

# CPC COOPERATIVE PATENT CLASSIFICATION

## Y02T CLIMATE CHANGE MITIGATION TECHNOLOGIES RELATED TO TRANSPORTATION

<b>10/00</b>	<b>Road transport of goods or passengers</b>	10/54	. . . relating to internal combustion engine emissions
10/10	. Internal combustion engine [ICE] based vehicles	10/56	. . . Optimising drivetrain operating point
10/12	. . Technologies for the improvement of indicated efficiency of a conventional ICE	10/60	. Other road transportation technologies with climate change mitigation effect ( <a href="#">not used, see subgroups</a> )
10/121	. . . Adding non fuel substances to fuel, air or fuel/air mixture	10/62	. . Hybrid vehicles
10/123	. . . Fuel injection	10/6204	. . . using ICE and mechanical energy storage, e.g. flywheel ( <a href="#">mechanical storage units for electromobility in general Y02T 10/7027</a> )
10/125	. . . Combustion chambers and charge mixing enhancing inside the combustion chamber	10/6208	. . . using ICE and fluidic energy storage, e.g. pressure accumulator
10/126	. . . Treating fuel, air or air/fuel mixture	10/6213	. . . using ICE and electric energy storage, i.e. battery, capacitor ( <a href="#">battery or capacitor technology for electromobility in general Y02T 10/7005, Y02T 10/7022</a> )
10/128	. . . Methods of operating, e.g. homogeneous charge compression ignition [HCCI], premixed charge compression ignition [PCCI]	10/6217	. . . . of the series type or range extenders
10/14	. . Technologies for the improvement of mechanical efficiency of a conventional ICE	10/6221	. . . . of the parallel type
10/142	. . . Methods of operating, e.g. Atkinson cycle, Ericsson	10/6226	. . . . . Motor-assist type
10/144	. . . Non naturally aspirated engines, e.g. turbocharging, supercharging	10/623	. . . . . of the series-parallel type
10/146	. . . Charge mixing enhancing and kinetic or wave energy of charge outside the combustion chamber, i.e. ICE with external or indirect fuel injection	10/6234	. . . . . Series-parallel switching type
10/148	. . . Downsizing or downspeeding	10/6239	. . . . . Differential gearing distribution type
10/16	. . Energy recuperation from low temperature heat sources of the ICE to produce additional power	10/6243	. . . . . Electrical distribution type
10/163	. . . Turbocompound engines	10/6247	. . . . . with motor integrated into gearbox
10/166	. . . Waste heat recovering cycles or thermoelectric systems	10/6252	. . . . . connected or connectable to input shaft of gearing
10/17	. . Non-reciprocating piston engines, e.g. rotating motors	10/6256	. . . . . connected or connectable to intermediate shaft of gearing
10/18	. . Varying inlet or exhaust valve operating characteristics	10/626	. . . . . Motor between output shaft of gearing and driven wheels
10/20	. . Exhaust after-treatment	10/6265	. . . . . Driving a plurality of axles
10/22	. . . Three way catalyst technology, i.e. oxidation or reduction at stoichiometric equivalence ratio	10/6269	. . . . . provided with means for plug-in
10/24	. . . Selective Catalytic Reactors for reduction in oxygen rich atmosphere	10/6273	. . . Combining different types of energy storage
10/26	. . . Thermal conditioning of exhaust after-treatment	10/6278	. . . . Battery and capacitor
10/30	. . Use of alternative fuels	10/6282	. . . . Battery and mechanical or fluidic energy storage
10/32	. . . Gaseous fuels	10/6286	. . . Control systems for power distribution between ICE and other motor or motors
10/34	. . . Non-gaseous fuels	10/6291	. . . . Predicting future driving conditions
10/36	. . . Multiple fuels, e.g. multi fuel engines	10/6295	. . . Other types of combustion engine
10/38	. . . Non-fossil fuels	10/64	. . Electric machine technologies for applications in electromobility
10/40	. . Engine management systems	10/641	. . . characterised by aspects of the electric machine
10/42	. . . controlling air supply	10/642	. . . Control strategies of electric machines for automotive applications
10/44	. . . controlling fuel supply	10/643	. . . . Vector control
10/46	. . . controlling ignition	10/644	. . . . Control strategies for ac machines other than vector control
10/47	. . . Exhaust feedback	10/645	. . . . Control strategies for dc machines
10/48	. . . Switching off the internal combustion engine, e.g. stop and go	10/646	. . . . Number of electric drive machines
10/50	. . Intelligent control systems, e.g. conjoint control	10/647	. . . . . One electric drive machine
10/52	. . . relating to internal combustion engine fuel consumption	10/648	. . . . . Two electric drive machines
		10/649	. . . . . More than two electric drive machines
		10/70	. . Energy storage for electromobility ( <a href="#">hydrogen internal combustion engines Y02T 90/42; fuel cell powered electric vehicles Y02T 90/34</a> )
		10/7005	. . . Batteries

