

# CPC COOPERATIVE PATENT CLASSIFICATION

## Y GENERAL TAGGING OF NEW TECHNOLOGICAL DEVELOPMENTS; GENERAL TAGGING OF CROSS-SECTIONAL TECHNOLOGIES SPANNING OVER SEVERAL SECTIONS OF THE IPC; TECHNICAL SUBJECTS COVERED BY FORMER USPC CROSS-REFERENCE ART COLLECTIONS [XRACs] AND DIGESTS

(NOTES omitted)

## Y02 TECHNOLOGIES OR APPLICATIONS FOR MITIGATION OR ADAPTATION AGAINST CLIMATE CHANGE

(NOTES omitted)

## Y02P CLIMATE CHANGE MITIGATION TECHNOLOGIES IN THE PRODUCTION OR PROCESSING OF GOODS

### NOTE

This subclass covers climate change mitigation technologies in any kind of industrial processing or production activity, including the agroalimentary industry, agriculture, fishing, ranching and the like.

<b>10/00</b>	<b>Technologies related to metal processing</b>	10/259	. . . . in electric arc furnaces
10/10	. Reduction of greenhouse gas [GHG] emissions	10/262	. . . . in electrolytic cells
10/12	. . CO <sub>2</sub>	10/265	. . . by heat recovery
10/122	. . . by capturing CO <sub>2</sub>	10/268	. . . . with by-product gas in energy cycle
10/124	. . . . Recycling of CO <sub>2</sub> -rich gas	10/271	. . . . . low temperature heat recovery
10/126	. . . . Recycling of CO <sub>2</sub> -lean gas	10/274	. . . . . medium temperature heat recovery
10/128	. . . . Oxycombustion	10/277	. . . . . high temperature heat recovery
10/13	. . . . Post-combustion	10/28	. . . . using by-product gases
10/132	. . . . CO <sub>2</sub> storage	10/283	. . . . using water, e.g. for cooling
10/134	. . . by CO <sub>2</sub> avoidance	10/286	. . . by process control or by modelling
10/136	. . . . using hydrogen, e.g. H <sub>2</sub>	10/29	. . . Additive manufacturing
10/138	. . . . Electrolysis	10/292	. . . . of casting moulds
10/14	. . Greenhouse gases [GHG] other than CO <sub>2</sub>	10/295	. . . . of metals
10/143	. . . Methane [CH <sub>4</sub> ]	10/30	. . characterised by the energy source
10/146	. . . Perfluorocarbons [PFC]; Hydrofluorocarbons [HFC]; Sulfur hexafluoride [SF <sub>6</sub> ]	10/32	. . . the energy source being renewable
		10/34	. . . Cogeneration with other industries
10/20	. Process efficiency	<b>20/00</b>	<b>Technologies relating to chemical industry</b>
10/21	. . by recovering materials	20/10	. General improvement of production processes causing greenhouse gases [GHG] emissions
10/212	. . . Recovering metals from waste	20/12	. . Energy input
10/214	. . . . by pyro metallurgy	20/121	. . . Energy efficiency measures, e.g. energy management
10/216	. . . . . of Fe	20/122	. . . . characterised by the type of apparatus
10/218	. . . . . of Al	20/123	. . . . . Motor systems
10/22	. . . . . of Cu	20/124	. . . . . Boilers, furnaces, lighting or vacuum systems
10/224	. . . . . of Co or Ni	20/125	. . . . Process integration
10/226	. . . . . of Mg	20/126	. . . . Membrane separation
10/228	. . . . . of Sn	20/127	. . . . Reactive distillation
10/23	. . . . . of refractory metals	20/128	. . . Alternative fuel sources, e.g. for process heat or steam
10/232	. . . . . of Zn or ZnO	20/129	. . . Energy recovery
10/234	. . . . by hydro metallurgy	20/13	. . . . Cogeneration
10/236	. . . . . of Cu	20/131	. . . . Pressure recovery turbines
10/238	. . . . by means other than pyro metallurgy or hydro metallurgy	20/132	. . . . H <sub>2</sub> recovery
10/24	. . . . . powder metallurgy	20/133	. . . Renewable energy sources
10/242	. . . Slag reuse in metallurgical processes	20/134	. . . . Sunlight
10/25	. . by increasing the energy efficiency of the process	20/135	. . . . . Photoelectrochemical processes
10/253	. . . using induction furnaces		
10/256	. . . Design or operational measures for increasing the efficiency of electric conversion		

