

Patent search strategies for the identification of selected environment-related technologies (ENV-TECH)

SELECTED ENVIRONMENT-RELATED TECHNOLOGIES:

1. ENVIRONMENTAL MANAGEMENT

1.1. AIR POLLUTION ABATEMENT

- 1.1.1. Emissions abatement from stationary sources (e.g. SO_x, NO_x, PM emissions from combustion plants)
- 1.1.2. Emissions abatement from mobile sources (e.g. NO_x, CO, HC, PM emissions from motor vehicles)
- 1.1.3. Not elsewhere classified

1.2. WATER POLLUTION ABATEMENT

- 1.2.1. Water and wastewater treatment
- 1.2.2. Fertilizers from wastewater
- 1.2.3. Oil spill cleanup

1.3. WASTE MANAGEMENT

- 1.3.1. Solid waste collection
- 1.3.2. Material recycling
- 1.3.3. Fertilizers from waste
- 1.3.4. Incineration and energy recovery
- 1.3.5. Landfilling [n.a.]
- 1.3.6. Not elsewhere classified

1.4. SOIL REMEDIATION

1.5. ENVIRONMENTAL MONITORING

2. WATER-RELATED ADAPTATION TECHNOLOGIES

2.1. DEMAND-SIDE TECHNOLOGIES (water conservation)

- 2.1.1. Indoor water conservation (faucets, showers, sanitation, home appliances)
- 2.1.2. Irrigation water conservation
- 2.1.3. Water conservation in thermoelectric power production
- 2.1.4. Water distribution

2.2. SUPPLY-SIDE TECHNOLOGIES (water availability)

- 2.2.1. Water collection (rain, surface and ground-water)
- 2.2.2. Water storage
- 2.2.3. Desalination of sea water [n.a.]

3. BIODIVERSITY PROTECTION AND ECOSYSTEM HEALTH [n.a.]

CLIMATE CHANGE MITIGATION (groups 4-9)

4. CLIMATE CHANGE MITIGATION technologies related to ENERGY generation, transmission or distribution

4.1. RENEWABLE ENERGY GENERATION

- 4.1.1. Wind energy
- 4.1.2. Solar thermal energy
- 4.1.3. Solar photovoltaic (PV) energy
- 4.1.4. Solar thermal-PV hybrids
- 4.1.5. Geothermal energy
- 4.1.6. Marine energy
- 4.1.7. Hydro energy (conventional, tidal, stream)

4.2. ENERGY GENERATION FROM FUELS OF NON-FOSSIL ORIGIN

- 4.2.1. Biofuels
- 4.2.2. Fuel from waste (e.g. methane)

4.3. COMBUSTION TECHNOLOGIES WITH MITIGATION POTENTIAL (e.g. using fossil fuels, biomass, waste, etc.)

- 4.3.1. Technologies for improved output efficiency (combined heat and power, combined cycles, etc.)
- 4.3.2. Technologies for improved input efficiency (efficient combustion or heat usage)

4.4. NUCLEAR ENERGY

- 4.4.1. Nuclear fusion reactors
- 4.4.2. Nuclear fission reactors

4.5. EFFICIENCY IN ELECTRICAL POWER GENERATION, TRANSMISSION OR DISTRIBUTION

- 4.5.1. Superconducting electric elements or equipment
- 4.5.2. Not elsewhere classified (incl. FACTS, APF, etc.)

4.6. ENABLING TECHNOLOGIES IN ENERGY SECTOR¹

- 4.6.1. Energy storage
 - 4.6.1.1. Batteries

- 4.6.1.2. *Capacitors*
- 4.6.1.3. *Thermal storage*
- 4.6.1.4. *Pressurised fluid storage*
- 4.6.1.5. *Mechanical storage*
- 4.6.1.6. *Pumped storage*
- 4.6.2. *Hydrogen technology*
- 4.6.3. *Fuel cells*
- 4.6.4. *Smart grids in energy sector*
- 4.7. OTHER ENERGY CONVERSION OR MANAGEMENT SYSTEMS REDUCING GHG EMISSIONS**
- 5. CAPTURE, STORAGE, SEQUESTRATION OR DISPOSAL OF GREENHOUSE GASES**
 - 5.1. CO2 CAPTURE OR STORAGE (CCS)**
 - 5.2. CAPTURE OR DISPOSAL OF GREENHOUSE GASES OTHER THAN CARBON DIOXIDE (N2O, CH4, PFC, HFC, SF6)**
- 6. CLIMATE CHANGE MITIGATION technologies related to TRANSPORTATION**
 - 6.1. ROAD TRANSPORT**
 - 6.1.1. *Conventional vehicles (based on internal combustion engine)*
 - 6.1.2. *Hybrid vehicles*
 - 6.1.3. *Electric vehicles*
 - 6.1.4. *Fuel efficiency-improving vehicle design (common to all road vehicles)*
 - 6.2. RAIL TRANSPORT**
 - 6.3. AIR TRANSPORT**
 - 6.4. MARITIME OR WATERWAYS TRANSPORT**
 - 6.5. ENABLING TECHNOLOGIES IN TRANSPORT ¹**
 - 6.5.1. *Electric vehicle charging*
 - 6.5.2. *Application of fuel cell and hydrogen technology to transportation*
- 7. CLIMATE CHANGE MITIGATION technologies related to BUILDINGS**
 - 7.1. INTEGRATION OF RENEWABLE ENERGY SOURCES IN BUILDINGS**
 - 7.2. ENERGY EFFICIENCY IN BUILDINGS**
 - 7.2.1. *Lighting*
 - 7.2.2. *Heating, ventilation or air conditioning [HVAC]*
 - 7.2.3. *Home appliances*
 - 7.2.4. *Elevators, escalators and moving walkways*
 - 7.2.5. *Information and communication technologies [ICT]*
 - 7.2.6. *End-user side*
 - 7.3. ARCHITECTURAL OR CONSTRUCTIONAL ELEMENTS IMPROVING THE THERMAL PERFORMANCE OF BUILDINGS**
 - 7.4. ENABLING TECHNOLOGIES IN BUILDINGS ¹**
- 8. CLIMATE CHANGE MITIGATION technologies related to WASTEWATER TREATMENT OR WASTE MANAGEMENT**
 - 8.1. WASTEWATER TREATMENT**
 - 8.2. SOLID WASTE MANAGEMENT**
 - 8.2.1. *Waste collection, transportation, transfer or storage*
 - 8.2.2. *Waste processing or separation*
 - 8.2.3. *Landfill technologies aiming to mitigate methane emissions*
 - 8.2.4. *Bio-organic fraction processing; Production of fertilisers from the organic fraction of waste or refuse*
 - 8.2.5. *Reuse, recycling or recovery technologies*
 - 8.2.5.1. *Dismantling or mechanical processing of waste for the recovery of materials during separation, disassembly, pre-processing or upgrading*
 - 8.2.5.2. *Metal recycling*
 - 8.2.5.3. *Disassembly of vehicles for recovery of salvageable parts*
 - 8.2.5.4. *Construction or demolition [C&D] waste*
 - 8.2.5.5. *Glass recycling*
 - 8.2.5.6. *Plastics recycling*
 - 8.2.5.7. *Paper recycling*
 - 8.2.5.8. *Disintegrating fibre-containing textile articles to obtain fibres for re-use*
 - 8.2.5.9. *Rubber waste recycling*
 - 8.2.5.10. *Recovery of polymers other than plastics or rubbers*
 - 8.2.5.11. *Recovery of luminescent materials*
 - 8.2.5.12. *Recovery of fats, fatty oils, fatty acids or other fatty substances, e.g. lanolin or waxes*
 - 8.2.5.13. *Recovery of tanning agents from leather*
 - 8.2.5.14. *Recycling of wood or furniture waste (production of fertilisers from the organic fraction of waste or refuse)*

- 8.2.5.15 Packaging reuse or recycling (bio-packaging)
- 8.2.5.16 Recycling of waste of electrical or electronic equipment
- 8.2.5.17 Recycling of batteries
- 8.2.5.18 Recycling of fuel cells
- 8.2.5.19 Nuclear fuel reprocessing
- 8.2.5.20 Reuse, recycling or recovery technologies cross-cutting to different types of waste

8.3. ENABLING TECHNOLOGIES OR TECHNOLOGIES WITH A POTENTIAL OR INDIRECT CONTRIBUTION TO GREENHOUSE GAS [GHG] EMISSIONS MITIGATION ¹

