

# CPC COOPERATIVE PATENT CLASSIFICATION

## Y02E REDUCTION OF GREENHOUSE GASES [GHG] EMISSION, RELATED TO ENERGY GENERATION, TRANSMISSION OR DISTRIBUTION

<b>10/00</b>	<b>Energy generation through renewable energy sources</b>	10/58	. . . Maximum power point tracking [MPPT] systems
10/10	. Geothermal energy	10/60	. Thermal-PV hybrids
10/12	. . Earth coil heat exchangers	10/70	. Wind energy
10/125	. . . Compact tube assemblies, e.g. geothermal probes	10/72	. . Wind turbines with rotation axis in wind direction
10/14	. . Systems injecting medium directly into ground, e.g. hot dry rock system, underground water	10/721	. . . Blades or rotors
10/16	. . Systems injecting medium into a closed well	10/722	. . . Components or gearbox
10/18	. . Systems exchanging heat with fluids in pipes, e.g. fresh water or waste water	10/723	. . . Control of turbines
10/20	. Hydro energy	10/725	. . . Generator or configuration
10/22	. . Conventional, e.g. with dams, turbines and waterwheels	10/726	. . . Nacelles
10/223	. . . Turbines or waterwheels, e.g. details of the rotor	10/727	. . . Offshore towers
10/226	. . . Other parts or details	10/728	. . . Onshore towers
10/28	. . Tidal stream or damless hydropower, e.g. sea flood and ebb, river, stream	10/74	. . Wind turbines with rotation axis perpendicular to the wind direction
10/30	. Energy from sea ( <a href="#">tidal stream Y02E 10/28</a> ) ( <a href="#">not used; see subgroups</a> )	10/76	. . Power conversion electric or electronic aspects
10/32	. . Oscillating water column [OWC]	10/763	. . . for grid-connected applications
10/34	. . Ocean thermal energy conversion [OTEC]	10/766	. . . concerning power management inside the plant, e.g. battery charging/discharging, economical operation, hybridisation with other energy sources
10/36	. . Salinity gradient	<b>20/00</b>	<b>Combustion technologies with mitigation potential</b>
10/38	. . Wave energy or tidal swell, e.g. Pelamis-type	20/10	. Combined combustion ( <a href="#">not used, see subgroups</a> )
10/40	. Solar thermal energy	20/12	. . Heat utilisation in combustion or incineration of waste
10/41	. . Tower concentrators	20/14	. . Combined heat and power generation [CHP]
10/42	. . Dish collectors	20/16	. . Combined cycle power plant [CCPP], or combined cycle gas turbine [CCGT]
10/43	. . Fresnel lenses	20/18	. . . Integrated gasification combined cycle [IGCC]
10/44	. . Heat exchange systems	20/185	. . . . combined with carbon capture and storage [CCS]
10/45	. . Trough concentrators	20/30	. Technologies for a more efficient combustion or heat usage ( <a href="#">not used, see subgroups</a> )
10/46	. . Conversion of thermal power into mechanical power, e.g. Rankine, Stirling solar thermal engines	20/32	. . Direct CO <sub>2</sub> mitigation ( <a href="#">not used, see subgroups</a> )
10/465	. . . Thermal updraft	20/322	. . . Use of synair, i.e. a mixture of recycled CO <sub>2</sub> and pure O <sub>2</sub>
10/47	. . Mountings or tracking	20/324	. . . Use of reactants before or during combustion
10/50	. Photovoltaic [PV] energy	20/326	. . . Segregation from fumes, including use of reactants downstream from combustion or deep cooling
10/52	. . PV systems with concentrators	20/328	. . . Controls of combustion specifically inferring on CO <sub>2</sub> emissions
10/54	. . Material technologies ( <a href="#">not used; see subgroups</a> )	20/34	. . Indirect CO <sub>2</sub> mitigation, i.e. by acting on non CO <sub>2</sub> directly related matters of the process, e.g. more efficient use of fuels ( <a href="#">not used, see subgroups</a> )
10/541	. . . CuInSe <sub>2</sub> material PV cells	20/342	. . . Cold flame
10/542	. . . Dye sensitized solar cells	20/344	. . . Oxyfuel combustion
10/543	. . . Solar cells from Group II-VI materials	20/346	. . . Unmixed combustion