20/136	. . . . of biological origin, e.g. biomass, biofuels, biogas	20/59	. . Biological synthesis; Biological purification
20/14	. . Reagents; Educts; Products	<b>30/00</b>	<b>Technologies relating to oil refining and petrochemical industry</b>
20/141	. . . Feedstock	30/10	. Reduction of greenhouse gas [GHG] emissions during production processes
20/142	. . . . the feedstock being CO <sub>2</sub>	30/20	. Bio-feedstock
20/143	. . . . the feedstock being recycled plastics	30/30	. Carbon capture or storage [CCS] specific to hydrogen production
20/144	. . . . . to generate syngas, i.e. H <sub>2</sub> + CO	30/40	. Ethylene production
20/145	. . . . the feedstock being materials of biological origin	30/42	. . using bio-feedstock
20/146	. . . Changing the product type or product distribution	30/44	. . Cracking, e.g. steam cracking
20/147	. . . Using materials efficiently	30/442	. . . Furnace or cracking tube materials, e.g. chemical composition of the tubes; Controlling or regulating the tube furnaces
20/148	. . . . Recycling	30/444	. . . Cogeneration using furnace exhaust
20/149	. . . . Reduced process losses	30/446	. . . Catalytic cracking
20/15	. . . . Reduced transportation losses	30/46	. . Separation
20/151	. . . Reduction of greenhouse gas [GHG] emissions	30/462	. . . using low temperature distillation
20/152	. . . . CO <sub>2</sub>	30/464	. . . using absorption or adsorption techniques
20/153	. . . . N <sub>2</sub> O	30/48	. . Compression
20/154	. . . . Halogenated hydrocarbons	<b>40/00</b>	<b>Technologies relating to the processing of minerals</b>
20/155	. . . . . Perfluorocarbons [PFC]; Hydrofluorocarbons [HFC]; Hydrochlorofluorocarbons [HCFC]; Chlorofluorocarbons [CFC]	40/10	. Production of cement
20/156	. . . . Methane [CH <sub>4</sub> ]	40/12	. . Clinker production
20/20	. Improvements relating to chlorine production	40/121	. . . Energy efficiency measures, e.g. improving or optimising the production methods
20/22	. . Optimization of Deacon process	40/123	. . . . Integrated production plants
20/224	. . . by process design	40/125	. . . Fuels from renewable energy sources
20/228	. . . by improving the materials, e.g. gauze composition or structure	40/126	. . . . Waste
20/30	. Improvements relating to adipic acid or caprolactam production	40/128	. . . . Biomass
20/32	. . Technologies aiming at reducing N <sub>2</sub> O emissions	40/14	. . Reduction of clinker content in cement
20/324	. . . by thermal destruction of N <sub>2</sub> O	40/141	. . . Blended cements
20/328	. . . by catalytic reduction of N <sub>2</sub> O	40/143	. . . . Clinker replacement by slag
20/40	. Improvements relating to chlorodifluoromethane [HCFC-22] production	40/145	. . . . Clinker replacement by combustion residues
20/42	. . Reducing fluoroform [HFC-23] emissions	40/146	. . . . Clinker replacement by ground limestone
20/424	. . . by capture and subsequent thermal oxidation	40/148	. . . Belite cements
20/50	. Improvements relating to the production of products other than chlorine, adipic acid, caprolactam, or chlorodifluoromethane, e.g. bulk or fine chemicals or pharmaceuticals	40/16	. . Non-limestone based cements, e.g. alkali-activated cements
20/51	. . Bulk chemicals	40/165	. . . Geopolymers
20/514	. . . Aldehydes; Alcohols	40/18	. . Carbon capture and storage [CCS]
20/518	. . . Hydrocyanation products, e.g. adipodinitrile	40/20	. Cement grinding
20/52	. . using catalysts, e.g. selective catalysts	40/30	. Manufacturing or processing of sand or stone
20/54	. . characterised by the solvent	40/40	. Production or processing of lime
20/542	. . . the solvent being an ionic liquid	40/42	. . Limestone calcination
20/544	. . . Supercritical solvents, e.g. supercritical H <sub>2</sub> O or CO <sub>2</sub>	40/44	. . Regeneration of lime in pulp and sugar mills
20/546	. . . Mixtures of ionic liquids and supercritical solvents	40/45	. . using fuels from renewable energy sources
20/55	. . Synthetic design, e.g. reducing the use of auxiliary or protecting groups	40/47	. . Reduction of lime consumption, e.g. in sugar industry
20/57	. . Efficient separation techniques	40/49	. . . Limestone grinding
20/572	. . . Membranes	40/50	. Glass production
20/58	. . Recycling	40/51	. . Producing or shaping of glass
20/582	. . . of unreacted starting or intermediate materials	40/52	. . Use of cullet or other waste
20/584	. . . of catalysts	40/53	. . Reusing waste heat during processing or shaping
20/586	. . . of reagents, e.g. co-catalysts, adjuvants	40/535	. . . Regenerative heating
20/588	. . . involving immobilised starting materials, reagents or catalysts	40/55	. . Oxy-fuel
		40/56	. . Batch or cullet pre-heating
		40/57	. . Reduction of reject rates; Improving the yield
		40/58	. . Fuels from renewable energy sources
		40/59	. . CO <sub>2</sub> capture, e.g. for large oxy-fuel furnaces
		40/60	. Production of ceramic materials or ceramic elements