9. CLIMATE CHANGE MITIGATION technologies in the PRODUCTION OR PROCESSING OF GOODS

9.1. TECHNOLOGIES RELATED TO METAL PROCESSING

- 9.1.1. Reduction of greenhouse gas [GHG] emissions
- 9.1.2. Process efficiency
 - 9.1.2.1 by recovering materials
 - 9.1.2.2 by increasing the energy efficiency of the process
 - 9.1.2.3 characterised by the energy source

9.2. TECHNOLOGIES RELATING TO CHEMICAL INDUSTRY

- 9.2.1. General improvement of production processes causing greenhouse gases [GHG emissions]
- 9.2.2. Improvements relating to chlorine production
- 9.2.3. Improvements relating to adipic acid or caprolactam production
- 9.2.4. Improvements relating to chlorodifluoromethane [HCFC-22] production
- 9.2.5. Improvements relating to the production of other chemicals or pharmaceuticals

9.3. TECHNOLOGIES RELATING TO OIL REFINING AND PETROCHEMICAL INDUSTRY

- 9.3.1. Reduction of greenhouse gas [GHG emissions during production processes]
- 9.3.2. Bio-feedstock
- 9.3.3. Carbon capture or storage [CCS] specific to hydrogen production
- 9.3.4. Ethylene production

9.4. TECHNOLOGIES RELATING TO THE PROCESSING OF MINERALS

- 9.4.1. Production of cement
- 9.4.2. Cement grinding
- 9.4.3. Manufacturing or processing of sand or stone
- 9.4.4. Production or processing of lime
- 9.4.5. Glass production
- 9.4.6. Production of ceramic materials or ceramic elements

9.5. TECHNOLOGIES RELATING TO AGRICULTURE, LIVESTOCK OR AGROALIMENTARY INDUSTRIES

- 9.5.1. Agricultural machinery or equipment
- 9.5.2. Reduction of greenhouse gas [GHG] emissions in agriculture
- 9.5.3. Land use policy measures
- 9.5.4. Afforestation or reforestation
- 9.5.5. Livestock or poultry management
- 9.5.6. Fishing and aquaculture
- 9.5.7. Apiculture
- 9.5.8. Food processing

9.6. TECHNOLOGIES IN THE PRODUCTION PROCESS FOR FINAL INDUSTRIAL OR CONSUMER PRODUCTS

- 9.6.1. Technologies for shaping products (e.g. rolling metal, forging, hammering, pressing or riveting)
- 9.6.2. Technologies for metal working
- 9.6.3. Technologies for printing, lining or stamping machines
- 9.6.4. Technologies for working on wood, veneer or plywood
- 9.6.5. Technologies for production of paper and paper articles
- 9.6.6. Technologies for working on or processing of plastics
- 9.6.7. Technologies for conveying, packing or storing of goods
- 9.6.8. Other technologies for manufacturing (e.g., for mixing, separation, applying liquids, drying, etc.)
- 9.6.9. Manufacturing of products or systems for producing renewable energy (e.g. wind turbines)
- 9.6.10. Manufacturing of batteries and fuel cells
- 9.6.11. Manufacturing or assembling of vehicles
- 9.6.12. Manufacturing of electric and electronic components of products
- 9.6.13. Technologies for production or treatment of textiles and footwear
- 9.6.14. Technologies for production of tobacco products

9.7. CLIMATE CHANGE MITIGATION TECHNOLOGIES FOR SECTOR-WIDE APPLICATIONS

9.8. ENABLING TECHNOLOGIES WITH A POTENTIAL CONTRIBUTION TO GREENHOUSE GAS [GHG] EMISSIONS MITIGATION ¹

¹ Technologies with potential or indirect contribution to GHG emissions mitigation

1. ENVIRONMENTAL MANAGEMENT	IPC class
1.1. AIR POLLUTION ABATEMENT	All classes from 1.1.1 to 1.1.3
1.1.1. Emissions abatement from stationary sources (e.g. SO _x , NO _x , PM emissions from combustion plants)	
Post-combustion technologies	
Chemical or biological purification of waste gases (e.g. engine exhaust gases, smoke, fumes, flue gases or aerosols; removing sulfur oxides, nitrogen oxides, etc.)	B01D53/34-72
Incinerators or other apparatus specially adapted for consuming waste gases or noxious gases	F23G7/06
Arrangements of devices for treating smoke or fumes of purifiers, e.g. for removing noxious material	F23J15
Shaft or like vertical or substantially vertical furnaces; Arrangements of dust collectors	F27B1/18
Integrated technologies	
Blast furnaces; Dust arresters	C21B7/22
Manufacture of carbon steel, e.g. plain mild steel, medium carbon steel, or cast-steel; Removal of waste gases or dust	C21C5/38
Combustion apparatus characterised by means for returning flue gases to the combustion chamber or to the combustion zone	F23B80
Combustion apparatus characterised by arrangements for returning combustion products or flue gases to the combustion chamber	F23C9
Apparatus in which combustion takes place in a fluidised bed of fuel or other particles	F23C10
1.1.2. Emissions abatement from mobile sources (e.g. NO _x , CO, HC, PM emissions from motor vehicles)	
Post-combustion technologies	
Processes, apparatus or devices specially adapted for purification of engine exhaust gases	B01D53/92
...by catalytic processes	B01D53/94
Regeneration, reactivation or recycling of reactants	B01D53/96
Catalysts comprising metals or metal oxides or hydroxides; of noble metals; of the platinum group metals	B01J23/38-46
Crankcase ventilating or breathing	F01M13/02-04
Methods of operating engines involving adding non-fuel substances including exhaust gas to combustion air, fuel, or fuel-air mixtures of engines; the substances including exhaust gas	F02B47/08-10
Controlling engines characterised by their being supplied with non-fuel gas added to combustion-air, such as the exhaust gas of engine, or having secondary air added to fuel-air mixture	F02D21/06-10
Engine-pertinent apparatus for adding exhaust gases to combustion-air, main fuel, or fuel-air mixture	F02M25/07
Testing of internal-combustion engines by monitoring exhaust gases	G01M15/10
Integrated technologies	
Methods of operating engines involving adding non-fuel substances or anti-knock agents to combustion air, fuel, or fuel-air mixtures of engines; the substances including non-airborne oxygen	F02B47/06
Electrical control of supply of combustible mixture or its constituents	F02D41
Conjoint electrical control of two or more functions, e.g. ignition, fuel-air mixture, recirculation, supercharging, exhaust-gas treatment	F02D43
Electrical control of combustion engines	F02D45
Idling devices for preventing flow of idling fuel	F02M3/02-055
Apparatus for adding secondary air to fuel-air mixture.	F02M23
Engine-pertinent apparatus for adding non-fuel substances or small quantities of secondary fuel to combustion-air, main fuel, or fuel-air mixture.	F02M25
Apparatus for treating combustion-air, fuel, or fuel-air mixture, by catalysts, electric means, magnetism, rays, sonic waves, etc.	F02M27
Apparatus for thermally treating combustion-air, fuel, or fuel-air mixture	F02M31/02-18
Fuel-injection apparatus	F02M39-71
Advancing or retarding ignition; Control therefore	F02P5
1.1.3. Not elsewhere classified ²	
Post-combustion technologies	
Filters or filtering processes specially modified for separating dispersed particles from gases or vapours	B01D46
Separating dispersed particles from gases, air or vapours by liquid as separating agent	B01D47
Separating dispersed particles from gases, air or vapours by other methods	B01D49
Combinations of devices for separating particles from gases or vapours	B01D50

² Including technologies potentially applicable to both stationary and mobile sources.

