Eurelectric response to the SEAC draft opinion on restricting PFAS

Eurelectric consultation response paper

May 2026

Eurelectric response to the SEAC draft opinion

KEY MESSAGES

Eurelectric welcomes the publication of the SEAC Draft Opinion on the Restriction of PFAS. We welcome the fundamental efforts to reduce the use of PFAS and ensure an environmentally conscious approach to protect people and the environment. Given the associated risks of PFAS, it is essential to ensure that regulatory action balances environmental protection with the continued functioning of critical infrastructure and services.

In the European power sector, PFAS groups are currently used in essential, professional and long-life industrial products. Eurelectric represents downstream users who procure power sector components for their operations and do not manufacture these products. As manufacturers are not required to disclose the presence of PFAS in their products, utilities face significant challenges in identifying all instances of PFAS use in their supply chains.

Any proposed restriction on PFAS must therefore consider its potential impact on the availability of electrical equipment used in power generation, transmission, and distribution networks. These components are critical for the decarbonisation and electrification of the Union, which are contingent upon competitiveness and open strategic autonomy.

Eurelectric agrees with SEAC's conclusion that a blanket ban on PFAS would not be proportionate, and we support the implementation of use-specific derogations and socio-economic considerations in establishing such derogations. Moreover, Eurelectric would like to highlight our key concerns and recommendations in response to the Draft Opinion:

Insufficient information to assess substitution potential

- In some cases, SEAC acknowledges there is insufficient information to assess substitution potential. We believe any transition period should be evidence-based, and that insufficient information provides a basis for longer derogation periods.
- We agree with SEAC that the nonexistence of alternatives should not be the sole basis for whether or not a derogation is justified. Additional reasons such as risk of market shortages or safety requirements should also be considered.

Challenges in substitution and derogation assessments

- Introducing alternative products requires a profound operational and technical process that is not feasible within 18 months for many applications. Energy assets are operated under high reliability, durability, and security requirements, with strict technical standards. Even when an alternative technology may exist, implementation, qualification, and in-situ testing require substantially longer timelines than the proposed 18 months.
- Shifting to alternatives would not only affect the products themselves, but would also require extensive re-testing, re-qualification, updates to specifications, audits, workforce training, and adjustments in operational capacity.
- The requirement for strong evidence of low substitution potential as a basis for

derogations is particularly challenging in complex supply chains, where data is difficult to obtain despite high system relevance. A PFAS ban must not lead to a de facto creation of a monopoly. The introduction of any ban should be explicitly linked to the availability of multiple substitute technologies on the market.

Overlap with the FGAS Regulation 2024/573

- Eurelectric agrees that alignment between the PFAS restriction and the F-gas Regulation (2024/573) is essential.
- The development of alternatives to HFC to respond to requirements in the F-gas Regulation, for instance the use of HFOs having lower global warming potential but that can degrade into PFAS, should be covered solely by the F-gas regulation.
- The SEAC opinion does not address the availability of derogations for most PFAS based alternatives to SF_6 in high voltage switchgear. This omission assumes that by the time the PFAS Regulation enters into force, these substances will already have been phased out of the market under the F-gas Regulation. However, SEAC overlooks the potential application of the cascading principle and the possibility of an EU-wide derogation to be issued by the European Commission, which could effectively extend the use of PFAS based alternatives.

Structural limitations of the consultation framework

- The consultation framework does not fully capture the breadth and complexity of PFAS applications in the power system, making it challenging to adequately assess and convey the extensive implications of PFAS restrictions for the electricity sector.
- Many use cases fall outside of defined evaluation levels and are highly challenging to classify within the current framework.
- Questions regarding feasibility of alternatives apply to thousands of individual components across multi-layered supply chains, meaning that multiple-choice responses may apply differently across components.
- The absence of an option to indicate lack of available information limits the ability to provide accurate responses in cases where data is not currently available.

Moving forward, we recommend that the PFAS restriction process considers the following recommendations:

1. Introduce adequate transition periods for power sector applications. Where SEAC cannot assess an adequate derogation period, or where suitable, safe and in-situ tested alternatives are not available, Eurelectric suggests introducing an unlimited derogation period. In addition, introducing the cascading principle, similar to the F-gas regulation, would incentivise the use of the most suitable alternative, prevent supplier monopolies for critical energy assets, and allow for unlimited derogations in cases related to safety requirements.
2. Implement a labelling system to identify PFAS-free products, thereby ensuring greater transparency across the supply chain.
3. We welcome SEAC's view to avoid regulatory overlaps with existing frameworks, specifically that of the F-Gas Regulation, and for all voltage levels.
4. We welcome SEAC's stance to permit continued use, repair, and maintenance of existing equipment for a prolonged period after being placed on the market until the

end of service life. We strongly recommend a 50-year derogation period for power sector applications to match the lifetime of power sector equipment.

5. Include reassessment mechanisms to review derogations based on technological progress, or lack thereof.

Dépôt legal: D/2026/12.105/2

1. Sector-Specific Survey Questions

Sector-specific survey questions

#	Question	Response options	Instructions
1.1	Which of the following best describes you or your affiliation?	Single choice: 1. Citizen/individual 2. Organisation	Select Citizen/individual if you are responding in a personal capacity. Select Organisation if you represent an organisation (e.g. company) or other official role.
Eurelectric Response: 2. Organisation			
1.2	**Only if Q1.1 response: 2** What type of organisation are you responding for?	Single choice: 1. Government organisation 2. Non-governmental organisation 3. Academic institution 4. Industry association 5. Company	
Eurelectric Response: 4. Industry Association			
1.3	**Only if Q1.1 response: 2** What is the name of the organisation you are reporting for?	Free text (limit: 300 characters)	
Eurelectric Response: Eurelectric			

1.4	What is the name of a person ECHA can contact if needed?	Free text (limit: 100 characters)	
Eurelectric Response: Aida Garcia			
1.5	What is the email address for that contact person?	Free text (limit: 100 characters)	
Eurelectric Response: Agarcia@eurelectric.org			
1.8	What country are you (or your organisation) based in?	Single choice: List of countries	Individuals should choose the country where they permanently reside. Respondents representing organisations, such as companies, should select the country where the largest share of their PFAS related activities occur. Respondents representing other organisations may choose the country where the organisation is based in.
Eurelectric Response: Belgium			
1.9	**Only if Q1.2 response: 4** How many members does your association have?	Numerical	Provide the number of member organisations (e.g. for industry associations), or individuals (e.g. for trade unions).
Eurelectric Response: 33 Members			

