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ANNEX

ANNEXES

to the

COMMISSION DELEGATED REGULATION (EU) .../...
of XXX

amending Regulation (EU) 2024/1735 of the European Parliament and of the Council as regards the identification of sub-categories within net-zero technologies and the list of specific components used for those technologies.

ANNEX

List of final products and specific components considered to be primarily used for the production of net-zero technologies.

	Sub-categories of net-zero technologies	Final products	Primarily used components
Solar technologies	Photovoltaic (PV) technologies	<ul style="list-style-type: none"> – Solar photovoltaic systems 	<ul style="list-style-type: none"> – PV grade polysilicon – PV grade silicon ingots or equivalent¹ – PV wafers or equivalent¹ – PV cells or equivalent¹ – Solar glass – PV encapsulants – PV ribbons – PV connectors – PV junction boxes – PV modules – PV inverters – PV trackers for large-scale plants
	Solar thermal electric technologies	<ul style="list-style-type: none"> – Concentrated solar power (CSP) plants 	<ul style="list-style-type: none"> – CSP reflectors – CSP trackers – CSP receivers (point or line)
	Solar thermal technologies	<ul style="list-style-type: none"> – Solar thermal systems 	<ul style="list-style-type: none"> – Solar thermal collectors (including flat-plates, evacuated tubes, concentrating systems and air collectors) – Solar thermal absorbers – Solar glass – Solar thermal trackers
	Other solar technologies		

¹ The term ‘equivalent’ refers to similar steps or key enabling technologies needed for thin-film, organic, tandem or other PV technologies.

Onshore wind and offshore renewable technologies	Onshore wind technologies	<ul style="list-style-type: none"> – Onshore wind turbines 	<ul style="list-style-type: none"> – Nacelles (assembly) – Yaw systems – Pitch systems – Rotor hubs – Pitch bearings – Yaw bearings – Main bearings – Direct drive generators / drivetrains and gearbox drivetrains – Permanent magnets of wind turbines – Gearboxes of wind turbines – Blades – Towers
	Offshore wind technologies	<ul style="list-style-type: none"> – Offshore wind turbines 	<ul style="list-style-type: none"> – Nacelles (assembly) – Yaw systems – Pitch systems – Rotor hubs – Pitch bearings – Yaw bearings – Main bearings – Direct drive generators / drivetrains and gearbox drivetrains – Permanent magnets of wind turbines – Gearboxes of wind turbines – Blades – Towers – Foundations / floaters (for offshore wind)
	Other offshore renewable technologies	<ul style="list-style-type: none"> – Tidal stream energy technologies – Wave energy technologies 	

Battery and energy storage technologies	Battery technologies	<ul style="list-style-type: none"> – Battery packs – Battery modules 	<ul style="list-style-type: none"> – Battery packs – Battery modules – Battery cells – Cathode active materials – Anode active materials – Electrolytes – Separators – Binders – Current collectors (including thin copper and aluminium foils) – Battery Management Systems (BMS) – Battery Thermal Management Systems (BTMS)
	Energy storage technologies		
	Electrochemical storage technologies	<ul style="list-style-type: none"> – Ultracapacitors / supercapacitors – Redox flow energy storage 	<ul style="list-style-type: none"> – Electrolytes – Separators – Collectors – Electrode plates
	Gravitational storage technologies	<ul style="list-style-type: none"> – Pumped hydro storage 	<ul style="list-style-type: none"> – Reversible hydro turbines and pump runners – Distributors with adjustable / guide vanes
	Thermal energy storage technologies	<ul style="list-style-type: none"> – Thermal energy storage plants 	<ul style="list-style-type: none"> – Sensible heat storage and latent heat storage mediums (including phase-change materials and molten salts)
	Compressed/liquefied gas energy storage technologies		

Heat pumps and geothermal energy technologies	Heat pump technologies	<ul style="list-style-type: none"> – Heat pumps 	<ul style="list-style-type: none"> – Heat pumps – Four-way valves – Scroll compressors
	Geothermal energy technologies	<ul style="list-style-type: none"> – Geothermal power plants – Geothermal direct use systems 	
Hydrogen technologies	Electrolysers	<ul style="list-style-type: none"> – Alkaline electrolysers (AEL) 	<ul style="list-style-type: none"> – Stacks – Separators (diaphragm or membranes tailored for water electrolysis) – Bipolar plates – Electrodes – Frames – Gaskets / sealants
		<ul style="list-style-type: none"> – Proton exchange membrane electrolysers (PEMEL) 	<ul style="list-style-type: none"> – Stacks – Membrane electrode assemblies (3-layer) / catalyst coated membranes – Porous transport layers / gas diffusion layers – Bipolar plates – Gaskets / sealants
		<ul style="list-style-type: none"> – Anion exchange membrane electrolysers (AEMEL) 	<ul style="list-style-type: none"> – Stacks – Membrane electrode assemblies (3-layer) / catalyst coated membranes – Porous transport layers / gas diffusion layers – Bipolar plates – Gaskets / sealants
		<ul style="list-style-type: none"> – Solid-oxide electrolysers (SOEL) 	<ul style="list-style-type: none"> – Stacks – Electrolytes & electrodes – High-temperature gaskets / sealings – Interconnectors – Meshes

