ENERGY & SMART BUIDLING TRACK

- **innovative technologies, processes and products of the agri-food and forestry-wood sectors:**

■ wood drying technology:
  • drying process optimization through new analyses and innovative raw materials quality assessment tool methods,

■ agri-food industry waste management:
  • research and analysis of development of further waste acquisition from the agri-food industry.

- **high efficiency, low-emission and integrated manufacturing, storage, transmission and distribution of energy systems:**

■ wind power industry:
  • innovative technologies of electricity generation from wind power to increase efficiency of conversion of wind energy into electricity (among others wind turbines with vertical rotation axis),
  • developing and improving tools for forecasting electricity generation at wind power plants,
  • new solutions in the area of batteries and accumulators, including lithium-ion, acid, and flow batteries and accumulators,
  • automatic / remotely managed systems allowing for a variable regulation of supply and demand for renewable energy sources through energy storage,
  • integration of energy storage facilities with the national power grid at different voltage levels, inducing identification of barriers and concepts of their removal necessary for diffusion of energy storage technologies;
  • integration of energy storage facilities with renewable energy installations.

■ biogas plants:
  • development of pasteurization technology and other technologies increasing efficiency of waste or biomass for the purpose of fermentation optimization,
  • development of biosynthesis and biotransformation catalysts to maximize waste utilization,
  • improvement of methods of conversion of biomass or waste to fuels with parameters allowing for safe use in cogeneration units,
  • development of systems predicting and analyzing technical condition of machines, increasing energy efficiency,
  • development of technologies allowing for adjusting gaseous fuels to grid parameters,
  • development of methods and algorithms for insolation and gustiness prediction for the purpose of renewable energy sources integration in smart energy grids,
  • new or improved energy storage technologies,
  • innovative energy storage technologies using compounds, including heat accumulators,
  • automatic / remotely managed systems allowing for a variable regulation of supply and demand for renewable energy sources through energy storage,
  • integration of energy storage facilities with renewable energy installations,
  • mobile energy storage in the form of high-temperature heat – optimization of heat generation relative to the demand of local cogeneration systems.

■ solar farms:
  • innovative solar technologies allowing for heat generation,
  • solar cells based on new materials and other technologies allowing for energy generation from solar sources,
  • new technologies allowing for improving efficiency of energy generation and other operational characteristics of conventional solar cells.

- **sensors (including biosensors) and smart sensor networks:**

■ biogas purification and analysis:
  • developing biogas purification and its quality control through the use of technologically advanced gas quality sensors.

- **information systems – smart metering, remote meter reading, smart systems / grids:**

  • developing software for automatic meter reading (electricity, gas, heating, water) covering AMI (Advanced Metering Infrastructure) technology functionalities to allow to use data for smart utilities management.

- **smart city:**

  • using telecommunications / IT solutions to increase effectiveness of companies,
  • using ICT solutions in e-services and on-line tools for knowledge management,
  • smart software for building automation – energy management optimization.

- **IoT:**

  • wireless communication technologies collecting data from sensors,
  • data collecting, storing, and processing technologies.

■ Cyber security and AI:

  • automation and optimization of processes of electricity generation, storage, trading, and distribution,
  • developing AI systems, machine learning, Big Data processing in the context of biogas plants, wind farms, and other energy sources management,
  • smart self-learning software for securing computer and industrial networks, and workstations (PCs, laptops, smartphones) in the context of distributed energy and industrial systems management.

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ENERGY & SMART BUIDLING TRACK

- Intelligent and energy-efficient construction.
- Modern systems of sourcing raw materials for chemistry and construction.
- Polymeric composites, fibre-polymeric composites, bio nanocomposites, multilayer and multifunctional integrated composites.
- Nano and micro fibres, fibre nanomaterials, bio and nano coatings.
- Innovative (bio)polymers and (bio)materials.
- Fibre biomaterials and innovative polymeric materials for specialized construction applications.
- Application of additive manufacturing in construction.
- Innovative analytical software of sales for real estate developments.
- Biogas energy.
- Waste energy.
- Wind power energy.
- Intelligent systems for managing and controlling windmill farms with forecast analytics.
- Solar energy.
- Technology, materials and equipment for photovoltaics.
- Geothermal energy.
- Prosumer energy.
- Energy storage systems.
- Intelligent electricity grid.
- IoT.
- Industrial additive manufacturing
- Sensors