1.17	Which specific use or application do you want to comment on?	Multiple choice: Specific uses and applications evaluated by SEAC in the draft opinion (see PFAS Use mapping)	Select all specific uses or applications (i.e. SEAC evaluation level) that you wish to comment on. If your use or application is not explicitly mentioned under an SEAC evaluation level described in the use mapping, but it would reasonably be included in that category based on the definition, you may submit information for that SEAC evaluation level. If your use is not covered by any SEAC evaluation level in the sector but you still consider it is covered within that specific sector evaluation, select 'other use'.

Eurelectric Response:

Sectors: Energy, Applications of Fluorinated Gases, Electronics and Semiconductors (Electronics), Lubricants

SEAC Evaluation Levels:

12.01.02. Photovoltaic cells (solar panels)

12.01.03. Wind energy

12.02.02. PEM water electrolysers

12.04.02 Lithium-ion batteries (prismatic, cylindrical and pouch) (secondary)

12.04.13. Flow batteries

12.05.01. Switchgear/circuit breakers (gas-insulated switchgear and air-insulated switchgear)

08.01.03. Industrial refrigeration

08.08.01. Electrical switchgear up to and including 145 kV

08.08.02.03. Insulating gases used in electrical switchgear above 145 kV [Ga16.1], except C5-FK and HFO-1234yf

08.08.02.02 HFO-1234yf used in electrical switchgear above 145 kV

08.08.02.01 C5-FK used in electrical switchgear above 145 kV

11.03.01. Coatings and films of electronic components (excluding displays and Lenses)

11.01.01 Low/mid temperature applications of wire and cable insulation, excluding extremely high frequency applications 11.01.02 Other applications of wires and cables (apart from low/mid-temperature applications of wire and cable insulation except extremely high frequency applications), including connectors 14.01 Lubricants (industrial use)			
1.18	Are you providing information from the perspective of a single organisation, or more broadly (e.g. on behalf of multiple organisations or other broader perspective, such as, sector-wide view)?	Single choice: 1. I am reporting information for a single organisation – the responses provided reflect the impacts (e.g. losses) on the entity, which I am reporting for. 2. I am reporting information more broadly e.g. for multiple organisations or a whole sector.	The survey allows to provide information from a single organisation or multiple organisation perspective. Select the single organisation perspective if your responses reflect the impact on the entity you are reporting for, where applicable. Select the multiple organisation perspective, if you are submitting information that represents several companies (e.g. separate subsidiaries under one parent company or separate companies within the same sector or industry – such as in the case of industry associations).
Eurelectric Response: 2. Reporting information more broadly e.g. for multiple organisations and as a whole sector.			

Sector-Specific Survey Questions

Table 1: ENERGY

#	Question	Response options	Instructions
The questions below are asked for each SEAC evaluation level selected in question 1.17 above			
1.19	What is or are the process(es) or product(s) PFAS (or an alternative to PFAS) are used in? How and why are they used?	Free text (limit: 2000 characters)	Briefly describe how PFAS (or alternatives) are used in your uses or applications. This should include e.g. the function provided by PFAS and the type of part/article/product they are used in. If your use is covered by the scientific research and development exemption from the restriction (Article 67(1) of REACH) please indicate so.
Eurelectric Response: **1. Lithium-ion Batteries** **12.04.02 Lithium-ion batteries (prismatic, cylindrical and pouch) (secondary)** PFAS used in lithium-ion batteries include Lithium bis(trifluoromethylsulfonyl)amide (LiTFSI), Lithium bis(fluorosulfonyl)imide (LiFSI), and Polyvinylidene Fluoride (PVDF). PFAS are used as electrolyte salts/additives, as well as in electrode binders and cathode/anode slurry processes. Fluorinated polymers are additionally used in separators to improve mechanical strength, dielectric properties, thermal stability, and wettability. **2. Redox Flow Batteries:** **12.04.13. Flow batteries** Redox flow batteries (RFBs) are a promising energy storage technology for stationary applications. RFBs rely on perfluorosulfonic acid (PFSA) membranes that are made using PFAS. These membranes stand out due to their good mechanical properties, excellent proton conductivity and outstanding chemical stability.			

3. Photovoltaic Panels (PV):

12.01.02. Photovoltaic cells (solar panels)

Certain PV modules incorporate polyvinylidene fluoride (PVDF), a PFAS, in their polymer back sheets for safety purposes. PFAS are also found in the front sheet coating and the plastic material on the front of glassless modules. Glass/backsheet modules account for around 60% of the global market share. Most backsheets are composed of fluorinated compounds such as PVF (polyvinyl fluoride) and PVDF.

4. Wind Turbine Generators (WTGs)

12.01.03. Wind energy

PFAS can be used in wind turbines, especially in electrical switchgear, cable insulation, and semiconductors. The manufacturing of rotor blades additionally implies the use of PFAS.

5. Electrolysers and P2X applications:

12.02.02. PEM water electrolysers

PFAS-containing fluoropolymers are used in gas diffusion layers, proton exchange membranes, electrodes, and sealing materials due to their chemical and thermal stability. These technologies are critical for hydrogen production and carbon capture and utilisation (CCU).

6. Circuit Breakers and PTFE

12.05.01. Switchgear/circuit breakers (gas-insulated switchgear and air-insulated switchgear)

PTFE is used in circuit breaker nozzles to ensure performance, reliability, and technical safety. Maintenance requires PTFE-containing materials; otherwise, equipment may become non-repairable and must be removed from service. In nuclear applications, PTFE and FKM are additionally used as gasket materials due to their high temperature resistance and long service life.

