

**The Transformation of Home Heating in
Finland: Key Narratives and Events from the
1940s to the Present**

JUSTHEAT Strand II Report

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1. Introduction

The present report is part of the *Looking back to move forwards: a social and cultural history of home heating* (JUSTHEAT) project which looks to understand major changes in domestic heating systems over the past 70 years in order to better facilitate future home heating transitions especially when considering the justice dimensions of these transitions.

The aim of this report is to provide an overview of selected narratives and events that relate to home heating in Finland over the past seven decades. It seeks to shed light on significant discussions on domestic heating that citizens have been exposed to or have actively participated in, to better understand how home heating was discussed on the political level as well as how discussion on domestic heating have been portrayed in the public sphere.

This report draws upon various documents and debates, linking them to academic research to provide a more nuanced understanding of the evolution of domestic heating in the Finnish context. However, it is important to note that the scope of the report is limited to selected events and debates impacting on domestic heating and cannot provide a detailed tracing of each aspect of political and public discussions on matters related to domestic heating.

In the current climate of rising energy and electricity prices the report also provides more framing to ongoing discussions on domestic heating. This connects the themes of the historic narrative with ongoing discussions in the present. At the same time, Finland is known for having developed a highly efficient district heating system and the key role played by heat pumps in decarbonising heating in the country. These developments of the heating systems are not only stories of technology that unfolded detached from other events in society. Instead, they are embedded in broader societal developments and several aspects of these transitions are discussed from a variety of perspectives.

This report first presents national statistics on the current use of heating energy in Finland and the distribution according to types of heating modes. After establishing the current situation, it narrates how we arrived at the current heating system and, in its conclusion, provides food for thought when considering ongoing and future discussions. Heating transitions have occurred in the past as well, and understanding these transitions provides valuable insights for future changes to how we keep warm at home.

The conclusion section also sets the scene for how work done as part of JUSTHEAT informs and enriches ongoing discussions on creating a more just future for domestic heating. Considering the importance of social implications of heating transitions is key in this respect, given that changes to domestic heating systems impact different sections of society in diverse ways, especially when considering the need for a just distribution of costs and benefits associated with a heating transition.

The report provides an outlook to the contribution of our work within the JUSTHEAT project, to not only better understanding past heating transitions, especially when focusing on issues of justice in transitions, but will also provide an outlook how the analysis of the oral histories against the backdrop of these historical narrative can enrich discussions on a more just future for domestic heating. It sheds light on the societal complexities of these transitions that should be fully accounted for when looking to develop measures to facilitate future transitions. The goal, as we move forward, is to ensure that we do so with a keen awareness of the past and without leaving anyone behind.

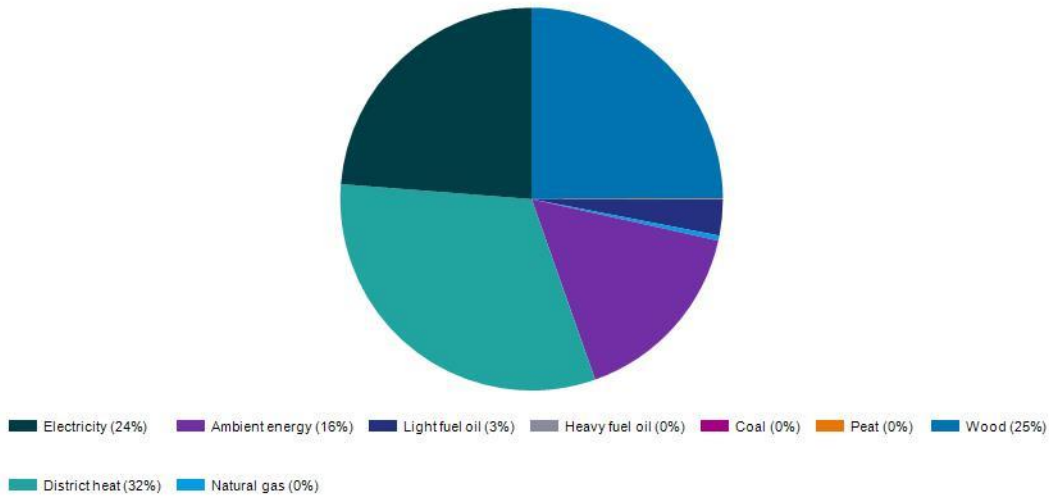
2. Background: the current heating system in Finland

Due to its cold climate, Finland has the highest number of heating degree-days in the EU (IEA 2023). The yearly heating demand can vary considerably though, up to 5% in the final energy consumption, depending on the average winter temperatures (TEM 2019:55).