40/61	. . Manufacturing of materials for construction, e.g. beams, bricks or tiles	60/62	. . Fishing equipment
40/615	. . . Bricks made from lime and sand	60/64	. . Aquaculture; Aquafarming
40/63	. . Improving processing, storage or transport systems	60/642	. . . combined with aquaponics or hydroponics
40/65	. . Improving kilns	60/70	. Apiculture
40/67	. . Fuels from renewable energy sources	60/80	. Food processing
40/69	. . Substitution of clay or shale by alternative raw materials, e.g. ashes	60/81	. . Use of renewable energies or variable speed drives in handling, conveying or stacking
<b>60/00</b>	<b>Technologies relating to agriculture, livestock or agroalimentary industries</b>	60/83	. . Warming or cooking
60/10	. Agricultural machinery or equipment	60/831	. . . using steam
60/12	. . using renewable energies	60/833	. . . using microwave ovens
60/122	. . . for irrigation, e.g. solar water pumping	60/835	. . . by boiling
60/124	. . . Collecting solar energy in greenhouses	. . Food storage or conservation	
60/14	. . Measures for saving energy	60/851	. . . Cooling, refrigeration or freezing
60/141	. . . in irrigation, i.e. motor control	60/853	. . . Drying
60/142	. . . Reduction of fuel consumption	60/855	. . . Ice production, e.g. for conservation purposes
60/144	. . . Combined machines, e.g. seeder combined with fertilizers	60/87	. . Re-use of by-products of food processing for fodder production
60/146	. . . in greenhouses	60/871	. . . from molasses
60/147	. . . Heating, ventilation or air conditioning	60/873	. . . from distillers' or brewers' waste
60/148	. . . Constructive measures, e.g. light structures or improved insulation	60/875	. . . from waste products of dairy plants
60/149	. . . . Efficient lighting, e.g. LED lighting	60/877	. . . from by-products of vegetal origin
60/15	. . . in preparing or milling grain	60/89	. . characterised by the product
60/16	. . Machines for direct seeding, i.e. sod or grassland seeding	60/891	. . . Dairy products
60/18	. . Activities not otherwise provided for, e.g. storage	<b>70/00</b>	<b>Climate change mitigation technologies in the production process for final industrial or consumer products</b>
60/20	. Reduction of greenhouse gas [GHG] emissions in agriculture	70/10	. Greenhouse gas [GHG] capture, material saving, heat recovery or other energy efficient measures, e.g. motor control, characterised by manufacturing processes
60/21	. . N <sub>2</sub> O	70/12	. . related technologies for improving processes or machines for shaping products
60/212	. . . Reducing the use of fertilizers	70/121	. . . Machines for rolling metal, e.g. rolling mills
60/214	. . . . Efficient applying machines	70/123	. . . . Motor control
60/215	. . . . Efficient spraying methods	70/125	. . . . Removing fumes from rolling mills
60/216	. . . . Aquaponics or hydroponics	70/127	. . . . using heat shields
60/218	. . . use of additives, e.g. nitrification inhibitors, biochar	70/129	. . . . Heat recovery during rolling
60/22	. . Reducing methane [CH <sub>4</sub> ] emissions from agricultural lands, e.g. from rice paddies	70/131	. . . . using liquid recovering devices
60/23	. . Reduction of CO <sub>2</sub> emissions from biota and soils	70/133	. . . . . for recovering coolants
60/24	. . Enhancing carbon sequestration in biota and soils	70/135	. . . . . for recovering lubricants
60/242	. . . Roof greening	70/137	. . . relating to forging, hammering, pressing or riveting
60/244	. . . Wall greening	70/139	. . . relating to the manufacture or working of metal sheets or profiles
60/246	. . . Use of plant growth regulators to improve carbon dioxide up-take by crop plants	70/141	. . . relating to pressing processes or machines therefore
60/247	. . . Plants with high carbon sequestration potential	70/143	. . . . Optimisation of energy consumption
60/25	. . Biomass with low greenhouse gas [GHG] emissions	70/145	. . . . . by control of drive motors
60/30	. Land use policy measures	70/16	. . related technologies for metal working by removing or adding material
60/40	. Afforestation or reforestation	70/161	. . . Power management, e.g. limiting power to tools
60/50	. Livestock or poultry management	70/163	. . . Power down for energy saving
60/52	. . use of renewable energies	70/167	. . . relating to the design or operation of machining centres or machine tools
60/521	. . . Solar lighting, e.g. for poultry	70/169	. . . . using minimal quantities of coolants or lubricants
60/524	. . . for pumping or supplying water to livestock	70/171	. . . . Devices or processes for removing and reusing chips
60/526	. . . for electric energy supply	70/173	. . . . Machine centres provided for turning, boring or milling
60/528	. . . . for electric livestock fences		
60/54	. . Environmental control in livestock or poultry housing		
60/542	. . . using renewable energy		
60/56	. . Methane [CH <sub>4</sub> ] capture		
60/60	. Fishing		

