Joint Nordic PFAS Consultation response

Submitted by

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Sector concerned in this document: energy sector/ heat pump operators / district heating and cooling sector,
Sub-uses concerned: Refrigeration, Applications of fluorinated gases, Air Conditioning and heat pumps, Solvents

Content

Key messages

The Nordic District Heating and Energy Associations

- Oppose the timeline for a ban on PFAS classified F-gases that are used in district heating and cooling, as there is currently no technological or economical viable drop-in alternative available on the market, able to deliver near 100% availability and the temperature ranges needed in most Nordic district heating networks.

- Underline that an immediate ban on the usage of PFAS classified F-gases in existing and new installations, could lead to a switch away from heat pumps in district heating and cooling networks towards less efficient electric and fossil boilers, as well as making it harder to make use of excess heat sources in society, with the accompanied negative socio-economic, environmental and climate effects this would have. This could hamper further electrification of society, as district heating and cooling networks, currently play an important role in freeing up electricity for other purposes. This development would therefore be contrary to the goals set out by the Energy Efficiency Directive and the larger EU strategies, such as the European Green Deal, the RePowerEU and the Green Deal Industrial Plan, as well as the upcoming EU Heat Pump Action Plan.

- Emphasize that the district heating and cooling sector has a long tradition for adhering to the strictest environmental and climate regulations and is well-positioned to safely handle refrigerants containing PFAS. Many of our members already have strict monitoring systems in place, which we believe should be replicated where possible in a customized way.

For existing heating and cooling installations,

- We consider the proposed 12 years derogation for "Maintenance and refilling of existing HVACR equipment put on the market before [18 months after EiF] and for which no drop-in alternatives exist" as a minimum derogation period. Most industrial installations have up to 50 years lifetime and replacing them too early will have negative environmental and economical effects for both consumers and society.

- We strongly recommend instead, the derogation period to be extended for the remaining lifetime of existing installations, as long as operators can prove to have strict customized PFAS leakage monitoring systems is in place to avoid PFAS leakages from district heating and cooling installations.

- Propose that derogation permits must be granted and supervised by a competent authority and renewed every 12 year, on the condition that there is sufficient evidence that drop-in alternative solutions are not available during the next derogation period.

For new district heating and cooling installations, we

- Strongly recommend, due to the non-existence of technically and economically feasible alternatives, a 12-year derogation followed by an independent review and a possible prolongment, in order to give investors some regulatory certainty and not slow down the transition away from fossil heating and cooling in Europe.

- Emphasize the need for a level playing field in the heating and cooling market. The proposed unlimited time derogation for heating, ventilation, air conditioning, and refrigeration (HVACR) equipment installed in buildings, will create a market distortion in favour of less societal beneficial and decentralised heating and colling solutions. This must be avoided, and the derogation therefore also needs to be valid for industrial district heating and cooling installations placed both in urban areas and industrial complexes.

<u>Finally, we would like to underline that we</u>

- Understand ECHA's ambition for a group ban on PFAS classified substances, due to its simplicity compared to independently regulating each substance. but focus must be on compounds and applications that have major impact on health and environment.

- Believe that future heat pump installations and chillers in district heating and cooling should be built with natural or other sustainable refrigerants. However, we know from our members' experiences that more research and development is necessary to make this happen.

- Agrees that the use of dangerous PFAS substances must be minimized and in the long run completely phased out. Only applications that lack viable technical and economical alternatives, and are critical to society, shall be permitted in a transitional period.

Introduction

The Finnish, Norwegian and Swedish Energy and District Heating Associations; Finnish Energy Norwegian District Heating Association and Swedenergy, representing the large majority of Nordic energy companies and suppliers, would like to thank ECHA for the opportunity to provide our views on the proposed PFAS restriction. A proposal that, despite its good intentions, could have damaging effects to the Nordic Energy system, jeopardizing the last decades' efforts to develop some of the world's most advanced district heating and cooling networks and putting the European decarbonization efforts for the heating and cooling sector at risk.

