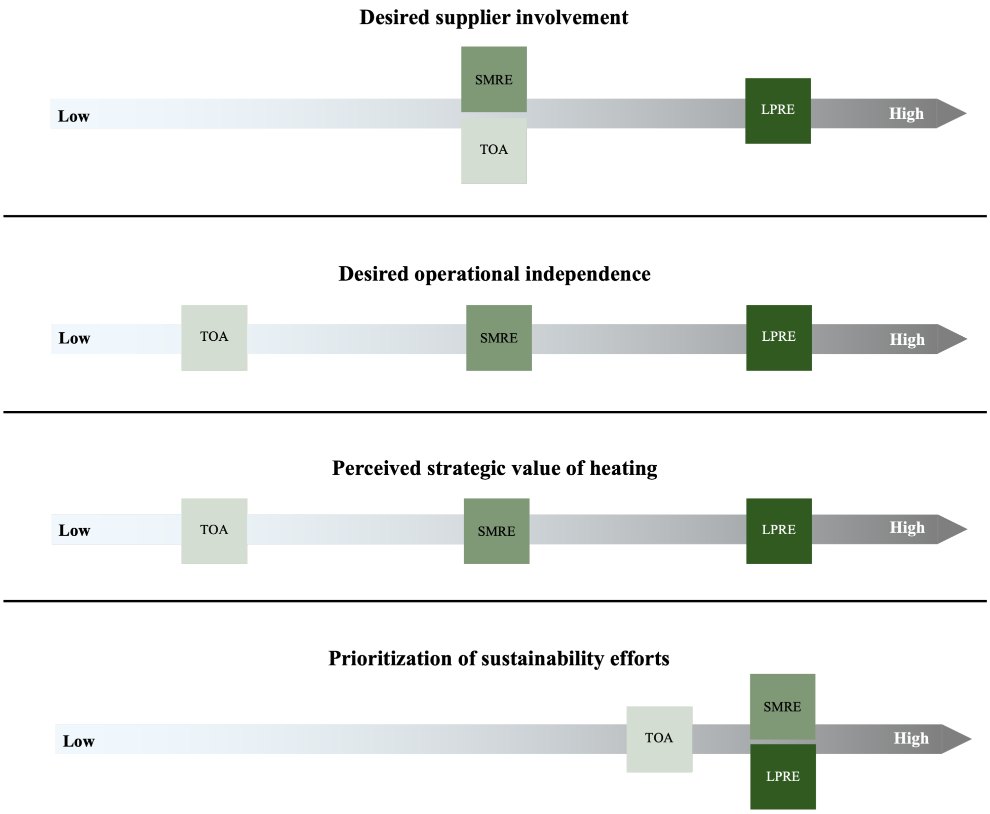

Figure 5.2: Four overarching themes that offer industry-specific insights on how the three customer profiles differ from each other

The first theme concerns the degree of supplier involvement that each customer profile desires. A high degree indicates a preference for ongoing support and collaborative engagement, while a low degree reflects a desire for autonomy and minimal interaction. TOAs and many SMREs typically show limited interest in maintaining a close or frequent relationship with their energy supplier. They value having a reliable point of contact for troubleshooting or urgent needs, but prefer not to engage in co-development or strategic dialogue. In contrast, LPREs tend to seek a more active, long-term partnership, often involving co-innovation and shared development of solutions that align with their broader energy and operational strategies.

The second theme captures the preferred level of operational independence, particularly reflected in attitudes toward owning technical infrastructure such as sub-centrals if DH is deployed. A clear pattern emerges: the more professionally managed the customer profile, the greater the ownership interest. LPREs favor ownership as it grants them control over system optimization and modification without depending on supplier intervention. TOAs, by contrast, typically lack both the technical competence and organizational incentive to take on such responsibilities and therefore prefer supplier-managed solutions. SMREs exhibit more diversity, some lean toward independence, while others prefer delegation, largely depending on internal resources and strategic priorities.

The third theme is the extent to which customers perceive energy supply as a strategic lever within their operations. In simpler terms, this refers to how much time, effort, and emphasis the respective board or management devotes to energy-related matters. LPREs frequently view their choice of energy solution as critical to achieving financial, environmental, and tenant-related performance goals. This perspective is driven by the direct impact of energy systems on NOI, carbon footprint, and stakeholder perception. As one LPRE representative explained:

"District heating, or any energy solution that we would hold on to, is profoundly important strategically, as it touches on multiple aspects that are critical for us."

(C7)

In contrast, SMREs show more variation in this regard, depending on company size, internal competence, and strategic ambition. TOAs generally adopt a more transactional view of energy supply, important for comfort and compliance, but not typically framed as a strategic issue.

The fourth and last theme reflects the priority given to sustainability in energy-related decisions. While all customer profiles recognize sustainability as important, the degree to which it drives decision-making varies. Most customers expect a baseline level of environmental responsibility. However, differences remain, especially when sustainability goals compete with price sensitivity. LPREs are most likely to treat sustainability as a core strategic pillar, integrating it into long-term plans and stakeholder communications. SMREs' focus varies by organizational vision, while TOAs often view sustainability primarily as a compliance issue or reputational risk, rather than a proactive goal.

5.3 Customer dissatisfaction in relation to current business model logic

In this subchapter, interview findings regarding customer dissatisfaction and unmet needs concerning DH companies' current business model logic are presented. Three overarching themes could be distinguished, which will be addressed in the following section, and are represented in Figure 5.3.

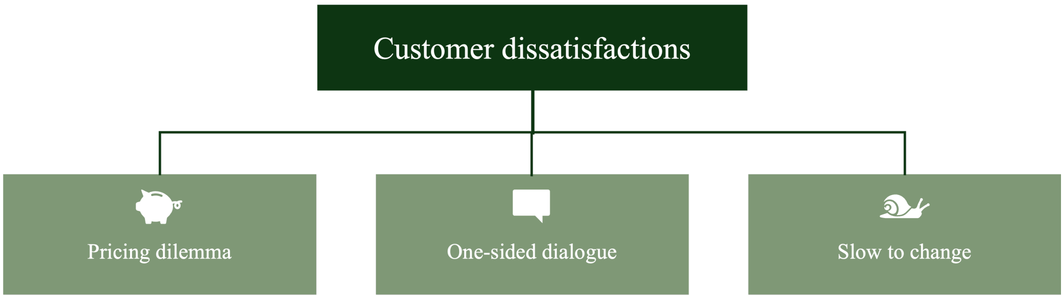

Figure 5.3: Customer dissatisfaction with the current offered value proposition by district heating companies

5.3.1 The pricing dilemma

A recurring pain point raised by all respondents is the recent price hikes. As one industry expert succinctly noted:

"We have seen a clear price trend upwards, and I know customers perceive this as highly critical and problematic."

(IE3)

Among the customer profiles, the LPREs have been the most action-oriented in their response to rising prices. Several respondents described how they are not only frustrated but also willing to explore alternatives, sometimes as a strategic signal toward the DH company:

"District heating companies have raised prices significantly. It would almost be considered a failure if customers do not review or consider other options. Some customers, probably the larger ones, even install heat pumps just to show that they can, using it to put pressure on the energy company."

(IE6)

"We have definitely started a debate about their pricing."

(C2)

DH companies acknowledge that price levels have increased in recent years and that their pricing is now approaching, or in some cases exceeding, that of competitors. However, they tend to quickly shift the responsibility to external cost pressures, such as limited fuel availability and geopolitical instability:

"The biggest issue in the industry right now, which has caused much of the recent public scrutiny and discussion, is the increased prices for supplies. They are, in turn, driven by the heightened global uncertainty."

(DHC1)

Although many customers acknowledge that supply costs may have risen, several express dissatisfaction that DH companies keep maintaining a high financial return requirement and thus often tend to pass the cost effect to the customer:

"There is a push for an unjustifiably high return on investment that drives them to continually raise their prices. For district heating to remain a competitive and preferred option in the future, they would realistically need to cut their required return on investment, not least because many are owned by municipalities."

(C2)

Moreover, customers argue that it is surprising that DH companies do not appear to adjust their procurement strategies or pricing models in response to changing market conditions:

"Who says they have to buy the best and most environmentally friendly fuel? There are certainly some who are willing to pay for it, but I believe many would be satisfied with the second most environmentally friendly option, which has a much lower demand on the market and should therefore be significantly cheaper to purchase."

(C9)

In addition, LPREs repeatedly mention that DH companies have often attempted to justify their price increases by claiming that they are still priced below HPs. However, when LPREs have asked how this conclusion is reached and what assumptions underlie the comparison, DH companies are often unable to provide a clear explanation or make adjustments when challenged. In cases where the assumptions are disclosed, the calculations are typically based on a standard house model that rarely reflects the specific circumstances of the actual customer:

"We are not interested in listening to a standard house of 120 square meters - we build and manage large properties."

(C6)

In addition to concerns about overall price levels, many respondents described the current price models and their underlying components as too complex and difficult to interpret or influence:

"The pricing model, along with the associated contracts, is complex and difficult to fully understand."

(C8)

A common thread in the interviews was that the confusion often stems not only from the complexity of the pricing structures themselves, but also from a lack of information and support in interpreting them:

"The price component for surcharges on high return temperature or high water-flow must be combined with information on what can be improved, but that is rarely the case."

