

Patent search strategies for the identification of selected environment-related technologies (ENV-TECH), climate change adaptation technologies, and similar technologies relevant for the ocean economy

ENVIRONMENT-RELATED TECHNOLOGIES (groups 1-8):

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. Air pollution abatement - 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 and pollutant clean-up

1.3. WASTE MANAGEMENT

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

1.4. SOIL REMEDIATION

1.5. ENVIRONMENTAL MONITORING

CLIMATE CHANGE MITIGATION

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

2.1. RENEWABLE ENERGY GENERATION

- 2.1.1. Wind energy
- 2.1.2. Solar thermal energy
- 2.1.3. Solar photovoltaic (PV) energy
- 2.1.4. Solar thermal-PV hybrids
- 2.1.5. Geothermal energy
- 2.1.6. Marine energy, e.g. using wave energy or salinity gradient
- 2.1.7. Hydro energy

2.2. ENERGY GENERATION FROM FUELS OF NON-FOSSIL ORIGIN

- 2.2.1. Biofuels, e.g. bio-diesel
- 2.2.2. Fuel from waste, e.g. synthetic alcohol or diesel

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

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

2.4. NUCLEAR ENERGY

- 2.4.1. Nuclear fusion reactors
- 2.4.2. Nuclear fission reactors

2.5. TECHNOLOGIES FOR AN EFFICIENT ELECTRICAL POWER GENERATION, TRANSMISSION OR DISTRIBUTION

- 2.5.1. Superconducting electric elements or equipment
- 2.5.2. Smart grids as climate change mitigation technology in the energy generation sector
- 2.5.3. Not elsewhere classified

2.6. ENABLING TECHNOLOGIES (TECHNOLOGIES WITH POTENTIAL OR INDIRECT CONTRIBUTION TO GHG EMISSION MITIGATION)

- 2.6.1. Energy storage
 - 2.6.1.1. Batteries
 - 2.6.1.2. Capacitors
 - 2.6.1.3. Thermal energy storage
 - 2.6.1.4. Mechanical energy storage, e.g. flywheels or pressurised fluids
- 2.6.2. Hydrogen technology
- 2.6.3. Fuel cells
- 2.6.4. High-voltage direct current transmission

2.7. OTHER ENERGY CONVERSION OR MANAGEMENT SYSTEMS REDUCING GHG EMISSIONS

2.8. NOT ELSEWHERE CLASSIFIED

3. **CAPTURE, STORAGE, SEQUESTRATION OR DISPOSAL OF GREENHOUSE GASES**
 - 3.1. Capture or disposal of nitrous oxide (N₂O)
 - 3.2. Capture or disposal of methane (CH₄)
 - 3.3. Capture or disposal of perfluorocarbons [PFC], hydrofluorocarbons [HFC] or sulfur hexafluoride [SF₆]
 - 3.4. Capture or disposal of carbon dioxide (CO₂)
 - 3.5. Not elsewhere classified
4. **CLIMATE CHANGE MITIGATION technologies related to TRANSPORTATION**
 - 4.1. **ROAD TRANSPORT**
 - 4.1.1. Conventional vehicles (based on internal combustion engine)
 - 4.1.2. Hybrid vehicles
 - 4.1.3. Electric vehicles
 - 4.1.4. Fuel efficiency-improving vehicle design (common to all road vehicles)
 - 4.2. **RAIL TRANSPORT**
 - 4.3. **AERONAUTICS OR AIR TRANSPORT**
 - 4.4. **MARITIME OR WATERWAYS TRANSPORT**
 - 4.5. **ENABLING TECHNOLOGIES IN TRANSPORT**¹
 - 4.5.1. Electric vehicle charging
 - 4.6. **NOT ELSEWHERE CLASSIFIED**
5. **CLIMATE CHANGE MITIGATION technologies related to BUILDINGS**
 - 5.1. **INTEGRATION OF RENEWABLE ENERGY SOURCES IN BUILDINGS**
 - 5.2. **ENERGY EFFICIENCY IN BUILDINGS**
 - 5.2.1. Energy efficiency lighting
 - 5.2.2. Energy efficiency heating, ventilation or air conditioning [HVAC]
 - 5.2.3. Energy efficiency in home appliances
 - 5.2.4. Energy efficient elevators, escalators and moving walkways, e.g. energy saving or recuperation technologies
 - 5.2.5. End-user side
 - 5.3. **ARCHITECTURAL OR CONSTRUCTIONAL ELEMENTS IMPROVING THE THERMAL PERFORMANCE OF BUILDINGS**
 - 5.4. **ENABLING TECHNOLOGIES IN BUILDINGS**¹
 - 5.5. **NOT ELSEWHERE CLASSIFIED**
6. **CLIMATE CHANGE MITIGATION technologies related to WASTEWATER TREATMENT OR WASTE MANAGEMENT**
 - 6.1. **WASTEWATER TREATMENT**
 - 6.2. **SOLID WASTE MANAGEMENT**
 - 6.2.1. Waste collection, transportation, transfer or storage
 - 6.2.2. Waste processing or separation
 - 6.2.3. Landfill technologies aiming to mitigate methane emissions
 - 6.2.4. Bio-organic fraction processing; Production of fertilisers from the organic fraction of waste or refuse
 - 6.2.5. Reuse, recycling or recovery technologies
 - 6.2.5.1. Mechanical processing of waste for the recovery of materials, e.g. crushing, shredding, separation or disassembly
 - 6.2.5.2. Waste management of vehicles
 - 6.2.5.3. Construction or demolition [C&D] waste
 - 6.2.5.4. Glass recycling
 - 6.2.5.5. Plastics and rubber recycling
 - 6.2.5.6. Paper recycling
 - 6.2.5.7. Disintegrating fibre-containing textile articles to obtain fibres for re-use
 - 6.2.5.8. Recovery of fats, fatty oils, fatty acids or other fatty substances, e.g. lanolin or waxes
 - 6.2.5.9. Recycling of wood or furniture waste
 - 6.2.5.10. Packaging reuse or recycling, e.g. of multilayer packaging
 - 6.2.5.11. Recycling of waste of electrical or electronic equipment (WEEE)
 - 6.2.5.12. Recycling of batteries or fuel cells
 - 6.2.5.13. Use of waste materials as fillers for mortars or concrete
 - 6.3. **ENABLING TECHNOLOGIES**¹
 - 6.4. **NOT ELSEWHERE CLASSIFIED**
7. **CLIMATE CHANGE MITIGATION technologies in the PRODUCTION OR PROCESSING OF GOODS**
 - 7.1. **TECHNOLOGIES RELATED TO METAL PROCESSING**
 - 7.1.1. Reduction of greenhouse gas [GHG] emissions
 - 7.1.2. Process efficiency
 - 7.2. **TECHNOLOGIES RELATING TO CHEMICAL INDUSTRY**