Auxiliary pre-treatment of gases or vapours to be cleaned from dispersed particles	B01D51
Separating dispersed particles from gases or vapour, e.g. air, by electrostatic effect	B03C3
Exhaust or silencing apparatus having means for purifying or rendering innocuous	F01N3
Exhaust or silencing apparatus combined or associated with devices profiting by exhaust energy	F01N5
Exhaust or silencing apparatus, or parts thereof	F01N7
Exhaust or silencing apparatus characterised by constructional features	F01N13
Electrical control of exhaust gas treating apparatus	F01N9
Monitoring or diagnostic devices for exhaust-gas treatment apparatus	F01N11
Integrated technologies	
Use of additives to fuels or fires for particular purposes for reducing smoke development	C10L10/02
Use of additives to fuels or fires for particular purposes for facilitating soot removal	C10L10/06
1.2. WATER POLLUTION ABATEMENT	All classes from 1.2.1 to 1.2.3
1.2.1. Water and wastewater treatment	
Arrangements of installations for treating waste-water or sewage	B63J4
Treatment of water, waste water, sewage or sludge	C02F
Chemistry; Materials for treating liquid pollutants, e.g. oil, gasoline, fat	C09K3/32
Plumbing installations for waste water	E03C1/12
Sewers – Cesspools	E03F
1.2.2. Fertilizers from wastewater	
Fertilisers from waste water, sewage sludge, sea slime, ooze or similar masses	C05F7
1.2.3. Oil spill cleanup	
Devices for cleaning or keeping clear the surface of open water from oil or like floating materials by separating or removing these materials	E02B15/04-10
Vessels or like floating structures adapted for special purposes - for collecting pollution from open water	B63B35/32
Materials for treating liquid pollutants, e.g. oil, gasoline or fat	C09K 3/32
1.3. WASTE MANAGEMENT	All classes from 1.3.1 to 1.3.6
1.3.1. Solid waste collection	
Street cleaning; Removing undesirable matter, e.g. rubbish, from the land, not otherwise provided for	E01H15
Transporting; Gathering or removal of domestic or like refuse	B65F
1.3.2. Material recovery, recycling and re-use	
Animal feeding-stuffs from distillers' or brewers' waste; waste products of dairy plant; meat, fish, or bones; from kitchen waste	A23K1/06-10
Footwear made of rubber waste	A43B1/12
Heels or top-pieces made of rubber waste	A43B21/14
Separating solid materials; General arrangement of separating plant specially adapted for refuse	B03B9/06
Manufacture of articles from scrap or waste metal particles	B22F8
Preparing material; Recycling the material	B29B7/66
Recovery of plastics or other constituents of waste material containing plastics	B29B17
Presses specially adapted for consolidating scrap metal or for compacting used cars	B30B9/32
Systematic disassembly of vehicles for recovery of salvageable components, e.g. for recycling	B62D67
Stripping waste material from cores or formers, e.g. to permit their re-use	B65H73
Applications of disintegrable, dissolvable or edible materials	B65D65/46
Compacting the glass batches, e.g. pelletizing	C03B1/02
Glass batch composition - containing silicates, e.g. cullet	C03C6/02
Glass batch composition - containing pellets or agglomerates	C03C6/08
Hydraulic cements from oil shales, residues or waste other than slag	C04B7/24-30
Calcium sulfate cements starting from phosphogypsum or from waste, e.g. purification products of smoke	C04B11/26
Use of agglomerated or waste materials or refuse as fillers for mortars, concrete or artificial stone; Waste materials or Refuse	C04B18/04-10

Clay-wares; Waste materials or Refuse	C04B33/132
Recovery or working-up of waste materials (plastics)	C08J11
Luminescent, e.g. electroluminescent, chemiluminescent, materials; Recovery of luminescent materials	C09K11/01
Working-up used lubricants to recover useful products	C10M175
Working-up raw materials other than ores, e.g. scrap, to produce non-ferrous metals or compounds thereof	C22B7
Obtaining zinc or zinc oxide; From muffle furnace residues; From metallic residues or scraps	C22B19/28-30
Obtaining tin; From scrap, especially tin scrap	C22B25/06
Textiles; Disintegrating fibre-containing articles to obtain fibres for re-use	D01G11
Paper-making; Fibrous raw materials or their mechanical treatment - using waste paper	D21B1/08-10
Paper-making; Fibrous raw materials or their mechanical treatment; Defibrating by other means - of waste paper	D21B1/32
Paper-making; Other processes for obtaining cellulose; Working-up waste paper	D21C5/02
Paper-making; Pulping; Non-fibrous material added to the pulp; Waste products	D21H17/01
Apparatus or processes for salvaging material from electric cables	H01B 15/00
Recovery of material from discharge tubes or lamps	H01J 9/52
Reclaiming serviceable parts of waste cells or batteries	H01M 6/52
Reclaiming serviceable parts of waste accumulators	H01M 10/54
1.3.3. Fertilizers from waste	
Fertilisers made from animal corpses, or parts thereof	C05F1
Fertilisers from distillery wastes, molasses, vinasses, sugar plant, or similar wastes or residues	C05F5
Fertilisers from waste water, sewage sludge, sea slime, ooze or similar masses	C05F7
Fertilizers from household or town refuse	C05F9
Preparation of fertilizers characterized by the composting step	C05F17
1.3.4. Incineration and energy recovery	
Solid fuels essentially based on materials of non-mineral origin; on sewage, house, or town refuse; on industrial residues or waste materials	C10L5/46-48
Cremation furnaces; Incineration of waste; Incinerator constructions; Details, accessories or control therefor	F23G5
Cremation furnaces; Incinerators or other apparatus specially adapted for consuming specific waste or low grade fuels	F23G7
1.3.5. Landfilling	
<i>[Search strategy currently not available]</i>	
<i>Note: Landfilling patents are largely covered by IPC class B09B. However, this class also covers many aspects of recycling and incineration. Therefore, B09B is only used to generate aggregate 'waste management' counts.</i>	
1.3.6. Waste management – Not elsewhere classified	
<i>Disposal of solid waste</i>	B09B
<i>Production of liquid hydrocarbon mixtures from rubber or rubber waste</i>	C10G1/10
<i>Medical or veterinary science; Disinfection or sterilising methods specially adapted for refuse</i>	A61L11
1.4. SOIL REMEDIATION	
Reclamation of contaminated soil	B09C
1.5. ENVIRONMENTAL MONITORING	
Monitoring or diagnostic devices for exhaust-gas treatment apparatus	F01N11
Alarms responsive to a single specified undesired or abnormal condition and not otherwise provided for, e.g. pollution alarms; toxics	G08B21/12-14
<i>Note: This search strategy is under development, the counts generated are most likely incomplete.</i>	

2. WATER-RELATED ADAPTATION TECHNOLOGIES	IPC or CPC class
2.1. DEMAND-SIDE TECHNOLOGIES (water conservation)	
2.1.1. Indoor water conservation	
Faucets and showers	
Self-closing valves	
Self-closing valves, i.e. closing automatically after operation, in which the closing movement, either retarded or not, starts immediately after opening	F16K21/06-12
Self-closing valves, i.e. closing automatically after operation, closing after a predetermined quantity of fluid has been delivered	F16K 21/16-20
Aeration of water	
Arrangement or mounting of devices, e.g. valves, for venting or aerating or draining	F16L 55/07
Jet regulators with aerating means	E03C 1/084
Sanitation (dual-flush toilets, dry toilets, closed-circuit toilets)	
Flushing devices discharging variable quantities of water	E03D 3/12
Cisterns discharging variable quantities of water	E03D 1/14
Urinals without flushing	A47K 11/12
Dry closets	A47K 11/02
Waterless or low-flush urinals	E03D13/007
Special constructions of flushing devices with recirculation of bowl-cleaning fluid	E03D5/016
Greywater	
Greywater supply systems	E03B1/041
Home appliances	
Optimisation of water quantity (for dishwashers)	Y02B 40/46
Optimisation of water quantity (for washing machines)	Y02B 40/56
2.1.2. Irrigation water conservation	
Drip irrigation	
Watering arrangements located above the soil which make use of perforated pipe-lines or pipe-lines with dispensing fittings, e.g. for drip irrigation	A01G 25/02
Watering arrangements making use of perforated pipe-lines located in the soil	A01G 25/06
Control of watering	
Control of watering	A01G 25/16
Drought-resistant crops	
Mutation or genetic engineering; DNA or RNA concerning genetic engineering, vectors, e.g. plasmids, or their isolation, preparation or purification; for drought, cold, salt resistance	C12N15/8273
2.1.3. Water conservation in thermoelectric power production	
Combustion heat from one cycle heating the fluid in another cycle	F01K 23/08-10
Non-positive-displacement machines or engines, e.g. steam turbines / Preventing or minimizing internal leakage of working fluid, e.g. between stages	F01D 11
2.1.4. Water distribution	
Piping – reducing leakage and leakage monitoring	
Pipe-line systems / Protection or supervision of installations / Preventing, monitoring, or locating loss	[F17D5/02 and E03]
Devices for covering leaks in pipes or hoses, e.g. hose-menders	[F16L55/16 and E03]
Investigating fluid tightness of structures, by detecting the presence of fluid at the leakage point	[G01M 3/08 or G01M 3/14 or G01M 3/18 or G01M 3/22 or G01M 3/28] and E03
2.2. SUPPLY-SIDE TECHNOLOGIES (water availability)	
2.2.1. Water collection (rain, surface and ground-water)	