The three Nordic countries, Finland, Norway and Sweden, share many similarities both when it comes to climate, the tradition for strong environmental standards and our dedication towards developing efficient and fossil free district heating and cooling networks. Networks that ease the burden on the electricity grid, by not using electricity for heating and cooling, as well as make it possible to utilise the excess energy sources that surrounds us, such as heat from waste incineration, datacenters, the sewage system, and the air itself, as well as the cold water in our fjords.

Our three organisations, all share the fear that the proposal to restrict PFAS usage before there are real alternatives on the market, is a threat not only to our members and host cities, who have both invested heavily in large heat pumps over the years and are planning large-scale infrastructure projects to decarbonize local heating and cooling. It will also lead to consumer surplus loss and put an extra burden on the environment due to early scrappage of fully functioning installations with little benefits as leaks from professionally maintained district heating and cooling equipment are minimal.

We have therefore decided to deliver a joint Nordic position paper showcasing our unified Nordic view on this issue, backed up by annexes developed individually by each organisation describing the situation in our separate countries. We ask ECHA and the committees reviewing this response to thoroughly consider the material provided, as well as the possible societal consequences of the proposed PFAS ban and the effects it could have on the Nordic energy system and beyond. Our three associations will continue to be available if further information is needed.

District heating and cooling in the Nordics and the effects of a potential PFAS ban

District heating and cooling is an integrated part of the Nordic energy system that has been built up over decades. The sector relies on numerous different heating sources and has led the way towards decarbonization of our society. Today, the same network that previously transported hot water heated by coal is now distributing hot water heated by excess energy from datacenters or the sewage system, and soon heat from green hydrogen production and carbon capture can also be fed into the grid thanks to industrial scale heat pumps. District heating covers +90% of the heating demand in Helsinki, 20% in Oslo and in Sweden, more than half of all heating comes from district heating, and among multi-family houses the share

is around 90 percent. Stockholm and Helsinki are also the homes of the largest district heating heat pump fleets in Europe.

All three countries have either banned fossil heating or is in a phase out-process both for buildings and the district heating systems. In Oslo, the share of fossil fuels in the district heating production has gone from 26% in 2010 to 1,5% in 2022. This has happened by switching to biofuels, combined with the use of large industrial heat pumps making use of the city's excess energy sources.

In Stockholm, the world's largest district cooling system is developed, with more than 250 km of pipelines, based on utilizing the cold water from the sea in combination with large industrial heat pumps. By switching to district heating and cooling, building owners and the city itself gain a number of benefits: the air- and structure-borne noises and vibration caused by cooling equipment are eliminated, the space for cooling equipment becomes free for other use (such as green roofs, energy production or water management), condensing units spoiling the façade of the building are no longer required, and the repair and maintenance of cooling equipment are no longer necessary.

And in Finland, many companies already have or are investing into heat pump capacity, for instance, both Helsinki and Espoo are basing their carbon neutrality plans mainly on electrification and currently host the largest district heating heat pump fleets in the country. Coal is going to be phased out by the end of 2025 and it is going to be replaced mainly by heat pumps. Fortum has partnered up with Microsoft to build new mega scale data centers to Espoo and Kirkkonummi. Fortum has said that circa 40 % of district heat consumption in Espoo could be provided by waste heat from these data centers. This would equal to circa 1 TWh of heat which makes it one of the largest, if not the largest, waste heat utilization projects from data centers in the world.

For buildings, in most cases, the replacement of gas or oil heaters in buildings have been made possible by connecting to the local district heating system. Typically, older buildings with heating systems using local fuel-oil boilers, have heating systems designed for forward water temperatures in the range 80-90 °C and return temperature in the range 60-70 °C. When these local boilers are replaced by a connection to a district heating system, the temperature in the district heating system must be higher than the design temperature of the heating system in the buildings. Thus, the forward temperature in the district heating system must be at least 85-90 °C. This means that most of our Nordic District heating network are classified as high temperature district heating grids, operating normally around 90 °C during the heating season, which sets certain operational and technical requirements for the equipment we use, which current natural cooling blends cannot fulfill.

