

# CPC COOPERATIVE PATENT CLASSIFICATION

## 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.

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| <b>10/00</b> | <b>Technologies related to metal processing</b>  | 10/295       | . . . . of metals  |
| 10/10        | . Reduction of greenhouse gas [GHG] emissions  | 10/30        | . . characterised by the energy source   |
| 10/12        | . . CO <sub>2</sub>  | 10/32        | . . . the energy source being renewable  |
| 10/122       | . . . by capturing CO <sub>2</sub>   | 10/34        | . . . Cogeneration with other industries   |
| 10/124       | . . . . Recycling of CO <sub>2</sub> -rich gas   | <b>20/00</b> | <b>Technologies relating to chemical industry</b>  |
| 10/126       | . . . . Recycling of CO <sub>2</sub> -lean gas   | 20/10        | . General improvement of production processes causing greenhouse gases [GHG] emissions                                 |
| 10/128       | . . . . Oxycombustion  | 20/12        | . . Energy input   |
| 10/13        | . . . . Post-combustion  | 20/121       | . . . Energy efficiency measures, e.g. energy management   |
| 10/132       | . . . . CO <sub>2</sub> storage  | 20/122       | . . . . characterised by the type of apparatus   |
| 10/134       | . . . by CO <sub>2</sub> avoidance   | 20/123       | . . . . . Motor systems  |
| 10/136       | . . . . using hydrogen, e.g. H <sub>2</sub>  | 20/124       | . . . . . Boilers, furnaces, lighting or vacuum systems  |
| 10/138       | . . . . Electrolysis   | 20/125       | . . . . . Process integration  |
| 10/14        | . . Greenhouse gases [GHG] other than CO <sub>2</sub>  | 20/126       | . . . . . Membrane separation  |
| 10/143       | . . . Methane [CH <sub>4</sub> ]   | 20/127       | . . . . . Reactive distillation  |
| 10/146       | . . . Perfluorocarbons [PFC]; Hydrofluorocarbons [HFC]; Sulfur hexafluoride [SF <sub>6</sub> ] | 20/128       | . . . Alternative fuel sources, e.g. for process heat or steam   |
| 10/20        | . Process efficiency   | 20/129       | . . . Energy recovery  |
| 10/21        | . . by recovering materials  | 20/13        | . . . . Cogeneration   |
| 10/212       | . . . Recovering metals from waste   | 20/131       | . . . . Pressure recovery turbines   |
| 10/214       | . . . . by pyro metallurgy   | 20/132       | . . . . H <sub>2</sub> recovery  |
| 10/216       | . . . . . of Fe  | 20/133       | . . . Renewable energy sources   |
| 10/218       | . . . . . of Al  | 20/134       | . . . . Sunlight   |
| 10/22        | . . . . . of Cu  | 20/135       | . . . . . Photoelectrochemical processes   |
| 10/224       | . . . . . of Co or Ni  | 20/136       | . . . . of biological origin, e.g. biomass, biofuels, biogas   |
| 10/226       | . . . . . of Mg  | 20/14        | . . Reagents; Educts; Products   |
| 10/228       | . . . . . of Sn  | 20/141       | . . . Feedstock  |
| 10/23        | . . . . . of refractory metals   | 20/142       | . . . . the feedstock being CO <sub>2</sub>  |
| 10/232       | . . . . . of Zn or ZnO   | 20/143       | . . . . the feedstock being recycled plastics  |
| 10/234       | . . . . by hydro metallurgy  | 20/144       | . . . . . to generate syngas, i.e. H <sub>2</sub> + CO   |
| 10/236       | . . . . . of Cu  | 20/145       | . . . . the feedstock being materials of biological origin   |
| 10/238       | . . . . by means other than pyro metallurgy or hydro metallurgy                                | 20/146       | . . . Changing the product type or product distribution  |
| 10/24        | . . . . . powder metallurgy  | 20/147       | . . . Using materials efficiently  |
| 10/242       | . . . Slag reuse in metallurgical processes  | 20/148       | . . . . Recycling  |
| 10/25        | . . by increasing the energy efficiency of the process   | 20/149       | . . . . Reduced process losses   |
| 10/253       | . . . using induction furnaces   | 20/15        | . . . . Reduced transportation losses  |
| 10/256       | . . . Design or operational measures for increasing the efficiency of electric conversion      | 20/151       | . . . Reduction of greenhouse gas [GHG] emissions  |
| 10/259       | . . . . in electric arc furnaces   | 20/152       | . . . . CO <sub>2</sub>  |
| 10/262       | . . . . in electrolytic cells  | 20/153       | . . . . N <sub>2</sub> O   |
| 10/265       | . . . by heat recovery   | 20/154       | . . . . Halogenated hydrocarbons   |
| 10/268       | . . . . with by-product gas in energy cycle  | 20/155       | . . . . . Perfluorocarbons [PFC]; Hydrofluorocarbons [HFC]; Hydrochlorofluorocarbons [HCFC]; Chlorofluorocarbons [CFC] |
| 10/271       | . . . . . low temperature heat recovery  | 20/156       | . . . . . Methane [CH <sub>4</sub> ]   |
| 10/274       | . . . . . medium temperature heat recovery   |              |  |
| 10/277       | . . . . . high temperature heat recovery   |              |  |
| 10/28        | . . . . using by-product gases   |              |  |
| 10/283       | . . . . using water, e.g. for cooling  |              |  |
| 10/286       | . . . by process control or by modelling   |              |  |
| 10/29        | . . . Additive manufacturing   |              |  |
| 10/292       | . . . . of casting moulds  |              |  |