Underground water collection	
Use of pumping plants or installations	E03B 5
Methods or installations for obtaining or collecting drinking water or tap water from underground	E03B 3/06-26
Surface water collection	
Methods or installations for drawing-off water	E03B 9
Methods or installations for obtaining or collecting drinking water or tap water from surface water	E03B 3/04; 28-38
Rainwater water collection	
Methods or installations for obtaining or collecting drinking water or tap water from rainwater	E03B 3/02
Special vessels for collecting or storing rain-water for use in the household, e.g. water-butts	E03B 3/03
Not elsewhere classified	
Methods or installations for obtaining or collecting drinking water or tap water; rainwater, surface water, or groundwater	E03B 3/00 E03B 3/40
2.2.2. Water storage	
Arrangements or adaptations of tanks for water supply	E03B 11
2.2.3. Desalination of sea water	
<i>[Search strategy under development]</i>	

3. BIODIVERSITY PROTECTION AND ECOSYSTEM HEALTH	IPC or CPC class
<i>[Search strategy currently not available]</i>	

4. CLIMATE CHANGE MITIGATION technologies related to ENERGY generation, transmission or distribution	Y02E
4.1. RENEWABLE ENERGY GENERATION	Y02E10
4.1.1. Wind energy	Y02E10/70
<ul style="list-style-type: none"> – Wind turbines with rotation axis in wind direction: blades or rotors, components or gearbox, control of turbines, generator, nacelles, onshore and offshore towers – Wind turbines with rotation axis perpendicular to the wind direction – Power conversion electric or electronic aspects; for grid-connected applications; concerning power management inside the plant, e.g. battery (dis)charging, operation, hybridisation 	Y02E10/70-766
4.1.2. Solar thermal energy	Y02E10/40
<ul style="list-style-type: none"> – Tower concentrators; Dish collectors; Fresnel lenses; Heat exchange systems; Trough concentrators – Conversion of thermal power into mechanical power, e.g. Rankine, Stirling solar thermal engines; Thermal updraft – Mountings or tracking 	Y02E10/40-47
4.1.3. Solar photovoltaic (PV) energy	Y02E10/50
<ul style="list-style-type: none"> – PV systems with concentrators – Material technologies: CuInSe₂ material PV cells; Dye sensitized solar cells; Solar cells from Group II-VI materials; Solar cells from Group III-V materials; Microcrystalline silicon PV cells; Polycrystalline silicon PV cells; Monocrystalline silicon PV cells; Amorphous silicon PV cells; Organic PV cells – Power conversion electric or electronic aspects: for grid-connected applications; concerning power management inside the plant, e.g. battery (dis)charging, operation, hybridisation; Maximum power point tracking [MPPT] systems 	Y02E10/50-58
4.1.4. Solar thermal-PV hybrids	Y02E10/60
4.1.5. Geothermal energy	Y02E10/10
<ul style="list-style-type: none"> – Earth coil heat exchangers; Compact tube assemblies, e.g. geothermal probes – Systems injecting medium directly into ground, e.g. hot dry rock system, underground water – Systems injecting medium into a closed well – Systems exchanging heat with fluids in pipes, e.g. fresh water or waste water 	Y02E10/10-18
4.1.6. Marine energy	Y02E10/30
<ul style="list-style-type: none"> – Oscillating water column [OWC] – Ocean thermal energy conversion [OTEC] – Salinity gradient – Wave energy or tidal swell, e.g. Pelamis-type 	Y02E10/30-38
4.1.7. Hydro energy	Y02E10/20
<ul style="list-style-type: none"> – Conventional, e.g. with dams, turbines and waterwheels – Tidal, stream or damless hydropower, e.g. sea flood and ebb, river, stream 	Y02E10/20-28
4.2. ENERGY GENERATION FROM FUELS OF NON-FOSSIL ORIGIN	Y02E50
4.2.1. Biofuels	Y02E50/10
<ul style="list-style-type: none"> – CHP turbines for biofeed – Gas turbines for biofeed – Bio-diesel – Bio-pyrolysis – Torrefaction of biomass – Cellulosic bio-ethanol – Grain bio-ethanol – Bio-alcohols produced by other means than fermentation 	Y02E50/10-18
4.2.2. Fuel from waste	Y02E50/30
<ul style="list-style-type: none"> – Synthesis of alcohols or diesel from waste including a pyrolysis and/or gasification step – Methane production by fermentation of organic by-products, e.g. sludge; Methane from landfill gas 	Y02E50/30-346
4.3. COMBUSTION TECHNOLOGIES WITH MITIGATION POTENTIAL (e.g. using fossil fuels, biomass, waste, etc.)	Y02E20
4.3.1. Technologies for improved output efficiency (Combined heat and power, combined cycles, etc.)	Y02E20/10-185
Heat utilisation in combustion or incineration of waste	Y02E20/12
Combined heat and power generation [CHP]	Y02E20/14
Combined cycle power plant [CCPP], or combined cycle gas turbine [CCGT]	Y02E20/16
Integrated gasification combined cycle [IGCC]	Y02E20/18
combined with carbon capture and storage [CCS]	Y02E20/185
4.3.2. Technologies for improved input efficiency (Efficient combustion or heat usage)	Y02E20/30-366

<ul style="list-style-type: none"> – Direct CO2 mitigation: Use of synair, i.e. a mixture of recycled CO2 and pure O2; Use of reactants before or during combustion; Segregation from fumes, including use of reactants downstream from combustion or deep cooling; Controls of combustion specifically inferring on CO2 emissions – Indirect CO2 mitigation, i.e. by acting on non CO2 directly related matters of the process, e.g. more efficient use of fuels: Cold flame; Oxyfuel combustion; Unmixed combustion; Air pre-heating – Heat recovery other than air pre-heating: at fumes level, at burner level 	
4.4. NUCLEAR ENERGY	Y02E30
4.4.1. Nuclear fusion reactors	
<ul style="list-style-type: none"> – Magnetic plasma confinement [MPC]: Tokamaks; Stellarators; Other reactors with MPC; First wall, divertor, blanket – Inertial plasma confinement: Injection systems and targets – Low temperature fusion, e.g. "cold fusion" 	Y02E 30/10-18
4.4.2. Nuclear fission reactors	
<ul style="list-style-type: none"> – Boiling water reactors; Pressurized water reactors; Gas cooled reactors; Fast breeder reactors; Liquid metal reactors; Pebble bed reactors; Accelerator driven reactors – Fuel – Control of nuclear reactions – Other aspects relating to nuclear fission 	Y02E 30/30-40
4.5. TECHNOLOGIES FOR AN EFFICIENT ELECTRICAL POWER GENERATION, TRANSMISSION OR DISTRIBUTION	Y02E40
4.5.1. Superconducting electric elements or equipment	Y02E40/60-69
<ul style="list-style-type: none"> – Superconducting generators: Superconducting synchronous generators; Superconducting homopolar generators – Superconducting transmission lines or power lines or cables or installations thereof – Superconducting transformers or inductors – Superconducting energy storage for power networks, e.g. SME, superconducting magnetic storage – Protective or switching arrangements for superconducting elements or equipment – Current limitation using superconducting elements, including multifunctional current limiters 	
4.5.2. Not elsewhere classified	
<p>Flexible AC transmission systems [FACTS]</p> <ul style="list-style-type: none"> – 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] – Thyristor-controlled series capacitors [TCSC] – Static synchronous compensators [STATCOM] – Unified power flow controllers [UPF] or controlled series voltage compensators 	Y02E40/10-18
<p>Active power filtering [APF]</p> <ul style="list-style-type: none"> – Non-specified or voltage-fed active power filters – Current-fed active power filters; using a multilevel or multicell converter 	Y02E40/20-26
<p>Reactive power compensation</p> <ul style="list-style-type: none"> – Reactive power compensation; using synchronous generators; for voltage regulation 	Y02E40/30-34
Arrangements for reducing harmonics	Y02E40/40
Arrangements for eliminating or reducing asymmetry in polyphase networks	Y02E40/50
<p>Smart grids</p> <ul style="list-style-type: none"> – Systems characterised by the monitoring, control or operation of energy generation units, e.g. distributed generation [DER] or load-side generation; Systems characterised by the monitoring, control or operation of flexible AC transmission systems [FACTS] or power factor or reactive power compensating or correcting units; Computing methods or systems for efficient or low carbon management or operation of electric power systems 	Y02E40/70
4.6. ENABLING TECHNOLOGIES (Technologies with potential or indirect contribution to emissions mitigation)	Y02E60
4.6.1. Energy storage	Y02E60/10-17
4.6.1.1. Batteries	Y02E60/12
<ul style="list-style-type: none"> – Lithium-ion batteries – Alkaline secondary batteries, e.g. NiCd or NiMH – Lead-acid batteries – Hybrid cells 	
4.6.1.2. Capacitors	Y02E60/13
<ul style="list-style-type: none"> – Ultracapacitors, supercapacitors, double-layer capacitors 	
4.6.1.3. Thermal storage	Y02E60/14
<ul style="list-style-type: none"> – Sensible heat storage, Latent heat storage, Cold storage 	
4.6.1.4. Pressurised fluid storage	Y02E60/15
4.6.1.5. Mechanical storage	Y02E60/16
<ul style="list-style-type: none"> – Mechanical energy storage, e.g. flywheels 	
4.6.1.6. Pumped storage	Y02E60/17