- 7.2.1. *Process efficiency in chemical industry*
- 7.2.2. *Feedstock*
- 7.2.3. *Reduction of greenhouse gas emissions [GHG], e.g. CO₂*
- 7.2.4. *Improvements relating to chlorine production*
- 7.2.5. *Improvements relating to adipic acid or caprolactam production*
- 7.2.6. *Improvements relating to fluorochloro hydrocarbon, e.g. chlorodifluoromethane [HCFC-22] production*
- 7.2.7. *Improvements relating to the production of bulk chemicals*
- 7.3. TECHNOLOGIES RELATING TO OIL REFINING AND PETROCHEMICAL INDUSTRY**
 - 7.3.1. *Bio-feedstock*
 - 7.3.2. *Ethylene production*
- 7.4. TECHNOLOGIES RELATING TO THE PROCESSING OF MINERALS**
 - 7.4.1. *Production of cement*
 - 7.4.2. *Production or processing of lime*
 - 7.4.3. *Glass production*
 - 7.4.4. *Production of ceramic materials or ceramic elements*
- 7.5. TECHNOLOGIES RELATING TO AGRICULTURE, LIVESTOCK OR AGROALIMENTARY INDUSTRIES**
 - 7.5.1. *Using renewable energies, e.g. solar water pumping*
 - 7.5.2. *Measures for saving energy, e.g. in greenhouses*
 - 7.5.3. *Reduction of greenhouse gases [GHG] emissions in agriculture*
 - 7.5.4. *Land use policy measures*
 - 7.5.5. *Afforestation or reforestation*
 - 7.5.6. *Livestock or poultry management*
 - 7.5.7. *Fishing; Aquaculture; Aquafarming*
 - 7.5.8. *Food processing, e.g. use of renewable energies or variable speed drives in handling, conveying or stacking*
- 7.6. TECHNOLOGIES IN THE PRODUCTION PROCESS FOR FINAL INDUSTRIAL OR CONSUMER PRODUCTS**
- 7.7. CLIMATE CHANGE MITIGATION TECHNOLOGIES FOR SECTOR-WIDE APPLICATIONS**
- 7.8. ENABLING TECHNOLOGIES ¹**
- 7.9. NOT ELSEWHERE CLASSIFIED**
- 8. CLIMATE CHANGE MITIGATION in INFORMATION AND COMMUNICATION TECHNOLOGIES [ICT]**
 - 8.1. *Energy efficient computing*
 - 8.2. *Energy efficiency in communication networks*
 - 8.3. *Not elsewhere classified*

¹ Enabling technologies or technologies with potential or indirect contribution to GHG emissions mitigation

CLIMATE CHANGE ADAPTATION TECHNOLOGIES:

9. CLIMATE CHANGE ADAPTATION TECHNOLOGIES

9.1. ADAPTATION AT COASTAL ZONES OR RIVER BASINS

- 9.1.1. *Hard structures, e.g. dams, dykes or breakwaters*
- 9.1.2. *Dune restoration or creation; cliff stabilisation*
- 9.1.3. *Artificial reefs or seaweed; restoration or protection of coral reefs*
- 9.1.4. *Flood prevention; flood or storm water management*
- 9.1.5. *Controlling, monitoring or forecasting*

9.2. WATER RESOURCE MANAGEMENT

- 9.2.1. *Demand-side technologies (water conservation)*
 - 9.2.1.1 *Indoor water conservation*
 - 9.2.1.2 *Irrigation water conservation*
 - 9.2.1.3 *Water conservation in thermoelectric power production*
- 9.2.2. *Supply-side technologies (water availability)*
 - 9.2.2.1 *Water collection (rain, surface and ground-water)*
 - 9.2.2.2. *Water desalination*
 - 9.2.2.3 *Water storage and distribution*
 - 9.2.2.4 *Water filtration; Water and wastewater treatment*
 - 9.2.2.5 *Protecting water resources*

9.3. ADAPTING OR PROTECTING INFRASTRUCTURE OR THEIR OPERATION

- 9.3.1. *Extreme weather resilient electric power supply systems*
- 9.3.2. *Structural elements or technology for improving thermal insulation*
- 9.3.3. *Relating to heating, ventilation or air conditioning [HVAC] technologies*
- 9.3.4. *In transportation*
- 9.3.5. *Planning or developing urban green infrastructure*

9.4. ADAPTATION TECHNOLOGIES IN AGRICULTURE, FORESTRY, LIVESTOCK OR AGROALIMENTARY PRODUCTION

- 9.4.1. *In agriculture*
- 9.4.2. *Ecological corridors or buffer zones*
- 9.4.3. *In livestock or poultry*
- 9.4.4. *In fisheries management*
- 9.4.5. *In food processing or handling, e.g. food conservation*

9.5. ADAPTATION TECHNOLOGIES IN HUMAN HEALTH PROTECTION, E.G. AGAINST EXTREME WEATHER

- 9.5.1. *Air quality improvement or preservation*
- 9.5.2. *Against vector-borne diseases whose impact is exacerbated by climate change*