A heat pump for large-scale production of district heating and cooling has high availability, no to little refrigerant leakage, is well-monitored and has a long lifetime, up to 50 years if well maintained (see annex Norway 2). Contrary to many stand-alone heat pumps, which are operated without maintenance until they break, strict maintenance practices are already in

place to secure near 100 availability of industrial scale heat pumps, as their performance is crucial for the operation of the district heating and cooling grids.

As there are currently no viable alternatives for these in the Nordic district heating systems, a potential ban on PFAS based refrigerant blends could jeopardise the last decades' work, by moving more of the heat production towards less efficient and climate friendly fossil and electric boilers. Early closure of existing equipment will also lead to a welfare loss for consumers, large additional costs and could endanger the profitability of district heating companies, who operate with low margins and long horizons when making their investments decisions.

A ban will furthermore create obstacles for Europe's nascent carbon capture and storage (CCS) industry, as projects in the bioenergy and waste-to-energy sector are planning to utilise the excess heat generated by the carbon capture process and feed it into the district heating system with the help of industrial-scale heat pumps.

This clearly goes against the recent goals and objectives set by the European Union. The REPowerEU Plan encourages frontloading investments in renewables and energy efficiency to reduce fossil fuel imports as well as doubling the current deployment rates of heat pumps in buildings. It also calls for faster deployment of large district heating and cooling network heat pumps. To make this possible, the Commission has announced a Heat Pump Action Plan, which aims to accelerate heat pump deployment and markets in the EU. The European Commission has also promised an EU CCUS Strategy to be presented in Q4 2023 and it is important that the PFAS regulation is developed with the EU Green Deal and these EU objectives in mind.

The Nordic District Heating and Energy Associations are ready to contribute to realizing the goals of REPowerEU, the future Heat Pump Action Plan and the EU CCUS strategy, but strongly believe that existing infrastructure investments need to be safeguarded, while working towards minimizing any potential PFAS leakages, and rolling out heat pumps across Europe.

The PFAS ban – Good intentions but based on the wrong assumptions

The Nordic District Heating and Energy Associations understand ECHA's ambition for a group ban PFAS classified substances, due to its simplicity compared to independently regulating each substance. We also agree that the use of dangerous PFAS substances must be minimized and in the long run completely phased out. Only applications that lack viable technical and economical alternatives, and are critical to society, shall be permitted in a transitional period.

We also agree to the ambition that future heat pump installations and chillers in district heating and cooling should be built with natural or other sustainable refrigerants. However, we know from our members' experiences, as well as through a thorough market screening and discussions with heat pump suppliers (see annex Norway 1), that more research and

development is necessary to make this happen. There are also several safety challenges that would need to be overcome (more below and in annex Norway 3).

Contrary to the statements made by the reputable scholars, e.g. Hafner and Ciconkov[1] and the Heat Roadmap Europe[2], that natural cooling blends are easily technically and economically available in the market, we argue that this is not true for heat pumps operating in high temperature district heating grids, as the few large-scale heat pumps in operation with natural cooling blends suffers from regular break downs, high maintenance costs and struggles to deliver the required temperatures (see annex Norway 1). This means that the PFAS restriction proposal is built on misleading claims, and we believe that the ban can have severe and un-intended consequences for the necessary green European transition away from fossil fuel-based heating and cooling if it is implemented too quickly and before drop-in alternatives are in place.

Health and Safety

We acknowledge the concerns related to the spread of PFAS in society, and would like to underline our commitment towards limiting potential leakages from our industry. Many of our members already have strict monitoring systems in place, which we believe should be replicated where possible in a customized way. Intensive work is already underway to change energy production for reduced climate impact, where existing phase-out requirements according to the f-gas regulation for refrigerants are considered.

We are also certain that the Nordic district heating and cooling industry is more well-positioned to efficiently take measures aimed at secure management of PFAS substances, compared to many other sectors, which do not operate in the same controlled environment as we do. Seen from a socio-economic perspective, we therefore believe that measures for the phase out of PFAS should primarily and in the shorter term be aimed at the industries and areas of the use that account for the largest refrigerant leakage and emissions. For the reasons listed in the document and the attached annexes, the energy sector needs a sufficiently long adjustment, minimum 12 years, period to have the opportunity to reach the climate goals in a sustainable way while harmful substances such as dangerous PFAS are being phased out.