4.6.2. Hydrogen technology	Y02E60/30-368
<ul style="list-style-type: none"> – Hydrogen storage: Storage of liquefied, solidified, or compressed hydrogen in containers; Storage in caverns; Reversible uptake of hydrogen by an appropriate medium (e.g. carbon, metal, rare earth metal, metal alloy, organic compound) – Hydrogen distribution – Hydrogen production from non-carbon containing sources: by chemical reaction with metal hydrides, e.g. hydrolysis of metal borohydrides; by decomposition of inorganic compounds, e.g. splitting of water other than electrolysis, ammonia borane; by electrolysis of water; by photo-electrolysis 	
4.6.3. Fuel cells	Y02E60/50-566
<ul style="list-style-type: none"> – Fuel cells – characterised by type or design: Proton Exchange Membrane Fuel Cells [PEMFC], Direct Alcohol Fuel Cells [DAFC], Direct Methanol Fuel Cells [DMFC]; Solid Oxide Fuel Cells [SOFC]; Molten Carbonate Fuel Cells [MCFC]; Bio Fuel Cells; Regenerative or indirect fuel cells, e.g. redox flow type batteries – integrally combined with other energy production systems: Cogeneration of mechanical energy, e.g. integral combination of fuel cells and electric motors; Production of chemical products inside the fuel cell; incomplete combustion 	
4.6.4. Smart grids in the energy sector	Y02E60/70
<ul style="list-style-type: none"> – 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 	Y02E60/70-7892
4.7. OTHER ENERGY CONVERSION OR MANAGEMENT SYSTEMS REDUCING GHG EMISSIONS	Y02E70
<ul style="list-style-type: none"> – Hydrogen from electrolysis with energy of non-fossil origin, e.g. PV, wind power, nuclear – Systems combining fuel cells with production of fuel of non-fossil origin – Systems combining energy storage with energy generation of non-fossil origin – 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 	

5. CAPTURE, STORAGE, SEQUESTRATION OR DISPOSAL OF GREENHOUSE GASES	Y02C
5.1. CO2 CAPTURE OR STORAGE (CCS)	Y02C10
<ul style="list-style-type: none"> - Capture by biological separation - Capture by chemical separation - Capture by absorption - Capture by adsorption - Capture by membranes or diffusion - Capture by rectification and condensation - Subterranean or submarine CO2 storage 	Y02C10/00-14
5.2. CAPTURE OR DISPOSAL OF GREENHOUSE GASES OTHER THAN CO2	Y02C20
<ul style="list-style-type: none"> - of nitrous oxide (N2O) - of methane - of perfluorocarbons [PFC], hydrofluorocarbons [HFC] or sulfur hexafluoride [SF6] 	Y02C20/00-30

6. CLIMATE CHANGE MITIGATION technologies related to TRANSPORTATION	Y02T
6.1. ROAD TRANSPORT	Y02T10
6.1.1. Conventional vehicles (based on internal combustion engine)	Y02T10/10-56
Integrated approaches	
<ul style="list-style-type: none"> – Technologies for the improvement of indicated efficiency of a conventional internal combustion engine (ICE) <ul style="list-style-type: none"> ○ Adding non fuel substances to fuel, air or fuel/air mixture ○ Fuel injection ○ Combustion chambers and charge mixing enhancing inside the combustion chamber ○ Treating fuel, air or air/fuel mixture ○ Methods of operating, e.g. homogeneous charge compression ignition [HCCI], premixed charge compression ignition [PCCI] – Technologies for the improvement of mechanical efficiency of a conventional ICE <ul style="list-style-type: none"> ○ Methods of operating, e.g. Atkinson cycle, Ericsson ○ Non naturally aspirated engines, e.g. turbocharging, supercharging ○ Charge mixing enhancing and kinetic or wave energy of charge outside the combustion chamber, i.e. ICE with external or indirect fuel injection ○ Downsizing or downspeeding – Energy recuperation from low temperature heat sources of the ICE to produce additional power <ul style="list-style-type: none"> ○ Turbocompound engines ○ Waste heat recovering cycles or thermoelectric systems – Non-reciprocating piston engines, e.g. rotating motors – Varying inlet or exhaust valve operating characteristics – Engine management systems <ul style="list-style-type: none"> ○ controlling air supply ○ controlling fuel supply ○ controlling ignition ○ Exhaust feedback ○ Switching off the internal combustion engine, e.g. stop and go – Intelligent control systems e.g. conjoint control <ul style="list-style-type: none"> ○ relating to internal combustion engine fuel consumption ○ relating to internal combustion engine emissions ○ Optimising drivetrain operating point 	Y02T10/12-18 Y02T10/40-48 Y02T10/50-56
Post-combustion approaches	
<ul style="list-style-type: none"> – Exhaust after-treatment <ul style="list-style-type: none"> ○ Three way catalyst technology, i.e. oxidation or reduction at stoichiometric equivalence ratio ○ Selective Catalytic Reactors for reduction in oxygen rich atmosphere ○ Thermal conditioning of exhaust after-treatment 	Y02T10/20-26
Fuel substitution	
<ul style="list-style-type: none"> – Use of alternative fuels <ul style="list-style-type: none"> ○ Gaseous fuels ○ Non-gaseous fuels ○ Multiple fuels, e.g. multi fuel engines ○ Non-fossil fuels 	Y02T10/30-38
6.1.2. Hybrid vehicles	Y02T10/62
<ul style="list-style-type: none"> – using ICE and mechanical energy storage, e.g. flywheel – using ICE and fluidic energy storage, e.g. pressure accumulator – using ICE and electric energy storage, i.e. battery, capacitor: of the series type or range extenders; of the parallel type; of the series-parallel type; with motor integrated into gearbox; Driving a plurality of axles; provided with means for plug-in – Combining different types of energy storage: Battery and capacitor; Battery and mechanical or fluidic energy storage – Control systems for power distribution between ICE and other motor or motors; Predicting future driving conditions – Other types of combustion engine 	Y02T10/62-6295
6.1.3. Electric vehicles	
Electric machine technologies for applications in electromobility	
<ul style="list-style-type: none"> – Electric machine technologies for applications in electromobility <ul style="list-style-type: none"> ○ characterised by aspects of the electric machine ○ Control strategies of electric machines for automotive applications ○ Control strategies for ac machines other than vector control ○ Control strategies for dc machines ○ Number of electric drive machines: one, two, or more 	Y02T10/64-649
Energy storage for electromobility	
<p>Energy storage for electromobility</p> <ul style="list-style-type: none"> – Batteries, e.g. lithium ion battery, lead acid battery – Capacitors, supercapacitors or ultracapacitors – Mechanical energy storage devices, e.g. flywheels – Energy storage management – Electromobility-specific charging systems or methods for batteries, ultracapacitors, supercapacitors or double-layer 	Y02T10/70-7094

