ENVIRONMENT:

Clean Energy Systems

Product, process, infrastructure, and management innovations relating to energy in context of clean generation, efficient transmission, smart distribution, and storage at different scales, both centralized and decentralized.

Energy Production:

Reducing carbon emissions through clean and renewable energy generation and increased efficiency. New solutions and technologies to improve and automate site scouting, site preparation and construction of renewable plant. New technologies to enable development of floating plants (both wind and solar).

Energy Transmission and Distribution:

Increasing power efficiency and reducing power loss during transmission and distribution, improving power flow and congestion management, enhancing grid flexibility, demand response capabilities and bi and multi-directional smart energy flows in distributed energy resources.

Energy Storage:

Developing energy conversion and stationary storage systems applicable to the utilities, commercial, industrial as well as residential sectors, ranging from fast responsive options for near real-time to long-duration options.

Energy Communities:

Promoting and simplifying Energy Communities, by providing to the self-consumers, the managers and the administrators specific tools aimed at managing the hardware and monitoring the Key Performance Indicators.

Sustainable Mobility & Transport

Reduction of greenhouse gas emissions generated by passenger mobility and transport of goods over land, sea, and air. This could be facilitated through innovation in fuels, transportation modality, infrastructure, services, optimized operations, innovative materials and route, system, and charge management.

Electrification:

New generation batteries with improved energy density and lifespan,
Facilitation of charging infrastructure.

Alternative fuels:

Process innovation to produce synthetic fuels (e.g. hydrogen, ammonia, …) for hard-to-abate transport systems.

Routing:

Efficiencies in traffic flow, connectivity and routes for individuals and fleets.

Transportation Modality:

Technologies and infrastructure that facilitate shifts to low carbon transportation modes and influence individual travel behavior.

Low Carbon Buildings

Technologies that facilitate zero or low carbon operational emissions from buildings and built infrastructure. This could be via increased energy efficiency or low carbon alternatives for energy demanding processes and appliances or alternatively, via enabling innovations that reduce the energy demand within a building.

Operational Functions:

Low carbon and improved efficiency technologies for heating,
cooling, ventilation, refrigeration, and lighting.

Optimized Control:

Optimization in energy control and management for indoor and outdoor environments.

Reduced Demand:

Innovations leading to performance improvement of buildings such as solar gain control, daylight control, night cooling and insulation.

Green Construction

On and off site construction that integrates low carbon and recycled construction materials, consumes less energy and natural resources through efficient design, processes and equipment, reduces waste and addresses end of life recovery of demolition debris.

Infrastructure Resilience:

Resilience of built infrastructure against the impacts of climate change

Eco-Efficient Water Infrastructure

Innovations targeting increased resource efficiency and energy efficiency, as well as improved reliability, capacity, security, and resilience across the water sector and across community dimensions. Relates to water processes and systems management in industry, the residential sector and agriculture.

Demand:

Innovations that reduce and manage water demand and reduce waste and non-revenue water. Distributed detection system for water quality and safety.

Energy Efficiency:

Energy efficient extraction, purification, distribution, treatment, and reclamation of water resources.

Wastewater Treatment:

Innovations in wastewater treatment to reduce fugitive waste gases such as methane and nitrous oxide, innovations for reuse of wastewater. Innovation in processing, reduce or recircle waste water treatment sludge. Waste water contaminant forecasting and predictive control.

Resilience:

Resilience of water infrastructure to the impacts of climate change.

Sustainable Behaviors

Innovations targeting new processes, business models or platform as tool to develop a more sustainable way of life, use resources more efficiently, boost savings and take care of the environment.

MATERIALS & MANUFACTURING

Novel Materials

Innovative materials and chemicals with a low carbon footprint and sustainable land use, high performance materials with superior longevity and robustness and materials that facilitate lower resource and energy use for carbon intensive sectors such as energy, mobility, infrastructure, chemical & industrial processes, packaging and textiles.

Biomaterials:

Materials generated from a renewable and sustainable bio-based source (including low or carbon negative plant, fungi and algae sources and by-products) as well as waste streams (such as urban and agricultural biowaste and waste-water sludge) and via microbial and enzymatic processes.

Biodegradable Materials:

Innovations in biodegradability of polymers whilst ensuring high performance of properties vital to applications.

Technology Enablers:

Novel materials that are imperative to a climate-tech breakthrough that enable its implementation. e.g. novel conductors that lower the working temperature of a fuel cell or phase change materials for thermal storage.

Novel Refrigerants:

Next generation non-hazardous refrigerants with low greenhouse warming potential.

Clean Manufacturing

Improvements and optimization, through both software and hardware, of industrial production processes and system maintenance that minimize energy and resource use, and reduce waste at the plant level.

Resource Efficiency:

Optimization of operating parameters and implementation of predictive maintenance leading to reduced use of energy, water, fluids and materials, elimination of waste that results from overproduction, overprocessing and defects, product design to increase manufacturing efficiency.

Resource Recovery:

Implementation of advanced recovery and recycling for materials, Recovery of low temperature waste heat and water from cooling towers.

