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Heating & Cooling Strategy, Call for Evidence – Finland / Finnish Energy

Finnish Energy welcomes the update of the heating and cooling strategy as a top-down strategy to decarbonise heating as to ensure cost efficient transition to climate neutral future. Finland showcases as a great example how to phase out fossil fuels whilst simultaneously building our capabilities for sector integration and district heat electrification. There is a large potential for decarbonisation of European heating sector through district heating and how the heating sector can help in balancing Europe's future energy mix.

District heating can be the backbone of any energy system, providing:

- **Emission reductions and support for climate targets,** driven by competitive markets, successful emissions trading scheme (ETS) and decrease of electricity tax for district heating.
- **District heating provides flexibility to the energy system –** it prevents the price spikes and brings stability to the energy markets. This is done by smart electrification, system integration and different innovative forms of flexibility offered by district heating (incl. energy storages, biomass- and waste-based CHP).
- **Integration of multiple sectors into an efficient system.** District heating connects the electricity system, industry, and buildings into one efficient whole. It creates new business models that drive decarbonisation in the sector which benefits the customer.

Nordic countries have demonstrated, converting from fossil heat to the use of bioenergy and waste heat from industry and businesses, utilising heat resources that otherwise would be lost, inlc. waste heats from waste incineration. The EU legislation must support ramp up and long-term usability of clean energy in district heating including bioenergy, large-scale heat pumps, electric boilers, heat only and CHP nuclear SMRs and heat from waste incineration. Technology neutrality, smart electrification, taking advantage of district heating concept and system integration should be in the main focus of H&C strategy.
District heating provides energy storages of increased importance and value through the large thermal storages connected to the district heating systems. District heating and the flexibility of these systems have high impact to the electricity system. District heating's flexibility is key to successful clean energy transition in Europe.

Emission reductions and support for climate targets

- Finland's district heating sector is rapidly decarbonising, with non-combustion-based heat production, electrification of heating, and the use of waste heat and heat pumps steadily increasing. The change is driven by market competition, supportive policies, and the unique ability of district heating networks to transfer and utilize industrial waste heat.

By 2030 non-combustion-based heat production accounts for nearly half of Finland's district heat production. Finnish district heating has been and still is undergoing a significant transformation. Electrification of district heating has been gaining momentum during and after the European energy crisis of 2022–2023 as fossil fuels were first primarily replaced by biomass. Since 2015, the use of waste heat, heat pumps and electrification has grown steadily.

> ***Evidence:*** The growth of decarbonisation in Finnish DH is driven by both commercial and technical factors. District heating companies operate in a competitive market and must minimize production costs. As fossil fuels are subject to high national taxes and EU Emission Trading System costs, the decrease of electricity tax for district heating has been extremely important to support the investments to heat pumps and electric boilers.

> ***Evidence:*** In Finland industrial areas are typical producers of waste heat, while residential areas are typical beneficiaries of heat. District heating is the only feasible way to transfer waste heat from one place to another. There is a huge potential of district heating to serve as an energy platform for utilizing waste heat from energy-intensive industries. District heating networks can be used to utilize waste heat from, for example, hydrogen production and data centres, transfer it to customers who need heat, and reduce primary energy consumption.

Decarbonisation potential of energy-as-a-service to industries

- Energy-as-a-Service (EaaS) models and long-term cooperation between Finnish district heating companies and industry are driving industrial decarbonisation and electrification.

In Finland, district heating companies and industries have co-operated for decades. The main ways this has taken place are joint venture investments and operation (CHP plants have been invested and built together), industries connected to the heat production unit producing both industrial steam and district heating, and energy-as-a-service companies providing energy production services on industrial sites. One key challenge on industrial decarbonisation and electrification are the payback times of required from their own investments. **Energy-as-a-Service** (EaaS) has been utilized to further support industrial decarbonisation and electrification in recent years as they are fine with longer payback times than the industry and widening the number of feasible projects. It allows customers to outsource their energy needs—such as heating, cooling, electricity, water solutions or energy efficiency upgrades—to a service provider who installs, owns, operates, and maintains the energy systems. Energy-as-a-Service (EaaS) model delivers a complete, outcome-based solution—covering design, installation, ownership, operation, and maintenance—while charging based on energy performance or usage rather than just equipment rental.