70/175	. . . relating to the design or operation of machines for dry cutting gears or toothed racks	70/58	. . Greenhouse gas [GHG] capture, heat recovery or other energy efficient measures relating to manufacturing or assembling of vehicles, e.g. motor control
70/177	. . . Grinding or polishing	70/585	. . . Aircraft Eco design, i.e. taking into account the full life cycle of the aircraft including re-use, recyclability and disposal
70/179	. . . . Treatment of used abrasive materials aiming at a further reuse	70/60	. . Greenhouse gas [GHG] capture, heat recovery or other energy efficient measures relating to production or assembly of electric or electronic components or products, e.g. motor control
70/181	. . . relating to the design or operation of machines for soldering, welding or cutting by applying heat locally	70/601	. . . the product being a basic electric component or element, i.e. cables, resistors, capacitors, switches, connectors, relays or protections
70/183	. . . relating to the design or operation of machines for machines for sawing, cutting, perforating, punching or severing	70/603	. . . the product being a lighting component
70/185	. . . relating to the operation of machines combining different processes for working of metal	70/605	. . . the product being a semiconductor or solid state device or parts thereof
70/187	. . . relating to the design or operation of machines for working metal not otherwise provided for	70/607	. . . . Manufacturing of electronic silicon based components
70/20	. . related technologies for printing, lining or stamping machines	70/609	. . . the product being a dynamo-electric machine, i.e. electrical generators or motors
70/22	. . Technologies for working on wood, veneer or plywood	70/611	. . . the product being a printed circuit board [PCB]
70/24	. . related technologies for saving energy and raw materials during the production of paper or paper articles	70/613	. . . involving the assembly of several electronic elements
70/26	. . related technologies for working on or processing of plastics	70/62	. . related technologies for production or treatment of textile or flexible materials or products thereof, including footwear
70/261	. . . recovering energy or power from drive motors in injection moulding	70/621	. . . Production or treatment of artificial filaments or the like
70/263	. . . recovering energy or reusing materials in extrusion moulding	70/623	. . . . Energy efficient measures, e.g. motor control or heat recovery
70/265	. . . relating to blow moulding	70/625	. . . . Recovery of starting material, waste material or solvents during the manufacturing process
70/267	. . . . Means for recycling or reusing auxiliaries or materials	70/627	. . . . . of cellulose, cellulose derivatives or proteins
70/269	. . . . reducing blowing fluid consumption	70/629	. . . . . of synthetic polymers
70/271	. . . . . by recycling blow fluid	70/631	. . . Production or treatment of lace, e.g. knitting or braiding
70/273	. . . . . recycling reactive gas	70/633	. . . . Saving materials
70/275	. . . . . reusing heat	70/635	. . . . Saving energy by reducing inertia of moving parts
70/277	. . . relating to thermoforming	70/637	. . . Treatment of textiles
70/279	. . . . Recycling or reuse of materials	70/639	. . . . Energy efficient measures, e.g. motor control or heat recovery
70/281	. . . . Reuse of pressure or vacuum	70/641	. . . . Recovery of solvents
70/30	. . related to technologies for conveying, packing or storing of goods or handling thin or filamentary material	70/643	. . . . Treatment of textiles using a short bath ratio
70/32	. . relating to mixing	70/645	. . . Manufacturing of wall or floor covering materials or the like
70/34	. . relating to separation, flotation or differential sedimentation	70/647	. . . . Energy efficient measures, e.g. motor control or heat recovery
70/36	. . Recycling or reuse of a liquid sprayed or atomised	70/649	. . . . using scraps or recycled materials
70/38	. . Apparatus or processes for applying liquids or other fluent materials	70/651	. . . . . the materials being particles
70/40	. . Drying by removing liquid	70/653	. . . Footwear made at least partially of recyclable material
70/405	. . . Drying with heating arrangements using waste heat	70/66	. . Greenhouse gas [GHG] capture, use of renewable energies, heat recovery or other energy efficient measures for manufacturing or preparation of tobacco products, e.g. motor control
70/50	. Manufacturing or production processes characterised by the final manufactured product	<b>80/00</b>	<b>Climate change mitigation technologies for sector-wide applications</b>
70/52	. . Manufacturing of products or systems for producing renewable energy	80/10	. Efficient use of energy
70/521	. . . Photovoltaic generators	80/11	. . of electric energy
70/523	. . . Wind turbines		
70/525	. . . Hydropower turbines		
70/527	. . . . for tidal streams or dam-less hydropower, e.g. sea flood and ebb or stream current		
70/54	. . Manufacturing of lithium-ion, lead-acid or alkaline secondary batteries		
70/56	. . Manufacturing of fuel cells		