(IE6)

Beyond transparency, several respondents also pointed out a lack of price differentiation, describing the current structure as undifferentiated across customer types. The respondents emphasized the need for greater segmentation to enable tailored offers and price lists that may address the unique prerequisites of each customer segment and contribute to system efficiency:

"The price lists are quite standardized regardless of the type of business or property owner. We, as a large commercial actor, receive the same pricing as a tenant-owned association, even though we have completely different conditions and purchase volumes."

(C4)

The lack of customer-tailored pricing is also reflected in dissatisfaction among LPREs regarding the absence of a bundled offering that focuses on their core functional JTBD; the provision of a stable indoor climate, which, by definition, includes both heating and cooling.

"I do not want to separate district heating and district cooling when I talk about it; they are interconnected to me, but district heating companies talk about them and price them as two completely different entities."

(C1)

"We have many properties where we have a simultaneous need for both heating and cooling[...] and that is not taken into account when they specify the price. Accordance to me, they should prioritize developing a bundled offer."

(C4)

5.3.2 One-sided dialogue with customers

The second dissatisfaction theme that emerged in the interviews was the frustration about the communication and engagement practices by DH companies. Many respondents shared feelings of being unheard and undervalued, which sparked a sense of distance between customers and the companies they rely on. One customer highlighted this by saying:

"Historically, customers have been taken for granted. DH companies have, and are still to some extent doing so, working with a limited customer focus."

(C3)

Several respondents pointed out that DH companies often adopt a disconnected approach, leaving customers with the impression that their concerns are being ignored. As a result, many customers expressed a sense of lack of insight into what the DH companies are doing and why. This was perceived as a transparency issue and a source of frustration, as highlighted by an industry expert:

"I think many customers are frustrated by not knowing more about what their district heating company is doing within their walls. For example, what are they burning in their production facility at the moment?"

(IE3)

In addition, frequent criticism concerned DH companies' tendency not to open up a dialogue when publicizing public statements. Customers primarily referred to the announcements of the yearly price increase, meaning that the announcements have been publicized without a profound and solid motivation or with space for discussion, which has fueled their frustration. This lack of genuine engagement has fostered bitterness towards DH companies, with some even questioning the legitimacy of the monopoly-like structure. As one customer remarked:

"It is the business itself, how customers have been treated, and how there is a monopolistic approach that many question."

(C4)

Although the price dialogue has been established to address this, customers and industry experts alike have expressed some criticism about this initiative, seeing it as more of a formality. As one industry expert stated:

"The price dialogue is meant to build legitimacy. However, in many price dialogues, it has been referred to as 'price monologues'. It is difficult to verify the type of data they present."

(IE4)

5.3.3 Lack of agility and slow response to market changes

Building on the previous discussion of customer frustration regarding low transparency, several respondents also highlighted a sense of disappointment with how DH companies respond to their needs, inquiries, or even expressions of interest in collaborative innovation. Many customers noted that, although some companies demonstrate a willingness to listen, their responses are often slow and fail to address the underlying issues or align with customer expectations. This feedback was particularly evident among SMREs and, most prominently LPREs, while rarely mentioned by TOAs.

Customers believe that this slow and limited responsiveness stems from a perceived reliance on traditional ways of operating. As one industry expert pointed out, DH companies' way of working has remained largely stagnant:

"It has nearly been status quo for the last 30 years."

(IE1)

This slow pace of change, often seen as embedded in organizational culture, makes it difficult for DH companies to meet evolving customer needs. From the customer's perspective, there is a clear desire for a more responsive and adaptive approach. As one respondent stated:

"District heating companies are today, unfortunately, generally not agile in their way of working. That has to be addressed more openly."

(PC3)

To address this challenge, an industry expert emphasized that the required competencies within DH companies must evolve. This shift involves not only becoming more responsive to the jobs customers are trying to get done but also redefining the core identity of a DH company. Several respondents predicted a transition toward placing greater emphasis on the distribution system, with the customer positioned at the center of operations. This reorientation signals a fundamental change in their business models, moving away from a traditional focus on production and technical performance toward one that prioritizes customer needs and collaborative value creation.

"The conventional production-oriented business model is problematic and not necessarily relevant today. You need unique conditions to make it work. I believe it is a mistake to think of yourself primarily as a producer of heat."

(IE4)

Furthermore, industry experts advocated for a broader reconceptualization of how DH companies could be perceived and operated. They emphasized viewing DH providers as network operators, closely collaborating with engaged customers to co-develop innovative solutions:

"The network and the customers should be the core. Production changes over time. District heating companies do not even necessarily need to own production resources. We should talk more about district heating as a business network rather than a business chain."

(IE6)

5.4 Insights from the heat pump industry

As HPs were identified as the main technological competitor in chapter 2, with a notably stronger growth trajectory than DH, respondents were asked to share their perspectives on the evolving competitive landscape. The aim was not only to understand the nature of competition but also to extract valuable insights and potential learnings from the development and positioning of HPs that could benefit the DH industry. From these dialogues, three overarching factors emerged as central, summarized in Figure 5.4 and further elaborated in the following subsections.

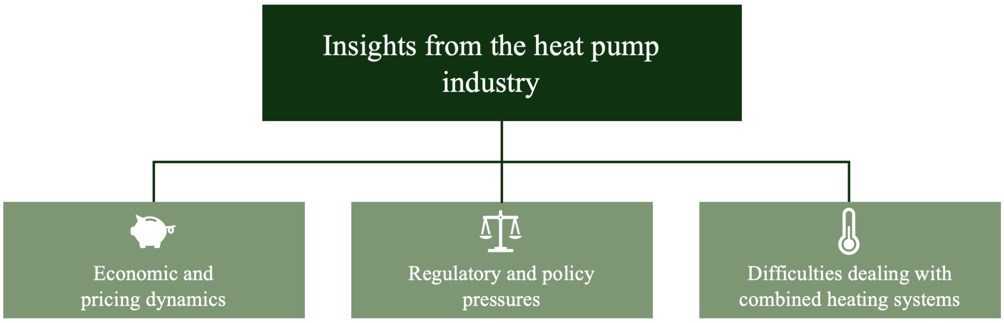

Figure 5.4: Key factors influencing the competitive dynamics between district heating and heat pumps

5.4.1 Economic and pricing dynamics

One of the key themes where DH could draw valuable learnings from HPs, as highlighted in the interviews, was the economic and pricing dynamics. Many respondents perceived HPs as the more economically attractive option in the long term due to lower operating costs, although many acknowledge that the upfront investment tends to be higher for an HP solution. This perceived cost-effectiveness has been a significant driver behind the increasing popularity of HPs, as reflected in customer feedback:

"District heating is not priced competitively compared to other alternatives."

(C2)

Beyond the actual price levels of DH and HPs, respondents noted that the structure of the electricity market itself tends to favor HPs. Unlike DH pricing, which was described as complex and varies significantly between regions and companies, electricity pricing is generally perceived as more transparent, with a clearer and more direct relationship between supply and demand. This perceived clarity makes electricity-based solutions, such as HPs, more approachable for many decision-makers. However, several respondents acknowledged that the increased volatility of the electricity price in recent years has made it more difficult to accurately predict future electricity costs. However, as one industry expert pointed out, the perceived difference in pricing transparency and control continues to influence customer decision-making:

"Heat pumps, and what they ultimately cost to operate, are easier to understand. People have a better sense of electricity prices."

(IE5)

Further reinforcing the positive aspect of an energy system relying on electricity, some respondents highlighted that HPs can be integrated into an internal electrical system, which, for example, can be powered by electricity generated from rooftop solar panels. Since self-produced electricity is essentially free for the owner, this creates an opportunity to produce heating or cooling at minimal cost, highlighting a promising advantage of HPs:

"Heat pumps may become even more relevant going forward, especially in combination with solar panels."

(C5)

Another advantage of HPs, emphasized primarily by LPREs, is their ability to generate both heating and cooling from the same unit, and this one investment provides dual values. This dual functionality makes HPs particularly attractive in contexts where both heating and cooling are needed. As one customer clearly expressed:

"If you need both heating and cooling, then [heat pumps] are better than buying district heating and district cooling separately. Because there we have to pay double energy and capacity costs."

(C1)

5.4.2 Regulatory and policy pressures

In addition to economic and pricing challenges, regulations and policy frameworks were widely regarded as key factors influencing the competitive balance between HPs and DH. This influence is particularly strong in the construction of new buildings, which must comply with energy performance limits set by Boverket, and for existing buildings aiming to reach higher energy classifications. A key regulatory feature is that energy performance assessments are based on purchased energy rather than total energy use. Since HPs use electricity to refine ambient energy (e.g., from air or ground), they require significantly less purchased energy, despite delivering comparable thermal output. This was highlighted by several respondents:

"We are measured based on purchased energy, not consumed energy."

(C1)

"If you follow Boverket's building regulations, which are based on purchased energy, then heat pumps will be more attractive than district heating, and that's hard to counter as a district heating company."