	Hydrogen fuel cells	<ul style="list-style-type: none"> - Proton exchange membrane fuel cells (PEMFC) 	<ul style="list-style-type: none"> - Stacks - Membrane electrode assemblies (3-layer) / catalyst coated membranes - Porous transport layers / gas diffusion layers - Bipolar plates - Gaskets / sealants
		<ul style="list-style-type: none"> - Solid-oxide fuel cells (SOFC) 	<ul style="list-style-type: none"> - Stacks - Electrolytes and electrodes - High-temperature gaskets / sealings - Interconnectors - Meshes
	Other hydrogen technologies	<ul style="list-style-type: none"> - Hydrogen distribution - Hydrogen storage 	<ul style="list-style-type: none"> - Onboard hydrogen storage - Hydrogen on-tank valves - Stationary (high-pressure) storage tanks - Hydrogen compressors

Sustainable biogas and biomethane technologies	Sustainable biogas technologies	<ul style="list-style-type: none"> – Sustainable biogas plants 	<ul style="list-style-type: none"> – Anaerobic digesters / fermentation tanks – Enzymes and microorganisms for sustainable biogas production – Catalysts for sustainable biogas production
	Sustainable biomethane technologies	<ul style="list-style-type: none"> – Sustainable biomethane plants 	<ul style="list-style-type: none"> – Anaerobic digesters / fermentation tanks – Enzymes and microorganisms for sustainable biomethane production – Biomethane upgrading units – Catalysts for sustainable biomethane production
CCS technologies	Carbon capture technologies	<ul style="list-style-type: none"> – Absorption capture – Adsorption capture – Membranes capture – Solid cycles capture – Cryogenics capture – Direct air capture 	
	Carbon storage technologies		

Electricity grid technologies	Electricity grid technologies	<ul style="list-style-type: none"> - Onshore substations - Offshore substations 	<ul style="list-style-type: none"> - 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 - Insulators - Surge arrestors - Capacitors - Reactors - Busbar systems - Electric cabinets - Offshore substations
		<ul style="list-style-type: none"> - Electricity transmission and distribution towers 	<ul style="list-style-type: none"> - Electricity transmission and distribution towers - Electrical conductors (including advanced conductors and high-temperature superconductors) - Insulators - Surge arrestors
		<ul style="list-style-type: none"> - Cables and lines for electricity transmission and electricity distribution (overhead lines, underground and undersea cables, including HVDC and HVAC) 	<ul style="list-style-type: none"> - 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
		<ul style="list-style-type: none"> - Power transformers 	<ul style="list-style-type: none"> - Power transformers - Transformer cores - Transformer windings - Transformer tap changers

	Electric charging technologies for transport	<ul style="list-style-type: none"> – Electric vehicle supply equipment – Electric road systems² – Shore-side electricity supply equipment – Overhead contact lines 	<ul style="list-style-type: none"> – Electric vehicle supply equipment – Electric vehicle charging connectors – Shore-side electricity supply equipment
	Technologies to digitalise the grid and other electricity grid technologies	<ul style="list-style-type: none"> – High- and medium-voltage power electronics equipment and components (including DC technology) – Flexible alternating current transmission system (FACTS) technologies – Smart meters / advanced metering infrastructures 	<ul style="list-style-type: none"> – High- and medium-voltage power electronics equipment and components (including DC technology) – Flexible alternating current transmission system (FACTS) technologies – Substation automation systems – Smart meters / advanced metering infrastructures

² The term ‘Electric road system’ (also known as dynamic charging) refers to equipment along the road that supplies power to vehicles while they are in motion. This final product includes both conductive and inductive charging.