80/112	. . . Power supplies with power electronics for efficient use of energy, e.g. power factor correction [PFC] or resonant converters	90/30	. Computing systems specially adapted for manufacturing
80/114	. . . Control systems or methods for efficient use of energy	90/40	. Fuel cell technologies in production processes
80/116	. . . . Electronic drive motor controls	90/45	. Hydrogen technologies in production processes
80/12	. . using compressed air as energy carrier, e.g. for pneumatic systems	90/50	. Energy storage in industry with an added climate change mitigation effect
80/13	. . using pressurized fluid as energy carrier, e.g. for hydraulic systems	90/60	. Electric or hybrid propulsion means for production processes
80/14	. . District level solutions, i.e. local energy networks	90/70	. Combining sequestration of CO <sub>2</sub> and exploitation of hydrocarbons by injecting CO <sub>2</sub> or carbonated water in oil wells
80/15	. . On-site combined power, heat or cool generation or distribution, e.g. combined heat and power [CHP] supply	90/80	. Management or planning
80/152	. . . for heat recovery	90/82	. . Energy audits or management systems therefor
80/154	. . . for steam generation or distribution	90/84	. . Greenhouse gas [GHG] management systems
80/156	. . in fluid distribution systems	90/845	. . . Inventory and reporting systems for greenhouse gases [GHG]
80/158	. . . Solar or wind-powered water pumping not specially adapted for irrigation	90/86	. . Maintenance planning
80/20	. Sector-wide applications using renewable energy	90/90	. Financial instruments for climate change mitigation, e.g. environmental taxes, subsidies or financing
80/21	. . Biomass as fuel	90/95	. . CO <sub>2</sub> emission certificates or credits trading
80/22	. . Wind energy		
80/23	. . Solar energy		
80/24	. . . Solar thermal energy		
80/25	. . . Photovoltaic energy		
80/30	. Reducing waste in manufacturing processes; Calculations of released waste quantities		
80/40	. Minimising material used in manufacturing processes		
<b>90/00</b>	<b>Enabling technologies with a potential contribution to greenhouse gas [GHG] emissions mitigation</b>		
90/02	. Total factory control, e.g. smart factories, flexible manufacturing systems [FMS] or integrated manufacturing systems [IMS]		
90/04	. . characterised by the assembly processes		
90/06	. . characterised by direct numerical control [DNC]		
90/08	. . characterised by the cooperation between machine tools, manipulators or work piece supply systems		
90/083	. . . Manipulators cooperating with conveyors		
90/087	. . . Manipulators cooperating with machine tools		
90/10	. . characterised by identification, e.g. of work pieces or equipment		
90/12	. . characterised by programme execution		
90/14	. . characterised by fault tolerance, reliability of production system		
90/16	. . characterised by system universality, i.e. configurability or modularity of production units		
90/18	. . characterised by the network communication		
90/185	. . . using local area networks [LAN]		
90/20	. . characterised by job scheduling, process planning or material flow		
90/205	. . . Tool management		
90/22	. . characterised by quality surveillance of production		
90/24	. . characterised by computer integrated manufacturing [CIM], planning or realisation		
90/26	. . characterised by modelling or simulation of the manufacturing system		
90/265	. . . Product design therefor		
90/28	. . characterised by transport systems		
90/285	. . . using automatic guided vehicles [AGV]		