1.20	Do suitable alternatives exist for this use/application?	Single choice: 1. Yes 2. No 3. I do not know	Suitable alternatives are those that are technically and economically feasible, safer for human health and the environment, and available in sufficient quantities. For PFAS Manufacturing, this question will only be relevant for the use of PFAS as polymerisation aids. The same applies to Q.1.21-Q.1.25 below.

Eurelectric Response:

1. Lithium-ion Batteries:

No **2. Redox Flow Batteries** No **3. PV Panels** No **4. Wind Turbine Generators (WTGs)** No **5. Electrolysers** No **6. Circuit breakers and PTFE** No			
1.21	What is the availability of alternatives for this use/application? Select all options that apply in general for this use/application and provide an explanation of each point in the next question.	Multiple choice: 1. **Alternatives are not available due to insufficient quantities**: PFAS-free alternatives are not available in sufficient quantities for this use/application. 2. **Alternatives are not available because of safety concerns**: PFAS-free alternatives are not safer for human health or the environment. 3. **Alternatives are not available because of technical feasibility**: PFAS-free alternatives do not meet the functional requirements for this use/application. 4. **Alternatives are not available**	Select the option that best describes the overall situation for application(s) you described above. If your response concerns multiple applications, you can provide more detailed information for each application and its alternatives in the question below.

		because of economic feasibility: It is not possible to operate profitably using the alternatives. 5. **None of the above - Alternatives are available**: There are suitable alternatives for this use/application. They exist in sufficient quantities, they are safer than PFAS, and they are technically and economically feasible.	
Eurelectric Response: 1, 2, 3, 4			
1.22	Please give a justification for your responses above by providing an explanation for each of the four points make sure to name which specific application and alternative you are referring to: 1. **Sufficiency**: Are the alternatives available in a sufficient quantity for this use/application? 2. **Safety**: Are there concerns for risks on human health or the environment that could limit the substitution potential of alternatives? 3. **Technical feasibility**: Are there technical requirements for this use/application? How do potential alternatives perform against the	Free text (limit: 3000 characters)	

	requirements? 4. **Economic feasibility**: What is the impact of using the alternative on profitability? How much would switching to the alternative cost?		

Eurelectric Comment:

1. Lithium-ion Batteries:
Despite the enormous efforts of the academic and industrial community to find potential replacements for fluorinated lithium salts, to date there are no commercial alternatives, and no roadmap has been proposed by the battery suppliers.

Battery manufacturers are gradually moving PVDF to hydrophilic binder materials such as SBR (Styrene Butadiene rubber) copolymers, that can be used for practically all Li-ion cell chemistries. Although the replacement of PVDF for aqueous binders is desirable and at the core of the efforts of several cell manufacturers; to date this goal has not been achieved and it is not possible to find suppliers of batteries without PVDF.

Regarding the use of separator coated in PVDF-based separators, it is difficult to map this product category, as some suppliers only provide the commercial name of the material used for the separator and there is no disclosure of PFAS polymers employed.

2. Redox Flow Batteries
Despite the enormous efforts to find replacements for PFAS, alternatives are not available because of technical feasibility. In the market, several Nafion-based membranes are proposed. Due to the high cost of Nafion membranes, several RFB producers propose in-house membranes based on PVDF (Polyvinylidene fluoride), another PFAS. Recent research also focuses on the development of membranes based on fluorine-free materials, for example the Poly(ether ether ketone) (PEEK), which is a low-cost fluorine free alternative. It can be functionalized in sulphuric acid to obtain sulfonated-PEEK (SPEEK). However, this new membrane material is still under development and is not commercially available, nor is a well-defined technological roadmap on the development and production currently available.

4. Wind Turbine Generators (WTGs)
Alternative technologies are being developed in isolated cases but currently are not reliably available on the market. Therefore, a transition period of 13.5 years is appropriate, but an investigation must be conducted regarding semiconductors.

5. Electrolysers
The excellent chemical and electrochemical stability of PFAS under various conditions in fuel cells or electrolytic cells cannot yet be replaced.

6. Circuit Breakers and PTFE
Circuit breakers rely on the high temperature resistance of PTFE, crucial for their functioning. No alternatives for this critical part are readily available. There is no alternative material that can substitute PTFE in this application. In the case of necessary maintenance, the original PTFE-containing material needs to

be used. Should this not be the case, the whole circuit breaker cannot be repaired, taking it out of service and limiting the performance of the substation. Additionally, no adequate replacement for FKM is available either. Without FKM, nuclear power plant technology cannot be kept in operation.			
1.29	If PFAS could not be used in this use/application, what is the magnitude of potential negative impacts on society, e.g. from lack of access or worse quality of products (in addition to impacts on employment and profit losses)?	Single choice: 1. Very low or none 2. Low 3. Moderate 4. High 5. Very high 6. I do not know	Consider other societal impacts than profits or employment and indicate their expected magnitude. Impacts are considered greater, for example, when they affect large populations or significantly reduce quality of life. Do not include information on health and environmental impacts of PFAS itself.
Eurelectric Response: 5. Very high			
1.30	Please explain your response to question above, e.g. by describing the elements leading to your judgement on the magnitude of additional impacts. If possible, provide quantified or monetised estimates of the impacts.	Free text (limit: 2000 characters)	Describe additional negative impacts, such as changes in quality of life resulting from reduced availability or lower quality of products. It is sufficient to describe the impacts, but quantified or monetised estimated can also be provided. Do not include information on health and environmental impacts of PFAS itself here, but in the general survey.
Eurelectric Response: Operating electrical grids – and the entire energy system – with currently available products on the market is not possible without PFAS. There is a lack of transparency as to which exact products have feasible alternatives. Electrical grids and thus electricity are a key component of modern society and its critical infrastructure. All grid customers rely on it for their normal functioning. Therefore, a rating of 5 (very high) seems appropriate. **1. Lithium Ion Batteries:**			

If PFAS could not be used in batteries, it would likely lead to a halt in lithium battery imports into Europe. It would significantly disrupt key sectors that depend heavily on lithium-ion batteries, particularly electric vehicles, energy storage systems, and consumer electronics. The energy transition would slow down significantly. Lithium batteries are essential for integrating renewable energy sources like wind and solar into the grid. Without sufficient battery supply, grid stability could be affected, limiting the expansion of renewables and potentially increasing reliance on fossil fuels in the short term. Furthermore, lithium batteries could not even be replaced by other technologies such as solid-state batteries, sodium batteries, metal air batteries, or redox flow batteries, as those technologies also rely on PFAS. The ban on PFAS would lead to permanent closure of businesses or parts of them (including relocation outside EU) for BESS activities.