> ***Evidence:*** In Finland, EaaS-companies have been the primary driver of industrial electrification investments. Commission should ensure that EaaS-providers are recognized in legal framework as eligible solution. They should also be eligible for EU and national support schemes with even terms with companies own investments.

District heating as a flexibility provider

- District heating supported by flexible electricity generation and smart electrification, plays a crucial role as a platform integrating multiple sectors, stabilizing energy markets, and accelerating the clean energy transition through significant investments in electric boilers, heat pumps, and cogeneration plants.

Investments in low-variable-cost electricity generation, such as wind and nuclear, have lowered average electricity prices, although volatility has increased. This shift has made flexibility a valuable asset in the energy markets. Flexible use of electricity has become key player in heating solutions as wind power generation was increase 37% in 2024, Finland has one of the lowest electricity prices in Europe and the number of hours with negative or zero electricity price has grown sharply.
District heating integrates multiple sectors into an efficient system as it connects the electricity system, industry, and buildings into one efficient whole. Smart electrification through district heating refers to the strategic and flexible integration of electricity into district heating systems to optimize energy efficiency, grid stability and infrastructure use, and decarbonization. It encompasses both electricity consumption (via electric boilers and heat pumps) and electricity production (via CHP plants), forming a bidirectional interface between heating and power systems. District heating can help electricity markets by smart electrification and with DH ability to utilize and combine multiple different heat sources.

> ***Evidence:*** Finnish district heating companies have been investing and are investing 3 GW to electric boilers and heat pumps in couple of years. Not many other industries are able to get of flexible consumption to the electricity markets in a short timeframe (maximum demand of Finnish electricity system has been about 15 GW, hence new build 3 GW flexible consumption asset is significant considering the size of the market).

Cogeneration plants - balance the electricity system in connection with heat production when the demand is highest. DH networks with cogeneration have a combination of renewable biomass and electricity-based capacity helping Finland reach very high share of non-fossil-based electricity generation. Heat storages and flexibility the district heating systems are balancing the energy system.

> ***Evidence:*** Data from the TSO of Finland demonstrates the interaction between wind power production and use of electricity in district heating production.

Reliable heat and balance to the energy system

- Biomass and waste are still essential heat sources in the future, serving as a weather-independent energy source that complements the variability of wind and solar power.
- Heat only and CHP SMRs should be considered as heat sources in the future.
- There is a high potential in district heating systems to enhance energy efficiency.
- District heating reduces the load on the electricity distribution network.

Biomass - is derived mainly from by-products of the forest industry and sustainably sourced forest chips. It reduces dependence on fossil fuels and foreign electricity imports, thereby improving energy security. Biomass CHP-production follows the electricity spot price, increasing output during high-price periods. Biomass is especially used during peak production times when the electricity system cannot meet heating demand spikes, such as cold and windless spells.

> ***Evidence:*** Finnish DH companies are maintaining CHP capacity and investing in heat storages, electric boilers to enable active participation in electricity markets.

Waste incineration – In Finland all waste incineration plants are designed to generate energy for use. Waste incineration reduces dependence on fossil fuels and enhances energy security, especially during peak demand periods. Waste is incinerated in highly efficient CHP-plants because it is a necessary and regulated part of the waste management system that also enables energy recovery and supports district heating—particularly when no other suitable treatment method is available. With or without district heating connection, this waste would have been incinerated regardless, use of this waste heat must be part of strategy.

> ***Evidence:*** Finnish companies are investing in sorting plants, waste collection and thermal storages to use the inevitable waste heat as district heating in highly efficient CHP-plants.

Heat only SMRs - provide a continuous, local supply of clean heat, helping cities move away from fossil fuels and other combustion-based methods. By decoupling heating from the electricity grid, heat-only SMRs support renewable energy systems, especially during winter when solar and wind output is limited. The compact design and low operating pressure and temperature make it easier to deploy in urban areas with high safety standards. In addition, a CHP SMR (Small Modular Reactor) would help reduce pressure on electricity grid expansion, as it enables the simultaneous production of clean electricity and district heating near cities. To accelerate the deployment of clean heat solutions for Europe, small modular reactors (SMRs) should be eligible for EU Innovation Fund financing—just like other non-market-ready technologies such as hydrogen and carbon capture. Although market based investments are the best way to proceed, the first-of-a-kind SMR projects must not be delayed due to lack of financing and public funding.