9.6. TECHNOLOGIES HAVING AN INDIRECT CONTRIBUTION TO ADAPTATION TO CLIMATE CHANGE

- 9.6.1. *Information and communication technologies [ICT] supporting adaptation to climate change, e.g. for weather forecasting or climate simulation*
- 9.6.2. *Assessment of water resources*
- 9.6.3. *Monitoring or fighting invasive species*

9.7. NOT ELSEWHERE CLASSIFIED

ENVIRONMENT-RELATED AND ADAPTATION TECHNOLOGIES RELEVANT TO THE OCEAN ECONOMY:

10. SUSTAINABLE OCEAN ECONOMY

10.1. OCEAN RENEWABLE ENERGY GENERATION

10.1.1. Offshore wind energy

10.1.2. Offshore solar energy

10.1.3. Tide, wave, current and other marine energy

10.2. OCEAN POLLUTION ABATEMENT

10.2.1. Ballast water treatment

10.2.2. Oil spill (and other floating debris) prevention and clean-up

10.3. CLIMATE CHANGE MITIGATION IN MARITIME TRANSPORT

10.3.1. Improved vessel design

10.3.2. Fuel-efficient propulsion or fuel substitution

10.4. CLIMATE CHANGE MITIGATION & ADAPTATION IN FISHING, AQUACULTURE AND AQUAFARMING

10.5. DESALINATION OF SEA WATER

10.6. CLIMATE CHANGE ADAPTATION IN COASTAL ZONES

ENVIRONMENT-RELATED TECHNOLOGIES

1. ENVIRONMENTAL MANAGEMENT	IPC or CPC 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 sulphur oxides, nitrogen oxides, etc.)	B01D53/34-965
Incinerators or other apparatus specially adapted for consuming waste gases or noxious gases	F23G7/06
Arrangements of devices for treating smoke or fumes	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 creating a distinct flow path for flue gases or for non-combusted gases given off by the fuel	F23B80
Combustion apparatus characterised by arrangements for returning combustion products or flue gases to the combustion chamber	F23C9
Fluidised bed combustion apparatus	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	B01J23/38-468
Crankcase ventilating or breathing	F01M13 - F01M2013
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 exhaust gas; circulation of exhaust gas in closed or semi-closed circuits.	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, e.g. by exhaust gas recirculation [EGR] systems	F02M26 - F02M2026
Testing of internal-combustion engines by monitoring exhaust gases (or combustion flame)	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 not provided for in F02D41-43	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	F02M31/02-186
Fuel-injection apparatus	F02M39-71
Advancing or retarding ignition; Control therefore	F02P5

1.1.3. Air pollution abatement - 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
Auxiliary pre-treatment of gases or vapours to be cleaned	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, or otherwise treating exhaust	F01N3
Exhaust or silencing apparatus combined or associated with devices profiting by exhaust energy	F01N5
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 vessels' installations for treating waste-water or sewage, or for preventing environmental pollution not otherwise provided for	B63J4
Treatment of water, waste water, sewage or sludge	C02F
Materials for absorbing liquids to remove pollution, 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 and pollutant clean-up	
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
Tent-like structures for dealing with pollutant emissions below the water surface	E02B2015/005
Vessels or like floating structures adapted for special purposes - for collecting pollution from open water	B63B35/32
Materials for absorbing liquids to remove pollution, e.g. oil, gasoline, fat	C09K 3/32
1.3. WASTE MANAGEMENT	All classes from 1.3.1 to 1.3.6
1.3.1. Solid waste collection	
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 waste material such as feathers, bones or skin; waste dairy products; hydrolysates of wood or straw; molasses; distillers' or brewers' waste	A23K10/26-28 A23K10/32-33 A23K10/37-38
Footwear made of rubber waste	A43B1/12
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

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

Systematic disassembly of vehicles for recovery of salvageable components, e.g. for recycling	B62D67
Stripping waste material from cores or formers of thin or filamentary material, e.g. to permit their re-use	B65H73
Applications of disintegrable, dissolvable or edible materials. Packaging material.	B65D65/46
Compacting the glass batches, e.g. pelletizing	C03B1/02
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	C04B18/04-305
Clay-ware; 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	
Organic fertilisers from waste or refuse, e.g. manure, from distillery wastes, molasses, waste water, sewage sludge, household or town refuse	C05F
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 for consuming industrial waste, e.g. chemicals	F23G7
1.3.5. Landfilling	
<i>[Search strategy currently not available]</i>	
<i>Note: Landfilling patents are largely covered by the CPC 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	
Disposal of solid waste	B09B
Production of liquid hydrocarbon mixtures from rubber or rubber waste	C10G1/10
Medical or veterinary science; Disinfection or sterilising methods specially adapted for refuse	A61L11
Disintegrating medical waste	B02C19/0075
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. CLIMATE CHANGE MITIGATION technologies related to ENERGY GENERATION, TRANSMISSION OR DISTRIBUTION	<u>Y02E</u>
2.1. RENEWABLE ENERGY GENERATION	Y02E10
2.1.1. Wind energy	Y02E10/70-76
– Wind turbines with rotation axis in wind direction – Offshore wind turbines – Onshore wind turbines – Wind turbines with rotation axis perpendicular to the wind direction – Power conversion electric or electronic aspects	
2.1.2. Solar thermal energy	Y02E10/40-47
– Heat exchange systems – Conversion of thermal power into mechanical power, e.g. Rankine, Stirling or solar thermal engines – Mountings or tracking	
2.1.3. Solar photovoltaic (PV) energy	Y02E10/50-56
2.1.4. Solar thermal-PV hybrids	Y02E10/60
2.1.5. Geothermal energy	Y02E10/10
2.1.6. Marine energy, e.g. using wave energy or salinity gradient	Y02E10/30
2.1.7. Hydro energy	Y02E10/20
2.2. ENERGY GENERATION FROM FUELS OF NON-FOSSIL ORIGIN	Y02E50
2.2.1. Biofuels, e.g. bio-diesel	Y02E50/10
2.2.2. Fuel from waste, e.g. synthetic alcohol or diesel	Y02E50/30
2.3. COMBUSTION TECHNOLOGIES WITH MITIGATION POTENTIAL (e.g. using fossil fuels, biomass, waste, etc.)	Y02E20
2.3.1. Technologies for improved output efficiency (combined heat and power, combined cycles, etc.)	Y02E20/12-18
– Heat utilisation in combustion or incineration of waste – Combined heat and power generation [CHP] – Combined cycle power plant [CCPP] or combined cycle gas turbine [CCGT]; Integrated gasification combined cycle [IGCC]; IGCC combined with carbon capture and storage [CCS]	
2.3.2. Technologies for improved input efficiency (efficient combustion or heat usage)	Y02E20/30-34
– Technologies for a more efficient combustion or heat usage – Direct CO₂ mitigation – Indirect CO₂ mitigation, i.e. by acting on non CO₂ directly related matters of the process, e.g. pre-heating or heat recovery	
2.4. NUCLEAR ENERGY	Y02E30
2.4.1. Nuclear fusion reactors	Y02E30/10
2.4.2. Nuclear fission reactors	Y02E30/30
2.5. TECHNOLOGIES FOR AN EFFICIENT ELECTRICAL POWER GENERATION, TRANSMISSION OR DISTRIBUTION	Y02E40
2.5.1. Superconducting electric elements or equipment	Y02E40/60
2.5.2. Smart grids as climate change mitigation technology in the energy generation sector	Y02E40/70
2.5.3. Not elsewhere classified	Y02E40/10-50
– Flexible AC transmission systems [FACTS] – Active power filtering [APF] – Reactive power compensation – Arrangements for reducing harmonics – Arrangements for eliminating or reducing asymmetry in polyphase networks	
2.6. ENABLING TECHNOLOGIES (Technologies with potential or indirect contribution to GHG emission mitigation)	Y02E60