4. Wind Turbine Generators (WTGs)
PFAS can be used in wind turbines, especially in electrical switchgear, cable insulation, and semiconductors. The manufacturing of rotor blades additionally implies the use of PFAS. If this parameter is ignored in the PFAS regulation's drafting process, and the EU follows a decarbonisation path through the massive deployment of renewable energy assets, the production of WTGs will likely be relocated to outside of the EU.

Table 2: APPLICATIONS OF FLUORINATED GASES

#	Question	Response options	Instructions
The questions below are asked for each SEAC evaluation level selected in question 1.17 above			
1.19	What is or are the process(es) or product(s) PFAS (or an alternative to PFAS) are used in? How and why are they used?	Free text (limit: 2000 characters)	Briefly describe how PFAS (or alternatives) are used in your uses or applications. This should include e.g. the function provided by PFAS and the type of part/article/product they are used in. If your use is covered by the scientific research and development exemption from the restriction (Article 67(1) of REACH) please indicate so.
1. Industrial Heat Pumps **08.01.03. Industrial refrigeration** The negative impact of the PFAS ban on refrigeration, air conditioning and heat pumps would be extensive. All fluoropolymers fall under the proposed definition in the proposal. These substances such as PTFE and FPM, among others, are critical to most of the components which makes these systems run at maximum performance. Fluorinated gases are subject to the F-Gas Regulation, which incentivises manufacturers to develop fluorinated fluids with very low GWP. These fluids, hydro-fluoro-olefins (HFOs), are unsaturated hydrofluorocarbons (HFCs). They allow high temperature ranges combined with a high efficiency. They are not ozone-depleting and are in case of accidents less dangerous than alternatives like NH3 or propane. Many HFO-based heat pumps with a lifetime of +20 years have been recently installed or are in installation. The revamping of these heat pumps using natural refrigerants is not possible, making it necessary to operate HFOs until the end of their lifetime. **2. Switchgears** **08.08.01. Electrical switchgear up to and including 145 kV** **08.08.02.03. Insulating gases used in electrical switchgear above 145 kV, except C5-FK and HFO-1234yf** **08.08.02.02 HFO-1234yf used in electrical switchgear above 145 kV**			

08.08.02.01. C5-FK used in electrical switchgear above 145 kV SF_6 alternatives in Switchgears, gas insulated lines and busbars, all of which are fluorinated gases, serve as insulating and switching agents in gas-insulated electrical switchgears in applications above and below 145kV. 3. **Fixed suppressants** **08.06.01.03. Applications of clean fire suppressants, except FK-5- 1-12 used to protect critical or culturally significant infrastructure and 2-BTP used in hand-held extinguishers onboard aircraft** PFAS gases are used primarily in fixed fire suppression systems (FM-200, FE-36, NOVEC agents), as well as in portable fire extinguishers (FE-36 agent) intended for the protection of areas important to nuclear safety, where specific properties are required with respect to potential chemical interactions between substances, extinguishing temperatures, and extinguishing times.			
1.20	Do suitable alternatives exist for this use/application?	Single choice: 4. Yes 5. No 6. I do not know	Suitable alternatives are those that are technically and economically feasible, safer for human health and the environment, and available in sufficient quantities. For PFAS Manufacturing, this question will only be relevant for the use of PFAS as polymerisation aids. The same applies to Q.1.21-Q.1.25 below.
Previous consultation text/Eurelectric response: 1. No			
	What is the availability of alternatives for this	Multiple choice: **1. Alternatives are not available due to insufficient quantities**: PFAS-free alternatives are not available in sufficient quantities for this use/application. **2. Alternatives are not available because of safety concerns**: PFAS-free alternatives are not	Select the option that best describes the overall situation for application(s) you described above.

1.21	use/application? Select all options that apply in general for this use/application and provide an explanation of each point in the next question.	safer for human health or the environment. **Alternatives are not available because of technical feasibility**: PFAS-free alternatives do not meet the functional requirements for this use/application. **4. Alternatives are not available because of economic feasibility**: It is not possible to operate profitably using the alternatives. **5. None of the above - Alternatives are available**: There are suitable alternatives for this use/application. They exist in sufficient quantities, they are safer than PFAS, and they are technically and economically feasible.	If your response concerns multiple applications, you can provide more detailed information for each application and its alternatives in the question below.
Eurelectric response: 1, 2, 3, 4			
	Please give a justification for your responses above by providing an explanation for each of the four points make sure to name which		

1.22	specific application and alternative you are referring to: **1. Sufficiency**: Are the alternatives available in a sufficient quantity for this use/application? **2. Safety**: Are there concerns for risks on human health or the environment that could limit the substitution potential of alternatives? **3. Technical feasibility**: Are there technical requirements for this use/application? How do potential alternatives perform against the requirements? **4. Economic feasibility**: What is the impact of using the alternative on profitability? How much would switching to the alternative cost?	Free text (limit: 3000 characters)	
Eurelectric response: **1. Industrial Heat Pumps**			

To meet FGAS requirements, European industrials developed a few years ago low-GWP solutions (HFO-based), today mature or very close to maturity. Most of these solutions for the HT and VHT markets (supply temperature > 90°C) are designed to use an HFO-type refrigerant (r1234ze(Z); r1234ze(E); r1233zd(E); r1336mzz(Z)), belonging to the PFAS family.

For heat pumps providing heat at high or very high level (> 90°C), alternative refrigerants to HFO are still non-existent from a commercial point of view. The vast majority of HT and VHT heat pumps use HFO refrigerants, with no alternative solution available in the short term. However, more than 60% of industrial heating requirements that can be met by a HP (i.e. < 150°C) are actually at temperatures covered by these HT and VHT heat pumps (i.e. >90°C).