Circularity

Innovations in materials, processes, infrastructure and connectivity between stakeholders that enable materials, components, products, by-products and waste

Waste:

Innovations in sorting, recycling and recovery processes as well as new technologies, tools and infrastructure to define waste materials qualities for optimal conversion and utilization (for the production of new raw materials.

Resource Transparency:

Connecting between economic as well as civic players. Tracer technologies (physical, digital or biological) that allow to identify a product and capture, store, share and analyze data throughout its lifecycle, enabling trading, industrial symbiosis, recycling and in general, exchange of data between stakeholders leading to material valorization.

Transparent & Agile Supply Chains

Technologies, data analytics and decision making tools to achieve energy efficiency and waste minimization as well as transparency and agility with regard to emissions, climate risk and land degradation across the entire supply chain operation.

Traceability:

Traceability with respect to, amongst other materials, metals, plastic, and materials connected to deforestation and changes in land use and for attribution of GHG emissions to material flow across supply chain networks.

Value Chain Optimization:

Tools for real-time, predictive intelligence into supply chain activity such as supply and demand planning in order to reduce overproduction, material flow analysis to reduce material resources and waste.

Carbon Capture & Utilization

Capture of atmospheric carbon using engineered and hybrid (engineered & natural based) processes, and its utilization to generate novel materials with a net negative carbon impact, or alternatively, its permanent storage.

Capture:

Innovative materials and energy efficient methods for carbon capture with high selectivity and high conversion, also at atmospheric concentrations (Direct Air Capture).

Transformation:

Process innovations for chemical and biological transformation of CO2 into value-added products, e.g. production of bio-oils, specialty chemicals, polymers, fuels and construction material.

LAND USE

Restoring soil health, preventing land degradation, and reducing emissions that result from human land-use driven by agriculture and production and consumption behavior.

AgriTech and Bioenergy

Maintaining the capacity of agriculture to ensure food security whilst mitigating agricultural land footprint and emissions and adapting agricultural systems to the impact of climate change. Agriculture relates to farms, crops, livestock, aquaculture as well as food generation in novel farming systems. Climate change is a real threat and despite the very clear warning messages of international experts (e.g. IPCC Report1.5°C), the policies adopted so far are not enough.

Reduce Land Footprint:

Reducing land footprint by improving crop yields, increasing nutritional content, and implementing novel farming systems such as vertical, urban and aquaponic farming as well as insect and algae farms.

Renewable energy in agriculture

Replace fossil fuels with renewable energy sources to reduce pollution and emissions.

- Promoting the production of electricity in cogeneration from biogas and / or solar on the farm;
- Stimulating biomethane mechanization (including bioLNG), using biomethane and in all engines and energy uses that are not easily electrified;
- Electrifying the end uses of energy wherever possible by promoting the production of electrically powered agricultural vehicles;
- Reducing the overall environmental footprint of the product.

Reduce Inputs:

Decreasing high GHG farming inputs such as fertilizers via precision farming, nutrient management and increased efficiencies, biological alternatives for disease and pest prevention and treatment and induced crop resistance.

Optimising and promoting organic fertilisation with the targeted use of digestate as a substitute for chemical fertilisers, increasing awareness about the specific characteristics of digestate compared to livestock effluents and synthetic fertilisers and increasing the efficiency of use of the readily assimilable nitrogen it contains.

Reduce Emissions:

Reducing GHG emissions from equipment, crops, and livestock.

Resilience:

Improve resilience and reduce vulnerability of crops to increasing temperatures, weather variability, shifting agroecosystem boundaries, invasive crops and pests, and more frequent extreme weather events.

Metal & Mineral Mining

Reducing climate and landscape impact at all stages of a critical raw materials' (CRMs) production cycle; the exploration, exploitation, and closure phase as well as sustainable processing and recovery innovations.

Extraction:

Extraction process innovations and increased efficiency and purity leading to lower carbon and water footprints, implementation of waste solutions and a circular material cycle.

NATURE

Conservation and restoration of the Earth's natural ecosystems such that carbon sinks are amplified, biodiversity loss is avoided, and the resilience of ecosystems.

Extreme Weather Events

Improving resilience to extreme weather events, such as drought, heatwaves, storms, flooding and wildfires, through advanced technologies that target disaster prediction, risk assessment, management and recovery with respect to both emergency response and long-term preparedness.

Prediction, Risk Assessment and Monitoring:

Tools with high spatial and temporal resolution for event prediction and risk assessment, including now-casting for short-term forecasts, warnings and real-time alert and monitoring systems.

Disaster Management and Aid Mobilization:

Tools to improve quality and speed of event management, information sharing, cooperation between stakeholders, response measures, rescue operations and safety of emergency responders.

Infrastructure and Community Resilience:

Minimize damage from extreme weather events to construction, water, sanitation (and related health risks), telecommunications, power and additional essential services as well as to local communities. Can include both endurance to extreme phenomena as well as measures that reduce the intensity of an event.