2.6.1. Energy storage	Y02E60/10-16
2.6.1.1. Batteries	Y02E60/10
2.6.1.2. Capacitors	Y02E60/13
2.6.1.3. Thermal energy storage	Y02E60/14
2.6.1.4. Mechanical energy storage, e.g. flywheels or pressurised fluids	Y02E60/16
2.6.2. Hydrogen technology	Y02E60/30-36
- Hydrogen storage - Hydrogen distribution - Hydrogen production from non-carbon containing sources, e.g. by water hydrolysis	
2.6.3. Fuel cells	Y02E60/50
2.6.4. High-voltage direct current transmission	Y02E60/60
Arrangements for transfer of electric power between AC networks via a high-tension DC link, HVDC transmission	
2.7. OTHER ENERGY CONVERSION OR MANAGEMENT SYSTEMS REDUCING GHG EMISSIONS	Y02E70
Systems combining energy storage with energy generation of non-fossil origin	
2.8. NOT ELSEWHERE CLASSIFIED	

3. CAPTURE, STORAGE, SEQUESTRATION OR DISPOSAL OF GREENHOUSE GASES	<u>Y02C</u>
3.1. Capture or disposal of nitrous oxide (N ₂ O)	Y02C20/10
3.2. Capture or disposal of methane (CH ₄)	Y02C20/20
3.3. Capture or disposal of perfluorocarbons [PFC], hydrofluorocarbons [HFC] or sulfur hexafluoride [SF ₆]	Y02C20/30
3.4. Capture or disposal of carbon dioxide (CO ₂)	Y02C20/40
3.5 Not elsewhere classified	

4. CLIMATE CHANGE MITIGATION technologies related to TRANSPORTATION	<u>Y02T</u>
4.1. ROAD TRANSPORT	Y02T10
4.1.1. Conventional vehicles (based on internal combustion engine)	Y02T10/10-40
- Improving ICE (internal combustion engine) efficiencies - Use of alternative fuels, e.g. biofuels - Engine management systems	
4.1.2. Hybrid vehicles	Y02T10/62
4.1.3. Electric vehicles	Y02T10/64-72
- Electric machine technologies in electromobility - Energy storage systems for electromobility, e.g. batteries - Electromobility specific charging systems or methods for batteries, ultracapacitors, supercapacitors or double-layer capacitors - Electric energy management in electromobility	
4.1.4. Fuel efficiency-improving vehicle design (common to all road vehicles)	Y02T10/80-92
Technologies aiming to reduce greenhouse gas (GHG) emissions common to all road transportation technologies	
- Elements for improving aerodynamics - Data processing systems or methods, management, administration - Optimisation of rolling resistance, e.g. weight reduction; Tyres, e.g. materials; Bearings - 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	

4.2. RAIL TRANSPORT	Y02T30/00
– Transportation of goods or passengers via railways, e.g. energy recovery or reducing air resistance	
4.3. AERONAUTICS OR AIR TRANSPORT	Y02T50
– Drag reduction – Wing lift efficiency – Weight reduction – On board measures aiming to increase energy efficiency – Efficient propulsion technologies and use of fuels of non-fossil origin – Energy efficient operational measures, e.g. ground operations or mission management	
4.4. MARITIME OR WATERWAYS TRANSPORT	Y02T70
– Measures concerning design or construction of watercraft hulls – Measures to reduce GHG emissions related to the propulsion system; Less carbon-intensive fuels, e.g. natural gas, biofuels; Renewable or hybrid-electric solutions	
4.5. ENABLING TECHNOLOGIES IN TRANSPORT	Y02T90
4.5.1. Electric vehicle charging	Y02T90/10-167
– Electric charging stations – Plug-in electric vehicles – Information or communication technologies [ICT] improving the operation of electric vehicles – Systems integrating technologies related to power network operation and communication or information technologies for supporting the interoperability of electric or hybrid vehicles, i.e. smart-grids as interface for battery charging of electric vehicles [EV] or hybrid vehicles [HEV]	
4.5.2. Application of hydrogen technology to transportation, e.g. using fuel cells	Y02T90/40
4.6. NOT ELSEWHERE CLASSIFIED	