2. Switchgear

Currently, there are no ready-to-market PFAS-free products available for equipment above 145 kV and in certain high-voltage applications below 145kV, particularly for GIS and AIS circuit breakers, and development in this voltage range seems limited with physical constraints making market maturity in the next 10-15 years unlikely.

At present, only one manufacturer can supply F-gas-free products to meet European switchgear requirements for the next decade or more regarding HV. Competitors have not shown any development strategy for non-PFAS, gas-insulated high-voltage switchgear in the European market, meaning x2/3 European GIS suppliers are not available and more non-European suppliers will have to be considered. This would result in quality, testing compliance and service support risks.

Additionally, the value of 145 kV does not constitute a strict boundary for high voltage levels, as different member states classify voltage levels differently. For example, in accordance with IEC 60038 (Table 4), a nominal voltage of 123 kV (classified as High Voltage) is applied in the Czech Republic as well as in several other EU Member States. Similarly, Germany applies an even lower threshold of 110 kV for High Voltage. If these alternatives to SF_6 (e.g. C4 FN gas) were to be prohibited due to PFAS restrictions, it would no longer be possible to apply the exemption pursuant to Article 13(13) of EU Regulation 2024/573. Consequently, lower voltage levels are relevant for grid operation and potentially affected by a PFAS restriction.

3. Fire suppressants

No replacements for FM-200, FE-36, or NOVEC 1230 are currently available, and these agents cannot be substituted with CO_2 or other inert gases. Spatial, design and functional impacts make their use unfeasible within existing operations and facilities.

FM-200 and FE-36 are regulated under EU Regulation 2024/573. FM-200 is used in fixed fire suppression systems in nuclear power plant operations. No replacement currently exists. FE-36 is used in nuclear power plant operations as an autonomous fire suppression agent for critical switchgears. When replacing these switchgears, the only alternative fire suppressants offered are FM200 or NOVEC 1230.

NOVEC™ 1230 is not regulated under EU Regulation 2024/573. NOVEC 1230 is irreplaceable in nuclear power plant operations due to its performance characteristics. It is used in essential systems at nuclear power plants, including main control rooms and emergency control rooms. No replacement currently exists.

1.29	If PFAS could not be used in this use/application, what is the magnitude of potential negative impacts on society, e.g. from lack of access or worse quality of products (in addition to impacts on employment and profit losses)?	Single choice: 1. Very low or none 2. Low 3. Moderate 4. High 5. Very high 6. I do not know	Consider other societal impacts than profits or employment and indicate their expected magnitude. Impacts are considered greater, for example, when they affect large populations or significantly reduce quality of life. Do not include information on health and environmental impacts of PFAS itself.
Eurelectric Response: Very High			
1.30	Please explain your response to question above, e.g. by describing the elements leading to your judgement on the magnitude of additional impacts. If possible, provide quantified or monetised estimates of the impacts.	Free text (limit: 2000 characters)	Describe additional negative impacts, such as changes in quality of life resulting from reduced availability or lower quality of products. It is sufficient to describe the impacts, but quantified or monetised estimated can also be provided. Do not include information on health and environmental impacts of PFAS itself here, but in the general survey.
Eurelectric Response: The cost of transitioning to an alternative is enormous, and ultimately, households and businesses will have to pay the bill. In every company critical to electricity generation in a given Member State, there are hundreds to thousands of devices that currently use PFAS. Often, simply replacing the substance is not possible; instead, the entire technology must be replaced, at a cost ranging from hundreds of thousands to millions of euros. In the case of electrical switching equipment, this represents investments in the range of millions, tens to hundreds of millions of euros in each Member State.			

Table 3: ELECTRONICS AND SEMICONDUCTORS (ELECTRONICS)

#	Question	Response options	Instructions
The questions below are asked for each SEAC evaluation level selected in question 1.17 above			
1.19	What is or are the process(es) or product(s) PFAS (or an alternative to PFAS) are used in? How and why are they used?	Free text (limit: 2000 characters)	Briefly describe how PFAS (or alternatives) are used in your uses or applications. This should include e.g. the function provided by PFAS and the type of part/article/product they are used in. If your use is covered by the scientific research and development exemption from the restriction (Article 67(1) of REACH) please indicate so.
Eurelectric Response: **1. Coatings** **11.03.01. Coatings and films of electronic components (excluding displays and Lenses)** PFAS-containing coatings have been applied to electrical components to provide water repellence and resistance to oils and other contaminants. This may include coating surfaces of power lines and electrical connectors to prevent damage from moisture or environmental exposure. **2. Electrical Wires and Cables** **11.01.01 Low/mid temperature applications of wire and cable insulation, excluding extremely high frequency applications** **11.01.02 Other applications of wires and cables (apart from low/mid-temperature applications of wire and cable insulation except extremely high frequency applications), including connectors** PFAS is used in the electrical wires and cable necessary to the function of critical energy system infrastructure. Not only electrical cables are affected, but also cable accessories, which are equally relevant. One cannot be understood without the other.			

1.20	Do suitable alternatives exist for this use/application?	Single choice: 1. Yes 2. No 3. I do not know	Suitable alternatives are those that are technically and economically feasible, safer for human health and the environment, and available in sufficient quantities. For PFAS Manufacturing, this question will only be relevant for the use of PFAS as polymerisation aids. The same applies to Q.1.21-Q.1.25 below.
Eurelectric Response: 2. No			
1.21	What is the availability of alternatives for this use/application? Select all options that apply in general for this use/application and provide an explanation of each point in the next question.	Multiple choice: 1. **Alternatives are not available due to insufficient quantities**: PFAS-free alternatives are not available in sufficient quantities for this use/application. 2. **Alternatives are not available because of safety concerns**: PFAS-free alternatives are not safer for human health or the environment. 3. **Alternatives are not available because of technical feasibility**: PFAS-free alternatives do not meet the functional requirements for this use/application. 4. **Alternatives are not available because of economic feasibility**: It is not possible to operate profitably using the alternatives. 5. **None of the above - Alternatives**	Select the option that best describes the overall situation for application(s) you described above. If your response concerns multiple applications, you can provide more detailed information for each application and its alternatives in the question below.

