

**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**

- Y04S 30/00
  - Systems supporting specific end-user applications in the sector of transportation**
- 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**

- Y04S 40/00
  - Communication or information technology specific aspects supporting electrical power generation, transmission, distribution or end-user application management**
- 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 ([not used, see subgroups](#))
- 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 ([not used, see subgroups](#))
- 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 ([not used, see subgroups](#))
- 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**

- Y04S 50/00
  - Market activities related to the operation of systems integrating technologies related to power network operation and communication or information technologies**
- 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