capacitors	
Electric energy management in electromobility	
Electric energy management in electromobility <ul style="list-style-type: none"> - Electric power conversion within the vehicle - Optimisation of vehicle performance <ul style="list-style-type: none"> o Automated control o Desired performance achievement o Optimisation of energy management o Route optimisation 	Y02T10/72-7291
6.1.4. Fuel efficiency-improving vehicle design (common to all road vehicles)	
Technologies aiming to reduce greenhouse gas (GHG) emissions common to all road transportation technologies <ul style="list-style-type: none"> - Tools or systems for aerodynamic design - Data processing systems or methods, management, administration - Optimisation of rolling resistance: Tyres, e.g. materials, shape; Bearings; Others, e.g. wheel construction - Optimized components or subsystems e.g. lighting, actively controlled glasses - Energy harvesting concepts as power supply for auxiliaries' energy consumption e.g. photovoltaic sun-roof - Energy efficient charging or discharging systems for batteries, ultracapacitors, supercapacitors or double-layer capacitors specially adapted for vehicles - Energy-efficient charging or discharging systems for batteries, ultracapacitors, supercapacitors or double-layer capacitors adapted for road vehicles 	Y02T10/80-86 Y02T10/90-92
6.2. RAIL TRANSPORT	Y02T30
Transportation of goods or passengers via railways <ul style="list-style-type: none"> - Energy recovery technologies concerning the propulsion system in locomotives or motor railcars <ul style="list-style-type: none"> o In electric locomotives or motor railcars with electric accumulators, e.g. involving regenerative braking o In locomotives or motor railcars with pneumatic accumulators o In locomotives or motor railcars with two or different kinds or types of engine o Specific power storing devices - Other technological aspects of railway vehicles <ul style="list-style-type: none"> o Reducing air resistance by modifying contour o Composite; Lightweight materials o Device for using the energy of the movements of the vehicle o Bogie frames comprising parts made from fiber-reinforced matrix material o Applications of solar cells or heat pipes, e.g. on ski-lift cabins or carriages for passengers or goods o concerning heating, ventilating or air conditioning 	Y02T30/00-42
6.3. AIR TRANSPORT	Y02T50
Aeronautics or air transport <ul style="list-style-type: none"> - Drag reduction <ul style="list-style-type: none"> o Overall configuration, shape or profile of fuselage or wings o Adaptive structures: Morphing wings or smart wings o by influencing airflow: Wing tip vortex reduction; Winglets o by influencing the boundary layer - Wing lift efficiency <ul style="list-style-type: none"> o Optimised high lift wing systems o Helicopter rotor blades lift efficiency - Weight reduction <ul style="list-style-type: none"> o Airframe: Materials (composites, metallic lightweight); Design measures o Interior: Materials; Design measures - On board measures aiming to increase energy efficiency <ul style="list-style-type: none"> o concerning the electrical systems: Energy recovery, conversion or storage systems; Electric actuators or motors o Thermal management: Reduction of energy losses; Optimization of hot and cold sources on board an aircraft - Efficient propulsion technologies <ul style="list-style-type: none"> o Electrical o Hybrid o Propellers o Relevant aircraft propulsion technologies: Measures to reduce the propulsor weight (e.g. using composites); Improving the rotor blades aerodynamic; Enabling an increased combustion temperature by cooling; Controlling the propulsor to control the emissions; using fuels of non-fossil origin o Solar cells as on board power source - Enabling use of sustainable fuels <ul style="list-style-type: none"> o Synthetic fuels o Bio fuels - Energy efficient operational measures <ul style="list-style-type: none"> o Related to ground operations: Aircraft equipment, e.g. wheel embedded; Ground equipment o Related to management of trajectory and mission - Eco design, i.e. taking into account the full life cycle of the craft including re-use, recyclability and disposal 	Y02T50/00-90
6.4. MARITIME OR WATERWAYS TRANSPORT	Y02T 70

<p>Maritime or waterways transport</p> <ul style="list-style-type: none"> - Measures concerning design or construction of watercraft hulls <ul style="list-style-type: none"> o Improving hydrodynamics of hull: reducing surface friction (air lubrication, air cavity systems; hull coatings, e.g. biomimicry), lower wave resistance (bow shape), improving wake pattern (reducing the interaction between hull and propeller) o Construction of hull: materials (e.g. ultra light steels, composites); energy efficient measures related to fabrication or assembly of hull - Measures at the maintenance or repair stage specially aiming at GHG emissions reduction <ul style="list-style-type: none"> o Surface or tank cleaning and treatment operations o Improved operation of fossil fuel transfer, e.g. ship-to-ship oil or gas transfer o Handling waste - Measures to reduce GHG emissions related to the propulsion system <ul style="list-style-type: none"> o Propulsion power plant <ul style="list-style-type: none"> ▪ Relating to type of fuel: Less carbon-intensive fuels (e.g. natural gas, biofuels); Non-conventional fuels (e.g. nuclear) ▪ Renewable or hybrid-electric solutions (e.g. solar, wind) ▪ Other measures to increase efficiency of the power plant: Engine monitoring and control; Waste heat recovery; Reducing auxiliary power o Propeller <ul style="list-style-type: none"> ▪ Improved propeller design ▪ Recovery of rotational energy ▪ Wake equalizing arrangements o Jets o Propulsion by direct use of wind: Energy-efficient technologies involving sails; Kites o Other propulsion concepts for reducing GHG emissions, e.g. wave-powered - Technologies for a more efficient operation of the waterborne vessel not otherwise provided for <ul style="list-style-type: none"> o Related to heating, ventilation, air conditioning, or refrigeration systems o Integrating maritime voyage control: Speed reduction; Weather routing; Course optimization - Measures concerning recycling, retrofitting or dismantling of waterborne vessels - Port equipment or systems reducing GHG emissions 	Y02T 70/00-90
<p>6.5. ENABLING TECHNOLOGIES IN TRANSPORT</p>	Y02T90
<p>6.5.1. Electric vehicle charging</p>	
<ul style="list-style-type: none"> - Electric charging stations <ul style="list-style-type: none"> o by conductive energy transmission o by inductive energy transmission o by exchange of energy storage elements o Alignment between the vehicle and the charging station o Converters or inverters for charging o Energy exchange control or determination - Plug-in electric vehicles - Information or communication technologies [ICT] improving the operation of electric vehicles <ul style="list-style-type: none"> o Navigation o ICT for charging station selection (suitability, location, availability) o Smart grids as interface for battery charging of electric and hybrid vehicles; Remote or cooperative charging operation; Aspects supporting the interoperability of electric or hybrid vehicles, e.g. recognition, authentication, identification or billing 	Y02T 90/10-169
<p>6.5.2. Application of fuel cell and hydrogen technology to transportation</p>	
<ul style="list-style-type: none"> - Application of fuel cell technology to transportation <ul style="list-style-type: none"> o Fuel cells specially adapted to transport applications, e.g. automobile, bus, ship o Fuel cell powered electric vehicles [FCEV] o Fuel cells as on-board power source in aeronautics o Fuel cells as on-board power source in waterborne transportation - Application of hydrogen technology to transportation <ul style="list-style-type: none"> o Hydrogen as fuel for road transportation o Hydrogen as fuel in aeronautics o Hydrogen as fuel in waterborne transportation 	Y02T 90/30-38 Y02T 90/40-46