Another important consideration is that HFC/HFO fluorinated gases (F-Gases) as refrigerants are fully contained and function in closed loop systems. Their emissions are subject to rigorous obligatory containment RRMs (on leaks controls, end-of-life collection, and disposal, etc.), under the EU F-Gas legislation. According to the very first words of Article 1 of the F-Gas Regulation, its key objective is the same as that aimed by the Proposal - reduction of emissions, i.e.: “The objective of this Regulation is to protect the environment by reducing emissions of fluorinated greenhouse gases”. According to the European Commission, F-Gas

1 Current state and market trends in technologies with natural refrigerants. Hafner, Armin og Ciconkov, Risto. 2021.

2 Heat Roadmap Europe: Large-scale Electric Heat Pumps in District Heating. David, Andrei, et al. 2017.

legislation is an example of “European success story”.[1] Therefore, uses of HFC/HFO substances are already adequately controlled from the perspective of the main goal of the REACH restriction Proposal. Also, the authorities have already opportunity to require up-to-date monitoring and control system. Therefore a proposed restriction under REACH would be a case of double regulation.

Differentiate between compounds, their function and impacts

The proposed PFAS restriction must differentiate between unnecessary PFAS use with large emissions (non-essential and short-lived products and applications), versus essential industrial use of long-life products and solutions with low emissions. The restriction should also differentiate between PFAS applications for which alternatives already exist and PFAS applications for which there is currently no alternative available and for which specific derogations are needed. This is in line with the article 68 in REACH regulation, which states that any new restriction "must take into account the socio-economic impact, including the availability of alternative solutions".

For essential industrial use of long-life products and solutions assess and legislate how to minimize and eliminate the environment and health impacts by avoiding, collecting, and destruction of leakages.

Derogation periods

Existing installations

We consider the proposed 12 years derogation for “Maintenance and refilling of existing HVACR equipment put on the market before [18 months after EiF] and for which no drop-in alternatives exist” as a minimum derogation period. Most industrial installations have up to 50 years lifetime (see annex Norway 2) and replacing them too early will have negative environmental and economical effects for both consumers and society. Something which is also pointed out in the Annex XV report from ECHA (p. 124)[3].

We strongly recommend instead, the derogation period to be extended for the remaining lifetime of existing installations, as long as operators can prove to have strict customized PFAS leakage monitoring systems is in place to avoid PFAS leakages from district heating and cooling installations.

New Installations

As thoroughly explained in annex 1 Norway, there are no existing technically and economically feasible alternatives to PFAS-based refrigerants today, able to operate in high temperature district heating grids. At the same time, national governments and the EU are betting on heat pumps as a key tool in the ongoing energy transition. It is therefore crucial that the potential PFAS ban, does not create uncertainty for companies that want to contribute to this

[3] https://echa.europa.eu/documents/10162/f605d4b5-7c17-7414-8823-b49b9fd43aea

endeavour by investing in large-scale industrial heat pumps, but who require long horizons to make a return on the investment.

Under RO2, two types of time-limited derogations are considered, five and twelve years. Based on the information provided in the following annexes to this consultation response, it is clear that there are no viable alternatives to PFAS based cooling blends. And while there are work ongoing to develop ammonia, CO_2, propane or Isobutane based solutions, it is not expected that these will be ready for a large-scale market roll-out for high temperature district heating within the next five years. Nor do they offer a drop in solution, as the large differences in molecular weight, and not least in thermodynamic properties, refrigerants such as ammonia, carbon dioxide or propane cannot simply be used in heat pumps designed for synthetic alternatives. Meaning that existing and fully functioning technical equipment would need to be replaced, even though it could have an expected remaining lifetime of up to 45 years (if installed just before the transition period begins).