Nowadays, district heating plays a key role in the provision of heat holding a 46% share of heating in all buildings (Energiateollisuus 2023). Looking to residential buildings only, 2022 saw a share of 32% for district heating, followed by wood (26%), electricity (24%) and heat pumps (16%) (see Graph 1; Statistics Finland 2023a). Overall, looking more recent times, fuel shifts can be identified, with a clear update in the use of heat pumps, a slight increase in electricity use and a decline in the use of oil in heating. Wood has retained its position in the heating system during this time (see Graph 2; Statistics Finland 2023b).

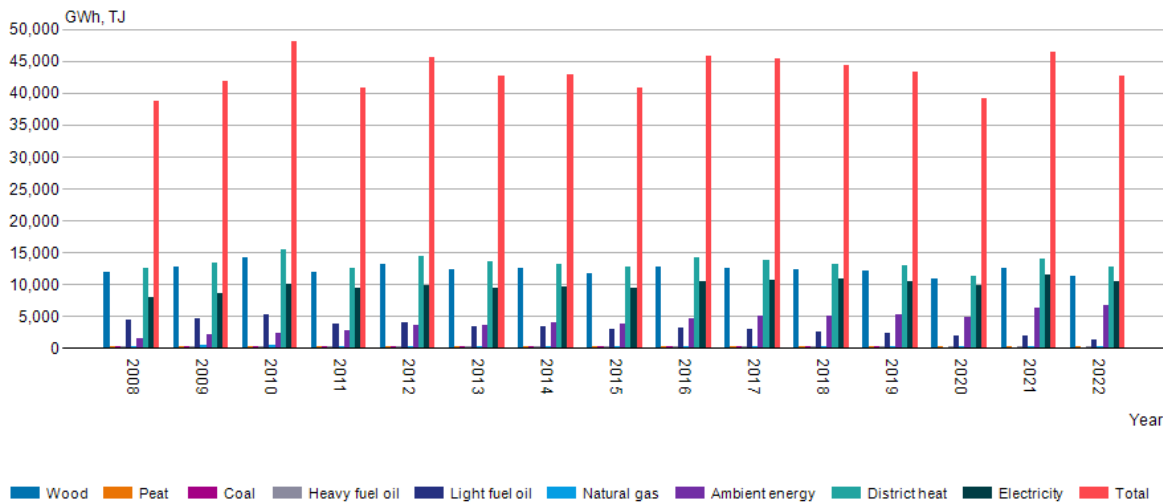
The trends tracked by the statistics on residential heating in Finland capture a set of different transitions that played out over the past seven decades. While these transitions involve a change of technology, they are just as much affected by social and political factors that can provide support or opposition to a specific solution, in addition, these developments are as much impacted by domestic factors as they are by international developments, as the oil crises of the 1970s as well as a concerted effort for decarbonization of heating from the early 2000s onwards show.

Heating of residential buildings by Energy source. Residential buildings, Consumption of heating energy in residential buildings, GWh, 2022.



Source 1 Statistics Finland 2023a

Heating of residential buildings by Energy source and Year. Total, Consumption of heating energy in residential buildings, GWh.



Source 2 Statistics Finland 2023b

3. 1940s-1960s: Moving from war time restrictions to a more diverse heating system

The period from the early 1940s up to the end of the 1960s was marked by a wide set of issues connected to the provision of domestic heating, ranging from wartime rationing due to limited fuel availability to major shifts in the types of fuels used for heating in the 1950s and 1960s as exemplified by the transition from biomass to oil-based heating systems, the development of district heating in urban areas as well as the introduction of electric heating in the later part of the 1960s.

During the war and early post-war period in Finland, a core aspect of discussions on domestic heating were questions of rationing and conservation measures. In the context of Helsinki, heating in wartime was characterized by only intermittent availability, with notes on restrictions, rationing as well as saving practices being published in the main daily newspaper Helsingin Sanomat.

Directives on rationing domestic heating were commonplace in war-time Helsinki, though enforcing them was not a straightforward process (HS 1940a) though announcement aimed at both house owners and renters to contribute to the effort of saving energy via reducing domestic heating (HS 1940b; HS 1940d). Also prohibitions on using any fuels for domestic heating were put in place (HS 1942c) though “heating days” were also regularly announced in the newspaper (HS 1942d; HS 1943). Overall, savings were framed as “contemporary responsibility” during war times (HS 1940e). This also included an appeal to the role women can play in these efforts via an economic use of fuel for domestic heating (HS 1940f). Discussions unfolding in the letters to the editor section in Helsingin Sanomat paint a picture of concern over the restrictions and limitations on using domestic heating including what counts as acceptable indoor temperatures (HS 1940c) and the impact heating restrictions as well as low indoor temperatures can have for example on children (HS 1942f; HS 1942e). In addition, low levels of heating were seen critically in a situation where rent increases were taking place (HS 1942b; HS 1942e). This not only reflects the connection between heating and care work for family members, but also sheds light on the broader socio-economic developments impacting the availability of financial resources to be used for ensuring domestic heating. At the same time energy efficiency and savings were also discussed in relation to domestic heating, noting the potential for energy savings by not only adjusting heating practices to save fuel via skilled use of heating systems but also encouraging to keep indoor temperatures at low levels (HS 1941b). Insecure supplies of coal for domestic heating purposes also meant that citizens were encouraged to pre-

emptively use coal sparingly and replace it with domestic fuels, i.e. wood and peat, where possible (HS 1941a).