5. CLIMATE CHANGE MITIGATION technologies related to BUILDINGS	Y02B
5.1. INTEGRATION OF RENEWABLE ENERGY SOURCES IN BUILDINGS	Y02B10
– Photovoltaic [PV] – Solar thermal – Wind power – Geothermal heat-pumps – Hydropower in dwellings – Hybrid systems; Uninterruptible or back-up power supplies integrating renewable energies	
5.2. ENERGY EFFICIENCY IN BUILDINGS	
5.2.1. Energy efficient lighting	Y02B20
– Semiconductor lamps, e.g. solid state lamps [SSL], light emitting diodes [LED], or organic LED [OLED] – Control techniques providing energy savings, e.g. smart controllers or presence detection – In street lighting	
5.2.2. Energy efficient heating, ventilation or air conditioning [HVAC]	Y02B30
– Hot water central heating systems using heat pumps – Hot air central heating systems using heat pumps – District heating – Domestic hot-water supply systems using recuperated or waste heat – 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 – Free-cooling systems – Heat recovery units – Absorption based systems, e.g. combined with heat or power generation [CHP], e.g. trigeneration – Efficient control or regulation technologies, e.g. for control of refrigerant flow, motor or heating – Passive houses; Double facade technology	

5.2.3. Energy efficiency in home appliances	Y02B40
Technologies aiming at improving the efficiency of home appliances, e.g. induction cooking or efficient technologies for refrigerators, freezers or dish washers using renewables, e.g. solar cooking stoves, furnaces or solar heating	
5.2.4. Energy efficient elevators, escalators and moving walkways, e.g. energy saving or recuperation technologies	Y02B50
5.2.5. End-user side	Y02B70
Technologies for an efficient end-user side electric power management and consumption: - Technologies improving the efficiency by using switched-mode power supplies, i.e. efficient power electronics conversion - 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 - Demand response systems, e.g. load shedding, peak shaving - Smart metering supporting the carbon neutral operation of end-user applications in buildings	
5.3. ARCHITECTURAL OR CONSTRUCTIONAL ELEMENTS IMPROVING THE THERMAL PERFORMANCE OF BUILDINGS	Y02B80
Architectural or constructional elements improving the thermal performance of buildings: - Insulation (e.g. vacuum insulation, aerogel insulation) - Glazing, e.g. vacuum glazing - Roof garden systems	
5.4. ENABLING TECHNOLOGIES IN BUILDINGS	Y02B90
Enabling technologies or technologies with a potential or indirect contribution to GHG emissions mitigation: - Applications of fuel cells in buildings - Smart grids as enabling technology in buildings sector (smart grids supporting the management or operation of end-user stationary applications in general, or like technologies with no associated climate change mitigation effect)	
5.5. NOT ELSEWHERE CLASSIFIED	

6. CLIMATE CHANGE MITIGATION TECHNOLOGIES related to WASTEWATER TREATMENT OR WASTE MANAGEMENT	<u>Y02W</u>
6.1. WASTEWATER TREATMENT	Y02W10
- Biological treatment of water, waste water, or sewage - Sludge processing - Wastewater or sewage treatment systems using renewable energies - Valorisation of by-products of wastewater, sewage or sludge processing	
6.2. SOLID WASTE MANAGEMENT	Y02W30
6.2.1. Waste collection, transportation, transfer or storage	Y02W30/10
e.g. segregated refuse collecting, electric or hybrid propulsion	
6.2.2. Waste processing or separation	Y02W30/20
6.2.3. Landfill technologies aiming to mitigate methane emissions	Y02W30/30
6.2.4. Bio-organic fraction processing; Production of fertilisers from the organic fraction of waste or refuse	Y02W30/40
6.2.5. Reuse, recycling or recovery technologies	Y02W30/50-91
6.2.5.1. Mechanical processing of waste for the recovery of materials, e.g. crushing, shredding, separation or disassembly	Y02W30/52
6.2.5.2. Waste management of vehicles	Y02W30/56
6.2.5.3. Construction or demolition [C&D] waste	Y02W30/58
6.2.5.4. Glass recycling	Y02W30/60
6.2.5.5. Plastics and rubber recycling	Y02W30/62
6.2.5.6. Paper recycling	Y02W30/64
6.2.5.7. Disintegrating fibre-containing textile articles to obtain fibres for re-use	Y02W30/66
6.2.5.8. Recovery of fats, fatty oils, fatty acids or other fatty substances, e.g. lanolin or waxes	Y02W30/74
6.2.5.9. Recycling of wood or furniture waste	Y02W30/78
6.2.5.10. Packaging reuse or recycling, e.g. of multilayer packaging	Y02W30/80
6.2.5.11. Recycling of waste of electrical or electronic equipment [WEEE]	Y02W30/82
6.2.5.12. Recycling of batteries or fuel cells	Y02W30/84
6.2.5.13. Use of waste materials as fillers for mortars or concrete	Y02W30/91
	Y02W90

6.3. ENABLING TECHNOLOGIES OR TECHNOLOGIES WITH A POTENTIAL OR INDIRECT CONTRIBUTION TO GHG MITIGATION	
– Bio-packaging (e.g. packaging containers made from renewable resources e.g. bio-plastics)	
6.4. NOT ELSEWHERE CLASSIFIED	