		are available: There are suitable alternatives for this use/application. They exist in sufficient quantities, they are safer than PFAS, and they are technically and economically feasible.	
Eurelectric Response: **2. Alternatives are not available because of safety concerns**: PFAS-free alternatives are not safer for human health or the environment. **3. Alternatives are not available because of technical feasibility**: PFAS-free alternatives do not meet the functional requirements for this use/application.			
1.22	Please give a justification for your responses above by providing an explanation for each of the four points make sure to name which specific application and alternative you are referring to: 5. **Sufficiency**: Are the alternatives available in a sufficient quantity for this use/application? 6. **Safety**: Are there concerns for risks on human health or the environment that could limit the substitution potential of alternatives? 7. **Technical feasibility**: Are there technical requirements for this use/application? How do potential alternatives perform against the requirements? 8. **Economic feasibility**: What is the	Free text (limit: 3000 characters)	

	impact of using the alternative on profitability? How much would switching to the alternative cost?		
Eurelectric response: **Electrical Wires and cables** Currently, no fully viable alternatives are known to be available. In the absence of such alternatives, the expansion and maintenance of the electricity distribution network at low-voltage (LV), medium-voltage (MV), and high-voltage (HV) levels would not be possible. Regarding optical cables, including associated cable assemblies (e.g. joints, connectors, etc.), currently no fully viable alternatives are known to be available. If no alternative is available, the expansion and maintenance of the optical communication network would not be possible, nor would the effective remote control and monitoring of medium- and high-voltage substations (MV and HV) and medium-voltage sectionalizing disconnectors (MV) be achievable.			
1.25	If PFAS could not be used in this use/application, what would be the most likely impact on organisation(s) covered by your response?	Single choice: 1. Permanent closure of business or parts of it (including relocation outside EU) 2. Temporary closure of business or parts of it (including relocation outside EU) 3. Continued operations with increased costs or lower quality. 4. No impact or minor impact	Consider a situation where PFAS could not be used in this use/application by you or your competitors (including articles imported from outside the EEA). Select the option that best describes the situation for applications you described above. When responding on behalf of a group of organisations, choose the option that is most representative of the covered companies.
Eurelectric Response: 1. Permanent closure of business or parts of it (including relocation outside EU) 2. Temporary closure of business or parts of it (including relocation outside EU)			

Table 4: LUBRICANTS

#	Question	Response options	Instructions
The questions below are asked for each SEAC evaluation level selected in question 1.17 above			
1.19	What is or are the process(es) or product(s) PFAS (or an alternative to PFAS) are used in? How and why are they used?	Free text (limit: 2000 characters)	Briefly describe how PFAS (or alternatives) are used in your uses or applications. This should include e.g. the function provided by PFAS and the type of part/article/product they are used in. If your use is covered by the scientific research and development exemption from the restriction (Article 67(1) of REACH) please indicate so.
Eurelectric Comments: **1. Lubricants** **14.01 Lubricants (industrial use)** Lubricants used in turbines and related installations necessary for thermal production, as well as lubricants used in grid operation at substations and power lines, use PFAS. This includes lubricants used in the maintenance of distribution system equipment. **2. Lubricants in nuclear applications** **14.01 Lubricants (industrial use)** For nuclear applications, PFAS are used in facilities due to very specific properties, particularly adapted to normal and accidental environmental conditions. Their use is therefore essential for the proper functioning of the equipment concerned. Given their properties, particularly adapted to the environmental conditions undergone by the materials used in nuclear power plants, a certain number of materials and products belong to the PFAS family – especially in fluorinated lubricants used as pump bearing grease (fluorinated oils and fats like “Krytox”). Properties justifying the use of these materials/substances include excellent temperature resistance, efficient lubrication, suitable for high speeds.			

1.20	Do suitable alternatives exist for this use/application?	Single choice: 1. Yes 2. No 3. I do not know	Suitable alternatives are those that are technically and economically feasible, safer for human health and the environment, and available in sufficient quantities. For PFAS Manufacturing, this question will only be relevant for the use of PFAS as polymerisation aids. The same applies to Q.1.21-Q.1.25 below.
Eurelectric Comments: 2. No.			
1.21	What is the availability of alternatives for this use/application? Select all options that apply in general for this use/application and provide an explanation of each point in the next question.	Multiple choice: **1. Alternatives are not available due to insufficient quantities**: PFAS-free alternatives are not available in sufficient quantities for this use/application. **2. Alternatives are not available because of safety concerns**: PFAS-free alternatives are not safer for human health or the environment. **3. Alternatives are not available because of technical feasibility**: PFAS-free alternatives do not meet the functional requirements for this use/application. **4. Alternatives are not available because of economic feasibility**: It is not possible to operate profitably using the alternatives.	Select the option that best describes the overall situation for application(s) you described above. If your response concerns multiple applications, you can provide more detailed information for each application and its alternatives in the question below.

		5. None of the above - Alternatives are available: There are suitable alternatives for this use/application. They exist in sufficient quantities, they are safer than PFAS, and they are technically and economically feasible.	
Eurelectric Response: **2. Alternatives are not available because of safety concerns**: PFAS-free alternatives are not safer for human health or the environment. **3. Alternatives are not available because of technical feasibility**: PFAS-free alternatives do not meet the functional requirements for this use/application.			
1.22	Please give a justification for your responses above by providing an explanation for each of the four points make sure to name which specific application and alternative you are referring to: **1. Sufficiency**: Are the alternatives available in a sufficient quantity for this use/application? **2. Safety**: Are there concerns for risks on human health or the environment that could limit the substitution potential of alternatives? **3. Technical feasibility**: Are there technical requirements for this use/application? How do potential	Free text (limit: 3000 characters)	