Overall, news reports highlight the difficulties in anticipating the availability of fuel resources making it difficult to anticipate the expected scope of rationing of fuel and therefore, heat (HS 1942a; HS 1945). In addition, for homes on central heating discussion on the possible length and start of the heating season as well as concerns over how to secure sufficient fuels were part of the debate (HS 1942a).

In the decades following World War II, Finland transitioned from a biomass-based economy to a fossil-fuel based one where heating, also in rural settings, relied to increasing degrees on the use of oil-based systems due to its perceived ease of use and efficiency. As a consequence of this increased reliance on oil, the development of research, delivery systems, as well as markets for fuel wood was reduced significantly (Wessberg 2002). The impact of an increased use of coal and oil on the overall structure of energy supply and the national forest industry were also part of the public discussion, where the “fuel question” was also connected to security of supply as well as the role of domestic fuels, wood and peat, in securing energy supply in times of crisis (HS 1957a) as well as costs and the question over whether domestic fuels can compete with coal and oil. Here, residential heating is highlighted as a case where cost competitiveness, especially in cases where wood supply is covered from local forests, can be achieved (HS 1959a).

These developments not only impacted the overall structure of the energy system but also the provision of heating throughout the country. In 1960 the share of biomass in heating stood at 86%, while by 1970 it had dropped to 25%. Concurrently, the share of oil in the heating system increased from 17% to 60% in the 1960s (Energiapolitiikan neuvottelukunta 1974:12). The loss of hydropower capacity as a consequence of the war meant the construction of new, mainly coal-based power plants, enabling the development of integrated heat and power production (Wessberg 2002).

Electric heating entered the Finnish system in the 1960s, with an estimate of 3000 homes using electric heating in 1966 and reports of the time foreseeing a clear rise in households relying on electricity for heating (HS 1968). The 1950s also saw the focused development of district heating in urban contexts (Vadén et al. 2019), with early developments in Helsinki starting in 1952 (HS 1959d) and expansion of the district heating network continuing in the following years (HS 1957b; HS 1959b). The ease and cleanliness of district heating were stressed, though the disruption coming with street works needed for the installation of pipes were also part of the reporting. The development of the district heating network was

thus not without interruption and also saw setbacks when delays in the work meant that connecting properties to the network was delayed (HS 1959c).

Overall, the decades after the war brought with them profound changes to the domestic heating system that meant a diversification of available modes of heating, including the gradual introduction of electricity, oil, and district heating systems. These changes also impact political and societal discussions on suitability of heating methods and their connection to other important policy issues such as availability, resilience, and crisis preparedness that will shape dialogue and decision making also in the decades to come.

4. 1970s: The impact of the oil crises on domestic heating

Energy policy in the 1970s was characterised by efforts to respond to the immediate impacts of the energy crises and by efforts to prepare energy systems to deal not only with the far-reaching impacts of the current crises but to also increase their resilience against future crises. The energy crisis of the early 1970s also brought with it a need to reconsider Finnish energy politics, including domestic heating needs, given the import dependency of the Finnish energy system (Energiapolitiikan neuvottelukunta 1974).

The Finnish Energy Policy Commission, in its report on “Guidelines for the Finnish Energy Policy in 1976-1985”, highlights the role of heating in the overall high energy consumption in the country given the climatic conditions (Finnish Energy Policy Commission 1976). Energy saving is framed as a central tenant of addressing the challenges face in developing energy policy, with the caveat that curbing energy demand needs to combine a rise in the standard and quality of living with a declining energy consumption growth rate (Finnish Energy Policy Commission 1976). Buildings and measures aimed at lowering energy consumption in buildings are identified as a key sector for such demand reduction. Alongside a need for revising laws and regulations, upgrades to heating systems and insulation as well as selecting heating systems based on “economic interests of the country” are highlighted. The report states a preference for regional and district heating if possible and also calls for investigating measures to “raise the safety of energy supply in individual buildings” (Finnish Energy Policy Commission 1976:7)

In the Finnish context, the need for residential heating has increased with the expansion of the residential building stock after the war period and throughout the 1950s and 1960s. At the same time, increased

indoor temperatures were seen to relate to increased standards of living in a period during which cheap energy was available. The oil crisis of the early 1970s prompted a need to re-evaluate the development of energy used for domestic heating and the establishment of energy saving goals, including a lowering of indoor temperature, better mechanisms for regulating indoor temperature as well as developing energy efficiency and upgrading of the building stock. These measures were seen as beneficial for increasing overall energy savings potential (Energiapolitiikan neuvottelukunta 1974: 11, 12 & 102).