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| 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  |
| 20/59        | . . Biological synthesis; Biological purification   | 40/56        | . . Batch or cullet pre-heating   |
| <b>30/00</b> | <b>Technologies relating to oil refining and petrochemical industry</b>   | 40/57        | . . Reduction of reject rates; Improving the yield                                    |
| 30/10        | . Reduction of greenhouse gas [GHG] emissions during production processes   | 40/58        | . . Fuels from renewable energy sources   |
| 30/20        | . Bio-feedstock   | 40/59        | . . CO <sub>2</sub> capture, e.g. for large oxy-fuel furnaces                         |
| 30/30        | . Carbon capture or storage [CCS] specific to hydrogen production   | 40/60        | . Production of ceramic materials or ceramic elements                                 |
| 30/40        | . Ethylene production   | 40/61        | . . Manufacturing of materials for construction, e.g. beams, bricks or tiles          |
| 30/42        | . . using bio-feedstock   | 40/615       | . . . Bricks made from lime and sand  |
| 30/44        | . . Cracking, e.g. steam cracking   | 40/63        | . . Improving processing, storage or transport systems                                |
| 30/442       | . . . Furnace or cracking tube materials, e.g. chemical composition of the tubes; Controlling or regulating the tube furnaces   | 40/65        | . . Improving kilns   |
| 30/444       | . . . Cogeneration using furnace exhaust  | 40/67        | . . Fuels from renewable energy sources   |
| 30/446       | . . . Catalytic cracking  | 40/69        | . . Substitution of clay or shale by alternative raw materials, e.g. ashes            |
| 30/46        | . . Separation  | <b>60/00</b> | <b>Technologies relating to agriculture, livestock or agroalimentary industries</b>   |
| 30/462       | . . . using low temperature distillation  | 60/10        | . Agricultural machinery or equipment   |
| 30/464       | . . . using absorption or adsorption techniques   | 60/12        | . . using renewable energies  |
| 30/48        | . . Compression   | 60/122       | . . . for irrigation, e.g. solar water pumping  |
| <b>40/00</b> | <b>Technologies relating to the processing of minerals</b>  | 60/124       | . . . Collecting solar energy in greenhouses  |
| 40/10        | . Production of cement  | 60/14        | . . Measures for saving energy  |
| 40/12        | . . Clinker production  | 60/141       | . . . in irrigation, i.e. motor control   |
|              |   | 60/142       | . . . Reduction of fuel consumption   |
|              |   | 60/144       | . . . Combined machines, e.g. seeder combined with fertilizers                        |
|              |   | 60/146       | . . . in greenhouses  |
|              |   | 60/147       | . . . . Heating, ventilation or air conditioning                                      |
|              |   | 60/148       | . . . . Constructive measures, e.g. light structures or improved insulation           |
|              |   | 60/149       | . . . . Efficient lighting, e.g. LED lighting   |

