NZIA list of net-zero technology main specific components

A Eurelectric consultation response to the Net-Zero Industry Act list of net-zero technology final products and their main specific components (implementing act)

February 2025

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;

Dépôt légal: D/2025/12.105/4

WG Sustainable Network Technology
WG Renewables & Storage
WG Industrial Competitiveness & Innovation
WG Wholesale Market Design & Investment Frameworks

Contact:
Jessica GARCIA, advisor Distribution and Market facilitation
– jgarcia@eurelectric.org

NZIA list of net zero technology main specific components

A Eurelectric consultation response February 2025

Summary

As the EU-level industry association for the electricity sector, we appreciate the opportunity to contribute to the consultation on the implementing act of the NZIA defining the main specific components (Art. 29(2)). This list lays the foundation of the resilience criterion in public procurement procedures (Art 25(7)) and RES Auctions (Art 26(2)). In the context of this consultation, Eurelectric members can be both the contracting entities procuring net zero technologies, and/or bidders in public procurement tenders or RES Auctions.

Eurelectric welcomes the efforts of the European Commission with the long-term aim of increasing manufacturing capacity in Europe. This necessary end-goal is a means of reaching 2030, 2040 and 2050 decarbonisation targets, while fostering sovereignty and technological development in the Union. Nevertheless, it remains key that the measures are balanced and align with the two leading principles of the EU to strive for simplification and affordable energy.

While the resilience criteria could support the contracting entities choosing local products in a long-term perspective, it risks being counter-productive in the short term. The industry's opportunity for efficient procurements and auctions has consequences for the pace at which the sector can enable the energy transition. We see a risk that applying the resilience criterion overly stringent could risk further straining supply chain issues in the coming years, potentially increasing the price and delivery times, in a time where a nearly doubling of grid investments is needed and customer affordability is key.

Our five recommendations for the Implementing act and its application:

1. **We recommend the European Commission create an implementing act as per Art 29(2) with a list of Tier 1 level products**, rather than the resilience criteria applying to Tier 2-level products. This would alleviate the sector from the highest administrative costs. In Annex 2, suggested amendments to the list can be found.

2. **The resilience criterion should be applied after at least 12 months after the EU Commission's trade assessment has been published.** As the Implementing Act is currently written, actors on the market will receive a maximum of 5 months from the trade assessment publication to analyse their supply chains and adjust procurement and auction procedures.

3. **The trade assessment should be formed transparently and evidence-based**, providing opportunities for stakeholders to contribute.

4. **Where possible, the provisions in Article 25 should align with the provisions in Article 26 provisions.** As many actors are subject to non-price criteria (NPCs) in both RES auctions and public procurement, an alignment will facilitate compliance.

5. **The EU Commission should notify the National Regulatory Authority to consider the possible impact of the increased costs of equipment in each country's tariff plans for Distribution System Operators**. Any cost increase arising from the resilience criterion should be considered in the Regulatory Asset Base (RAB) of DSOs.

General comments

This section explains and motivates the five recommendations outlined in the summary.

1. We recommend the European Commission create an implementing act as per Art 29(2) with a list of Tier 1 level products. Since the European manufacturing industry does not currently meet the entire European demand, existing shortages and supply chain disruptions in parts of the sector could worsen in the short term. Given how derogations are stipulated in act, we fear that an overly stringent calculation of the resilience criterion, could drive up prices and will prolong delivery times.

DSOs, as contracting entities, typically procure final products like transformers or even substations. Applying the resilience criterion to subcomponents would create excessive administrative burden across the value chain, regardless of the companies' existing European sovereignty. This type of analysis is not commonly applied for procurement procedures and adds little proportionate value.

The delegated act list of art 46(7) should serve as a subset of the Article 29(2) list. The implementing act takes an enforcement-oriented approach, while the delegated act provides benefits and incentives a boost of the manufacturing capacity. For Electricity Grid Technologies, both lists are extensive and the amount of components only differs by 5 components.

2. The resilience criterion should be applied at least 12 months after the EU Commission's trade assessment has been published. The trade assessment determines the current third country dependencies, and how to calculate dependencies. As this document is fundamental to ensuring compliance with the NZIA, stakeholders need time to adjust internal processes. For many contracting entities which are to launch a tender in Oct 2025, the process of forming a tender has already begun.