(DHC3)

Consequently, constructors still choosing DH often need to compensate by improving insulation and constructing thicker walls to meet efficiency requirements, resulting in a higher investment compared to if HPs had been chosen. Moreover, another trade-off was mentioned by a respondent:

"Thicker walls also lead to less rentable space, and thus lower revenue. Installing DH is definitely disfavored by the system by Boverket"

(DHC4)

Another concern relates to the weighting factors attached to different heating technologies, which are used in the calculations to decide the energy classification for buildings. Currently, the weighting factor is fixed and does not vary across different DH systems based on their production methods or energy sources. In other words, regardless of whether heat is generated from renewable electricity or fossil fuels, the assigned factor remains the same:

"Boverket's building code is based solely on the type of heating system used, such as heat pumps or district heating. The weighting factors do not take into account how the heat is actually produced. You could have district heating generated entirely from green electricity, and it would still receive the same factor as a system that relies solely on waste incineration, or in the worst case, fossil fuels."

(C4)

These classification systems also influence financing conditions, as many banks offer green loans with lower interest rates tied to the energy class. Since HPs often result in more favorable classifications, buildings equipped with HPs typically qualify for better financing terms than those using DH:

"The taxonomy used by banks also indirectly drives an increase in the number of heat pumps."

(DHC4)

The NAV, which LPREs and SMREs frequently track and monitor as part of their core business, is also affected by the same logic. Because HPs reduce purchased energy, and installation depreciation is not counted in NOI, properties using HPs often show improved NOI and ultimately NAV, even if total energy demand remains unchanged.

5.4.3 Difficulties dealing with combined heating systems

In systems where a hybrid setup, combining DH and HPs, is deployed, the interviews revealed that customers typically use HPs to cover base load heating and DHW, while DH is primarily utilized during peak demand or as a backup when the HP system is out of service. This shift introduces new challenges for DH companies in terms of capacity planning and profitability, as one respondent explained:

"What customers may not understand is that we still have to maintain capacity for hybrid customers [...]. The fact is, it is difficult to find profitability in customers who only draw energy when it's coldest or when their heat pump fails."

(DHC1)

DH companies acknowledge that their current pricing models have not been adapted to accommodate hybrid customers. However, as more customers adopt HPs while retaining DH as a backup, there is a growing consensus that pricing mechanisms and incentive structures need to be revised. Some also admit that the increasing popularity of hybrid systems may stem from a growing mistrust of the DH value proposition.

5.5 Opportunities to tackle misaddressed customer jobs and perceived customer dissatisfaction

In this subchapter, the positioning of DH companies, assessed based on the preceding subsections on DH value propositions, customer dissatisfaction, and insights from the HP industry, are compared and contrasted with the four overarching differentiated themes underlying the jobs that customers seek to fulfill through the purchase of an energy solution from a supplier. Following this comparison, a set of initiatives introduced during the interviews is explored to identify potential improvements to the current business model, with a particular emphasis on the value proposition component.

5.5.1 Comparison of district heating companies' position with customer jobs

To support the comparative analysis, where the four differentiating themes derived from the customers' JTBD, as discussed in Section 5.2.4, are assessed against how DH companies are currently positioned to address them, two matrices have been developed, using the themes as axes. The first matrix focuses on the themes with a more operational and day-to-day orientation, while the second contrasts the more strategic, long-term, and visionary aspects, which the latter two themes are argued to reflect.

Starting with the first comparison, shown in Figure 5.5, the matrix's horizontal axis represents the degree of supplier involvement each customer profile desires, and the vertical axis captures the desired level of operational independence, reflected in the preference for owning system equipment, specifically, sub-centrals.

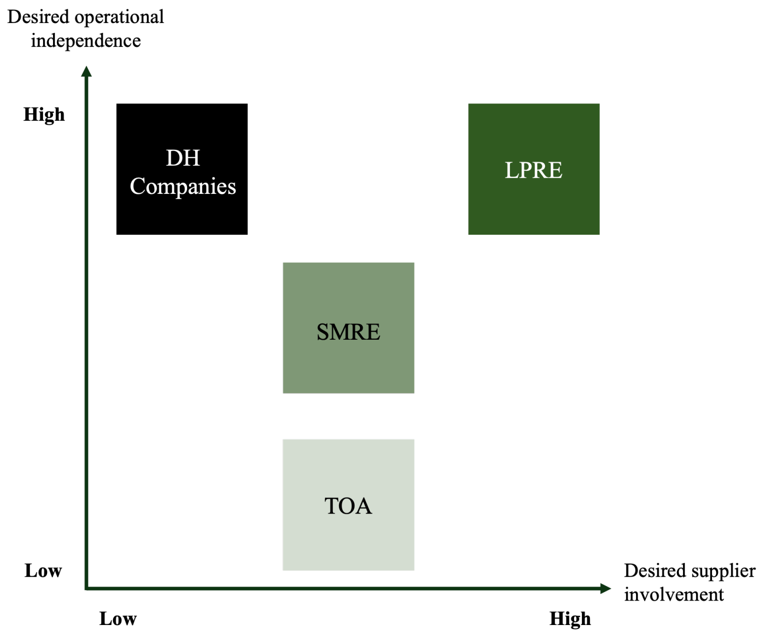

Figure 5.5: Matrix illustrating the customer profiles' desired operational independence and supplier involvement, alongside district heating companies' current position

Focusing first on the horizontal axis, the data suggests that DH companies typically maintain a relatively low level of customer interaction, as illustrated by one DH company representative:

> *"District heating companies are, by definition, anonymous. You do not necessarily think about their existence; it is just supposed to work. You get the bill, and sometimes you see their cars in town."*
>
> (DHC1)

While this view may be somewhat exaggerated, it reflects a prevailing reality; DH companies often act reactively and seldom establish close or continuous relationships with their customers, not least evident in the prior data analysis of customer dissatisfaction areas where the one-sided dialogue and lack of agility were emphasized as areas of customer disappointment.

Turning to the vertical axis, also here is a clear missmatch evident between the preferences of different customer profiles and the current DH positioning. Most DH companies have historically focused on the LPREs' needs, as very few retain ownership of sub-centrals. Hence, the current value proposition favors customers seeking operational independence, leaving TOAs and some SMREs underserved.

Figure 5.6 provides a second mapping that compares DH companies' position against the remaining two themes. Here, the horizontal axis represents the extent to which customers view heating supply as a strategic lever, while the vertical axis reflects the degree to which sustainability is prioritized in decision-making and operations.

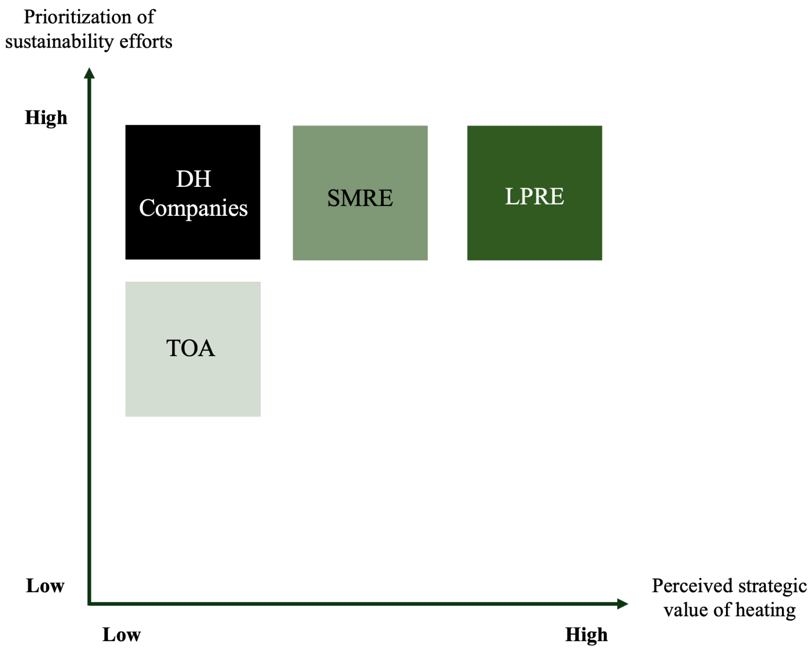

Figure 5.6: Matrix illustrating the customer profiles' emphasis on sustainability when selecting an energy supplier, and strategic view of heating supply, alongside district heating companies' current position

Starting with the horizontal axis, which represents the strategic importance of heating, it becomes evident, especially from the insights in Section 5.3, that DH companies are often perceived as unresponsive, conservative, and lacking adaptability. Thus, DH companies often fail to meet the expectations of customer profiles who consider this highly important and place high value on suppliers that are responsive and interested in building a close and mutual relationship with the overarching aim of creating joint wins. Moreover, the pricing mechanism lacks incentives for customers to actively adjust their energy and power usage to both enhance system performance as well as optimize their usage and, ultimately, lower their cost, which could serve as incentives that create mutual wins. As a result, they appear poorly positioned to meet the needs of customers, primarily LPREs, who regard energy as a critical strategic concern and would like to actively and continuously discuss potential improvement areas and novel ideas.

Concerning the vertical axis, sustainability, DH companies have largely succeeded in aligning their value proposition with market demand. However, variations persist across and within customer profiles regarding how prominently sustainability should be prioritized and how much it is regarded as a strategic lever.