- 60/15 . . . in preparing or milling grain
- 60/16 . . Machines for direct seeding, i.e. sod or grassland seeding
- 60/18 . . Activities not otherwise provided for, e.g. storage
- 60/20 . Reduction of greenhouse gas [GHG] emissions in agriculture
- 60/21 . . N<sub>2</sub>O
- 60/212 . . . Reducing the use of fertilizers
- 60/214 . . . . Efficient applying machines
- 60/215 . . . . Efficient spraying methods
- 60/216 . . . . Aquaponics or hydroponics
- 60/218 . . . use of additives, e.g. nitrification inhibitors, biochar
- 60/22 . . Reducing methane [CH<sub>4</sub>] emissions from agricultural lands, e.g. from rice paddies
- 60/23 . . Reduction of CO<sub>2</sub> emissions from biota and soils
- 60/24 . . Enhancing carbon sequestration in biota and soils
- 60/242 . . . Roof greening
- 60/244 . . . Wall greening
- 60/246 . . . Use of plant growth regulators to improve carbon dioxide up-take by crop plants
- 60/247 . . . Plants with high carbon sequestration potential
- 60/25 . . Biomass with low greenhouse gas [GHG] emissions
- 60/30 . Land use policy measures
- 60/40 . Afforestation or reforestation
- 60/50 . Livestock or poultry management
- 60/52 . . use of renewable energies
- 60/521 . . . Solar lighting, e.g. for poultry
- 60/524 . . . for pumping or supplying water to livestock
- 60/526 . . . for electric energy supply
- 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
- 60/62 . . Fishing equipment
- 60/64 . . Aquaculture; Aquafarming
- 60/642 . . . combined with aquaponics or hydroponics
- 60/70 . Apiculture
- 60/80 . Food processing
- 60/81 . . Use of renewable energies or variable speed drives in handling, conveying or stacking
- 60/83 . . Warming or cooking
- 60/831 . . . using steam
- 60/833 . . . using microwave ovens
- 60/835 . . . by boiling
- 60/85 . . Food storage or conservation
- 60/851 . . . Cooling, refrigeration or freezing
- 60/853 . . . Drying
- 60/855 . . . Ice production, e.g. for conservation purposes
- 60/87 . . Re-use of by-products of food processing for fodder production
- 60/871 . . . from molasses
- 60/873 . . . from distillers' or brewers' waste
- 60/875 . . . from waste products of dairy plants
- 60/877 . . . from by-products of vegetal origin
- 60/89 . . characterised by the product
- 60/891 . . . Dairy products

**70/00****Climate change mitigation technologies in the production process for final industrial or consumer products**

- 70/10 . Greenhouse gas [GHG] capture, material saving, heat recovery or other energy efficient measures, e.g. motor control, characterised by manufacturing processes
- 70/12 . . related technologies for improving processes or machines for shaping products
- 70/121 . . . Machines for rolling metal, e.g. rolling mills
- 70/123 . . . . Motor control
- 70/125 . . . . Removing fumes from rolling mills
- 70/127 . . . . using heat shields
- 70/129 . . . . Heat recovery during rolling
- 70/131 . . . . using liquid recovering devices
- 70/133 . . . . . for recovering coolants
- 70/135 . . . . . for recovering lubricants
- 70/137 . . . relating to forging, hammering, pressing or riveting
- 70/139 . . . relating to the manufacture or working of metal sheets or profiles
- 70/141 . . . relating to pressing processes or machines therefore
- 70/143 . . . . Optimisation of energy consumption
- 70/145 . . . . . by control of drive motors
- 70/16 . . related technologies for metal working by removing or adding material
- 70/161 . . . Power management, e.g. limiting power to tools
- 70/163 . . . Power down for energy saving
- 70/167 . . . relating to the design or operation of machining centres or machine tools
- 70/169 . . . . using minimal quantities of coolants or lubricants
- 70/171 . . . . Devices or processes for removing and reusing chips
- 70/173 . . . . Machine centres provided for turning, boring or milling
- 70/175 . . . relating to the design or operation of machines for dry cutting gears or toothed racks
- 70/177 . . . Grinding or polishing
- 70/179 . . . . Treatment of used abrasive materials aiming at a further reuse
- 70/181 . . . relating to the design or operation of machines for soldering, welding or cutting by applying heat locally
- 70/183 . . . relating to the design or operation of machines for machines for sawing, cutting, perforating, punching or severing
- 70/185 . . . relating to the operation of machines combining different processes for working of metal
- 70/187 . . . relating to the design or operation of machines for working metal not otherwise provided for
- 70/20 . . related technologies for printing, lining or stamping machines
- 70/22 . . Technologies for working on wood, veneer or plywood
- 70/24 . . related technologies for saving energy and raw materials during the production of paper or paper articles
- 70/26 . . related technologies for working on or processing of plastics