There is a risk that companies do not manage to adjust processes, and no suitable tenders enter, which would result in contracting entities launching a subsequent tender (Art. 25(11)), adding time and administrative costs to the process.

3. The trade assessment should be formed transparently, providing opportunities for stakeholders to contribute. It should be an evidence-based principle. The methodologies for calculating third country dependencies should be simple to apply and previously consulted with both bidders and contracting entities.

4. Where possible, the provisions in Article 25 should align with the provisions in Article 26 provisions. As many actors are subject to NPCs in both RES auctions and public procurement, an alignment will facilitate compliance.

5. The EU Commission should notify the National Regulatory Authority to consider the possible impact of the increased costs of equipment in each country's tariff plans for Distribution System Operators. DSOs are regulated entities, operating under economic regulation models with medium-term allowed revenues set within regulatory. It is therefore crucial that, in case of increased costs, these are reflected in the allowed revenues for DSOs. More specifically, this means that any cost increase should be considered in the Regulatory Asset Base (RAB). Customer affordability is a priority for both the DSOs and for the National Regulatory Authorities (NRAs). A price increase of up to 10 percent (Art 25(7d)), for European grid components might not be justifiable for the customers. Any price increase for grid components is distributed in the grid tariff, entailing that the customer will ultimately pay the cost.

Annex 1 – explaining supply chain strains for DSOs amid urgent grids expansion

The electricity sector is at a critical juncture, with €67 bn of annual investments needed to accommodate and enable the energy transition, according to our Grids for Speed report (2024). That means a nearly doubling of the current investments, from todays' level of €36 bn. Adding to these challenges is the fact that the electricity grid is aging. 30 % of the grid is over 40 years old, and this figure could rise to 90 % by 2050 if we do not keep pace with the necessary expansions. For transformers specifically, we estimate that they will double in numbers, and that the conductors will have to increase by a factor of x1.7 (see figure 1).

Currently, the sector is grappling with severe supply chain constraints. Lead times for transformers have significantly increased, averaging between 2.2 to 2.5 years. For larger units, such as substation power transformers and generator step-up transformers, lead times can extend from 1.5 to 4 years. Additionally, transformer prices have surged by 60 % to 70 % on average since January 2020, driven by supply chain disruptions, manufacturing shortfalls, and rising commodity costs as well as other qualitative legislation constraints.

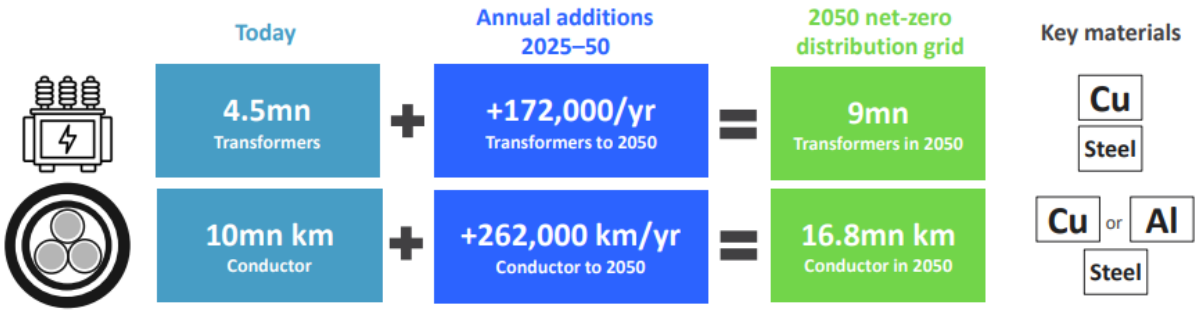

Figure 1: an estimation of the necessary increase in transformers and conductors to meet the goals of Fit for 55. (Eurelectric, Grids for Speed, 2024, p. 85).

Annex 2 – Eurelectric members suggested amendments to the list of main specific components

The first 3 columns are the EU Commission proposal. In the 4th and 5th column, our suggested amendments can be found. The proposed amendments are underlined for suggested additions are made, and have a ~~strikethrough~~ for suggested deletions.