10/544	. . . Solar cells from Group III-V materials	20/348	. . . Air pre-heating
10/545	. . . Microcrystalline silicon PV cells	20/36	. . Heat recovery other than air pre-heating
10/546	. . . Polycrystalline silicon PV cells	20/363	. . . at fumes level
10/547	. . . Monocrystalline silicon PV cells	20/366	. . . at burner level
10/548	. . . Amorphous silicon PV cells	<b>30/00</b>	<b>Energy generation of nuclear origin</b>
10/549	. . . organic PV cells	30/10	. Fusion reactors
10/56	. . Power conversion electric or electronic aspects	30/12	. . Magnetic plasma confinement [MPC]
10/563	. . . for grid-connected applications		
10/566	. . . concerning power management inside the plant, e.g. battery charging/discharging, economical operation, hybridisation with other energy sources		

- 30/122 . . . Tokamaks
- 30/124 . . . Stellarators
- 30/126 . . . Other reactors with MPC
- 30/128 . . . First wall, divertor, blanket
- 30/14 . . Inertial plasma confinement
- 30/16 . . . Injection systems and targets
- 30/18 . . Low temperature fusion, e.g. "cold fusion"
- 30/30 . Nuclear fission reactors
- 30/31 . . Boiling water reactors
- 30/32 . . Pressurized water reactors
- 30/33 . . Gas cooled reactors
- 30/34 . . Fast breeder reactors
- 30/35 . . Liquid metal reactors
- 30/36 . . Pebble bed reactors
- 30/37 . . Accelerator driven reactors
- 30/38 . . Fuel
- 30/39 . . Control of nuclear reactions
- 30/40 . . Other aspects relating to nuclear fission
- 40/00 Technologies for an efficient electrical power generation, transmission or distribution**
- 40/10 . Flexible AC transmission systems [FACTS]
- 40/12 . . Static VAR compensators [SVC], static VAR generators [SVG] or static VAR systems [SVS], including thyristor-controlled reactors [TCR], thyristor-switched reactors [TSR] or thyristor-switched capacitors [TSC]
- 40/14 . . Thyristor-controlled series capacitors [TCSC]
- 40/16 . . Static synchronous compensators [STATCOM]
- 40/18 . . Unified power flow controllers [UPF] or controlled series voltage compensators
- 40/20 . Active power filtering [APF] ([not used, see subgroups](#))
- 40/22 . . Non-specified or voltage-fed active power filters
- 40/24 . . Current-fed active power filters
- 40/26 . . using a multilevel or multicell converter
- 40/30 . Reactive power compensation ([Y02E 40/10, Y02E 40/20 take precedence](#))
- 40/32 . . using synchronous generators
- 40/34 . . for voltage regulation
- 40/40 . Arrangements for reducing harmonics ([Y02E 40/10 - Y02E 40/30 take precedence](#))
- 40/50 . Arrangements for eliminating or reducing asymmetry in polyphase networks
- 40/60 . Superconducting electric elements or equipment or power systems integrating superconducting elements or equipment
- 40/62 . . Superconducting generators
- 40/622 . . . Superconducting synchronous generators
- 40/625 . . . . with a superconducting rotor
- 40/627 . . . Superconducting homopolar generators
- 40/64 . . Superconducting transmission lines or power lines or cables or installations thereof
- 40/641 . . . characterised by their form
- 40/642 . . . . Films or wires on bases or cores
- 40/644 . . . . Multifilaments embedded in normal conductors
- 40/645 . . . characterised by the disposition of thermal insulation
- 40/647 . . . characterised by cooling
- 40/648 . . . Installation of superconducting cables or lines
- 40/66 . . Superconducting transformers or inductors
- 40/67 . . Superconducting energy storage for power networks, e.g. SME, superconducting magnetic storage
- 40/68 . . Protective or switching arrangements for superconducting elements or equipment
- 40/69 . . Current limitation using superconducting elements, including multifunctional current limiters