The comparison exercises reveal that the current DH value offering is not fully aligned with the specific jobs of each customer profile. Even if the mapped DH offering is understood as an aggregate based on data analysis, the underlying rationale remains; insufficient differentiation prevents the offering from effectively addressing each customer profile's unique needs. This presents an opportunity for DH companies to rethink their segmentation strategies by developing targeted offerings that better support the specific jobs each customer profile is trying to fulfill. As one industry expert emphasized:

"The dialogue and handling of customers must be better in adapting to the respective type of customer, and their needs and conditions."

(IE6)

However, there is an industry-wide practice of not exploiting segmentation at all due to a strict adherence to the *District heating law*, noted by an industry expert:

"There is an industry-wide practice of interpreting the law very strictly. People say that all customers should be priced the same. Some have dared to separate private customers from commercial ones, but no one has gone further than that."

(IE6)

Despite this, experts suggest that alternative segmentation approaches could be implemented without violating legal requirements if they are communicated clearly:

"The District heating law says that you must be able to clearly explain how segmentation is done. My take is that as long as you can justify your segmentation, you are free to segment as you wish. However, I believe companies should start internally before communicating it externally."

(IE6)

As such, there appears to be a growing interest within the industry in moving toward more nuanced segmentation practices. Not least when it comes to internal segmentation processes with the goal of developing attractive offerings for the right customer profiles. One DH company representative simply put it:

"I think segmentation will become increasingly important, no doubt about that."

(DHC1)

5.5.2 Customer-derived improvement initiatives

Lastly, the data analysis identified six actionable initiatives that were discussed as potential interventions to address areas of customer dissatisfaction and the aforementioned value discrepancy. These are illustrated in Figure 5.7 and are further explained in the following sections.

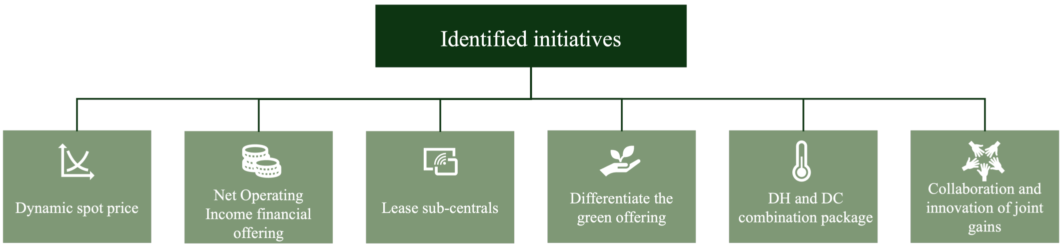

Figure 5.7: Categorization of empirically derived concepts to address discrepancies between the customer jobs and the current positioning and to cope with the competitive pressure from heat pumps

First, to address that LPRE seeking a state where the equipment could be managed independently, yet maintain a close connection with the DH company and thus optimize their usage based on the system condition, different ideas of sending more data signals, and particularly through enabling spot pricing or real-time pricing models, have been declared:

"I would like to see more dynamic pricing. We understand that production costs vary depending on demand and fuel price fluctuations."

(C8)

"Spot pricing is probably the best solution. With all the thermal storage that buildings inherently have, there is no need for demand peaks if we have the ability and incentives to adjust our energy use."

(C1)

Several customers made direct comparisons with the electricity market, where the spot pricing model is established and widely understood:

"Compare it with electricity, which operates on a spot price market. I think it would be beneficial to move towards that pricing model, and we have already implemented technology to handle and benefit from it."

(C7)

DH companies also recognized the potential benefits of spot-pricing, particularly in terms of risk sharing, since DH companies today must add a premium on the price to cover the risk associated with offering a future communicated and set seasonal fixed price level. Further, a respondent pondered that the value of absorbing risk instead could be offered as a separate add-on to the dynamic price:

"We should ask ourselves: which customers would rather take on the risk themselves, and which see value in paying for the district heating company to carry it?"

(DHC1)

"It is about packaging spot pricing in a clear way, tailored to the different segments."

(PC1)

A way to package this offering was coined by an SMRE respondent, who proposed the idea of a pricing structure akin to electricity arrangements:

"Why cannot it be priced like the electricity market, fully variable, hybrid, or fully fixed? That would be easy to understand."

(C3)

"We would probably choose moderate risk, 50/50 variable and fixed. Tenant-owned associations would probably go for fully fixed."

(C3)

While the SMRE expressed an interest in taking an intermediate level of risk, thus opting for the hybrid pricing package, the LPREs expressed their interest in opting for the fully dynamic pricing plan:

"We would absolutely start adjusting our consumption under a dynamic pricing model. We always adapt to the rules and are both flexible and innovative. If the price was high between 07:00-09:00, we obviously would not have high consumption during those hours. That's a win-win for everyone."

(C1)

In addition to pricing signals, some respondents, such as the one above, suggested that implementing a dynamic pricing mechanism could enhance the environmental profile and help smooth demand patterns, thus contributing to improved system efficiency. This approach could be further complemented by transparent sharing of live emission data, which may support behavioral nudging and encourage more sustainable choices:

"Sending environmental signals, like a prediction of CO_2 emissions for each hour of the coming day, could also be an interesting opportunity."

(DHC1)

Second, another recurring initiative was primarily aimed at addressing the financial considerations underlying the increasing interest in HPs among LPREs. More specifically, the initiative is based on the observation that the lower operating costs of HPs contribute to increased NAV. To offer a competitive alternative, a new pricing model for DH was proposed:

"One idea is that the customer makes an initial investment in an intangible asset offered by the DH company, which could be viewed as a grant of access to the network for a number of years. This is followed by a discounted energy price."

(C4)

This model reflects LPREs' overarching goal of optimizing their NAV and, thus, their preference to shift part of the DH cost from purely operational expense to an upfront investment. This enables a more equal comparison between DH and HPs, or, as two respondents phrased it:

"It will enable the customer to compare apples with apples."

(IE6)

"The cost structure for investing in and employing DH would, with this type of financial offering, resemble that of investing in an HP-powered system."

(C4)

A potential benefit for the DH company by implementing an offering aiming to enhance LPREs' NOI was emphasized by another respondent:

"The initial investment will entail that we get a positive cash flow from the customer early. That is very positive, as we can use the capital to make investments in production or other areas in the organization without taking a financial risk with borrowed capital."

(PC2)

Third, TOAs and SMREs expressed the need for a reliable point of contact to compensate for their generally limited technical competence and their desire for peace of mind, which was addressed through a proposed solution in which the DH company would lease and operate the customer's sub-central. In this setup, the customer avoids both the upfront investment and the responsibility for ongoing maintenance, both addressing the profiles' JTBD and increasing the barrier to opting for an investment in an HP-powered heating system. Respondents voiced a leasing offering in positive terms:

"The customer rents a sub-central from us, and we operate it. We have made it very smooth and easy for the customer to choose district heating. This offering suits customers who want a simple solution."

(DHC1)

"Just knowing that if something were to happen, even on December 23, you can pick up the phone and know that someone will show up. That is incredibly valuable."

(IE2)

Several DH representatives explained how such a model has already been piloted with positive results:

"We have the technical expertise, which the customers certainly do not always have. We see that customers appreciate this, and it lowers the threshold for choosing and continuing to use district heating. In addition, we receive a stable and predictable cash flow from this value proposition."

(DHC3)

One customer explained that they currently rely on a third-party service provider for their sub-central maintenance, but would consider switching if their DH supplier started offering a similar service:

"We do not have the expertise to manage our sub-centrals ourselves, so we hire a third party. If district heating companies could offer this at a competitive price, we would definitely be interested."

(C5)

Fourth, while all customer profiles express a clear preference for sustainable energy solutions, LPREs tend to frame sustainability not only as an ethical priority but also as a strategic concern. Based on this, several respondents suggested that DH companies should consider tiering their environmental offering. One customer suggested that differentiating environmental levels could offer a more flexible approach:

"Give customers the option to choose their desired environmental level. District heating is inherently environmentally friendly, but if someone wants the best environmental certification, such as FSC-certified biofuels and green electricity, they should be able to pay for it separately, instead of everyone having to pay for the best when 'good enough' might be sufficient."

(C9)

Fifth, the general request for a customized value proposition that addresses the jobs of each profile becomes particularly evident in the case of LPREs, who identify DC as a core job in addition to DH and DHW. To address this, the respondents suggested introducing bundled offerings that combine heating and cooling into a single, coherent product. A representative of the partner company elaborated on a model that exploits the synergy effect in the production of DH and DC (if done simultaneously):

"Let the customer pay a shared power charge for the overlapping energy volumes, rather than full charges for heating and cooling separately. This way, the customer shares in the benefit of our heating, generating cooling as a byproduct, and vice versa. It also makes it easier to compare this bundled offer with a heat pump solution."

(PC1)

The value and importance of creating a combined package is jointly approved by other DH representatives, who emphasize both the strategic urgency of aligning with customer expectations:

"Cooling will become an important product going forward. In areas where we can't offer cooling, it's harder to sell heating. We should treat these as one business since they are highly interconnected."

(DHC3)

"If we can only deliver heating to a property, there is a greater risk that the customer will implement their own solution."