The early 1970s saw slowly evolving changes to the heating system. The share of district heating in the Finish heating system increased in the early 1970s from 11% in 1970 to 16% in 1973 while electric heating was still a niche solution with a share of 3%. In the early 1970s coal was also no longer a dominating fuel in the heating system. In building-specific heating systems coal only played a marginal role (standing at 0,5%) while in district heating it featured mainly in the heating system of Helsinki (Suomen Energiahuolto 1975-1985, 1974: 12ff) where coal was used up to 2023 (Helen 2023). The increase of the share of district heating (based on coal in Helsinki and mainly oil in other locations) was expected to increase throughout the 1970s and 1980s beyond urban areas also to semi-urban areas (Energiapolitiikan neuvottelukunta 1974: 44). The increase in the share of district heating solutions was seen as favourable especially for the capacity to develop CHP (Energiapolitiikan neuvottelukunta 1974).

The oil crises prompted an increased competitiveness of wood, however the share of wood in the heating system was expected to continue to decline. Similarly, the share of oil heating was expected to sink to 50% by 1985, which in line with increased total energy amounts on heating would still mean a rise of 0.7% per year (Energiapolitiikan neuvottelukunta 1974: 12ff).

In addition to the heating discussion, the oil crises also meant a refocusing on the question of the level of domesticity of energy sources, stressing that a high share of domestic fuels should be strived for and upheld. At the same time, the strong connectedness to international markets and their price fluctuation also meant that the need for stockpiling was stressed (Energiapolitiikan neuvottelukunta 1974: 103&106).

A consequence of rising oil prices was their impact on the costs of oil heating. A committee report on oil and electric heating published in 1976 concluded that both forms of heating in semi-detached and detached houses were close to each other in economic terms and thus neither should be favoured in decision making. In the report it is stressed that respective representatives of the oil and electricity sector had differing viewpoints on the cost parameters used in compiling the report. The report goes on to note the need to further explore how electricity demand for heating can be guided to avoid contributing to

peak loads as well as clarifying the security of heating supply for semi-detached and detached houses in times of crisis. The report also notes, in addition to economic parameters, the importance of other societal viewpoints, including costs of broader infrastructure development needed as well as environmental impacts, impact on crisis economy as a need to evaluate the share of domesticity of fuels (Energiapolitiikan neuvottelukunta. Sähkö- ja öljylämmitysjaosto 1976).

While environmental impacts were evaluated as part of the report, they were not included in the economic comparison due to difficulties in quantifying their economic impact (Energiapolitiikan neuvottelukunta. Sähkö- ja öljylämmitysjaosto 1976: 4). The question over benefits and drawbacks of different heating modes in terms of crisis was forwarded to the “Council for Security of Supply and Infrastructure and it was noted that no such considerations yet exist with the committee recommending that this question be explored further. Drawing out differences between oil and electric heating, the report sees more favourable conditions for oil heating in cases of larger spaces to be heated and in colder climates; electric heating then is seen as more favourable in smaller units with lower heating needs. Small scale district heating is seen as most cost-efficient solution the larger the heat amount needed is (Energiapolitiikan neuvottelukunta. Sähkö- ja öljylämmitysjaosto 1976: 5)

The debate over the costs of oil and electric heating also carried over in the public debate (HS 1976a; HS 1976b) as well as letters to the editor on the topic, discussing the rising costs of oil heating (HS 1975a), the impact of type of housing on the preferable heating mode (HS 1975b), to pieces questioning the role of electric heating in Finland overall (HS 1974).

Discussions on energy savings and their impact dominated the early 1970s, with reports on fears over running out of oil leading to rationing and low indoor temperatures, bringing back memories of rationing during war time (HS 1970). The energy crisis also meant a national energy savings programme that also included a dropping of indoor temperatures to 20 °C in residential buildings (HS 1973a). At the same time, later on energy savings were also framed as contributing to avoiding wasting energy by lowering indoor temperatures to 17-19 °C alongside improving the building stock to improve energy efficiency (Öller & Rautio 1978). Contributions to the public debate also focused in on the fact that indoor temperatures had consistently increased in homes and questioned whether indoor temperatures had gotten too high (Kettunen 1973).

The energy crisis and the associated high prices for energy and, by extension heating, also increased the public interest in different modes of heating, such as houses using solar energy as well as ground heat in addition to oil and electricity (HS 1979) and first experiments with heat pumps (HS 1973b).

The oil crisis as a defining feature of energy politics in the 1970s and beyond created some momentum to move away from oil-based domestic heating systems. At the same time, discussions on the potential of increasing the use of domestic fuels in the form of biomass in domestic heating gained ground as these fuels were seen to increase not only independence from international energy shocks but also as increasing the overall resilience of the energy system and replace oil with renewable energy in the energy system (Peltola 2011).