10/7011	. . . . Lithium ion battery	30/12	. . In electric locomotives or motor railcars with electric accumulators, e.g. involving regenerative braking
10/7016	. . . . Lead acid battery		
10/7022	. . . Capacitors, supercapacitors or ultracapacitors	30/14	. . In locomotives or motor railcars with pneumatic accumulators
10/7027	. . . Mechanical energy storage devices	30/16	. . In locomotives or motor railcars with two or different kinds or types of engine
10/7033	. . . . Fly wheels	30/18	. . Specific power storing devices
10/7038	. . . Energy storage management	30/30	. Other technological aspects of railway vehicles
10/7044	. . . . Controlling the battery or capacitor state of charge	30/32	. . Reducing air resistance by modifying contour
10/705	. . . . Controlling vehicles with one battery or one capacitor only	30/34	. . Composite; Lightweight materials
10/7055	. . . . Controlling vehicles with more than one battery or more than one capacitor	30/36	. . Device for using the energy of the movements of the vehicle
10/7061	. . . . . the batteries or capacitors being of the same voltage	30/38	. . Bogie frames comprising parts made from fiber-reinforced matrix material
10/7066	. . . . . the batteries or capacitors being of a different voltage	30/40	. . Applications of solar cells or heat pipes, e.g. on ski-lift cabins or carriages for passengers or goods
10/7072	. . . Electromobility specific charging systems or methods for batteries, ultracapacitors, supercapacitors or double-layer capacitors ( <a href="#">efficient charging systems for batteries, ultracapacitors, supercapacitors or double-layer capacitors in road transportation in general Y02T 10/92</a> )	30/42	. . concerning heating, ventilating or air conditioning
10/7077	. . . . on board the vehicle	<b>50/00</b>	<b>Aeronautics or air transport</b>
10/7083	. . . . . with the energy being of renewable origin	50/10	. Drag reduction
10/7088	. . . . Charging stations	50/12	. . Overall configuration, shape or profile of fuselage or wings
10/7094	. . . . . with the energy being of renewable origin	50/14	. . Adaptive structures
10/72	. . Electric energy management in electromobility	50/145	. . . Morphing wings or smart wings
10/7208	. . . Electric power conversion within the vehicle	50/16	. . by influencing airflow
10/7216	. . . . DC to DC power conversion	50/162	. . . Wing tip vortex reduction
10/7225	. . . . . Using step - up or boost converters	50/164	. . . . Winglets
10/7233	. . . . . Using step - down or buck converters	50/166	. . . by influencing the boundary layer
10/7241	. . . . DC to AC or AC to DC power conversion	50/168	. . . . actively
10/725	. . . . AC to AC power conversion	50/30	. Wing lift efficiency
10/7258	. . . Optimisation of vehicle performance	50/32	. . Optimised high lift wing systems
10/7266	. . . . Automated control	50/34	. . Helicopter rotor blades lift efficiency
10/7275	. . . . Desired performance achievement	50/40	. Weight reduction
10/7283	. . . . Optimisation of energy management	50/42	. . Airframe
10/7291	. . . . Route optimisation	50/43	. . . Materials
10/76	. . Transmission of mechanical power	50/433	. . . . Composites
10/80	. Technologies aiming to reduce green house gasses emissions common to all road transportation technologies	50/436	. . . . Metallic lightweight
10/82	. . Tools or systems for aerodynamic design	50/44	. . . Design measures
10/84	. . Data processing systems or methods, management, administration	50/46	. . Interior
10/86	. . Optimisation of rolling resistance	50/47	. . . Materials
10/862	. . . Tyres, e.g. materials, shape	50/48	. . . Design measures
10/865	. . . Bearings	50/50	. On board measures aiming to increase energy efficiency
10/867	. . . Others, e.g. wheel construction	50/52	. . concerning the electrical systems
10/88	. . Optimized components or subsystems, e.g. lighting, actively controlled glasses	50/53	. . . Energy recovery, conversion or storage systems
10/90	. . Energy harvesting concepts as power supply for auxiliaries' energy consumption, e.g. photovoltaic sun-roof	50/54	. . . Electric actuators or motors
10/92	. . Energy efficient charging or discharging systems for batteries, ultracapacitors, supercapacitors or double-layer capacitors specially adapted for vehicles	50/545	. . . . All electric architecture
<b>30/00</b>	<b>Transportation of goods or passengers via railways</b>	50/56	. . Thermal management
30/10	. Energy recovery technologies concerning the propulsion system in locomotives or motor railcars	50/57	. . . Reduction of energy losses
		50/58	. . . Optimization of hot and cold sources on board an aircraft
		50/60	. Efficient propulsion technologies
		50/62	. . Electrical
		50/64	. . Hybrid
		50/66	. . Propellers
		50/67	. . Relevant aircraft propulsion technologies
		50/671	. . . Measures to reduce the propulsor weight
		50/672	. . . . using composites
		50/673	. . . Improving the rotor blades aerodynamic
		50/675	. . . Enabling an increased combustion temperature by cooling
		50/676	. . . . Blades cooling