(DHC4)

Sixth, the respondents, primarily LPREs, expressed ideas that could improve the level of involvement and collaboration between the customers and DH companies. The first recurring theme was the possibility for customers to actively influence their power level, rather than having the DH company define and charge based on calculated peak demand. A representative from the partner company explained:

"By letting the customer agree on a capacity level, they will only pay for what they desire. It also allows us to adjust our capacity buffer and optimize our production investments, ultimately in the long term lowering the price for customers."

(PC1)

Another DH representative highlighted how such mutual agreement could reduce contemporary grid strains and system investments:

"If we could agree with customers on a capacity cap, it would reduce our investment needs [...]. We must start working more actively with customers who have specific needs and stop treating everyone the same, to create an optimal and cost-efficient system."

(PC2)

The second recurring theme within this sixth initiative was a growing interest in bidirectional use of the grid. Rather than only receiving energy, these customers, primarily LPREs, see untapped potential in feeding surplus heat back into the system, thus becoming active prosumers:

"We have excess heat to sell. I think there is great potential for an interesting partnership here."

(C4)

Two respondents further elaborated on the concept, giving two distinct examples of how a mutual solution could be formed:

"All buildings occasionally have excess heat, pure waste heat that just disappears. It could be recovered and injected into the district heating network, the traditional return pipe, or the district cooling return. This includes heat from ventilation systems, cold rooms, and server rooms."

(C2)

"They could open up the network and let us release heat from buildings with a surplus and then retrieve it elsewhere, in buildings with a simultaneous need. Of course, we would pay to use the network, but not for the energy we have contributed ourselves."

(C8)

6

Discussion

This chapter discusses and contrasts the empirical findings using the conceptual lens as a guiding framework. The discussion follows the temporal sequence of the lens and employs its analytical function to link the data to relevant theoretical frameworks. It begins by analyzing the current characteristics of business models in the DH industry as part of the initiation phase. The discussion then shifts to the ideation phase, exploring how current business models fall short in addressing customer jobs and how the proposed initiatives could be exploited to bridge that gap. Finally, the chapter transitions into the integration phase, translating promising ideas into a proposed refined and innovated business model.

6.1 Conceptual lens to guide the discussion

To move from insight to action, a structured analytical approach is essential (Frankenberger et al., 2013). In this report, that approach is supported by the conceptual lens, which applies the JTBD framework and BMPs as central analytical tools (Remane et al., 2017). The patterns offer a shared language for BMI, allowing individual initiatives to be grouped, generalized, and recombined into broader strategic directions (Remane et al., 2017). This pattern-based logic fosters creativity beyond incremental improvements, enhances organizational alignment, and helps overcome internal resistance by anchoring new ideas in established business design principles (Chesbrough, 2010). Most importantly, it bridges the gap between customer-derived insights and their integration into a firm's actual business model.

6.2 Initiation phase, insights into the current offerings

The empirical data indicate that the core offerings, namely heating, cooling, and DHW, are predominantly marketed and sold as physical products, delivered in the form of heated or cooled water, rather than positioned as service-based solutions (e.g., a comfortable indoor climate). This suggests that many DH providers operate according to the *physical manufacturer* BMP, which is characterized by the creation and sale of tangible assets (Remane et al., 2017). Notably, the high level of reliability and quality in delivering these products, to foster trust among the customers, stands out in comparison to competing solutions.

Moreover, there are elements in the value proposition that signal an intended shift and leaning toward including services in the value proposition. The inclusion of basic energy advisory services and the emphasis on system-level benefits inherent in DH systems suggest tentative steps toward the *servitization of product* pattern. This pattern primarily impacts the value proposition, integrating service-based elements into traditionally product-focused offerings (Remane et al., 2017).

Furthermore, the current business model appears to be shaped by the industry's structure as a natural monopoly. This structure inherently creates a perceived lock-in effect among customers, which aligns with the *lock-in* pattern. As defined by Remane et al. (2017), the *lock-in* pattern describes a situation in which the customer becomes embedded within a broader ecosystem, making the cost of switching to alternative solutions significantly higher. In this context, the DH grid can be viewed as that ecosystem. Although the empirical data indicate that some customers have transitioned to competing solutions, the high upfront capital investment required for alternative heating solutions as well as the technical expertise required for this shift often serve as barriers, or at least a delay, for such moves. As a result, customer mobility remains limited, contributing to a sense of inertia within the industry. This inertia may act as a buffer for DH companies facing market pressures, effectively buying them more time to address emerging challenges than would be possible in a more competitive setting without lock-in effects (Gassmann et al., 2014a). At the same time, this lock-in may lead to a higher volume of customer complaints and voiced dissatisfaction, as customers without easy exit options are arguably more likely to express concerns rather than silently leave. Viewed from this perspective, companies might interpret *lock-in* not only as a defensive mechanism but also as a strategic opportunity to capture valuable feedback and insights directly from their customer base, while also benefiting from additional time to address these issues compared to a fully open market context.

It is important to note that the customer-side lock-in described above differs from the form of internal lock-in discussed by Lygnerud (2018), who identified an industry inertia rooted in existing infrastructure, technology, and energy supply chains that can hinder innovation and experimentation within DH companies. In other words, multiple types of lock-in appear to coexist in the DH industry, an internal type addressing the infrastructure, technology, and energy supply chains, as well as an external type restricting the customers' ability to churn in favor of other heating alternatives, which have been identified in this research.

Lastly, while customers expressed dissatisfaction with the current pricing structure, to be further discussed in the following ideation and integration discussion, the industry deploys the *disaggregated pricing* pattern, allowing customers to pay exactly and only what they use (Remane et al., 2017). This pattern is typically combined with the *flat rate* pattern, where consumers pay a flat rate based on their maximum power demand. Both of these patterns are strongly related to the value capture component of the business model (Remane et al., 2017). The key characteristics and the corresponding BMPs are summarized in Table 6.1.

Table 6.1: Key characteristics of the industry‘s current business models, the associated business model patterns, and their connection to business model components, as classified by Remane et al. (2017)

Observed characteristics of the current business model	**Corresponding business model pattern**	**Linked business model component**
Sale of the core products, hot and cold water	Physical manufacturer	Value proposition, Value creation, Value capture
Provision of energy advisory services	Servitization	Value proposition
The DH system operates as a natural monopoly	Lock-in	Value delivery
Energy priced per kWh, and maximum power by kW. The former is dynamic, whilst the latter has minimal room for customer impact	Disaggregated pricing Flat rate	Value capture

6.3 Ideation phase, from insights to initiatives

Although this research adopts an outside-in perspective, with a primary focus on customer perceptions, interview data offer broader insights into the current DH ecosystem. A key observation is the multitude of challenges and pressures emerging from various sources, all converging at the interface of DH companies and creating a complex web of systemic interdependencies. Consequently, DH companies tend to occupy a central position within the network, surrounded by a wide array of stakeholders who influence or hold opinions on how operations should be conducted. While evolving customer needs and increased competition are common challenges across industries, the DH sector faces a particularly complex regulatory and policy landscape, shaped by national and EU-level directives, due to its intersections with, among others, biofuels, electricity, incineration, and waste heat utilization, all topics with extensive political priority.

As such, DH companies are largely exposed to regulatory changes, market dynamics, and shifting customer expectations place considerable pressure on existing business models. This underscores the importance of understanding both current business models and outside-in perceptions to guide strategic improvements. However, discussions with industry stakeholders, supported by several prior publications (e.g., Lygnerud et al. (2023)), highlight a recurring concern; the difficulty DH companies face in acting on external inputs and testing new ideas without jeopardizing financial performance or their role as trusted actors. Drawing on insights from interviews with industry experts, DH company representatives, and the partner company, it is evident that innovative activities must be pursued from three strategic perspectives to mitigate the risk of severe harm to company stability:

1. Policymakers implement favorable legislation that alleviates current regulatory and policy-related challenges.
2. Customers begin to place greater value on DH and its associated system benefits beyond heating and cooling, such as support to the electricity grid and waste handling (e.g., incineration).
3. DH companies innovate their business models to maintain or improve profitability by addressing the most urgent and prominent customer dissatisfaction areas, resolving discrepancies between the current value offering and customer needs, and responding to increasing competitive pressure.

In line with the focus area and aim of this research, the third pathway will be further discussed. Consequently, potential legislative changes and strategies to influence customer awareness and appreciation of system value fall outside the primary scope of this discussion, although they will be somewhat addressed.

6.3.1 Business model innovation in response to customer dissatisfaction, discrepancies and competitive pressure

The empirical findings identified three main areas of customer dissatisfaction: (1) the recent price increases and the logic underlying the pricing structure, (2) the one-sided nature of the dialogue between DH companies and their customers, and (3) the perceived slowness of DH companies in responding to evolving customer expectations and system-level developments.