> ***Evidence:*** Several cities in Finland have started permitting and planning projects in aim to accommodate SMR heat in district heating networks.

Lower temperatures in district heating networks - enables higher energy efficiency of heat delivery and production of district heating. In existing district heating networks, there is high potential to enhance energy efficiency. Finnish Energy recently updated its national design guidelines for customer substations to enable lower delivery temperatures in existing networks to accommodate high volumes of heat from heat pumps and electric boilers.

> ***Evidence:*** Record amount of waste heat and heat from heat pumps has been utilized to provide district heating for customers. The district heating network losses in heat delivery are comparable to electricity networks due to design and operation.

Electrification of heating and electricity networks - Finland's strong electricity grid used to be a key enabler of electrification of heating sector and industry. As the rush for electrification started we have seen that it is very difficult to maintain necessary investment levels and slow permitting of projects (and very slow processing of complains and appeals of permits) has become major barrier for fast electrification. Historically favourable investment conditions have allowed the grid to accommodate new loads and support infrastructure upgrades, although recent regulatory changes have weakened this environment. This also highlights the importance of district heating as part of the energy system, as district heating networks are capable of supplying a significant amount of energy, which at the same time reduces the load on the electricity distribution network.

> ***Evidence:*** Waste heat from industry and data centres, where many new facilities agreed to supply waste heat to district heating systems, is stalled as electrical connection possibilities are barrier.

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Benefits of free competition in Finnish heating and cooling markets

- Customers freedom of choice fosters innovation and encourages service providers to improve efficiency, sustainability, transparency and customer service.
- Market-driven model also supports the integration of new technologies and business models.
- It is essential to simplify EU legislation and to have more strategic approach as some major barriers to smart electrification and system integration of heating comes from the legal framework.

Maintaining a level playing field through technology-neutral and cost-effective policies is essential to ensure that competition leads to optimal outcomes for consumers, the environment, and energy security. Finnish heating and cooling market is fundamentally unregulated and competitive. District heating companies operate on commercial terms and are not obligated to connect customers or producers to their networks and customers are free to choose their preferred form of heating and cooling. The absence of specific legislation regulating heating or cooling methods, pricing, or the right to connect to networks allows market dynamics to shape the sector. While the market is formally free, political decisions—such as taxation, subsidies, emissions regulation, and other policy instruments—still influence the attractiveness and profitability of different energy solutions. DH companies produce heat from the most cost-effective sources available at the time of demand, which incentivizes the use of waste heat and other efficient solutions.

European regulatory framework - One major barrier to smart electrification and system integration of heating comes from the legal frameworks setting a strong emphasis on minimizing the use of grid-supplied energy, at the expense of broader system-level efficiency. This approach can lead to situations where maximizing on-site generation becomes the main goal, rather than optimizing the building's total energy performance or integrating with wider energy networks in a balanced cost-efficient way. This approach will lead to extensive costs on energy system level and to significantly more costly transition to low carbon society.

> ***Evidence:*** In Finland unregulated and market-based district heating systems have proven to decarbonize and electrify heating, stabilize prizing in crisis, and still maintaining the highest market share.

Demand response in buildings - District heating also can utilize the flexibility capabilities of customers. In many cases, customers do not even notice any changes in temperatures whilst the benefit in district heating system can be significant.

> ***Evidence:*** Many companies in Finland have been implementing this through new products that offer customers benefits for agreeing to demand response in heating.

Finnish Energy

Finnish Energy is an association that represents the Finnish energy sector. Our members are electricity transmission to distribution network operators, electricity generators, electricity retailers, district heating and cooling companies and gas (ng, biogas, hydrogen etc.) retail and network companies. Heating and cooling are fundamental to comfort, health, safety, and efficiency in nearly every aspect of life and industry.

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