It is obvious that no company would invest in technology it might be forced to decommission after only five years of operation, and at the same time, there are no functioning technological alternatives. This could force companies to postpone investments until there are, potentially, technology on the market able to deliver the high temperatures required in the Nordic district heating grids, something which could put the energy and climate targets in danger and jeopardize the heat pump roll-out envisioned by the European Union.

Therefore, we propose at least a 12-year derogation period for new installations, followed by an independent review of available drop-in alternatives in the market. This would give investors some certainty for their investments, while keeping the pressure up to further develop natural drop-in cooling refrigerants. If there are no alternatives after 12 years, the derogation should be prolonged with 12 new years, in order not to slow down the transition away from fossil heating and cooling in Europe.

Time-unlimited derogation due to safety regulations

We support the proposed time-unlimited derogation for heating, ventilation, air conditioning, and refrigeration (HVACR) equipment installed in buildings where national building codes or safety regulations prohibit the use of alternatives. We have members in all countries operating district heating centrals in basements of a wide range of buildings, e.g. residential, hotels and offices where the use of natural cooling blends, could become a safety hazard (see annex Norway 3), even though existing rules and regulations do not directly forbid it. Existing energy centrals were specially designed to fit within the parameters of each individual building, and should be able to continue operate to the end of its lifetime, as there are no drop-in alternatives available and that replacing the retiring fully functional equipment before its end-of-life would lead to costs for both consumers and the environment.

It is important to note that this unlimited time derogation should not only be valid for HVACR equipment in buildings, but also for district heating and cooling centrals placed in urban and industrial complexes. If not, there is a risk that HFO chillers/heat pumps, in for example, office

buildings can continue to use PFAS classed refrigerants, but the larger units placed at, or operated by, the utilities that are classified as industrial applications are forbidden to use the same refrigerant. This will create an uneven playing field in the heating and cooling market, favorizing stand-alone solutions over more societal beneficial solutions such as district heating and cooling.

We also risk jeopardising large district heating and cooling projects that are already in the pipeline and part of cities' decarbonisation strategies. For example, currently, our members are planning large investments in central urban areas, such as in energy centrals placed below city parks. As thoroughly explained in the report from Norsk Energi (annex Norway 3), these centrals will also be subject to numerous national and EU safety directives in-directly limiting the possibility of using natural cooling blends, and without the same time-unlimited derogation as for equipment placed in buildings, these projects risk being scrapped or postponed. This is highly critical, as energy centrals need to be planned from the start when an area is developed, meaning that if a company is not able to make an investment decision at the right time, each building in the whole area the planned energy central was supposed to serve, would need to go for other more suboptimal energy solutions, such as stand-alone energy wells, electrical boilers and air conditions equipment.

Business and socio-economic consequences associated with the lifetime of large heat pump systems

With reference to annex Norway 2, on the technical lifespan of large heat pumps, the following appears in the aforementioned external expert opinion from Norsk Energi: With proper maintenance and reinvestment in various individual components, you can expect to operate industrial heat pumps in a district heating system for up to 50 years. If suitable refrigerants are banned, these heat pumps with turbo compressors cannot be converted to natural refrigerants and they will reach the end of their technical life.

Natural refrigerants are normally more toxic or flammable and require higher safety measures. As a result, the entire energy plant may have to be relocated. The investments that have been made in larger heat pump systems represent investment amounts of many hundreds of millions to billions of euros, however, depending on the size of the plant investment. Only in Sweden, it is estimated that a complete switch to natural cooling blends would cost between 3-4 billion euro. Similar figures could be expected in the other Nordic countries as well. Relocation of such large facilities, including expansion of the district heating and cooling system would increase costs further. Use of natural refrigerants in urban areas, could also contribute to making these areas unsuitable for new apartment buildings, as we have seen in Helsinki due to safety concerns[4] (see annex Finland 4). Overall, a ban with the

[4] https://www.helsinginuutiset.fi/paikalliset/6218965

following switch to natural cooling blends could mean an extreme waste of financial resources and limit future urban development.