The energy crises of the 1970s also moved domestic heating and its impact on day-to-day life as well as its various technological solutions and their associated economic impacts to the centre of the discussion. In addition, discussions on energy savings and energy efficiency became a mainstay of the public debate.

5. 1980s: Heat pumps and debates about the role of electric heating

The energy programme of the 1980s was shaped by the experiences of the political and societal impact of the oil crises in the previous decade and identified energy security, an efficient use of energy as well as increasing the use of domestic sources of energy in order to increase resilience as key goals (Energiapolitiikan neuvosto 1982). The energy programme also expands on the understanding of domestic energy sources and highlights the potential for solar energy as well as heat pumps in the provision of domestic heating. The use of domestic fuel in heating systems in newly built housing was also supported by making available higher loans if used in new construction (HS 1980a). Referring to energy savings the need for energy efficiency as a key component is highlighted, including the plan to use individual meters for heat consumption in flats and terraced houses to encourage efficient energy use (Energiapolitiikan neuvosto 1982:10; HS 1981a).

The theme of energy savings continued as a central feature of energy policy considerations and a report by the Energy Savings Committee from 1980 identified residential buildings and households were identified as holding large savings potential (Energiasäästötoimikunta 1980:3). The report repeats an

observation already made in the 1970s – that while energy efficiency of buildings had improved, the overall energy consumption had not lowered significantly due to an increased standard of living and high indoor temperature (Energiasäästötoimikunta 1980: 55). Here, the role of individual households in contributing to energy savings by being aware of their energy consumption has been highlighted also in the public discussion at the time (Uusitalo 1980).

The key role of residential buildings in enacting energy savings in line with broader national energy goals was also underlined in a committee report on the Housing Energy Programme for 1981-1990 (Asuntojen energiaohjelmatoimikunta 1980). The Housing Energy Programme report identifies goals related to energy demand alongside goals related to energy management as key, while also highlighting that these are connected to other policy goals in housing, namely a good quality living environment, good habitability, as well as affordable housing costs (Asuntojen energiaohjelmatoimikunta 1980: 1). The report notes the role of practices and usage patterns of residents in achieving energy patterns and sees a central role for sparking an interest in energy saving measures with residents that should be aimed specifically at the lowering of high room temperatures as well as a prudent use of electricity and water (Asuntojen energiaohjelmatoimikunta 1980: 8). Domestic solid fuels are given a key role in providing heat to residential buildings in sparsely populated areas (Asuntojen energiaohjelmatoimikunta 1980:5)

The 1982 energy policy programme also supported an increase of burning wood and peat as well as highlighting the potential for including heat pumps and solar energy in domestic heating systems – this also shows the ways in which changes to ways of heating are inextricably linked to broader changes to the energy system not only regarding fuels and their share but also regarding the degree of centrality of the energy system. It also links up with the wider goals of energy policy at the time.

Discussions on the role of electricity in heating continued in the public as shown in asset of letters to the editor on electric heating, with opposing views labelling electric heating as wasteful (HS 1982b), and others arguing in support due to electric heating being useable also in more rural areas (HS 1982a) without the negative impact on air quality that for example wood and peat bring (HS 1982c). News reporting also focused on tangible advice for consumers, e.g. by comparing the costs of a variety of different heating systems concluding that heat pumps are one of the most economic solutions, but also highlighting that new technologies work best in new buildings with older buildings possibly needing to rely on hybrid systems (HS 1981b).

The political goals of increasing the share of renewable energy in the domestic energy system were not realised, and instead a decrease in oil prices from the early 1980s onwards meant a return to oil-based systems alongside an uptake in the use of natural gas due to expanding infrastructure (Peltola 2011). Peltola (2011) highlights that reasons for the failed wider adoption of biomass-based systems in heating were technical and logistical in nature. In addition, rural areas saw a return to wood-based heating systems in farmhouses motivated by rising oil prices and a government loan system that supported the renovation of heating systems (HS 1980b).

At the same time, after a first uptake of heat pumps and the development of a small-scale heat pump industry, the sector faltered. Alongside technical issues (Heiskanen et al. 2011, Majuri 2016) and a still existing conviction that the Finnish climate is too cold for heat pumps (Hyyalo et al. 2018), a drop in oil prices also contributed to these developments (Sovacool et al. 2019).

6. 1990s and 2000s: An increased focus on climate and environment: biomass and heat pumps

The early 1990s were characterized by the impact and consequences of a heavy recession. After the introduction of carbon taxation in Finland since 1990 (Vehmas 2005) and the establishment of the goal of increasing the share of renewable energy as well as the use of forest fuels (Peltola 2011), the Ministry of Trade and Industry launched programmes aimed at supporting the technological development of bioenergy solution followed by a sub-programme aimed at supporting small-scale bioenergy businesses though the role of this programme has been evaluated as being marginal in the overall technology programme. Still, it supported a change of perspective on bioenergy from household-level firewood usage to a local business activity in line with national environment and climate goals as well as business development targets (Peltola 2011). Peltola (2011) notes that despite the national drive to connect an increased use in biomass to climate and environmental goals, local debates focused on issues of improving forest management as well as the role of bioenergy in promoting rural livelihoods. Here, also the framing of bioenergy as a source of pride for rural areas has been noted (Åkerman et al. 2005).