Beyond the three specific dissatisfaction areas, a more fundamental issue emerged; a clear divergence between the jobs customers seek to fulfill and the values that DH companies currently address through their value offerings. This misalignment stems from the fact that current value offerings are largely undifferentiated and therefore insufficiently tailored to the distinct JTBD of different customer profiles. As a first step, DH companies could segment their customers based on their respective JTBD. Based on this segmentation, DH companies could then design and market differentiated offerings accordingly. In doing so, the DH companies would apply the *do more to address the job* pattern, which emphasizes the importance of looking beyond the current offering to address the actual jobs customers are trying to complete (Remane et al., 2017), as well as the *solution provider* pattern, where firms integrate multiple offerings into a unified, one-stop-shop to meet a broader set of customer needs (Gassmann et al., 2014a; Remane et al., 2017). While several novel ideas to construct this one-stop-shop approach will be introduced subsequently, DH companies could also begin by reviewing their existing value offerings and differentiating them. In essence, moving toward a state where DH companies offer a repertoire of tailored solutions aligned with each customer profile's JTBD is likely to address the currently perceived value discrepancy effectively.

Turning to the first and most prominent source of customer dissatisfaction, pricing, several issues were identified. These include recent years' price increases, a lack of transparency, and the rigidity of the existing pricing logic. Despite the introduction of the price dialogue initiative, these concerns persist. Many customers described the pricing logic as difficult to understand, overly complex, and insufficiently adaptable to their specific jobs. This again reflects the broader misalignment between customer jobs and what DH companies are currently offering.

In response to this, the respondents articulated ideas for improvement. These suggestions largely focus on the introduction of a marginal-cost spot pricing logic with greater flexibility and choice, which aligns well with the *flexible pricing* pattern. The *flexible pricing* pattern promotes price structures determined by supply and demand dynamics, with a profit margin added by the supplier in the last stage (Remane et al., 2017). The interviews revealed that flexible pricing can be further tailored and adjusted to fit each customer profile, including:

1. A fully flexible energy price, directly tied to the marginal production cost, designed for LPREs who indicate interest in optimizing their usage based on cost and current conditions.
2. A semi-flexible energy price, combining a fixed and a variable component, suitable for SMREs seeking a balance between cost control and risk.
3. A fully fixed energy price, agreed in advance with a risk premium, appealing to TOAs that prioritize predictability and low volatility.

By incentivizing demand-side flexibility through a flexible pricing model, DH companies can also reduce peak loads, thereby decreasing reliance on fossil-based production to meet peak demand. Furthermore, a smoother demand profile could reduce the need for capital-intensive investments, as the system's maximum required capacity may decline. This interpretation is supported by previous research, such as Li et al. (2019), which demonstrates that dynamic pricing can lower end-customer costs and flatten demand curves, yielding long-term cost benefits for DH companies.

The power component was also discussed in the interviews. The current pricing structure of it, previously associated with the *flat rate* pattern and unilaterally set by the DH company, cannot be considered either transparent or effective in communicating the actual value it represents, namely the assurance of a functioning production and grid system. A more collaborative approach, in which customers define their maximum power levels with professional guidance, could improve transparency and enhance customer understanding of what the component entails. Simultaneously, it would allow DH companies to manage system capacity more effectively by basing decisions on actual customer preferences rather than assumptions. Consequently, this could help avoid overinvestment in infrastructure and reduce long-term fixed costs. However, the willingness and capacity to engage in such a dialogue are likely to differ between customer profiles, depending on factors such as technical competence and risk tolerance. This underscores the importance of a nuanced understanding of each customer profile. Implementation may, therefore, begin with LPREs and SMREs, who have clearly expressed interest in collaboration and co-created solutions. For TOAs, a more guided approach is recommended, with strong, professionally developed recommendations that still require customer acknowledgement and approval.

Building on this, pricing energy based on marginal production cost combined with customer-defined power levels may also offer a constructive approach to addressing the competitiveness, and, from a DH company perspective, the perceived rivalry, between DH and HP. Within such a logic, currently challenging hybrid customers would contribute to infrastructure costs via the power component, while their energy consumption would be priced to consistently reflect marginal production costs. This could foster a more collaborative relationship with HPs, reposition hybrid customers as profitable rather than problematic, and ultimately reduce the prevailing tension between hybrid customers and DH companies. While hybrid customers were not distinguished as a unique profile in this research, it may be worthwhile for DH companies to explicitly identify them as such, to develop tailored offerings that better meet their specific needs.

In addition, the respondents identified several complementary initiatives that may further help mitigate the currently perceived negative aspects of pricing. These include 1) novel financial solutions such as an offering addressing NOI for LPREs, which also would easen the financial comparison with HPs, 2) leasing of sub-centrals to TOAs and SMREs to reduce the burden on boards or managers, 3) differentiated environmental offerings aligned with each profiles environmental policies, and 4) a bundled DH-DC package tailored to LPREs with dual heating and cooling demand. Collectively, these initiatives align well with the *solution provider* and *do more to address the job* patterns, enabling DH companies to address customer jobs more holistically and thereby enhance perceived value.

The second customer dissatisfaction area concerns the one-sided nature of the dialogue, where customers reported a lack of meaningful engagement with their DH provider. This communication gap reinforces the need for DH companies to re-evaluate how well their business models align with customer jobs, making the BMP *do more to address the job* pattern particularly relevant once again.

The third frustration, dissatisfaction with the pace at which DH companies respond to evolving customer expectations, was especially pronounced among LPREs. These customers expressed disappointment that DH providers continue to be perceived primarily as centralized *physical manufacturers*, rather than as dynamic participants in an evolving energy ecosystem. Instead, they envisioned a more collaborative relationship in which DH companies act as facilitators or orchestrators, actively engaging customers and other actors as partners in innovation and co-creation. This conceptual shift, from supplier to integrator, aligns with two interconnected BMPs; *distributive network* and *value net integrator*. The former involves providing infrastructure to connect other actors in the economy, while the latter emphasizes coordinating activities across the value network by aggregating, synthesizing, and distributing data (Remane et al., 2017). Together, these patterns capture the potential for DH companies to become central actors in an interconnected heating ecosystem, where grid ownership and coordination expertise are core assets. Such a role would enable integration of multiple heat sources, thermal storage, and prosumers, moving beyond the traditional model where the DH company is the sole producer. Moreover, becoming the central node in such an ecosystem would potentially enable better and closer feedback from customers, which in turn could lead to better offered solutions that, ultimately, could end up in a better position for DH companies in the competitive landscape. This envisioned reconfiguration is widely supported in literature on the future of DH systems, where the role of the DH company is increasingly described in terms such as system manager (Buffa et al., 2019), system controller (Lindhe et al., 2022), or aggregator (Lygnerud & Yang, 2024), indicating a shift from a production-focused value chain logic to a value network logic.

The data revealed that a profound understanding of customer profiles, the ability to design and monitor tailored offerings, and the implementation of supply-demand-based pricing logic will all require significantly enhanced digital capabilities within DH companies. This necessity aligns closely with the BMPs *digitalization* and *leverage customer data*. The *digitalization* pattern refers to the transformation of traditionally physical offerings into digital services, while *leverage customer data* involves systematically collecting and utilizing customer data to inform commercial decisions (Remane et al., 2017). Embracing these patterns will require DH companies to invest in digital infrastructure, analytics capabilities, and new competencies. This emphasis on digital solutions is echoed in the work of Lund et al. (2018), who highlights the critical role of digital tools in shaping the next generation of DH systems. Ultimately, adopting a data-driven approach could serve as the foundation for developing more adaptive, responsive, and tailored offerings, ones that are better aligned with the diverse jobs customers are trying to get done. The key characteristics and the corresponding BMPs are summarized in Table 6.2.

Table 6.2: Summary of identified customer dissatisfaction areas and discrepancies with current offering, their corresponding business model patterns, and their connection to business model components, as classified by Remane et al. (2017)

Customer dissatisfaction area or offering-discrepancy	**Suggested business model pattern**	**Linked business model component**
Misalignment between customer jobs-to-be-done and current value offerings	Do more to address the job	Value proposition, Value capture
Undifferentiated offerings that do not reflect distinct customer profiles or needs	Solution provider	Value proposition, Value creation
Pricing mechanism is overly complex, non-transparent, and lacks choice	Flexible pricing	Value capture
Perceived lack of meaningful dialogue and co-creation with DH companies	Distributive network, Value net integrator	Value proposition, Value creation
Limited digital capabilities to profile customers and deliver adaptive, data-driven offerings	Digitalization, Leverage customer data	Value proposition, Value delivery, Value creation

6.4 Integration phase, synthesizing insights into strategic business model suggestions

Building on the discussions from the initiation and ideation phases, it is clear that the current DH value proposition is not fully aligned with customer jobs. As earlier explored, substantial customer dissatisfaction restricts customers in fulfilling their desired jobs (Christensen et al., 2007), thereby offering a natural starting point for business model innovation. Following the logic proposed by Osterwalder et al. (2014) and Teece (2010), dissatisfaction signals an opportunity to develop a new, more customer-centric value proposition by modifying how value is proposed, created, delivered, and captured.

While there is, as outlined in the theoretical background, no universally agreed threshold for what constitutes BMI, the literature broadly defines it as innovation that affects the way a firm proposes, creates, delivers, or captures value (Amit & Zott, 2012; Geissdoerfer et al., 2018; Osterwalder et al., 2005; Zott et al., 2011). Taking this as a basis, the following integration-focused discussion aims to synthesize insights from the earlier phases and translate them into strategic and actionable business model suggestions. Specifically, the previously mapped BMPs are now used as a shared analytical framework to show how observed problems and initiatives can be structured into coherent business model modifications.