	alternatives perform against the requirements? **4. Economic feasibility**: What is the impact of using the alternative on profitability? How much would switching to the alternative cost?		
Eurelectric response: At the current state of knowledge, no substitutes exist that achieve the same level of performance as PFPE- and PTFE-based lubricants. For nuclear applications, PFAS are used in facilities due to very specific properties, particularly adapted to normal and accidental environmental conditions. Their use is therefore essential for the proper functioning of the equipment concerned. To date, no material of substitution with equivalent properties is identified. The prohibition of these substances would therefore lead to a technical deadlock and entail a risk regarding compliance with the requirements relating to the security functions performed by such equipment. In the hypothetical case where the replacement of an element by an equivalent without PFAS would be possible and imposed, this would constitute a major modification of the qualified equipment and would require an in-depth analysis which would require new qualification. This test process is long and expensive, with no guarantee of results. The service life of the equipment concerned would be reduced. This situation would have major negative impacts on operations. For nuclear applications, PFAS should not be assessed as a generic consumable chemistry issue, but as a materials qualification, safety and lifetime management issue. In many sealing, insulation, gasket, lubricant and spare-part applications, substitution is not a like-for-like material change; it can trigger requalification, compatibility testing, OEM redesign, regulatory review and outage risk. Continued access to PFAS-containing spare parts and maintenance materials is therefore essential for existing licensed assets until technically proven alternatives are qualified and commercially available.			
1.29	If PFAS could not be used in this use/application, what is the magnitude of potential negative impacts on society, e.g. from lack of access or worse quality of products (in addition to impacts on employment and profit losses)?	Single choice: 1. Very low or none 2. Low 3. Moderate 4. High 5. Very high 6. I do not know	Consider other societal impacts than profits or employment and indicate their expected magnitude. Impacts are considered greater, for example, when they affect large populations or significantly reduce quality of life. Do not include information on health and environmental impacts of PFAS itself.

Eurelectric Response: **5.** Very high			
1.30	Please explain your response to question above, e.g. by describing the elements leading to your judgement on the magnitude of additional impacts. If possible, provide quantified or monetised estimates of the impacts.	Free text (limit: 2000 characters)	Describe additional negative impacts, such as changes in quality of life resulting from reduced availability or lower quality of products. It is sufficient to describe the impacts, but quantified or monetised estimated can also be provided. Do not include information on health and environmental impacts of PFAS itself here, but in the general survey.
Eurelectric Response: The potential unavailability of oils and lubricants in nuclear power plants and energy systems classified as critical infrastructure would result in higher costs associated with replacement of critical components of energy/nuclear facilities (more frequent shutdowns). This could lead to the outage of essential technologies required for electricity production.			
1.31	**For relevant sectors only:** Please describe the costs and feasibility of implementing the risk management measures defined and included in restriction option 3 (RO3) in the SEAC sector specific evaluation for this use/application.	Free text (limit: 3000)	Consult the SEAC draft opinion for descriptions of the restriction option(s) RO3(s) for this sector. Please note that for some uses/applications, the risk management measures complement time-limited derogations, while for others they are independent options.
Eurelectric Response: PFAS-based and specifically designed lubricants must continue to be available throughout the entire life cycle of the industrial facility. RO3(s) would be the most suitable restriction option for such industrial facilities.			

2. General Survey Questions on the SEAC Opinion

Table 5: GENERAL SURVEY

#	Question	Response options	Instructions
2.1 to 2.18	**See the questions on the background of the respondent in the Table 1 (questions 1.1 to 1.18)**		
2.19	Choose all sectors that are relevant or covered by your responses in this general survey.	Multiple choice: List of sectors covered by the SEAC draft opinion (see section 2.2. of the SEAC draft opinion).	Select the sector(s) for which you will provide information. You can choose PFAS manufacturing and 22 sectors (14 sectors covered by SEAC sector-specific evaluation and additional eight sectors identified in the Background Document). You can select as many sectors as you see fit. Information provided will apply to all selected sectors unless you specify otherwise in your answers. If your use is not covered by any of the identified sectors, choose “other” and specify it in the next question.
Eurelectric Response: **Sealing Applications**			
2.20	Please provide a general description of the use(s) of PFAS (or alternatives) you are providing comments on	Free text (limit: 2000 characters)	Briefly describe the use(s) of PFAS (or alternatives) in this sector(s).
Eurelectric Response: **1. Sealing Applications Sector**			

Nuclear

The presence of PFAS in sealing applications serves an important function in heat and corrosion resistance and contributes to the safe production of low-carbon electricity. For nuclear applications, PFAS should be assessed as a materials qualification, safety and lifetime management issue. In many sealing applications, substitution is not a like-for-like material change; it can trigger requalification, compatibility testing, OEM redesign, regulatory review and outage risk. Continued access to PFAS-containing spare parts and maintenance materials is therefore essential for existing licensed assets until technically proven alternatives are qualified and commercially available.

Examples of sealing applications: sealants, rings of guidance, rings of rubbing, toppings of sealing, seats of tap, joints, O-rings, insulators for connectors of control order, and sealings for thermal power plants. These products contain PFAS such as Elastomers FKM (Viton) and FFKM (Kalrez), PTFE (Teflon), ETFE (Tefzel).

Insulation materials

In the electricity industry, PFAS-containing insulation materials are employed in electrical transformers and other equipment that require thermal insulation and fire resistance. Gaskets play a vital role in maintaining a secure seal in electrical equipment, preventing the leakage of potentially hazardous substances or protecting sensitive internal components. PFAS-containing gaskets have been used in situations where chemical resistance, temperature resilience, and a reliable seal are paramount for electrical safety and performance.

Fuel Cells

There are many application areas for PFAS in fuel cells. They occur in the gas diffusion layers, sealing materials for gas, water and air paths, and the cooling circuits. Since no alternatives are currently available in the areas of application, a transition period of 13.5 years seems appropriate for this. Alternative solutions exist for proton exchange membranes; a transition period of 6.5 years as set in the proposed restriction should be enough.

2.21	Please provide your comments on section 1.2. SEAC opinion	Free text (limit: 5000 characters)	Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

Eurelectric welcomes the publication of the SEAC Draft Opinion on the Restriction of PFAS. We agree with SEAC's conclusion that a blanket ban on PFAS would not be proportionate, and we support the implementation of use-specific derogations and socio-economic considerations in establishing such derogations. Eurelectric would like to highlight several key concerns in response to the Draft Opinion:

Insufficient information to assess substitution potential

- In some cases, SEAC acknowledges there is insufficient information to assess substitution potential. We believe any transition period should be evidence-based, and that insufficient information provides a basis for longer derogation periods.