The re-entry of biomass in the Finnish energy system overall and the heating system specifically was also guided by a conviction that a stronger focus on solutions using biomass would be key in the reduction of

CO₂ emissions, thus expanding the set of political drivers beyond questions such as energy security and increased self-sufficiency (Peltola 2011).

The National Climate Strategy of 2001 introduced the goal of decarbonising the heating sector. This goal was carried over into subsequent climate strategies as part of an overall push by consecutive governments to switch to renewable systems and decarbonise domestic heating (TEM 2001). In line with this overarching goal, 2001 saw the tightening of energy efficiency requirements of new houses and the introduction of a tax deduction on labour costs that supported a push in increasing the number of installed heat pumps (Lauttamäki & Hyysalo 2019). At the same time, this tax benefit was not designed specifically for heating systems alone and, by its structure as being applicable to labour costs, meant that not all citizens had the same possibility to benefit from it. A more support scheme also targeted at heat pumps were energy renovation grants available between 2003 – 2005 (Kern et al. 2017).

The share of ground-source heat pumps in newly built detached houses grew from 4% in 1997 to 29% in 2008 (Motiva 2024). In the same year, the Finnish government set a goal for the installation of heat pumps to provide 5 TWh by 2020 (TEM 2008). Further supporting the uptake of heat pumps was the establishment of SULPU, the Finnish National Heat Pump Association, in 1999. SULPU has been successful in ensuring heat pumps are eligible for public support schemes and in getting heat pump technology recognized as renewable energy source (Heiskanen et al 2011). In addition, Lauttamäki and Hyysalo (2019) highlight the role played by increasingly ambitious energy and environment policies (also reinforced by the Finnish accession to the EU in 1995) pushing taxes on non-renewable energy sources higher, the liberalization of the electricity market starting in the mid-1990s leading to more varying electricity prices as well as overall increases of costs for established heating modes to support the uptake of heat pumps. Also information campaigns and the sharing of knowledge supported the uptake of heat pumps (Hyysalo et al. 2013).

In addition to support the uptake of new technologies, measures also increasingly focused on phasing-out oil-based heating systems, with subsidies for the replacement of oil-based heating systems introduced in 2003 (Kern et al. 2017).

7. 2010s: Ambitious carbon neutrality goals and discussions on energy poverty

The goal of decarbonizing the heating sector was also included in the climate strategies published in 2013 and 2017 (TEM 2013; TEM 2017). The reduction of carbon emissions from fossil-fuel based heating was central in the 2010s. In 2019, Finland's Integrated Energy and Climate Plan set the goal for carbon neutrality by 2035 in addition to becoming the world's first fossil-free welfare society (TEM 2019). Achieving this goal was seen as based on previous climate strategies as well as broader government measures including the phase-out of coal in energy production by 2029, a phase-out of using oil for heating in the early 2030s as well as halving of the use of peat in energy production by 2030 (TEM 2019:12). The connection between fuel choice and preparedness was highlighted in the strategy, pointing to the role of solid wood fuels especially during winter times with high levels of heating demand (TEM 2019:46).

In 2018, Helsinki announced plans to be carbon-neutral by 2035. Decarbonising heating was key here given that carbon emissions from heating stood at 56%. In addition to targeting an increase in the share of renewables in the system and phasing out coal from the district heating system, Helsinki early on also looked to use information campaigns, provision of advice and inclusion of citizens in its activities as this was seen as vital in achieving ambitious targets (Juupaluoma 2018).

Impacts of rising electricity prices also shaped the public discussion in the 2010s. After a period of lower electricity prices in the early 2010s, electricity prices picked up from 2015 onwards which was attributed to low water levels, impacting on hydropower, as well as increasing taxes on fossil fuels. In addition, transfer fees saw an increase also contributing to higher electricity bills for end customers (Hartikainen 2019). The public debate highlighted the high possibility of individual customers as well as housing companies in lowering their utility bills, with a special focus on heating costs given their high share in total utility costs. Here energy savings were seen as smart actions avoiding energy losses (18.11.2018 Helsingin Sanomat no 312).