7. CLIMATE CHANGE MITIGATION TECHNOLOGIES IN THE PRODUCTION OR PROCESSING OF GOODS	Y02P
7.1. TECHNOLOGIES RELATED TO METAL PROCESSING	Y02P10
7.1.1. Reduction of greenhouse gas [GHG] emissions	Y02P10/10-146
– by capturing or storing CO ₂ – by avoiding CO ₂ , e.g. using hydrogen – of methane [CH ₄] – Perfluorocarbons [PFC]; Hydrofluorocarbons [HFC]; Sulfur hexafluoride [SF ₆]	
7.1.2. Process efficiency	Y02P10/20-32
– Recycling – Process efficiency – Using renewable energy sources	
7.2. TECHNOLOGIES RELATING TO CHEMICAL INDUSTRY	Y02P20
7.2.1. Process efficiency in chemical industry	Y02P20/10-133
– Energy recovery, e.g. by cogeneration, recovery or pressure recovery turbines – Renewable energy sources, e.g. sunlight	
7.2.2. Feedstock	Y02P20/141-145
– the feedstock being recycled material, e.g. plastics – the feedstock being materials of biological origin	
7.2.3. Reduction of greenhouse gas [GHG] emissions, e.g. CO ₂	Y02P20/151-156
– Perfluorocarbons [PFC]; Hydrofluorocarbons [HFC]; Hydrochlorofluorocarbons [HCFC]; Chlorofluorocarbons [CFC] – Methane [CH ₄]	
7.2.4. Improvements relating to chlorine production	Y02P20/20
7.2.5. Improvements relating to adipic acid or caprolactam production	Y02P20/30
7.2.6. Improvements relating to fluorochloro hydrocarbon, e.g. chlorodifluoromethane [HCFC-22] production	Y02P20/40
7.2.7. Improvements relating to the production of bulk chemicals	Y02P20/50
– using catalysts, e.g. selective catalysts – using solvents, e.g. supercritical solvents or ionic liquids – Design of synthesis routes, e.g. reducing the use of auxiliary or protecting groups – Recycling of unreacted starting or intermediate materials – Recycling of catalysts – Biological synthesis; Biological purification	
7.3. TECHNOLOGIES RELATING TO OIL REFINING AND PETROCHEMICAL INDUSTRY	Y02P30
7.3.1. Bio-feedstock	Y02P30/20
7.3.2. Ethylene production	Y02P30/40
7.4. TECHNOLOGIES RELATING TO THE PROCESSING OF MINERALS	Y02P40
7.4.1. Production of cement	Y02P40/10-18
– Energy efficiency measures, e.g. improving or optimising the production methods – Fuels from renewable energy sources, e.g. waste or biomass – Carbon capture and storage [CCS]	
7.4.2. Production or processing of lime	Y02P40/40-45
– e.g. limestone regeneration of lime in pulp and sugar mills – using fuels from renewable energy sources	
7.4.3. Glass production	Y02P40/50-57
– e.g. reusing waste heat during processing or shaping – Improving the yield, e.g. reduction of reject rates	
7.4.4. Production of ceramic materials or ceramic elements	Y02P40/60
– e.g. substitution of clay or shale by alternative raw materials, e.g. ashes	
7.5. TECHNOLOGIES RELATING TO AGRICULTURE, LIVESTOCK OR AGROALIMENTARY INDUSTRIES	Y02P60

7.5.1. Using renewable energies, e.g. solar water pumping	Y02P60/12
7.5.2. Measures for saving energy, e.g. in green houses	Y02P60/14
7.5.3. Reduction of greenhouse gas [GHG] emissions in agriculture	Y02P60/20-22
– e.g. CO₂ – Dinitrogen oxide [N₂O], e.g. using aquaponics, hydroponics or efficiency measures – Methane [CH₄], e.g. from rice paddies	
7.5.4. Land use policy measures	Y02P60/30
7.5.5. Afforestation or reforestation	Y02P60/40
7.5.6. Livestock or poultry management	Y02P60/50-52
– use of renewable energies	
7.5.7. Fishing; Aquaculture; Aquafarming	Y02P60/60
7.5.8. Food processing, e.g. use of renewable energies or variable speed drives in handling, conveying or stacking	Y02P60/80-87
– Food storage or conservation, e.g. cooling or drying – Re-use of by-products of food processing for fodder production	
7.6. TECHNOLOGIES IN THE PRODUCTION PROCESS FOR FINAL INDUSTRIAL OR CONSUMER PRODUCTS	Y02P70
– Greenhouse gas [GHG] capture, material saving, heat recovery or other energy efficient measures, e.g. motor control, characterised by manufacturing processes, e.g. for rolling metal or metal working – Manufacturing or production processes characterised by the final manufactured product; ...related technologies for production or treatment of textile or flexible materials or products thereof, including footwear	
7.7. CLIMATE CHANGE MITIGATION TECHNOLOGIES FOR SECTOR-WIDE APPLICATIONS	Y02P80
– Efficient use of energy, e.g. using compressed air or pressurized fluid as energy carrier – Using renewable energy – Reducing waste in manufacturing processes; Calculations of released waste quantities – Minimising material used in manufacturing processes	
7.8. ENABLING TECHNOLOGIES WITH A POTENTIAL CONTRIBUTION TO GHG EMISSIONS MITIGATION	Y02P90
– Total factory control (e.g. smart factories, flexible manufacturing systems, integrated manufacturing systems) – Computing systems specially adapted for manufacturing – Fuel cell technologies – Hydrogen technologies – Energy storage in industry with an added climate change mitigation effect – Electric or hybrid propulsion for production processes – Combining sequestration of CO₂ and exploitation of hydrocarbons by injecting CO₂ or carbonated water in oil wells – Management or planning – Financial instruments for climate change mitigation (e.g. environmental taxes, subsidies or financing; CO₂ emissions certificates or credits trading)	
7.9. NOT ELSEWHERE CLASSIFIED	

8. CLIMATE CHANGE MITIGATION IN INFORMATION AND COMMUNICATION TECHNOLOGIES [ICT] ³	Y02D
8.1. Energy efficient computing	Y02D10
– e.g. low power processors, power management or thermal management	
8.2. Energy efficiency in communication networks	Y02D30
– Reducing energy consumption in wire-line communication networks, e.g. low power modes or reduced link rate – Reducing energy consumption in wireless communication networks	
8.3. Not elsewhere classified	