• We agree that the nonexistence of alternatives should not be the sole basis for whether or not a derogation is justified. Additional reasons such as risk of market shortages or safety requirements should also be considered.

Challenges in substitution and derogation assessments

• Introducing alternative products requires a profound operational and technical process that is often not feasible within 18 months. Energy assets are operated under high reliability, durability, and security requirements, with strict technical standards. Even when an alternative technology may exist, implementation, qualification, and in-situ testing require substantially longer timelines.

• Shifting to alternatives would not only affect the products themselves, but would also require extensive re-testing, re-qualification, updates to specifications, audits, workforce training, and adjustments in operational capacity.

• The requirement for strong evidence of low substitution potential as a basis for derogations is particularly challenging in complex supply chains, where data is difficult to obtain. A PFAS ban must not lead to a de facto creation of a monopoly. The introduction of any ban should be explicitly linked to the availability of multiple substitute technologies on the market.

Overlap with the FGAS Regulation 2024/573

• Eurelectric agrees that alignment between the PFAS restriction and the F-gas Regulation is essential.

• The development of alternatives to HFC under the F-gas Regulation, for instance the use of HFOs having lower global warming potential but that can degrade into PFAS, should not be affected by the PFAS regulation.

• The SEAC opinion does not address the availability of derogations for most PFAS based alternatives to SF6 in high voltage switchgear. This omission assumes that by the time the PFAS Regulation enters into force, these substances will have been phased out of the market under the F Gas Regulation. SEAC overlooks the potential application of the cascading principle and the possibility of an EU-wide derogation to be issued by the European Commission, which could extend the use of PFAS based alternatives.

Structural limitations of the consultation framework

• The consultation framework does not fully capture the breadth and complexity of PFAS applications in the energy system, making it challenging to adequately assess and convey the extensive implications of PFAS restrictions for the electricity sector.

• Many use cases fall outside of defined evaluation levels and are highly challenging to classify within the current framework.

• Questions regarding feasibility of alternatives apply to thousands of individual components across multi-layered supply chains, meaning that multiple-choice responses may apply differently across components.

• The absence of an option to indicate lack of available information limits the ability to provide accurate responses in cases where data is not currently available.

We recommend that the PFAS restriction process considers the following recommendations:

1. Introduce an adequate transition period for power sector applications. When SEAC cannot assess an adequate derogation period, or for

applications without suitable, safe and in-situ tested alternatives, Eurelectric suggests introducing an unlimited derogation period. Introduce the cascading principle, similar to the F-gas regulation, to incentivise the use of the most suitable alternative, prevent the creation of a supplier monopoly on critical energy assets, and provide unlimited derogations for "safety requirements". 2. Implement a labelling system to identify PFAS-free products, ensuring transparency in the supply chain. 3. We welcome SEAC's view to avoid regulatory overlaps with existing frameworks, specifically that of the F-Gas Regulation, and for all voltage levels. 4. We welcome SEAC's stance to permit continued use, repair, and maintenance of existing equipment for a prolonged period after being placed on the market until the end of service life. We strongly recommend a 50-year derogation period for power sector applications to match the lifetime of power sector equipment. 5. Include reassessment mechanisms to review derogations based on technological progress, or lack thereof.			
2.24	Please provide your comments on section 3.3.1 Availability and technical and economic feasibility of alternatives	Free text (limit: 5000 characters)	Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion
Eurelectric Response: Introducing alternative products requires a profound operational and technical process; transitioning to alternative substances is not feasible in the short term, as the required technical, safety, and qualification processes span several years across many asset categories. Such a shift would not only affect the products themselves, but would also require extensive re-testing, re-qualification, updates to specifications, audits, workforce training, and adjustments in operational capacity. Additionally, the option to indicate a lack of information on the feasibility of alternatives is missing. In many instances the information 1-5 is not available at all at this point in time.			
2.30	Please provide your comments on section 3.4.2.2.4. Socio-economic analysis: Other relevant impacts	Free text (limit: 5000 characters)	Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion
Eurelectric Response: Energy system infrastructure and services are essential. Any temporary closures would lead to immediate major social consequences (transport, communications, security, defence, etc.). Therefore, PFAS-based materials and spare parts must continue to be available throughout the entire life cycle of the industrial facility. RO3(s), for example, would be the most suitable restriction option for such industrial facilities.			

Eurelectric represents the interests of the electricity industry in Europe. Our work covers all major issues affecting our sector. Our members represent the electricity industry in over 30 European countries.

We cover the entire industry from electricity generation and markets to distribution networks and customer issues. We also have affiliates active on several other continents and business associates from a wide variety of sectors with a direct interest in the electricity industry.

We stand for

The vision of the European power sector is to enable and sustain:
- A vibrant competitive European economy, reliably powered by clean, carbon-neutral energy
- A smart, energy efficient and truly sustainable society for all citizens of Europe

We are committed to lead a cost-effective energy transition by:

investing in clean power generation and transition-enabling solutions, to reduce emissions and actively pursue efforts to become carbon-neutral well before mid-century, taking into account different starting points and commercial availability of key transition technologies;

transforming the energy system to make it more responsive, resilient and efficient. This includes increased use of renewable energy, digitalisation, demand side response and reinforcement of grids so they can function as platforms and enablers for customers, cities and communities;

accelerating the energy transition in other economic sectors by offering competitive electricity as a transformation tool for transport, heating and industry;

embedding sustainability in all parts of our value chain and take measures to support the transformation of existing assets towards a zero carbon society;

innovating to discover the cutting-edge business models and develop the breakthrough technologies that are indispensable to allow our industry to lead this transition.

WG Sustainable Network Technology

Contact:
Aida GARCIA, Head of Unit, AI & Market Intelligence
Agarcia@eurelectric.org

Jordan MOSS, Intern
Jmoss@eurelectric.org

Union of the Electricity Industry - Eurelectric aisbl
Boulevard de l'Impératrice, 66 – bte 2 - 1000 Brussels, Belgium
Tel: + 32 2 515 10 00 - VAT: BE 0462 679 112 • www.eurelectric.org
EU Transparency Register number: 4271427696-87