Nuclear fission energy technologies	Nuclear fission energy technologies	<ul style="list-style-type: none"> - Nuclear fission power plants 	<ul style="list-style-type: none"> - Control rods - Control rod drive mechanisms - Fuel elements - Reactor (pressure) vessels - Reactor internals - Coolant/moderator and related purification systems - Pressurisers - Reactor coolant pumps / gas circulators - Primary piping - Steam generators - Nuclear heat exchangers - Secondary system components - Safety systems - Instrumentation and control systems - Refuelling machines
	Nuclear fuel cycle technologies	<ul style="list-style-type: none"> - Nuclear fuel cycles 	<ul style="list-style-type: none"> - Centrifuges - Gas handling and flow control systems - Chemical processing equipment - Waste vitrification equipment - Storage and disposal cylinders and casks

<p>Sustainable alternative fuels technologies</p>	<p>Sustainable alternative fuels (SAF) technologies</p>	<ul style="list-style-type: none"> - SAF plants 	<ul style="list-style-type: none"> - Catalysts for SAF production - Enzymes and microorganisms for SAF production - Thermochemical, chemical and biochemical/biological reactors to convert biomass into bio-intermediates and/or syngas - Reactors and post-treatment units to convert bio-intermediates and/or syngas into SAF
<p>Hydropower technologies</p>	<p>Hydropower technologies</p>	<ul style="list-style-type: none"> - Hydro turbine systems 	<ul style="list-style-type: none"> - Hydro turbine runners - Distributor with adjustable / guide vanes
<p>Other renewable energy technologies</p>	<p>Osmotic energy technologies</p>		
	<p>Ambient energy technologies (other than heat pumps)</p>		
	<p>Biomass technologies</p>		
	<p>Landfill gas technologies</p>		
	<p>Sewage treatment plant gas technologies</p>		
	<p>Other renewable energy technologies</p>		

Energy system-related energy efficiency technologies	Energy system-related energy efficiency technologies	<ul style="list-style-type: none"> – Energy management systems (EMS) – Building automation systems (BAS) – Automated demand response (ADR) – Variable speed drives 	<ul style="list-style-type: none"> – Energy management systems (EMS) – Building automation systems (BAS) – Automated demand response (ADR) – Variable speed drives
	Heat and cold grid technologies	<ul style="list-style-type: none"> – Heating and cooling distribution system pipework 	<ul style="list-style-type: none"> – Pipe fitters and couplers
	Other energy system-related energy efficiency technologies		
Renewable fuels of non-biological origin	Renewable fuels of non-biological origin (RFNBO) technologies	<ul style="list-style-type: none"> – RFNBO plants 	<ul style="list-style-type: none"> – Reactors to convert H₂ and CO₂ into syngas or alcohols – Reactors to convert syngas or alcohols into RFNBOs – Catalysts for RFNBO production

<p>Biotech climate and energy solutions</p>	<p>Biotech climate and energy solutions</p>	<ul style="list-style-type: none"> – 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 pretreat and convert feedstock into biofuels, bio-based chemicals, bio-based materials and bio-based products 	<ul style="list-style-type: none"> – 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 pretreat and convert feedstock into biofuels, bio-based chemicals, bio-based materials and bio-based products
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<p>Transformative industrial technologies for decarbonisation</p>	<p>Transformative industrial technologies for decarbonisation</p>	<ul style="list-style-type: none"> – 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 	<ul style="list-style-type: none"> – 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 radio-wave heaters / furnaces – Radio frequency generators – Industrial resistive heaters / furnaces
<p>CO₂ transport and utilisation technologies</p>	<p>CO₂ transport technologies</p>		
	<p>CO₂ utilisation technologies</p>	<ul style="list-style-type: none"> – Thermochemical utilisation – Electrochemical utilisation 	

³ The term ‘heater’ refers to low (200 C) and medium (500 C) temperature applications. The term ‘furnaces’ refers to high (1000 C) and very high (1500 C) temperature applications.

Wind and electric propulsion technologies for transport	Wind propulsion technologies	<ul style="list-style-type: none"> – Flettner rotors – Suction wing sails – Towing kites – Rigid wing sails 	
	Electric propulsion technologies	<ul style="list-style-type: none"> – Electric propulsion systems for road transport – Electric propulsion systems for rail transport – Electric propulsion systems for waterborne transport – Electric propulsion systems for air transport 	<ul style="list-style-type: none"> – Automotive traction electric motors – Permanent magnets of traction electric motor – Automotive battery packs – Automotive fuel cells – Traction inverters – Onboard chargers – Charge ports – Onboard hydrogen storages – Current collectors (including pantograph) – Rail propulsion electric motors – Waterborne propulsion electric motors
Other nuclear technologies	Other nuclear technologies		