50/677	. . . Controlling the propulsor to control the emissions	70/70	. Technologies for a more efficient operation of the waterborne vessel not otherwise provided for
50/678	. . . using fuels of non-fossil origin	70/72	. . Related to heating, ventilation, air conditioning, or refrigeration systems
50/69	. . Solar cells as on board power source	70/74	. . Integrating maritime voyage control
50/70	. Enabling use of sustainable fuels	70/742	. . . Speed reduction
50/72	. . Synthetic fuels	70/745	. . . Weather routing
50/74	. . Bio fuels	70/747	. . . Course optimization
50/80	. Energy efficient operational measures	70/80	. Measures concerning recycling, retrofitting or dismantling of waterborne vessels
50/82	. . Related to ground operations	70/90	. Port equipment or systems reducing GHG emissions
50/823	. . . Aircraft equipment, e.g. wheel embedded		
50/826	. . . Ground equipment		
50/84	. . Related to management of trajectory and mission		
<b>70/00</b>	<b>Maritime or waterways transport</b>	<b>90/00</b>	<b>Enabling technologies or technologies with a potential or indirect contribution to GHG emissions mitigation</b>
70/10	. Measures concerning design or construction of watercraft hulls	90/10	. Technologies related to electric vehicle charging (not used, see subgroups)
70/12	. . Improving hydrodynamics of hull	90/12	. . Electric charging stations
70/121	. . . Reducing surface friction	90/121	. . . by conductive energy transmission
70/122	. . . . Air lubrication, air cavity systems	90/122	. . . by inductive energy transmission
70/123	. . . . Hull coatings, e.g. biomimicry	90/124	. . . by exchange of energy storage elements
70/125	. . . Lower wave resistance	90/125	. . . Alignment between the vehicle and the charging station
70/126	. . . . Bow shape	90/127	. . . Converters or inverters for charging
70/127	. . . improving wake pattern	90/128	. . . Energy exchange control or determination
70/128	. . . . reducing the interaction between hull and propeller	90/14	. . Plug-in electric vehicles
70/14	. . Construction of hull	90/16	. . Information or communication technologies improving the operation of electric vehicles
70/143	. . . Materials, e.g. ultra light steels, composites	90/161	. . . Navigation
70/146	. . . Energy efficient measures related to fabrication or assembly of hull	90/162	. . . . Position determination
70/30	. Measures at the maintenance or repair stage specially aiming at green house gasses emissions reduction	90/163	. . . Information or communication technologies for charging station selection
70/32	. . Surface or tank cleaning and treatment operations	90/164	. . . . Charging station suitability
70/34	. . Improved operation of fossil fuel transfer, e.g. ship-to-ship oil or gas transfer	90/165	. . . . Charging station location
70/36	. . Handling waste	90/166	. . . . Charging station availability
70/50	. Measures to reduce greenhouse gas emissions related to the propulsion system	90/167	. . . Systems integrating technologies related to power network operation and communication or information technologies for supporting the interoperability of electric or hybrid vehicles, i.e. smartgrids as interface for battery charging of electric and hybrid vehicles (power aggregation of HEV or EV Y02E 60/721) (not used, see subgroups)
70/52	. . Propulsion power plant		<b>NOTE</b>
70/5209	. . . Relating to type of fuel		Documents tagged under Y02T 90/167 are concurrently tagged also under Y04S 30/10
70/5218	. . . . Less carbon-intensive fuels, e.g. natural gas, biofuels		
70/5227	. . . . Non-conventional fuels, e.g. nuclear		
70/5236	. . . Renewable or hybrid-electric solutions		
70/5245	. . . . using solar generated electricity, e.g. photovoltaics		
70/5254	. . . . using wind motor to generate electricity		
70/5263	. . . Other measures to increase efficiency of the power plant	90/168	. . . . Remote or cooperative charging operation
70/5272	. . . . Engine monitoring and control	90/169	. . . . Aspects supporting the interoperability of electric or hybrid vehicles, e.g. recognition, authentication, identification or billing
70/5281	. . . . Waste heat recovery		
70/529	. . . . Reducing auxiliary power	90/30	. Application of fuel cell technology to transportation (not used, see subgroups)
70/54	. . Propeller	90/32	. . Fuel cells specially adapted to transport applications, e.g. automobile, bus, ship
70/542	. . . Improved propeller design	90/34	. . Fuel cell powered electric vehicles [FCEV]
70/545	. . . Recovery of rotational energy	90/36	. . Fuel cells as on-board power source in aeronautics
70/547	. . . Wake equalizing arrangements	90/38	. . Fuel cells as on-board power source in waterborne transportation
70/56	. . Jets	90/40	. Application of hydrogen technology to transportation (Y02T 90/30 takes precedence) (not used, see subgroups)
70/58	. . Propulsion by direct use of wind	90/42	. . Hydrogen as fuel for road transportation
70/583	. . . Energy efficient technologies involving sails		
70/586	. . . Kites		
70/59	. . Other propulsion concepts for reducing greenhouse gas emissions, e.g. wave-powered		

## Y02T

- 90/44 . . Hydrogen as fuel in aeronautics
- 90/46 . . Hydrogen as fuel in waterborne transportation