

**CPC****COOPERATIVE PATENT CLASSIFICATION****Y04S****SYSTEMS INTEGRATING TECHNOLOGIES RELATED TO POWER NETWORK OPERATION, COMMUNICATION OR INFORMATION TECHNOLOGIES FOR IMPROVING THE ELECTRICAL POWER GENERATION, TRANSMISSION, DISTRIBUTION, MANAGEMENT OR USAGE, i.e. SMART GRIDS****Systems supporting electrical power generation, transmission or distribution****Y04S 10/00****Systems supporting electrical power generation, transmission or distribution**

## Y04S 10/10

- Systems characterised by the monitored, controlled or operated power network elements or equipment ([not used, see subgroups](#))

## Y04S 10/12

- the elements or equipments being or involving energy generation units, including distributed generation [DER] or load-side generation

## Y04S 10/123

- the energy generation units being or involving renewable energy sources

## Y04S 10/126

- the energy generation units being or involving electricity based vehicles, i.e. power aggregation of electric vehicles [EV] or hybrid vehicles [HEV] ([remote or cooperative charging Y04S 30/12; details associated with the interoperability in the section of transportation, e.g. vehicle recognition, authentication, identification or billing Y04S 30/14](#))

## Y04S 10/14

- the elements or equipments being or involving energy storage units ([for systems comprising uninterruptible power supplies or standby generators Y04S 20/12](#))

## Y04S 10/16

- the elements or equipments being or involving electric power substations

## Y04S 10/18

- the elements or equipments being or involving switches, relays or circuit breakers, e.g. intelligent electronic devices [IED]

## Y04S 10/20

- the elements or equipments being or involving protection elements, arrangements or systems

## Y04S 10/22

- the element or elements being flexible AC transmission systems [FACTS] or power factor or reactive power compensating or correcting units

## Y04S 10/24

- the elements or equipments being or involving voltage regulating units

## Y04S 10/26

- the elements or equipments being or involving measuring units

## Y04S 10/265

- the elements or equipments being or involving phasor measuring units [PMU]

## Y04S 10/30

- Systems characterised by state monitoring, e.g. fault, temperature monitoring, insulator monitoring, corona discharge

## Y04S 10/40

- Systems characterised by the display of information, e.g. of data or controls

## Y04S 10/50

- Systems or methods supporting the power network operation or management, involving a certain degree of interaction with the load-side end user applications ([not used, see subgroups](#))

## Y04S 10/52

- Outage or fault management ([not used, see subgroups](#))

## Y04S 10/522

- Fault detection or location

## Y04S 10/525

- Power restoration

## Y04S 10/527

- Power quality monitoring

- Y04S 10/54 . . Management of operational aspects, e.g. planning, load or production forecast, maintenance, construction, extension
- Y04S 10/545 . . . Computing methods or systems for efficient or low carbon management or operation of electric power systems
- Y04S 10/56 . . Supply chain or logistics
- Y04S 10/58 . . Financial aspects
- Y04S 10/60 . . Reporting; Information providing; Statistics or analysis

**Systems supporting the management or operation of end-user stationary applications, including also the last stages of power distribution and the control, monitoring or operating management systems at local level**

- Y04S 20/00** **Systems supporting the management or operation of end-user stationary applications, including also the last stages of power distribution and the control, monitoring or operating management systems at local level**
- Y04S 20/10 . System characterised by the monitored, controlled or operated end-user elements or equipments ([not used, see subgroups](#))
- Y04S 20/12 . . the elements or equipments being or involving energy storage units, uninterruptible power supply [UPS] systems or standby or emergency generators involved in the last power distribution stages ([energy storage units involved in power generation, transmission and distribution Y04S 10/14; uninterruptible power supply systems or standby or emergency generators as end-user application Y04S 20/248](#))
- Y04S 20/14 . . The elements or equipments being or involving protection elements, switches, relays or circuit breakers
- Y04S 20/16 . . The elements or equipments being or involving power plugs, sockets, adapters or power strips
- Y04S 20/18 . . The element or elements being a direct current power network, grid or distribution line
- Y04S 20/20 . End-user application control systems ([not used, see subgroups](#))
- Y04S 20/22 . . The system characterised by the aim of the control ([not used, see subgroups](#))
- Y04S 20/221 . . . General power management systems
- Y04S 20/222 . . . Demand response systems, e.g. load shedding, peak shaving
- Y04S 20/224 . . . . Curtailment; Interruptions; Retail price-responsive demand
- Y04S 20/225 . . . The system entering an energy saving mode, i.e. sleep, low-power or standby modes
- Y04S 20/227 . . . Domotics or building automation systems
- Y04S 20/228 . . . . Characterised by involving a home automation communication network
- Y04S 20/24 . . The system characterised by the end-user application ([not used, see subgroups](#))
- Y04S 20/242 . . . the end-user application being or involving home appliances
- Y04S 20/244 . . . . the home appliances being or involving heating ventilating and air conditioning [HVAC] units
- Y04S 20/246 . . . . the system involving the remote operation of lamps or lighting equipment
- Y04S 20/248 . . . the end-user application involving uninterruptible power supply [UPS] systems or standby or emergency generators ([for uninterruptible power supply systems or standby or emergency generators in the last power distribution stages Y04S 20/12](#))