Starting with the value proposition, understood as the set of benefits and solutions a company offers to its customers (Chen et al., 2021; Lüdeke-Freund et al., 2018; Teece, 2010; Tongur & Engwall, 2014; Zott et al., 2011), the findings and earlier discussion suggest a shift from today's largely undifferentiated offerings toward a more customer-tailored logic. To better meet diverse customer needs, DH companies are encouraged to adopt the role of a solution provider, offering a broader range of values adapted to distinct customer profiles. As emphasized in the ideation phase, segmenting customers based on the jobs they are trying to accomplish, rather than solely by size or sector, enables a more accurate and relevant alignment between customer jobs and the value offering. Extending this logic, DH companies may benefit from formulating their core offering around the provision of indoor climate and comfort, whether limited to heating and DHW or expanded to include cooling, and complementing this with a broad repertoire of tailored solutions designed to address the specific jobs different customer profiles are trying to get done.

Moving to value delivery, the systems, infrastructure, and actors used to bring the offering to the customer (Chen et al., 2021; Lüdeke-Freund et al., 2018; Teece, 2010; Tongur & Engwall, 2014; Zott et al., 2011), the current model is heavily influenced by the industrys structure as a natural monopoly. This structure was previously associated with the *lock-in* pattern, where customers face high switching costs, reducing the likelihood of churn. While this may have supported customer retention, it can also be seen as a source of dissatisfaction, as customers feel constrained by limited flexibility, ultimately contributing to a high level of voiced discontent. Rather than relying on structural barriers, DH companies should aim to retain customers by offering, creating, delivering, and capturing value that is genuinely appreciated. In other words, they should actively offer value that reduces the relevance of lock-in, rather than depend on it. This shift calls for rethinking how services are delivered and experienced, a development closely linked to the value proposition changes discussed.

Additionally, the *digitalization* and *leverage customer data* patterns offer promising means for DH companies to better understand and serve their customers. Beyond being a pivotal asset in enabling a more tailored value proposition, digital tools will likely be essential to implement the new pricing logic proposed in the ideation phase below, where real-time data computation and communication will be required.

In terms of value creation, the internal processes, technologies, capabilities, and partnerships that make the offering possible (Chen et al., 2021; Lüdeke-Freund et al., 2018; Teece, 2010; Tongur & Engwall, 2014; Zott et al., 2011), the current model still recognizes the centralized production and infrastructure. However, as discussed earlier, this production focus is no longer sufficient to differentiate DH from competing technologies like HPs. Future value creation is expected to rely more on coordination, integration, and collaboration across multiple stakeholders. This includes utilizing local heat sources, energy storage, and customer contributions by becoming so-called prosumers. The *value net integrator* and *distributive network* patterns describe this development well. While such a scenario may seem futuristic and more of a vision, many respondents, primarily LPREs, voiced a desire to cautiously commence with exploring these ideas. A first step may be to actively strengthen ties with these customer profiles as well as with other actors and DH companies to jointly sketch on and try out innovative solutions and proposals. Internally, DH companies may also begin to shift how they perceive and communicate their core assets, from mainly advocating for the value in production capacity, to also include the actual grid and operational expertise of building and maintaining these. This perspective, as argued earlier, may form the foundation of a more resilient and customer-oriented business model.

Finally, value capture, which refers to how a company retains part of the value it creates to ensure financial sustainability and profitability (Chen et al., 2021; Lüdeke-Freund et al., 2018; Teece, 2010; Tongur & Engwall, 2014; Zott et al., 2011), has been identified as a critical area of improvement due to widely perceived customer mistrust and lack of transparency. At a general level, this mistrust is something DH companies must actively address, as failure to do so may jeopardize the feasibility of several of the above proposed improvements, which commonly lean on increased customer involvement and closer interaction.

On a more concrete level, as suggested in the ideation phase, a shift toward a marginal-cost-based pricing model for the energy could enhance both flexibility and transparency. Customers could then choose between a fully fixed, semi-fixed, or fully dynamic pricing structure depending on their preferences and underlying JTBD. This transition is, as discussed in the ideation section, strongly supported by the *flexible pricing* and *do more to address the job* patterns.

Moreover, the power price component appears misaligned with the broader values it is intended to reflect, namely reliability, operational stability, and the theoretically unlimited availability of heated water within the system. Although customers consistently express appreciation for these qualities, they are neither communicated nor adequately reflected in the power component, which is unilaterally determined by the DH company. As discussed in the ideation phase, increasing customer involvement in defining their desired power level offers several potential benefits. These include improving customer understanding of the underlying cost structure and more effectively justifying the price level by making its connection to delivered value more transparent, as well as potentially reducing the need for large investments in the system.

Ultimately, building on the previously discussed shift in the value proposition, the pricing logic must also evolve to reflect greater differentiation, aligned with the *solution provider* and *do more to address the job* patterns. As the value offering becomes more differentiated, the associated values must be individually priced in a way that reflects their specific contribution and value. Doing so will not only enhance the ability to tailor offerings to different customer needs and enable customers to choose solutions that align with their budgets and JTBD, but also improve transparency regarding the value of each solution. For example, it would clarify what customers are paying for when opting for a fixed energy price, and the risk is absorbed by the DH company. Ultimately, this approach may help address the perceived complexity of DH pricing and respond to feedback that the value of HPs and their pricing models are easier to interpret and evaluate.

To conclude the integration discussion, Tables 6.3 and 6.4 summarize the proposed transition from the current business model configuration to a customer centric and network-advocating model. The tables outline which BMPs currently characterize the DH industry, as identified in the initiation phase, and which patterns are proposed to guide a reconfigured, more customer-centric model based on insights from the ideation and integration discussions. In essence, by applying the patterns outlined in Table 6.4, DH companies can systematically reshape the four key business model components, value proposition, value creation, value delivery, and value capture, to improve alignment with customer JTBD, manage customer dissatisfaction and ultimately strengthen their competitive positioning.

Table 6.3: Business model patterns that are assumed to characterize the district heating industry today

Business model component	**Corresponding business model pattern**
Value proposition	Physical manufacturer Servitization
Value delivery	Lock-in
Value creation	Physical manufacturer Reliable commodity
Value capture	Physical manufacturer Reliable commodity Disaggregated pricing Flat price

Table 6.4: Business model patterns that are proposed to characterize the district heating industry in the future

Business model component	**Corresponding business model pattern**
Value proposition	Do more to address the job Solution provider Distributive network Value net integrator Digitalization
Value delivery	Digitalization Leverage customer data
Value creation	Digitalization Leverage customer data Solution provider Distributive network Value net integrator
Value capture	Do more to address the job Flexible pricing

7

Practical recommendations

This chapter outlines the key recommendations for practitioners in the Swedish district heating industry, derived from the research findings and interrelated discussion.

Be aware of the customer dissatisfaction with the current undifferentiated value offering

The findings reveal considerable customer dissatisfaction with the current value proposition offered by district heating companies. Although complaints are voiced across several areas, including pricing concerns (rising costs, complex models, and a low degree of individual adjustment), frustration over the one-sided nature of customer dialogue, and perceptions of organizational inertia, analysis reveals a common underlying cause; a mismatch between what customers seek to achieve and the undifferentiated offerings currently provided. Moreover, these discrepancies vary across customer segments, highlighting the urgent need for a more differentiated approach in how district heating companies propose, create, deliver, and capture value.

Segment customers based on their unique jobs-to-be-done

Accordingly, it is recommended that district heating companies perform a new segmentation exercise, grouping customers into distinct profiles based on their underlying JTBD. This approach should replace the current practice of size-based segmentation. Even if the segment groups themselves do not change significantly, gaining a deeper understanding of the jobs each profile seeks to fulfill offers crucial insights for designing a value proposition that truly addresses customer needs and reduces dissatisfaction.

Reconsider pricing logic by implementing marginal-cost spot pricing and enabling customer-defined maximum power level

Given that pricing was the single most prominent source of customer dissatisfaction, the report identifies reforming pricing logic as an urgent and strategically important aspect to address with business model innovation. It is recommended that district heating companies reconsider charging energy based on a marginal-cost spot price logic, allowing customers to purchase energy based on real-time production costs. Customers could then choose to fix prices fully or partially, paying a premium for reduced exposure to price fluctuations. Regarding the power component, it is proposed that customers should be actively involved in determining their maximum capacity requirement, with a corresponding fixed fee structure. This approach could enhance transparency, fairness, and customer satisfaction while simultaneously improving system planning and operational efficiency.

Offer tailored solutions to become a true solution provider

Beyond the initiative to revise pricing structures, district heating companies should aim to transition toward becoming solution providers, offering tailored portfolios that directly address the distinct jobs-to-be-done of different customer profiles. Extending this logic, district heating companies may benefit from formulating their core offering around the provision of indoor climate and comfort, whether limited to heating and domestic hot water or expanded to include cooling, and complementing this with a broad repertoire of tailored solutions designed to address the specific jobs different customer profiles are trying to get done. Based on customer interviews, the following initiatives were identified as particularly relevant. These can serve as a starting point for complementing the current offering, which should also be evaluated to ensure it clearly aligns with each customer profile's objectives and expectations:

1. *Net Operating Income-oriented offering*: A financial package that facilitates comparison with heat pumps. Primarily targeted at large professional real estate companies.
2. *Leasing of sub-centrals*: Offer sub-central leasing to reduce customers' upfront investment, increase liquidity, and enable hassle-free ownership. Primarily aimed at tenant-owned associations and small to medium-sized real estate companies.
3. *Differentiated green offering*: Expand and customize the sustainability offering to better reflect individual climate goals, while clarifying both the value and cost of choosing FSC-certified fuels. Relevant for all customer segments.
4. *Bundled district heating and cooling package*: Introduce a combined pricing model for customers requiring both heating and cooling, an area where heat pumps currently have a strong competitive edge.