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| 70/261 | . . . recovering energy or power from drive motors in injection moulding   | 70/62        | . . related technologies for production or treatment of textile or flexible materials or products thereof, including footwear  |
| 70/263 | . . . recovering energy or reusing materials in extrusion moulding   | 70/621       | . . . Production or treatment of artificial filaments or the like  |
| 70/265 | . . . relating to blow moulding  | 70/623       | . . . . Energy efficient measures, e.g. motor control or heat recovery   |
| 70/267 | . . . . Means for recycling or reusing auxiliaries or materials  | 70/625       | . . . . Recovery of starting material, waste material or solvents during the manufacturing process   |
| 70/269 | . . . . reducing blowing fluid consumption   | 70/627       | . . . . . of cellulose, cellulose derivatives or proteins  |
| 70/271 | . . . . . by recycling blow fluid  | 70/629       | . . . . . of synthetic polymers  |
| 70/273 | . . . . recycling reactive gas   | 70/631       | . . . Production or treatment of lace, e.g. knitting or braiding   |
| 70/275 | . . . . reusing heat   | 70/633       | . . . . Saving materials   |
| 70/277 | . . . relating to thermoforming  | 70/635       | . . . . Saving energy by reducing inertia of moving parts  |
| 70/279 | . . . . Recycling or reuse of materials  | 70/637       | . . . Treatment of textiles  |
| 70/281 | . . . . Reuse of pressure or vacuum  | 70/639       | . . . . Energy efficient measures, e.g. motor control or heat recovery   |
| 70/30  | . . related to technologies for conveying, packing or storing of goods or handling thin or filamentary material  | 70/641       | . . . . Recovery of solvents   |
| 70/32  | . . relating to mixing   | 70/643       | . . . . Treatment of textiles using a short bath ratio   |
| 70/34  | . . relating to separation, flotation or differential sedimentation  | 70/645       | . . . Manufacturing of wall or floor covering materials or the like  |
| 70/36  | . . Recycling or reuse of a liquid sprayed or atomised   | 70/647       | . . . . Energy efficient measures, e.g. motor control or heat recovery   |
| 70/38  | . . Apparatus or processes for applying liquids or other fluent materials  | 70/649       | . . . . using scraps or recycled materials   |
| 70/40  | . . Drying by removing liquid  | 70/651       | . . . . . the materials being particles  |
| 70/405 | . . . Drying with heating arrangements using waste heat  | 70/653       | . . . Footwear made at least partially of recyclable material  |
| 70/50  | . Manufacturing or production processes characterised by the final manufactured product  | 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 |
| 70/52  | . . Manufacturing of products or systems for producing renewable energy  | <b>80/00</b> | <b>Climate change mitigation technologies for sector-wide applications</b>   |
| 70/521 | . . . Photovoltaic generators  | 80/10        | . Efficient use of energy  |
| 70/523 | . . . Wind turbines  | 80/11        | . . of electric energy   |
| 70/525 | . . . Hydropower turbines  | 80/112       | . . . Power supplies with power electronics for efficient use of energy, e.g. power factor correction [PFC] or resonant converters   |
| 70/527 | . . . . for tidal streams or dam-less hydropower, e.g. sea flood and ebb or stream current   | 80/114       | . . . Control systems or methods for efficient use of energy   |
| 70/54  | . . Manufacturing of lithium-ion, lead-acid or alkaline secondary batteries  | 80/116       | . . . . Electronic drive motor controls  |
| 70/56  | . . Manufacturing of fuel cells  | 80/12        | . . using compressed air as energy carrier, e.g. for pneumatic systems   |
| 70/58  | . . Greenhouse gas [GHG] capture, heat recovery or other energy efficient measures relating to manufacturing or assembling of vehicles, e.g. motor control                                 | 80/13        | . . using pressurized fluid as energy carrier, e.g. for hydraulic systems  |
| 70/585 | . . . Aircraft Eco design, i.e. taking into account the full life cycle of the aircraft including re-use, recyclability and disposal   | 80/14        | . . District level solutions, i.e. local energy networks   |
| 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 | 80/15        | . . On-site combined power, heat or cool generation or distribution, e.g. combined heat and power [CHP] supply   |
| 70/601 | . . . the product being a basic electric component or element, i.e. cables, resistors, capacitors, switches, connectors, relays or protections   | 80/152       | . . . for heat recovery  |
| 70/603 | . . . the product being a lighting component   | 80/154       | . . . for steam generation or distribution   |
| 70/605 | . . . the product being a semiconductor or solid state device or parts thereof   | 80/156       | . . in fluid distribution systems  |
| 70/607 | . . . . Manufacturing of electronic silicon based components   | 80/158       | . . . Solar or wind-powered water pumping not specially adapted for irrigation   |
| 70/609 | . . . the product being a dynamo-electric machine, i.e. electrical generators or motors  | 80/20        | . Sector-wide applications using renewable energy  |
| 70/611 | . . . the product being a printed circuit board [PCB]  | 80/21        | . . Biomass as fuel  |
| 70/613 | . . . involving the assembly of several electronic elements  | 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
- 90/00 Enabling technologies with a potential contribution to greenhouse gas [GHG] emissions mitigation**
- 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]
- 90/30 . Computing systems specially adapted for manufacturing
- 90/40 . Fuel cell technologies in production processes
- 90/45 . Hydrogen technologies in production processes
- 90/50 . Energy storage in industry with an added climate change mitigation effect
- 90/60 . Electric or hybrid propulsion means for production processes
- 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
- 90/80 . Management or planning
- 90/82 . . Energy audits or management systems therefor
- 90/84 . . Greenhouse gas [GHG] management systems
- 90/845 . . . Inventory and reporting systems for greenhouse gases [GHG]
- 90/86 . . Maintenance planning
- 90/90 . Financial instruments for climate change mitigation, e.g. environmental taxes, subsidies or financing
- 90/95 . . CO<sub>2</sub> emission certificates or credits trading