Sub-categories of net-zero technologies	Final products	Main specific components	Eurelectric's proposed amendments	Eurelectric's Rationale
Electricity grid technologies	– Onshore substations – Offshore substations	– Cables and lines for electricity transmission and electricity distribution (overhead lines, underground and undersea cables, including HVDC and HVAC) – Switchgears – Circuit breakers – Protection relays – Power transformers – Disconnectors – Busbar systems – Electric cabinets – Offshore substations	~~Electric cabinets~~	Suggesting to remove cabinets
Electricity grid technologies	– Electricity transmission and distribution towers	- Cables and lines for electricity transmission () and electricity distribution (overhead lines, underground and undersea cables, including HVDC and HVAC) – Electrical conductors, including advanced conductors and high temperature superconductors – Insulators	~~- Cables and lines for electricity transmission () and electricity distribution (overhead lines, underground and undersea cables, including HVDC and HVAC)~~ ~~– Electrical conductors, including advanced conductors and high temperature superconductors~~	Editorial comment for increased clarity: suggestion to remove this section, as the components listed are repeated under the category "Cables and lines for electricity transmission and electricity distribution" and relate better to this category." (the row below).

			~~– Insulators~~	
Electricity grid technologies	– Cables and lines for electricity transmission and electricity distribution (overhead lines, underground and undersea cables, including HVDC and HVAC)	– Cables and lines for electricity transmission () and electricity distribution (overhead lines, underground and undersea cables, including HVDC and HVAC) – Electrical conductors, including advanced conductors and high temperature superconductors – Insulators	~~– Electrical conductors, including advanced conductors and high temperature superconductors~~ – Grounding conductors ~~– Insulators~~	Suggesting tier1-level components by removing conductors and insulators, as it is part of the "cables and lines" category. However, since grounding conductors are not subcomponents of cables and lines, they should replace the conductor category. In addition, in the case that both cables and conductors would be mentioned, it could create confusion as the term "conductor" can refer to both the actual conductor (conducting metal) or the cable/line (final product including isolating material). We suggest using one joint term for cables and lines: "conductors, including cables and lines". Alternatively, using the term "Electrical lines"/"Overhead lines" and including "Cables" as an additional main component.
Electricity grid technologies	-Power transformers	– Power transformers – Transformer cores – Transformer windings – Transformer tap changers	~~– Transformer cores~~ ~~– Transformer windings~~ ~~– Transformer tap changers~~	Suggesting tier-1 level components

Electric technologies for transport	− Electric vehicle supply equipment − Electric road system2 − Shore-side electricity supply equipment − Overhead contact lines	− Electric vehicle supply equipment − Shore-side electricity supply equipment		
Technologies to digitalise the grid and other electricity grid technologies	− High- and mediumvoltage power electronics equipment and components (Including DC technology) − Flexible alternating current transmission system (FACTS) technology − Smart meters / advanced metering infrastructure	− High- and medium-voltage power electronics equipment and components (including DC technology) − Flexible alternating current transmission system (FACTS) technologies − Smart meters / advanced metering infrastructures		
Photovoltaic (PV) technologies	− Solar photovoltaic (PV) systems	− PV grade polysilicon − PV grade silicon ingots or equivalent1 − PV wafers or equivalent1 − PV cells or equivalent1 − Solar glass − PV modules − PV inverters − PV trackers for large-scale plants	-PV mounting structure ~~-PV trackers for large-scale plants~~ -PV racking, including trackers and fixed structures	instead of 'PV trackers for large-scale plants', it is suggested to include 'PV racking, including trackers and fixed structures.'
Solar thermal electric technologies	− Concentrated solar power (CSP) plants	− CSP reflectors − CSP trackers − CSP receivers (point or line)		