Foster collaborative relationships to better understand and serve customers

The report highlights an opportunity for district heating companies to build more collaborative and responsive relationships with their customers, particularly with large professional real estate companies. This customer group increasingly expects district heating providers to act not only as energy suppliers but also as facilitators and orchestrators within a broader energy ecosystem. Moving toward a more collaborative model would involve engaging customers as active partners in innovation, enabling the integration of multiple heat sources, local energy storage, and prosumers into the grid. Consistent with this, district heating companies are recommended to re-evaluate what constitutes their most valuable asset. Rather than primarily emphasizing energy production, companies are encouraged to recognize that the distribution network and operational expertise represent their core competitive advantages. Future business models are likely to center on leveraging these assets, hence moving beyond traditional production logic toward a network-driven approach.

8

Conclusion

The purpose of this research has been to explore the current business model characteristics in the district heating industry and examine how these fall short in addressing customer needs and increasing competitive pressures, particularly from heat pumps. Building on this foundation, the study aimed to identify strategic recommendations for how district heating companies can reshape their business models to align with customer needs, reduce customer dissatisfaction, and respond to competitive pressures. In short, the study sought pathways for business model innovation for active companies in the district heating industry.

To support this, a conceptual lens was developed as a structured approach to conducting business model innovation. This lens offers a novel perspective on how business model innovation can be systematically performed to enhance firm performance by having a strong customer focus. It integrates two key dimensions: (1) a temporal function that guides the innovation process through three distinct phases, and (2) an analytical function that uncovers what customers are truly trying to achieve by applying the jobs-to-be-done framework and business model patterns to support the integration of new ideas into actionable business model improvements.

Beyond offering a new approach to business model innovation, the conceptual lens was applied directly to the district heating industry to fulfill the study's purpose. Prior research on the industry has primarily taken an inside-out perspective, focusing on technological advancements as the basis for business model development. However, this report adopts an outside-in perspective, i.e., emphasizing customer perceptions and market responsiveness as key levers for business model innovation. Ultimately, the report provides two main theoretical contributions; the development of a generalizable conceptual lens for guiding business model innovation from an outside-in perspective, and the application of this tool within the district heating industry.

The findings from the application of the lens reveal a clear discrepancy between what district heating companies currently offer and what customers are trying to achieve. Specifically, it was found that the current value offering is often undifferentiated, resulting from limited or insufficient customer segmentation. Consequently, district heating companies risk failing to meet the needs that customers aim to fulfill when purchasing an energy solution.

Moreover, three distinct areas of customer dissatisfaction were identified, (1) concerns related to pricing, including dissatisfaction with recent sharp price increases as well as a lack of transparency and flexibility in current pricing models, (2) frustration with the one-sided nature of communication and the perceived lack of meaningful engagement from district heating companies, and (3) a general perception that district heating companies are slow to adapt to customer initiatives and evolving expectations.

To address the aspects mentioned in the previous paragraphs, district heating companies are encouraged to segment their customers based on their jobs-to-be-done, thereby moving beyond the current one-size-fits-all approach. This segmentation increases the potential to develop customer-centric offerings, thus helping to reduce the observed discrepancies. Moreover, the findings identify specific initiatives that may alleviate areas of customer dissatisfaction and serve as a foundation for broader business model innovation. To translate these individual initiatives into strategic business model recommendations, business model patterns were used to connect individual initiatives to specific business model components. The following patterns are proposed to characterize and form the foundation of a new business model for application in the industry:

- *Do more to address the job* pattern, to support the creation of differentiated value propositions aligned with distinct customer profiles, primarily affecting the value proposition and value capture components.
- *Solution provider* pattern, identified as key to shaping tailored portfolios of services, impacting both the value proposition and value creation components.
- *Flexible pricing* pattern, to foster transparency and pricing differentiation, primarily targeting the value capture component.
- *Value net creator* and *distributive network* patterns, to enhance collaboration and promote co-creation, primarily influencing the value proposition component.
- *Digitalization* and *leverage customer data* patterns, to enable data-driven offerings and segmentation, affecting the value proposition, value capture, and value delivery components.

If implemented thoughtfully, these patterns can support the evolution of district heating business models in a way that better reflects customer jobs and strengthens long-term competitiveness. Ultimately, this could result in a new collaborative ecosystem in which DH companies can take on the role of a network orchestrator.

8.1 Limitations and future research

Several research areas have emerged that merit deeper investigation, both those outlined in the delimitations and those raised during interviews that fell outside the scope of this report. To begin with, while this report proposes strategic directions for business model innovation, practical implementation within district heating companies remains a challenge. Many of the suggested initiatives imply cultural, structural, and procedural changes that can encounter internal resistance. Future research could therefore investigate how district heating companies can translate strategic intent into organizational action. Such research would complement the outside-in approach of this report with an inside-out perspective, helping bridge the gap between strategy and execution.

Furthermore, as acknowledged in this report, policy frameworks play a critical role in shaping the playing field for district heating innovation. However, policy has been treated here primarily as context. Future research could adopt a more focused lens on how local, national, and EU-level policies affect the feasibility and attractiveness of new business models. A better understanding of policy enablers and constraints would help district heating companies align their innovation efforts with long-term regulatory trajectories.

From a methodological standpoint, this report has several limitations that also point to future research opportunities. First, the report is based on a case study in collaboration with one district heating company, which limits the generalizability of the findings. Although the empirical data offers valuable depth and context, future research could benefit from multi-case designs involving several district heating companies with different ownership structures, geographical contexts, and strategic orientations. This would allow for cross-case comparisons and broader theory-building.

Lastly, the qualitative nature of this research emphasizes depth over breadth, relying primarily on semi-structured interviews and interpretive analysis. While this approach is well-suited for uncovering nuanced customer frustrations and strategic tensions, it neither allows for quantification of impact nor prioritization of initiatives. A valuable complement to this research would be quantitative research that tests the proposed initiatives. For example, surveys could help assess the relative importance of different dissatisfactions or evaluate customer preferences for tailored value propositions.

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Appendix

Interview guide customers

- Could you give a brief overview of your company and your role?
- Could you explain your experience and relationship with your district heating provider?
- What job would you say a heating system should provide you with?
  - What are the functional aspects (e.g., cost-efficiency, system reliability)?
  - What are the emotional aspects (e.g., risk mitigation, ease of management)?
  - What are the social aspects (e.g., sustainability goals, tenant satisfaction)?
- To what extent would you believe that your district heating company fulfills these jobs?
- Have you considered opting for a heat pump heating solution?
  - If yes, why?
  - If no, why?
- In what ways should a district heating company's way to conduct business change to better cover your needs (i.e., as referred to as jobs)?
  - Value proposition
  - Value delivery
  - Value creation
  - Value capture
- Is there anything else you think is important for us to consider?

Interview guide district heating companies

- Could you give a brief overview of your company and your role?
- Could you describe the characteristics of the market that you serve and your product and service offerings?
- What overall trends do you see in the heating industry in general and the district heating industry in particular?
- What are the main challenges district heating companies are facing today?
- In your view, what job would you say that a heating system should provide the customers with?
  - What are the functional aspects (e.g., cost-efficiency, system reliability)?
  - What are the emotional aspects (e.g., risk mitigation, ease of management)?
  - What are the social aspects (e.g., sustainability goals, tenant satisfaction)?
- To what extent would you believe that you, as a district heating company, fulfill these jobs?
- What is your view on the competitiveness of heat pumps?
  - Have you felt that the competitiveness has increased lately?
  - What do you think are the main reasons behind this?
- What do you think should be adjusted in your business model to better overcome your main challenges and to cover customers' needs (i.e., as referred to as jobs)?
  - Value proposition
  - Value delivery
  - Value creation
  - Value capture
- Is there anything else you think is important for us to consider?
- Do you have any person, company, or organization that you would recommend us to contact?

Interview guide industry experts

- Could you introduce yourself and your experience with the topic?
- What overall trends do you see in the heating industry in general and the district heating industry in particular?
- What are the main challenges facing district heating companies today?
- What are the main strengths and weaknesses of district heating today?
- What are the main strengths and weaknesses of heat pumps today?
- How would you describe the competitiveness between district heating and heat pumps?
- In your opinion, what adjustments should district heating companies make to their business model to better meet customer needs?
- In your opinion, what adjustments should district heating companies make to their business model to meet competitiveness from alternative heating solutions?
  - Value proposition
  - Value delivery
  - Value creation
  - Value capture
- Is there anything else you think is important for us to consider?
- Do you have any person, company, or organization that you would recommend us to contact?

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