7. CLIMATE CHANGE MITIGATION technologies related to BUILDINGS	Y02B
7.1. INTEGRATION OF RENEWABLE ENERGY SOURCES IN BUILDINGS	Y02B10
<ul style="list-style-type: none"> - Photovoltaic [PV]: Roof systems for PV cells; PV hubs - Solar thermal: Evacuated solar collectors; Air conditioning or refrigeration systems - Wind power - Geothermal heat-pumps - Hydropower in dwellings - Use of biomass for heating - Hybrid systems; Uninterruptible or back-up power supplies integrating renewable energies 	Y02B 10/00-72
7.2. ENERGY EFFICIENCY IN BUILDINGS	
7.2.1. Lighting	Y02B20
<p>Energy-efficient lighting:</p> <ul style="list-style-type: none"> - Energy saving technologies for incandescent lamps, e.g. halogen lamps - Gas discharge lamps, e.g. fluorescent lamps, high-intensity discharge lamps [HID], or molecular radiators - Semiconductor lamps, e.g. solid state lamps [SSL], light emitting diodes [LED], or organic LED [OLED] - Control techniques providing energy savings, e.g. timing or schedule, detection of the user, detection of the illumination level - Used in particular applications (e.g. in street lighting) 	Y02B 20/00-72
7.2.2. Heating, ventilation or air conditioning [HVAC]	Y02B30
<p>Energy-efficient HVAC systems:</p> <ul style="list-style-type: none"> - relating to domestic heating, space heating or domestic hot water heating or supply systems [DHW] <ul style="list-style-type: none"> o using boilers (condensing boilers; modular boilers) o Hot water central heating systems using heat pumps o Central heating systems having more than one heat source o Central heating systems using steam or condensate extracted or exhausted from steam engine plants o Domestic hot-water supply systems using recuperated or waste heat o Heat consumers: i.e. devices to provide the end user with heat (e.g. low-temperature radiators with increased heat-exchange surface; heating arrangements used in combination with water central heating system) - Systems profiting of external/internal conditions <ul style="list-style-type: none"> o Heat recovery pumps, i.e. heat pump based systems or units able to transfer the thermal energy from one area of the premises or part of the facilities to a different one, improving the overall efficiency o Free-cooling systems (e.g. air based, using dew point control, "Canadian well") o Heat recovery units (air to air; water to water) - Other technologies for heating or cooling <ul style="list-style-type: none"> o Absorption based systems (e.g. integrating CHP generation systems, i.e. trigeneration) o Adsorption based systems o Magnetic cooling - Efficient control or regulation technologies <ul style="list-style-type: none"> o Electric or electronic refrigerant flow control o Technologies based on motor control (e.g. speed regulation of the compressor/pumps/fans; condensing pressure control) o Centralised control (e.g. of heating or domestic hot water [DHW] systems; of refrigeration machines, plants or systems, including combined heating and refrigeration systems; of air distribution systems) o Ventilation adapted to air quality - Ultrasonic humidifiers - Passive houses; Double facade technology 	Y02B 30/00-94
7.2.3. Home appliances	Y02B40
<p>Technologies aiming at improving the efficiency of home appliances</p> <ul style="list-style-type: none"> - Relating to domestic cooking <ul style="list-style-type: none"> o Induction cooking in kitchen stoves (e.g. control circuit, coil) o Microwave ovens (e.g. control circuit, magnetron) o Improved cooking stoves (e.g. fuel-efficient biomass cooking stoves, fuel-efficient gas cooking stoves) o Solar cooking stoves or furnaces - Relating to refrigerators or freezers (e.g. compressors, fans, thermal insulation) - Relating to dish-washers (e.g. pumps, heat recovery of washing water, optimisation of water quantity of hot water) - Relating to washing machines (e.g. drum or pumps, heat recovery, optimisation of water quantity, solar heating) - Relating to laundry dryers (e.g. drum or fans, solar heating) - Related to vacuum cleaners - Energy efficient batteries, ultracapacitors, supercapacitors or double-layer capacitors charging or discharging systems or methods specially adapted for portable applications 	Y02B 40/00-90
7.2.4. Elevators, escalators and moving walkways	Y02B50
<p>Energy-efficient elevators, escalators and moving walkways:</p> <ul style="list-style-type: none"> - in elevators 	Y02B 50/00-24

<ul style="list-style-type: none"> ○ Energy saving technologies (e.g. by adapted call allocation, by adapting the motion profile) ○ Energy recuperation technologies (e.g. with electrical, mechanical, or pressure storage or by delivering current to the grid) – in escalators and moving walkways <ul style="list-style-type: none"> ○ Energy saving technologies (e.g. by adapting the motion profile) ○ Energy recuperation technologies 	
7.2.5. Information and communication technologies	Y02B60
<p>Information and communication technologies [ICT] technologies aiming at the reduction of own energy use:</p> <ul style="list-style-type: none"> – Energy efficient computing <ul style="list-style-type: none"> ○ Reducing energy-consumption at the single machine level, e.g. processors, personal computers, peripheral devices, power supply (e.g. low-power processors, performance modes, cooling means, power mgmt) ○ Reducing energy-consumption by means of multiprocessor or multiprocessing based techniques, other than acting upon the power supply (e.g. resource allocation, scheduling, virtualisation, consolidation, load distribution) ○ Reducing energy-consumption in distributed systems (e.g. delegation or migration, resource sharing) ○ Reducing energy consumption at software or application level (e.g. compilation; installation; feedback, prediction, usage patterns; suspending or hibernating, performance or eco-modes; information retrieval in databases) – Techniques for reducing energy-consumption in wire-line communication networks <ul style="list-style-type: none"> ○ using reduced link rate ○ using subset functionality ○ by operating in low-power or sleep mode – High level techniques for reducing energy-consumption in communication networks <ul style="list-style-type: none"> ○ by proxying ○ by energy-aware routing ○ by signaling and coordination ○ green peer-to-peer – Techniques for reducing energy-consumption in wireless communication networks 	Y02B 60/00-50
7.2.6. End-user side	Y02B70
<p>Technologies for an efficient end-user side electric power management and consumption:</p> <ul style="list-style-type: none"> – Technologies improving the efficiency by using switched-mode power supplies, i.e. efficient power electronics conversion <ul style="list-style-type: none"> ○ Power factor correction technologies for power supplies ○ Reduction of losses in power supplies ○ Efficient standby or energy saving modes, e.g. detecting absence of load or auto-off – Systems integrating technologies related to power network operation and ICT for improving the carbon footprint, i.e. smart grids supporting the management or operation of end-user stationary applications <ul style="list-style-type: none"> ○ End-user application control systems (e.g. load shedding, peak shaving, other demand response systems; domotics or building automation systems) ○ Smart metering supporting the carbon neutral operation of end-user applications in buildings <ul style="list-style-type: none"> ▪ Systems which determine the environmental impact of user behaviour ▪ Systems which monitor performance of renewable electricity generating systems, e.g. solar panels 	Y02B 70/00-346
7.3. ARCHITECTURAL OR CONSTRUCTIONAL ELEMENTS IMPROVING THE THERMAL PERFORMANCE OF BUILDINGS	Y02B80
<p>Architectural or constructional elements improving the thermal performance of buildings:</p> <ul style="list-style-type: none"> – Insulation (e.g. slab shaped vacuum insulation, aerogel insulation) – Windows or doors (e.g. vacuum glazing, aerogel) – Roofs (e.g. roof garden systems, roof coverings with high solar reflectance) – Floors specially adapted for storing heat or cold – Light-dependent control systems for sun shading 	Y02B 80/00-50
7.4. ENABLING TECHNOLOGIES IN BUILDINGS	Y02B90
<p>Enabling technologies or technologies with a potential or indirect contribution to GHG emissions mitigation:</p> <ul style="list-style-type: none"> – Applications of fuel cells in buildings <ul style="list-style-type: none"> ○ Cogeneration of electricity with other electric generators ○ Emergency, uninterruptible or back-up power supplies integrating fuel cells ○ Cogeneration or combined heat and power generation, e.g. for domestic hot water ○ Fuel cells specially adapted to portable applications, e.g. mobile phone, laptop – Systems integrating technologies related to power network operation and ICT mediating in the improvement of the carbon footprint of the management of residential or tertiary loads, i.e. smart grids as enabling technology in buildings sector (e.g. related to uninterruptible power supply systems, remote reading systems, etc.) 	Y02B 90/00-2692