³ ICT technologies aiming at the reduction of their own energy use

CLIMATE CHANGE ADAPTATION TECHNOLOGIES

9. CLIMATE CHANGE ADAPTATION TECHNOLOGIES	IPC or CPC codes
9.1. ADAPTATION AT COASTAL ZONES OR RIVER BASINS	Y02A10
9.1.1. Hard structures, e.g. dams, dykes or breakwaters	Y02A10/11
9.1.2. Dune restoration or creation; cliff stabilisation	Y02A10/23
9.1.3. Artificial reefs or seaweed; restoration or protection of coral reefs	Y02A10/26
9.1.4. Flood prevention; flood or storm water management	Y02A10/30
9.1.5. Controlling, monitoring or forecasting	Y02A10/40
9.2. WATER RESOURCE MANAGEMENT	
9.2.1. Demand-side technologies (water conservation)	
9.2.1.1 Indoor water conservation	
Faucets and showers - Self-closing valves, i.e. closing automatically after operation, in which the closing movement, either retarded or not, starts immediately after opening - Self-closing valves, i.e. closing automatically after operation, closing after a predetermined quantity of fluid has been delivered	F16K21/06-12 F16K 21/16-20
Aeration of water - Arrangement or mounting of devices, e.g. valves, for venting or aerating or draining - Domestic plumbing installations for fresh water or waste water; jet regulators with aerating means	F16L55/07 E03C1/084
Sanitation (dual-flush toilets, dry toilets, closed-circuit toilets) - Flushing devices discharging variable quantities of water - Cisterns discharging variable quantities of water - Urinals without flushing - Dry closets - Waterless or low-flush urinals - Special constructions of flushing devices with recirculation of bowl-cleaning fluid	E03D3/12 E03D1/14 A47K11/12 A47K11/02 E03D13/007 E03D5/016
Greywater - Greywater supply systems - Using grey water; using household water from wash basins or showers	E03B1/041 Y02A20/146-148
9.2.1.2 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 - Watering arrangements making use of perforated pipe-lines located in the soil	A01G25/02 A01G25/06
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
9.2.1.3 Water conservation in thermoelectric power production	
- Combustion heat from one cycle heating the fluid in another cycle - Non-positive-displacement machines or engines, e.g. steam turbines; preventing or minimizing internal leakage of working fluid, e.g. between stages - Relating to industrial water supply, e.g. used for cooling	F01K23/06-108 F01D11 Y02A20/30
9.2.2. Supply-side technologies (water availability)	
9.2.2.1 Water collection (rain, surface and ground-water)	
Rainwater collection - Methods or installations for obtaining or collecting drinking water or tap water from rainwater - Special vessels for collecting or storing rain-water for use in the household, e.g. water-butts - Rainwater harvesting	E03B3/02 E03B3/03 Y02A20/108
Surface water collection - Methods or installations for drawing-off water - Methods or installations for obtaining or collecting drinking water or tap water from surface water	E03B9 E03B3/04; 30,36
Underground water collection - Use of pumping plants or installations for water supply - Methods or installations for obtaining or collecting drinking water or tap water from underground sources	E03B5 E03B3/06-26
Not elsewhere classified Methods or installations for obtaining or collecting drinking water or tap water; rainwater, surface water, or groundwater	E03B3/28, 32-34, 38-40
9.2.2.2. Water desalination	
- Reverse osmosis - Using renewable energy (wind power, solar thermal, photovoltaic, wave energy)	Y02A20/124-144

– Desalination	C02F1/265
9.2.2.3 Water storage and distribution	
– Arrangements or adaptations of tanks for water supply	E03B11
– Leakage reduction or detection in water storage or distribution	Y02A20/15
– Pipe-line systems / Protection or supervision of installations / Preventing, monitoring, or locating loss ...with applications to water supply [i.e. with E03B-E03D co-classes]	F17D5/02 and [E03B or E03C or E03D]
– Devices for covering leaks in pipes or hoses, e.g. hose-menders ...with applications to water supply [i.e. with E03B-E03D co-classes]	F16L55/16 and [E03B or E03C or E03D]
– Investigating fluid tightness of structures, by detecting the presence of fluid at the leakage point ...with applications to water supply [i.e. with E03B-E03D co-classes]	[G01M3/08 or G01M3/14 or G01M3/18 or G01M3/22 or G01M3/28] and [E03B or E03C or E03D]
9.2.2.4 Water filtration; Water and wastewater treatment	
– Water filtration	Y02A20/152
– Keeping clear the surface of open water from oil spills	Y02A20/20-212
– Off-grid powered water treatment; Solar-powered water purification; Solar-powered wastewater sewage treatment, e.g. spray evaporation	
9.2.2.5. Protecting water resources	
– River restoration	Y02A20/40-411
– Saltwater intrusion barriers	
– Aquifer recharge	
9.3. ADAPTING OR PROTECTING INFRASTRUCTURE OR THEIR OPERATION	Y02A30
9.3.1. Extreme weather resilient electric power supply systems	Y02A30/14
9.3.2. Structural elements or technology for improving thermal insulation	Y02A30/24-254
– Slab shaped vacuum insulation	
– Using natural or recycled building materials, e.g. straw, wool, clay or used tires	
– Glazing, e.g. vacuum glazing	
– Roof garden systems; Roof coverings with high solar reflectance	
9.3.3. Relating to heating, ventilation or air conditioning [HVAC] technologies	Y02A30/27-274
– Solar heating or cooling	
– Using waste energy, e.g. from internal combustion engine	
9.3.4. In transportation	Y02A30/30
9.3.5. Planning or developing urban green infrastructure	Y02A30/60
9.4. ADAPTATION TECHNOLOGIES IN AGRICULTURE, FORESTRY, LIVESTOCK OR AGROALIMENTARY PRODUCTION	Y02A40
9.4.1. In agriculture	Y02A40/10-58
– Abiotic stress: Plants tolerant to drought, salinity or heat	
– Genetically modified [GMO] plants	
– Fertilizer of biological origin	
– Improving land use; improving water use or availability; controlling erosion	
– Greenhouse technology, e.g. cooling systems thereof	
– Specially adapted for farming or for storing agricultural or horticultural products; Using renewable energies	
9.4.2. Ecological corridors or buffer zones	Y02A40/60
9.4.3. In livestock or poultry	Y02A40/70-76
– Using renewable energies	
9.4.4. In fisheries management	Y02A40/80-818
– Aquaculture, e.g. of fish; Alternative feeds for fish, e.g. in aquaculture	
9.4.5. In food processing or handling, e.g. food conservation	Y02A40/90-966
– Using renewable energies; Cooking stoves or furnaces using solar heat or biomass	
– Off-grid food refrigeration; Powered by renewable energy sources	
9.5. ADAPTATION TECHNOLOGIES IN HUMAN HEALTH PROTECTION, E.G. AGAINST EXTREME WEATHER	Y02A50
9.5.1. Air quality improvement or preservation	Y02A50/20-2351
– e.g. vehicle emission control or emission reduction by using catalytic converters	
– Atmospheric particulate matter [PM], e.g. carbon smoke microparticles, smog, aerosol particles, dust	
9.5.2. Against vector-borne diseases whose impact is exacerbated by climate change	Y02A50/30
– e.g. certain mosquito-borne, fly-borne, tick-borne or water-borne diseases	
9.6. TECHNOLOGIES HAVING AN INDIRECT CONTRIBUTION TO ADAPTATION TO CLIMATE CHANGE	Y02A90
9.6.1. Information and communication technologies [ICT] supporting adaptation to climate change, e.g. for weather forecasting or climate simulation	Y02A90/10
9.6.2. Assessment of water resources	Y02A90/30
9.6.3. Monitoring or fighting invasive species	Y02A90/40
9.7. NOT ELSEWHERE CLASSIFIED	