The concept of energy poverty also entered the political debate in the 2010s with two reports by the Ministry of the Environment on the topic (Oja et al. 2013, Runsten et al. 2015). The 2013 report acknowledges that energy poverty as such has, up to this point, played a minor role in the political debate and states that extreme forms of energy poverty, mainly lack of heating supply, have not been observed

in Finland due to its strong social support networks. The report notes that energy poverty is not formally defined in Finland and that energy poverty can present itself as a variety of connected problems, including savings in other areas of spending in order to be able to pay energy bills, increased heating savings that in the long run can lead to moisture and mould problems in buildings negatively affecting health, building up of debts if households cannot afford to pay energy bills, as well as limited mobility and possibility to use necessary services if the financial upkeep of a car is not possible (Oja et al. 2013). Looking to fuels, the report highlights that electricity and oil are usually the most expensive in upkeep due to high and fluctuating energy prices. A key role in preventing as well as alleviating energy poverty is given to social security benefits that support housing and utility costs, as well as to energy advice and energy efficiency in lowering energy use. A key identified issue here is that energy efficiency and price are not seen as guiding actions sufficiently (Oja et al. 2013).

The second report on energy poverty focuses on the connection between heating systems renovation and energy poverty risk in the case of low-income homeowners (Runsten et al. 2015). The report assumes a risk group of 60 000-100 000 households in Finland, mainly living in unrenovated apartment buildings from the 1960s and 1970s, in oil-heated detached houses, and in unrenovated houses built before 1980. Regions with the highest risk of energy poverty are those experiencing population decline (Runsten et al. 2015). While elderly people are seen as being especially at risk of energy poverty, the report restates the earlier assumption that energy poverty is overall a rare phenomenon in Finland due to strong social security networks. A key tool in lowering the risk of energy poverty as well as preventing it all together is seen in developing financial instruments such as government backed loans or support schemes where investment costs are paid from the energy cost savings achieved (Runsten et al. 2015).

Thus, while increased climate ambitions mean a need to decarbonise heating systems, including via the renovation and upgrade of existing heating systems, the 2010s also saw a stronger acknowledgment of the possible pressures faced by low-income households that are at the risk of energy poverty or are financially not able to participate in the low-carbon transition unless they are able to access support schemes supporting them in making the necessary changes to their domestic heating systems.

8. 2020s: Multiple crises affecting domestic heating

The theme of energy poverty carried over into the 2020s when multiple, partly parallel crises affected domestic heating. This multiplicity of crises, including rising energy prices, inflation pressures and the war in Ukraine, lead to overall prices pressures on heating provision felt by citizens and centred discussion on costs and access to sufficient heating also in the public debate.

While at the time of writing existing data showed low energy poverty rates in Finland compared to other European countries and similar to those of Sweden (Castano-Rosa et al. 2022), there have been calls to actively reflect on the possible impact of rising energy prices on energy poverty levels (Martiskainen 2023). This is of key importance as changes underway might not be captured in statistics yet. However, as the reports on energy poverty show, a key component in the addressing energy poverty in Finland has been in pre-emptively addressing root causes. In addition, a renewed debate on how to define energy poverty seems to be necessary in designing and implementing support mechanism for households as decarbonizing heat is also key in reaching decarbonization targets.

A related issue is that of energy needs for cooling and the possible emergence of summer energy poverty (Castano-Rosa et al. 2022). The Finnish Integrated Energy and Climate Plan assumes that combined energy demand for heating and cooling needs will decrease due to energy savings in heating exceeding energy needs for cooling (TEM 2019). At the same time, heating system renovations that are sought after by consumers for their ability to provide cooling – such as heat pumps – are financially often out of reach for low-income households unless support schemes put their acquisition within reach. This also highlights the justice component of accessibility of up-to-date technology that also ensure a comfortable indoor temperature level – both in winter and summer.

In the case of single-family homes, hybridity continues to be a defining feature of domestic heating systems in Finland. Here, especially the combination of electric heating, wood heating and air-source heat pumps is prevalent (Numminen et al. 2023). At the same time, the uptake and combination of more individualised heating systems also puts pressure on the existing district heating network, especially when considering that opting out of district heating, especially in urban areas, is often the prerogative of financially well-situated households. This raises questions over distribution of heating costs in society at a time when also external pressures contribute to rising district heating prices.

The war in Ukraine also affected the Finnish heating system. In the case of district heating, the stop on imports of natural gas, electricity, and biomass from Russia impacted the fuel structure, with natural gas being replaced by coal and oil, and the cost of district heating increasing (Energiatieteollisuus 2023; YLE News 2022). The steady increase in prices of district heating puts pressure on the system especially in a situation where households are able to, increasingly taking up individual heating solutions. A more volatile energy situation has also meant a further uptake of installed heat pumps (YLE News 2023).

Energy, and especially electricity prices and their impact on domestic heating have been visible in the public debate. Already prior to the further rise in prices after 2022, electricity prices in Finland had been on an upward trend while spot prices were at times highly volatile (Löytymäki 2021, Lassila 2021a). Spot-prices fluctuated between being negative (Hartikainen 2020) to being the highest in Europe (Lassila 2021b). Those customers on spot prices using electric heating were especially exposed to the rising costs of heating with reports highlighting practices such as switching the heating off or reducing it to the absolute minimum as well as dressing in multiple layers of clothing indoors (Keski-Heikkilä 2021; Kuokkanen 2023; Koski 2023). This public debate again brings the issues of accessibility to heat, cost of heating to the fore. It also brings with it the inherent questions of who is most affected by high heating costs and who is able to actively invest in changing their heating system and thus taking control of heating costs.