Y04S 20/30	. Smart metering
Y04S 20/32	. . Systems characterised by remote reading
Y04S 20/322	. . . from a fixed location
Y04S 20/325	. . . from a mobile location
Y04S 20/327	. . . The remote reading system including mechanisms for turning on/off the supply
Y04S 20/34	. . Systems which determine the environmental impact of user behavior
Y04S 20/36	. . Methods or devices for detecting or reporting abnormalities, e.g. faults, outages, leaks
Y04S 20/38	. . Identification of individual loads by analysing current or voltage waveforms
Y04S 20/40	. . Displaying of usage with respect to time, e.g. monitoring evolution of usage, relating usage and weather conditions
Y04S 20/42	. . Utility meters which are networked together, e.g. within a single building
Y04S 20/44	. . Displaying utility price or cost
Y04S 20/46	. . Remote display of meters readings
Y04S 20/48	. . Methods for determining the topology of meters in a network
Y04S 20/50	. . Retrofitting of installed meters
Y04S 20/52	. . Systems oriented to metering of generated energy or power
Y04S 20/525	. . . Monitoring the performance of renewable electricity generating systems, i.e. of solar panels

#### **Systems supporting specific end-user applications in the sector of transportation**

<b>Y04S 30/00</b>	<b>Systems supporting specific end-user applications in the sector of transportation</b>
Y04S 30/10	. Systems supporting the interoperability of electric or hybrid vehicles (not used, see subgroups)
Y04S 30/12	. . Remote or cooperative charging
Y04S 30/14	. . Details associated with the interoperability, e.g. vehicle recognition, authentication, identification or billing

#### **Communication or information technology specific aspects supporting electrical power generation, transmission, distribution or end-user application management**

<b>Y04S 40/00</b>	<b>Communication or information technology specific aspects supporting electrical power generation, transmission, distribution or end-user application management</b>
Y04S 40/10	. Communication technology specific aspects (not used, see subgroups)
Y04S 40/12	. . Details of the transmission structure or support between the monitoring, controlling or managing units and monitored, controlled or operated electrical equipment (not used, see subgroups)
Y04S 40/121	. . . Using the power network as support for the transmission
Y04S 40/122	. . . . Using pulsed signals
Y04S 40/123	. . . . Using modification of a parameter of the network power signal
Y04S 40/124	. . . Using a data transmission bus

Y04S 40/125	. . . Using phone lines
Y04S 40/126	. . . Using wireless data transmission
Y04S 40/127	. . . . by means of mobile telephony
Y04S 40/128	. . . Using Internet
Y04S 40/14	. . Aspects related to the treatment or conditioning of data or signals ( <a href="#">not used, see subgroups</a> )
Y04S 40/143	. . . Associated to the communication via dedicated transmission supports
Y04S 40/146	. . . Associated to the communication via the power transmission network
Y04S 40/16	. . Details of management of the overlaying communication network between the monitoring, controlling or managing units and monitored, controlled or operated electrical equipments ( <a href="#">not used, see subgroups</a> )
Y04S 40/162	. . . related to configuration or provisioning
Y04S 40/164	. . . related to network topology
Y04S 40/166	. . . related to fault management
Y04S 40/168	. . . for performance monitoring
Y04S 40/20	. Information technology specific aspects ( <a href="#">not used, see subgroups</a> )
Y04S 40/22	. . Computer aided design [CAD]; Simulation; Modelling
Y04S 40/24	. . Arrangements for network security or for protecting computers or computer systems against unauthorised activity, e.g. cyber security

**Market activities related to the operation of systems integrating technologies related to power network operation and communication or information technologies**

<b>Y04S 50/00</b>	<b>Market activities related to the operation of systems integrating technologies related to power network operation and communication or information technologies</b>
Y04S 50/10	. Energy trading, including energy flowing from end-user application to grid
Y04S 50/12	. Billing, invoicing, buying or selling transactions or other related activities, e.g. cost or usage evaluation
Y04S 50/14	. Marketing, i.e. market research and analysis, surveying, promotions, advertising, buyer profiling, customer management or rewards