Solar thermal technologies	− Solar thermal systems	− Solar thermal collectors (including flat plate, evacuated tube, concentrating systems and air collectors) − Solar thermal absorbers − Solar glass − Solar thermal trackers		
	Other solar technologies			
Onshore wind technologies	− Onshore wind turbines	− Nacelles (assembly) − Rotor hubs − Direct drive generators / drivetrains and gearbox drivetrains − Permanent magnets of wind turbines − Gearboxes of wind turbines − Blades − Towers	~~- Direct drive generators / drivetrains and gearbox drivetrains~~	Not a main specific component as integrated in “drive”
Offshore wind technologies	− Offshore wind turbines	− Nacelles (assembly) − Rotor hubs − Direct drive generators/drivetrains and gearbox drivetrains − Permanent magnets of wind turbines − Gearboxes of wind turbines − Blades − Towers − Foundations / floaters (for offshore wind)	~~- Foundations / floaters (for offshore wind)~~	Not a main specific component if assessment based on value (as outside of control of OEM)
Other offshore renewable technologies	− Tidal stream energy technologies − Wave energy technologies			
Battery technologies	− Battery packs − Battery modules	− Battery packs − Battery modules		

		– Battery cells – Cathode active materials – Anode active materials – Electrolytes – Separators – Current collectors (including thin copper and aluminium foils) – Battery management systems (BMS) – Battery thermal management systems (BTMS)		
Energy storage technologies				
Electrochemical storage technologies	– Ultracapacitors / supercapacitors – Redox flow energy storage	– Electrolytes – Separators – Collectors – Electrode plates		
Gravitational storage technologies	– Pumped hydro storage	– Reversible hydro turbines and pump runners – Distributors with adjustable / guide vanes	- Generator stator and rotor - Turbine shaft - Axial and radial bearings - Unit auxiliary systems - Command and control system - Valves	If the insertion is accepted for this section, the Pump Storage Unit section needs to be revised accordingly For info: most common valves are roller gate, spherical, butterfly, Johnson
Thermal energy storage technologies	– Thermal energy storage plants	– Sensible heat storage and latent heat storage mediums (including phase change materials and molten salts)		
Compressed / liquefied gas energy				

storage technologies				
Heat pump technologies	− Heat pumps	− Heat pumps − Four-way valves − Scroll compressors		
Geothermal energy technologies	− Geothermal power plants − Geothermal direct use systems			
Electrolysers	− Alkaline electrolysers (AEL)	− Stacks − Separators (diaphragm or membranes tailored for water electrolysis) − Bipolar plates − Electrodes		
Electrolysers	− Proton exchange membrane electrolysers (PEMEL)	− Stacks − Membrane electrode assemblies (3-layer) / catalyst-coated membranes − Porous transport layers /gas diffusion layers − Bipolar plates		
Electrolysers	− Anion exchange membrane electrolysers (AEMEL)	− Stacks − Membrane electrode assemblies (3-layer) / catalyst-coated membranes − Porous transport layers / gas diffusion layers − Bipolar plates		
Electrolysers	− Solid-oxide electrolysers (SOEL)	− Stacks − Electrolyte and electrodes − High-temperature gaskets / sealings − Interconnectors		
Hydrogen fuel cells	− Proton exchange membrane fuel cells (PEMFC)	− Stacks		

		− Membrane electrode assemblies (3-layer) / Catalyst-coated membranes − Porous transport layer / Gas diffusion layers − Bipolar plates		
Hydrogen fuel cells	− Solid-oxide fuel cells (SOFC)	− Stack − Electrolyte and electrodes − Hightemperature gaskets / sealings − Interconnectors		
Other hydrogen technologies	− Hydrogen distribution − Hydrogen storage	− Onboard hydrogen storage − Stationary (high-pressure) storage Tanks		
Sustainable biogas technologies	− Sustainable biogas plants	− Anaerobic digesters / Fermentation tanks		
Sustainable bio-methane technologies	− Sustainable biomethane plants	− Anaerobic digesters / Fermentation tanks − Biomethane upgrading units		
Carbon capture technologies	− Absorption capture − Adsorption capture − Membrane capture − Solid cycles capture − Cryogenics capture − Direct air capture			
Carbon storage technologies				
Nuclear fission energy technologies	− Nuclear fission power plants	− Fuel elements − Reactor (pressure) vessels − Primary piping − Steam generators − Safety systems − Instrumentation and control systems	-Containment building -Electrical distribution systems -Air-cooling systems and systems for the treatment of radioactive liquid and gas affluents -Pumps	Make sure that nuclear technologies are fully recognized with the NZIA, added systems and equipment is relevant to reliable/safe operation with large reactors as well as SMRs.