ENVIRONMENT-RELATED AND ADAPTATION TECHNOLOGIES RELEVANT TO THE OCEAN ECONOMY

10.1 OCEAN RENEWABLE ENERGY GENERATION	CPC or IPC codes
10.1.1 Offshore wind energy	
– Offshore wind turbines	Y02E 10/727
– Assembly, mounting or commissioning of wind motors, specially adapted for offshore installation	F03D 13/25
– Components; Mounting on supporting structures or systems, offshore	F05B 2240/95
– Vessels or similar floating structures for converting wind energy into electric energy	B63B 2035/446
10.1.2 Offshore solar energy	
– Vessels or similar floating structures for converting solar energy into electric energy	B63B 2035/4453
10.1.3 Tide, wave, current and other marine energy	
– Tide or wave power plants	E02B 9/08
– Power stations or aggregates using wave or tide energy	F03B 13/12-268
– Vessels or similar floating structures for converting water energy into electric energy, e.g. from tidal flows, waves or currents	B63B 2035/4466
– Energy from the sea, e.g. using wave energy or salinity gradient	Y02E 10/30
– Ocean thermal energy conversion [OTEC]	F03G 7/05
10.2. OCEAN POLLUTION ABATEMENT	
10.2.1 Ballast water treatment	
– Treatment of wastewater, sewage or sludge originating from marine vessels, ships and boats, e.g. bilge water or ballast water	C02F 2103/008
– Arrangements of installations for treating ballast water, waste water, sewage, sludge, or for preventing environmental pollution from vessels	B63J 4/002-006
– Conduits for emptying or ballasting; Self-bailing equipment; Scuppers	B63B13
10.2.2 Oil spill (and other floating debris) prevention and cleanup	
– Arrangements for minimizing pollution by accidents of cargo tanks (e.g. oil leakage)	B63B 25/082
– Arrangements for minimizing pollution by accidents associated with tanks for fuel or the like not forming bunkers	B63B 17/0036
– Arrangement of ship-based loading or unloading equipment for transfer at sea between ships or between ships and off-shore structures using pipe-lines	B63B 27/34
– Vessels or like floating structures adapted for collecting pollution from open water	B63B 35/32
– Materials for absorbing liquids to remove pollution, e.g. oil, gasoline, fat	C09K 3/32
– Collecting oil or the like from a submerged leakage	E21B 43/0122
– Devices for cleaning or keeping clear the surface of open water from oil or like floating materials by separating or removing these materials	E02B 15/04-108
– Water pollution control technologies for keeping clear the surface of open water from oil spills	Y02A 20/204
10.3. CLIMATE CHANGE MITIGATION IN MARITIME TRANSPORT	
10.3.1 Improved vessel design	
– Measures concerning design or construction of watercraft hulls	Y02T 70/10
10.3.2 Fuel-efficient propulsion or fuel substitution	
Measures to reduce GHG emissions related to the propulsion system	Y02T 70/50-5236
– Less carbon-intensive fuels, e.g. natural gas, biofuels	
– Renewable or hybrid-electric solutions	
10.4. CLIMATE CHANGE MITIGATION & ADAPTATION IN FISHING, AQUACULTURE AND AQUAFARMING	
– CC mitigation technologies in fishing, aquaculture and aquafarming	Y02P 60/60
CC adaptation technologies in fisheries management	Y02A 40/80-818
– Aquaculture, e.g. of fish	
– Alternative feeds for fish, e.g. in aquacultures	
10.5. DESALINATION OF SEA WATER	
Water desalination technologies	
– Reverse-osmosis	Y02A 20/124-144
– Powered by a renewable energy source (e.g., wind power, solar thermal or photovoltaics, wave energy)	
– Desalination	C02F 1/265
10.6. CLIMATE CHANGE ADAPTATION IN COASTAL ZONES	
Technologies for adaptation to climate change at coastal zones or river basins	Y02A 10/00-40
– Hard structures, e.g. dams, dykes or breakwaters	
– Dune restoration or creation; Cliff stabilisation	
– Artificial reefs or seaweed; Restoration or protection of coral reefs	
– Flood prevention; Flood or storm water management, e.g. using flood barriers	

– Controlling or monitoring, e.g. of flood or hurricane; Forecasting, e.g. risk assessment or mapping	
Coastal water resources	Y02A 20/404
– Saltwater intrusion barriers	
Coastal infrastructure	
– Extreme weather resilient electric power supply systems, e.g. strengthening power lines or underground power cables	Y02A 30/14