How the ban will affect EU policy objectives

Currently, there are 17 000 DHC networks in the EU, covering 12% of the heating and cooling market. 70 million EU citizens are supplied by DHC networks, while 140 million citizens live in cities equipped with DHC. Based on national objectives and estimates from the sector to reach national energy and climate goals of selected countries, over 5 million additional households are expected to be connected to District Heating by 2030, while this number is expected to grow towards 2040 and 2050.

Heat pumps have been and will increasingly be the key for decarbonizing the European heating and cooling sector, both for independent buildings and large urban areas. Each building will need to make energy efficiency measures, such as better insulation, energy management and using its surfaces to produce energy. However, it is only district heating and cooling networks that is positioned to make use of excess energy sources such as heat from waste incineration, datacenters the sewage system and sea water, as emphasized by the Norwegian Government-appointed Energy Commission[5]. Going forward, our members are also aiming at recovering heat from new industrial processes such as carbon capture and green hydrogen production. District heating and cooling is energy efficiency on a systemic scale, and therefore crucial for Europe to reach its decarbonization and climate targets.

The REPowerEU Plan encourages frontloading investments in renewables and energy efficiency to reduce fossil fuels imports as well as doubling the current deployment rates of heat pumps in buildings. It also calls for faster deployment of large district heating and cooling network heat pumps.

To make this possible, earlier this year, the Commission announced a Heat Pump Action Plan, which aims to accelerate heat pump deployment and markets in the EU. It will include a partnership between the European Commission, Member States, the sector itself, financial institutions and training providers across the whole heat pump value chain; targeted communication and a Heat Pump Skills Partnership. It will also help focus the ongoing policy work and facilitate access to financing.

In the Forword to the 2023 DHC Insights & trends6, EU Energy Commissioner Kadri Simson writes that;

[5] https://www.regjeringen.no/contentassets/5f15fcecae3143d1bf9cade7da6afe6e/no/pdfs/nou202320230003000dddpdfs.pdf

[6] https://www.euroheat.org/policy/2023-dhc-insights-and-trends.html

"The new rules established in the Energy Efficiency Directive will drive the decarbonisation of district heating and cooling and be a powerful vehicle for clean energy use in the sector.

Delivering on these objectives also requires sharply reducing energy use from new and existing buildings. The Renovation Wave Strategy set out measures aiming to at least double the annual energy renovation rate by 2030; and the ongoing revision of the EU regulatory framework on buildings will be an essential building block in decarbonising heating and cooling. It will increase the rate of renovation, modernise the building stock and allow strong synergies with heat pumps, district heating and other renewables".

The proposed PFAS restriction is putting all this at risk, despite its good intentions, by creating uncertainty for investors, possibly forcing early decommissioning of fully functioning heat pumps, as well as threatening the energy security in heat pump dependent countries such as the Nordics.

Annexes explained

In the annexes, you will find the following information regarding different aspects of the Nordic District heating and cooling systems, an overview of existing installations, technological and operational experiences, lifetime assessments of current installations and a risk assessment of natural cooling refrigerants.

Annex Norway 1: District Heating and Cooling in Europe
Annex Norway 2: Assessment of the technical lifetime of industrial heat pumps
Annex Norway 3: Risk- natural refrigerants in large heat pumps
Annex Finland 4: DHC in Finland, problems of the ban and impacts of the ban
Annex Sweden 5: Swedenergy Consultation response on proposal for a restriction of PFAS

Who are we

Norwegian District Heating Association
The Norwegian District Heating Association represents 50 companies in the production and distribution of heating and cooling, and 80 companies from the supplier industry. The members account for over 90% of district heating production in Norway

Swedenergy
Swedenergy collects and gives voice to around 400 companies that produce, distribute, sell and store energy. Our goal is to develop the energy industry – for the benefit of all, based on knowledge, an overall view of the energy system and in cooperation with our environment.

Finnish Energy
Finnish Energy is a branch organisation for the industrial and labour market policy of the energy sector. It represents companies in Finland that produce, procure, distribute and sell electricity, gas, district heating and district cooling and related services.