Nuclear fuel cycle technologies	− Nuclear fuel cycles	− Centrifuges − Gas handling and flow control systems − Chemical processing equipment − Waste vitrification equipment − Storage and disposal cylinders and casks	-Safety systems -Storage and disposal vessels, cylinders and casks -Uranium gas-conversion systems -Containment enclosure equipment -Instrumentation and control systems -Mechanical processing and handling equipment	For efficient nuclear fuel manufacturing, storage and disposal
Sustainable alternative fuels (SAF) technologies	− SAF plants	− Thermochemical, chemical and biochemical / biological reactors to convert biomass into biointermediates and/or syngas − Reactors and post-treatment units to convert biointermediates and/or syngas into SAF		
Hydropower technologies	− Hydro turbine systems	− Hydro turbine runners − Distributors with adjustable / guide vanes		
Osmotic energy technologies				
Ambient energy technologies, other than heat pumps				
Biomass technologies				
Landfill gas technologies				

Sewage treatment plant gas technologies				
Other renewable energy technologies				
Energy system-related energy efficiency technologies	− Energy management systems (EMS) − Building automation systems (BAS) − Automated demand responses (ADR) − Variable speed drives	− Energy management systems (EMS) − Building automation systems (BAS) − Automated demand responses (ADR) − Variable speed drives		
Heat and cold grid technologies	− Heat and cold distribution system pipework			
Other energy system-related energy efficiency technologies				
Renewable fuels of non-biological origin (RFNBO) technologies	− RFNBO plants	− Reactors to convert H2 and CO2 into syngas or alcohol − Reactors to convert syngas or alcohols into RFNBOs		
Biotech climate and energy solutions	− Microorganisms (such as bacteria, yeasts, microalgae, fungi, microbial strains and methanogens) that are used to pretreat and convert feedstock into biofuels, bio-based chemicals, bio-based materials and bio-based products	− Microorganisms (such as bacteria, yeasts, microalgae, fungi, microbial strains and methanogens) that are used to pretreat and convert feedstock into biofuels, bio-based chemicals, bio-based materials and bio-based products − Enzymes (such as amylase and cellulase) that are used to		

	− Enzymes (such as amylase and cellulase) that are used to pretreat and convert feedstock into biofuels, bio-based chemicals, bio-based materials and bio-based products	pretreat and convert feedstock into biofuels, bio-based chemicals, bio-based materials and bio-based products		
Transformative industrial technologies for decarbonisation	− Electric arc furnaces − Hydrogen-ready direct-reduced iron shaft furnaces − Submerged arc furnaces − Open slag bath furnaces − Flash calciners − Industrial electric boilers − Industrial induction heaters / furnaces3 − Industrial infrared heaters / furnaces − Industrial microwave heaters / furnaces − Industrial radio-wave heaters / furnaces − Industrial resistive heaters / furnaces	− Graphite or carbon electrodes for electric furnaces − Industrial electric boilers − Industrial induction heaters / furnaces − Industrial induction coils − Industrial infrared heaters / furnaces − Industrial infrared emitters − Industrial microwave heaters / furnaces − Industrial magnetrons − Industrial radiowave heaters / furnaces − Radio frequency generators − Industrial resistive heaters / furnaces		
CO2 transport technologies				
CO2 utilisation technologies	− Thermochemical utilisation − Electrochemical Utilisation			
Wind propulsion technologies	− Flettner rotors − Suction wing sails − Towing kites − Rigid wing sails			

Electric propulsion technologies	− Electric propulsion systems for road transport − Electric propulsion systems for rail transport − Electric propulsion systems for waterborne transport − Electric propulsion systems for air transport	− Automotive traction electric motors − Permanent magnet of traction electric motor − Automotive battery packs − Automotive fuel cells − Traction inverters − Onboard chargers − Onboard hydrogen storage − Rail propulsion electric motors − Waterborne propulsion electric motors		
Other nuclear technologies			-Turbines	

Eurelectric pursues in all its activities the application of the following sustainable development values:

Economic Development

- Growth, added-value, efficiency

Environmental Leadership

- Commitment, innovation, pro-activeness

Social Responsibility

- Transparency, ethics, accountability

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