- 40/70 . Systems integrating technologies related to power network operation and communication or information technologies for improving the carbon footprint of electrical power generation, transmission or distribution, i.e. smart grids as climate change mitigation technology in the energy generation sector ([smart grids relating to the energy generation sector in general, including the technologies with no associated climate change mitigation effect Y04S 10/00](#)) ([not used, see subgroups](#))
- 40/72 . . Systems characterised by the monitoring, control or operation of energy generation units, e.g. distributed generation [DER] or load-side generation
- 40/74 . . Systems characterised by the monitoring, control or operation of flexible AC transmission systems [FACTS] or power factor or reactive power compensating or correcting units
- 40/76 . . Computing methods or systems for efficient or low carbon management or operation of electric power systems
- 50/00 Technologies for the production of fuel of non-fossil origin**
- 50/10 . Biofuels
- 50/11 . . CHP turbines for biofeed
- 50/12 . . Gas turbines for biofeed
- 50/13 . . Bio-diesel
- 50/14 . . Bio-pyrolysis
- 50/15 . . Torrefaction of biomass
- 50/16 . . Cellulosic bio-ethanol
- 50/17 . . Grain bio-ethanol
- 50/18 . . Bio-alcohols produced by other means than fermentation
- 50/30 . Fuel from waste
- 50/32 . . Synthesis of alcohols or diesel from waste including a pyrolysis and/or gasification step
- 50/34 . . Methane ([not used, see subgroups](#))
- 50/343 . . . production by fermentation of organic by-products, e.g. sludge
- 50/346 . . . from landfill gas
- 60/00 Enabling technologies or technologies with a potential or indirect contribution to GHG emissions mitigation**
- 60/10 . Energy storage ([not used, see subgroups](#))
- 60/12 . . Battery technology
- 60/122 . . . Lithium-ion batteries
- 60/124 . . . Alkaline secondary batteries, e.g. NiCd or NiMH
- 60/126 . . . Lead-acid batteries
- 60/128 . . . Hybrid cells
- 60/13 . . Ultracapacitors, supercapacitors, double-layer capacitors
- 60/14 . . Thermal storage ([empty, covered by subgroups](#))
- 60/142 . . . Sensible heat storage

- 60/145 . . . Latent heat storage
- 60/147 . . . Cold storage
- 60/15 . . Pressurised fluid storage
- 60/16 . . Mechanical energy storage, e.g. flywheels
- 60/17 . . Pumped storage
- 60/30 . Hydrogen technology (not used, see subgroups)
- 60/32 . . Hydrogen storage
- 60/321 . . . Storage of liquefied, solidified, or compressed hydrogen in containers
- 60/322 . . . Storage in caverns
- 60/324 . . . Reversible uptake of hydrogen by an appropriate medium
- 60/325 . . . . the medium being carbon
- 60/327 . . . . the medium being a metal or rare earth metal, an intermetallic compound or a metal alloy
- 60/328 . . . . the medium being an organic compound or a solution thereof
- 60/34 . . Hydrogen distribution
- 60/36 . . Hydrogen production from non-carbon containing sources
- 60/362 . . . by chemical reaction with metal hydrides, e.g. hydrolysis of metal borohydrides
- 60/364 . . . by decomposition of inorganic compounds, e.g. splitting of water other than electrolysis, ammonia borane, ammonia
- 60/366 . . . by electrolysis of water
- 60/368 . . . . by photo-electrolysis
- 60/50 . Fuel cells
- 60/52 . . characterised by type or design
- 60/521 . . . Proton Exchange Membrane Fuel Cells [PEMFC]
- 60/522 . . . . Direct Alcohol Fuel Cells [DAFC]
- 60/523 . . . . . Direct Methanol Fuel Cells [DMFC]
- 60/525 . . . Solid Oxide Fuel Cells [SOFC]
- 60/526 . . . Molten Carbamate Fuel Cells [MCFC]
- 60/527 . . . Bio Fuel Cells
- 60/528 . . . Regenerative or indirect fuel cells, e.g. redox flow type batteries
- 60/56 . . integrally combined with other energy production systems
- 60/563 . . . Cogeneration of mechanical energy, e.g. integral combination of fuel cells and electric motors