9. Conclusions

The development of domestic heating in Finland is characterised by a set of recurring, cross-cutting themes that persist irrespective of the predominant way of heating homes or the nature of heating transition underway. The timing of these transitions is intricate, as they do not occur in a linear sequence. Instead, also due to the long lifespan of heating systems, a complex picture of phasing heating systems in and out emerges. This pattern is not solely reliant on what is seen to be the most appropriate heating system at a given point in time, but also hinges on historical precedents and the degree to which citizens can and are willing to engage in and expedite these transitions.

The historical narrative sheds light on a set of cross-cutting themes that shape transitions in domestic heating and how these changes are received and discussed by the public.

A first theme is the value attributed to hybrid systems. The availability of diverse systems, ideally adaptable to be used with domestic fuels, significantly impacts both energy security and societal resilience. Concurrently, this brings up questions about an efficient use of resources as well as the economic means needed for the installation and upkeep to either upgrade the full heating system or add a new component, such as a heat pump, to an existing system. While a resilient heating system requires a certain degree of hybridity, realising such a system needs a careful consideration of how to best support these changes in an equitable way. Biomass plays a key role in the Finnish heating system to increase resilience and domesticity of fuels used for heating. At the same time, there is a need to consider the ecological impact of using biomass in heating and being able to reach the ambitious goal of carbon neutrality by 2035.

The cost and affordability of heating is a theme that carries through the historical narrative. This is exemplified by the political and public debates on heating in war time, the respective costs of oil and electric heating in the 1970s and 1980s, debates over electricity prices in the late 2010s and early 2020s as well as debates over support schemes for renovating or upgrading heating systems. Cost has also meant increased attention to the issues of energy savings and energy efficiency. Cost has also meant increased attention to the issues of energy savings and energy efficiency with customers being encouraged to be conscious of their energy use and use individual actions, such as lowering indoor temperatures, to save costs and reduce the overall energy demand. This shows that heating transitions are, in most cases, not straightforward processes of switching fuels or technologies but instead come with a myriad of consequences. The socio-economic status of users not only impacts on their position in relation to discussions on prices, but also influences who can participate in heating transitions, either because they have the financial means or are able to access support schemes, and which groups of society are disadvantaged due to their economic status and excluded from participating in these changes.

The phase out of oil heating and the associated complexities of how to support this transition in the best way is an example of a complex transition. Oil heating only entered Finnish heating systems after World War II yet became fast an established mode of heating. Yet, as a consequence of the energy crisis of the 1970s and the associated rising energy prices, other heating forms also entered the market. With the increasing attention being paid to the environmental impacts of fossil fuels from the 1990s and accelerating from the 2000s onwards, measures to phase-out oil-based heating intensified. Yet, reaching the goals of phasing out all oil-heating systems by 2030 relies on designing suitable support mechanisms that are financially accessible also to lower income households.

While Finland is now renowned for its successful uptake of heat pumps into the heating system, this process has been far from straightforward with first attempts already stretching back to the 1970s and 1980s that saw the nascent industry falter. Only through a combination of an increased focus on renewable heating solutions, lobbying efforts and support schemes did heat pumps reach their current level diffusion in the Finnish heating landscape. Thus, persistence is needed to enact far-reaching changes. At the same time, as the discussion on energy poverty has shown, new technologies, including heat pumps, are still out of reach for low-income households. This can bring with it an exacerbation of inequalities when looking to possibly increasing cooling needs in Finland in the future.

The development of district heating has been key in the overall development of domestic heating in Finland. It is seen as an efficient, easy way of heating homes, yet the changing heating landscape also puts pressure on the district heating system. The challenge here is dual – increasing prices and in increased uptake of individualised heating systems by those households able to access them. This brings with it questions for the future design of support schemes for heating renovations such as whether individualised solutions should be supported in areas where district heating is available and which type of support mechanism should be favoured.

Energy poverty has been a late entrant to the Finnish debates on domestic heating yet given the challenges facing the decarbonising heating system in types of multiple crises it is here to stay. There is a need to better define what energy poverty means in the Finnish context in order to be able to tailor policy measures aimed at targeting existing energy poverty and preventing a rise in energy poverty levels. This work should also connect to the work on energy justice in developing the heating system, such as the mentioned need to critically evaluate the scope of support mechanisms in order to ensure an equitable, society-wide heating transition. Here, a deeper understanding of how these transitions have been experienced by citizens is indispensable in ensuring a holistic view of past heating transitions. The JUSTHEAT project looks to enrich past perspectives via the collection of oral histories that capture individual experiences with home heating. This increased understanding of the complexity of past domestic heating transitions in turn supports a more nuanced understanding of current heating transitions.

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