8. CLIMATE CHANGE MITIGATION technologies related to WASTEWATER TREATMENT or WASTE MANAGEMENT	Y02W
8.1. WASTEWATER TREATMENT	Y02W10
<ul style="list-style-type: none"> – Biological treatment of water, waste water, or sewage – Sludge processing – Wastewater or sewage treatment systems with climate change mitigation effect characterised by the origin of the energy – Valorisation of by-products of wastewater, sewage or sludge processing 	Y02W 10/00-45
8.2. SOLID WASTE MANAGEMENT	Y02W30
8.2.1. Waste collection, transportation, transfer or storage	Y02W 30/10
<ul style="list-style-type: none"> – e.g. segregated refuse collecting, electric or hybrid propulsion 	
8.2.2. Waste processing or separation	Y02W 30/20
8.2.3. Landfill technologies aiming to mitigate methane emissions	Y02W 30/30-38
<ul style="list-style-type: none"> – Sealing or covering – Landfill gas capture – Landfill gas flaring 	
8.2.4. Bio-organic fraction processing; Production of fertilisers from the organic fraction of waste or refuse	Y02W 30/40-47
<ul style="list-style-type: none"> – Aerobic fermentation, e.g. composting – Anaerobic fermentation, e.g. methanation combined with capture, recycling or flaring 	
8.2.5. Reuse, recycling or recovery technologies	Y02W 30/50-97
8.2.5.1. Dismantling or mechanical processing of waste for the recovery of materials during separation, disassembly, pre-processing or upgrading	Y02W 30/52-528
8.2.5.2. Metal recycling	Y02W 30/54-543
8.2.5.3. Disassembly of vehicles for recovery of salvageable parts	Y02W 30/56
8.2.5.4. Construction or demolition [C&D] waste	Y02W 30/58
8.2.5.5. Glass recycling	Y02W 30/60-61
8.2.5.6. Plastics recycling	Y02W 30/62-628
8.2.5.7. Paper recycling	Y02W 30/64-648
8.2.5.8. Disintegrating fibre-containing textile articles to obtain fibres for re-use	Y02W 30/66-667
8.2.5.9. Rubber waste recycling	Y02W 30/68-687
8.2.5.10. Recovery of polymers other than plastics or rubbers	Y02W 30/70-706
8.2.5.11. Recovery of luminescent materials	Y02W 30/72
8.2.5.12. Recovery of fats, fatty oils, fatty acids or other fatty substances, e.g. lanolin or waxes	Y02W 30/74
8.2.5.13. Recovery of tanning agents from leather	Y02W 30/76
8.2.5.14. Recycling of wood or furniture waste (production of fertilisers from the organic fraction of waste or refuse)	Y02W 30/78
8.2.5.15. Packaging reuse or recycling (bio-packaging)	Y02W 30/80-807
8.2.5.16. Recycling of waste of electrical or electronic equipment	Y02W 30/82-829
8.2.5.17. Recycling of batteries	Y02W 30/84
8.2.5.18. Recycling of fuel cells	Y02W 30/86
8.2.5.19. Nuclear fuel reprocessing	Y02W 30/88-884
8.2.5.20. Reuse, recycling or recovery technologies cross-cutting to different types of waste	Y02W 30/90-97
8.3. ENABLING TECHNOLOGIES OR TECHNOLOGIES WITH A POTENTIAL OR INDIRECT CONTRIBUTION TO GHG MITIGATION	Y02W 90
<ul style="list-style-type: none"> – Bio-packaging – Computer systems or methods specially adapted for waste reduction or recycling of materials or goods 	–

9. CLIMATE CHANGE MITIGATION TECHNOLOGIES IN THE PRODUCTION OR PROCESSING OF GOODS	Y02P
9.1. TECHNOLOGIES RELATED TO METAL PROCESSING	Y02P 10
9.1.1. Reduction of greenhouse gas [GHG] emissions	Y02P 10/10
– CO ₂ – Greenhouse gases [GHG] other than CO ₂	Y02P 10/10-146
9.1.2. Process efficiency	Y02P 10/20
– by recovering materials – by increasing the energy efficiency of the process – characterised by the energy source	Y02P 10/20-34
9.2. TECHNOLOGIES RELATING TO CHEMICAL INDUSTRY	Y02P 20
9.2.1. General improvement of production processes causing greenhouse gases [GHG] emissions	Y02P 20/10
9.2.2. Improvements relating to chlorine production	Y02P 20/20
9.2.3. Improvements relating to adipic acid or caprolactam production	Y02P 20/30
9.2.4. Improvements relating to chlorodifluoromethane [HCFC-22] production	Y02P 20/40
9.2.5. Improvements relating to the production of other chemicals or pharmaceuticals	Y02P 20/50
9.3. TECHNOLOGIES RELATING TO OIL REFINING AND PETROCHEMICAL INDUSTRY	Y02P 30
9.3.1. Reduction of greenhouse gas [GHG] emissions during production processes	Y02P 30/10
9.3.2. Bio-feedstock	Y02P 30/20
9.3.3. Carbon capture or storage [CCS] specific to hydrogen production	Y02P 30/30
9.3.4. Ethylene production	Y02P 30/40
9.4. TECHNOLOGIES RELATING TO THE PROCESSING OF MINERALS	Y02P 40
9.4.1. Production of cement	Y02P 40/10
9.4.2. Cement grinding	Y02P 40/20
9.4.3. Manufacturing or processing of sand or stone	Y02P 40/30
9.4.4. Production or processing of lime	Y02P 40/40
9.4.5. Glass production	Y02P 40/50
9.4.6. Production of ceramic materials or ceramic elements	Y02P 40/60
9.5. TECHNOLOGIES RELATING TO AGRICULTURE, LIVESTOCK OR AGROALIMENTARY INDUSTRIES	Y02P 60
9.5.1. Agricultural machinery or equipment	Y02P 60/10
– using renewable energies – Measures for saving energy in irrigation, in greenhouses, in preparing grain, etc. – Machines for direct seeding, i.e. sod or grassland seeding – Activities not otherwise provided for, e.g. storage	Y02P 60/10-18
9.5.2. Reduction of greenhouse gas [GHG] emissions in agriculture	Y02P 60/20
– N ₂ O – Reducing methane [CH ₄] emissions from agricultural lands, e.g. from rice paddies – Reduction of CO ₂ emissions from biota and soils – Enhancing carbon sequestration in biota and soils – Biomass with low greenhouse gas [GHG] emissions	Y02P 60/20-25
9.5.3. Land use policy measures	Y02P 60/30
9.5.4. Afforestation or reforestation	Y02P 60/40
9.5.5. Livestock or poultry management	Y02P 60/50
– use of renewable energies – Environmental control in livestock or poultry housing – Methane (CH ₄) capture	Y02P 60/50-56
9.5.6. Fishing and aquaculture	Y02P 60/60
– Fishing equipment – Aquaculture; Aquafarming	Y02P 60/60-642
9.5.7. Apiculture	Y02P 60/70
9.5.8. Food processing	Y02P 60/80
– Use of renewable energies or variable speed drives in handling, conveying or stacking – Warming or cooking – Food storage or conservation	Y02P 60/80-891

<ul style="list-style-type: none"> – Re-use of by-products of food processing for fodder production – characterised by the product 	
9.6. TECHNOLOGIES IN THE PRODUCTION PROCESS FOR FINAL INDUSTRIAL OR CONSUMER PRODUCTS	Y02P 70
<p>GHG capture, material saving, heat recovery or other energy efficient measures, characterised by manufacturing processes:</p> <ul style="list-style-type: none"> – 9.6.1. Technologies for shaping products (e.g. rolling metal, forging, hammering, pressing or riveting) – 9.6.2. Technologies for metal working – 9.6.3. Technologies for printing, lining or stamping machines – 9.6.4. Technologies for working on wood, veneer or plywood – 9.6.5. Technologies for production of paper and paper articles – 9.6.6. Technologies for working on or processing of plastics – 9.6.7. Technologies for conveying, packing or storing of goods – 9.6.8. Other manufacturing technologies (e.g., for mixing, separation, applying liquids, drying, etc.) 	<p>Y02P 70/12-145 Y02P 70/16-187 Y02P 70/20 Y02P 70/22 Y02P 70/24 Y02P 70/26-281 Y02P 70/30 Y02P 70/32-405</p>
<p>GHG capture, material saving, heat recovery or other energy efficient measures, characterised by the final manufactured product:</p> <ul style="list-style-type: none"> – 9.6.9. Manufacturing of products or systems for producing renewable energy (e.g. wind turbines) – 9.6.10. Manufacturing of batteries and fuel cells – 9.6.11. Manufacturing or assembling of vehicles – 9.6.12. Manufacturing of electric and electronic components of products – 9.6.13. Technologies for production or treatment of textiles and foot wear – 9.6.14. Technologies for production of tobacco products 	<p>Y02P 70/52-527 Y02P 70/54-56 Y02P 70/58-585 Y02P 70/60-613 Y02P 70/62-653 Y02P 70/66</p>
9.7. CLIMATE CHANGE MITIGATION TECHNOLOGIES FOR SECTOR-WIDE APPLICATIONS	Y02P 80
<ul style="list-style-type: none"> – Efficient use of energy – Sector-wide applications using renewable energy – Reducing waste in manufacturing processes; Calculations of released waste quantities – Minimising material used in manufacturing processes 	Y02P 80/00-40
9.8. ENABLING TECHNOLOGIES WITH A POTENTIAL CONTRIBUTION TO GHG EMISSIONS MITIGATION	Y02P 90
<ul style="list-style-type: none"> – Total factory control (e.g. smart factories, flexible manufacturing systems, integrated manufacturing systems) – Computing systems, fuel cells, hydrogen, energy storage technologies in production processes – Management or planning – Financial instruments for climate change mitigation 	Y02P 90/00-95