- 60/566 . . . Production of chemical products inside the fuel cell; incomplete combustion
- 60/60 . Arrangements for transfer of electric power between AC networks via a high-tension DC link, HVDC transmission
- 60/70 . Systems integrating technologies related to power network operation and communication or information technologies mediating in the improvement of the carbon footprint of electrical power generation, transmission or distribution, i.e. smart grids as enabling technology in the energy generation sector (smart grids relating to the energy generation sector in general, including the technologies with no associated climate change mitigation effect Y04S 10/00 ) {not used, see subgroups}
- 60/72 . . Systems characterised by the monitored, controlled or operated power network elements or equipments {not used, see subgroups}
- 60/721 . . . the elements or equipments being or involving electricity based vehicles, i.e. power aggregation of electric vehicles [EV] or hybrid vehicles [HEV] (remote or cooperative charging Y02T 90/168; details associated with the interoperability in the section of transportation, e.g. vehicle recognition, authentication, identification or billing Y02T 90/169)
- 60/722 . . . the elements or equipments being or involving energy storage units (for systems comprising uninterruptible power supplies or standby generators Y04S 20/12)
- 60/723 . . . the elements or equipments being or involving electric power substations
- 60/724 . . . the elements or equipments being or involving switches, relays or circuit breakers, e.g. intelligent electronic devices [IED]
- 60/725 . . . the elements or equipments being or involving protection elements, arrangements or systems
- 60/726 . . . the elements or equipments being or involving voltage regulating units
- 60/727 . . . the elements or equipments being or involving measuring units
- 60/728 . . . . the elements or equipments being or involving phasor measuring units [PMU]
- 60/74 . . Systems characterised by state monitoring, e.g. fault, temperature monitoring, insulator monitoring, corona discharge
- 60/76 . . Computer aided design [CAD]; Simulation; Modelling
- 60/78 . . Communication technology specific aspects (not used, see subgroups)
- 60/7807 . . . Details of the transmission structure or support between the monitoring, controlling or managing units and monitored, controlled or operated electrical equipment (not used, see subgroups)
- 60/7815 . . . . using the power network as support for the transmission
- 60/7823 . . . . . using pulsed signals
- 60/783 . . . . . using modification of a parameter of the network power signal
- 60/7838 . . . . using a data transmission bus
- 60/7846 . . . . using phone lines
- 60/7853 . . . . using wireless data transmission
- 60/7861 . . . . . By means of mobile telephony
- 60/7869 . . . . using Internet
- 60/7876 . . . Aspects related to the treatment or conditioning of data or signals {not used, see subgroups}
- 60/7884 . . . . Associated with communication via dedicated transmission supports
- 60/7892 . . . . Associated with communication via power transmission network
- 70/00 Other energy conversion or management systems reducing GHG emissions**
- 70/10 . Hydrogen from electrolysis with energy of non-fossil origin, e.g. PV, wind power, nuclear
- 70/20 . Systems combining fuel cells with production of fuel of non-fossil origin
- 70/30 . Systems combining energy storage with energy generation of non-fossil origin

- 70/40
- Energy efficient batteries, ultracapacitors, supercapacitors or double-layer capacitors charging or discharging systems or methods, e.g. auxiliary power consumption reduction, resonant chargers or dischargers, resistive losses minimisation