Enabling Smart Energy as a Service via 5G Mobile Network advances

"NRG5 delivers an architecture and set of software tools for the exploitation of 5G, software network, and IoT technologies in the emerging Smart Energy vertical"

HIGH AMBITION

NRG-5 advances the state-of-the-art in 5G network softwarization technologies, making them suitable to support at large scale the stringent requirements of Smart Energy as Service (SEaaS) applications.

CHALLENGING USE CASES

Targeting the Smart Energy vertical domain, NRG-5 defines several industry-driven use cases that cover all three traffic classes from ITU IMT-2020 (xMBB, mMTC, and URLLC). NRG-5 explores how 5G can be applied to Smart Energy, defining also new NFV concepts to optimize performance supporting its stringent use case requirements.

Use Case 1

5G traffic classes: mMTC, URLLC

Realizing decentralized, trusted, lock-in free "Plug & Play" vision.

According to the Smart Energy paradigm, customers play an increasingly active role in energy flexibility. Smart metering devices are quickly proliferating and need to offer advanced services such as real-time measurements and reporting, service discovery, infrastructure automation and AAA. NRG-5 eases real-time automated smart-meter identification so to achieve network auto-configuration addressing multi-tenancy under geographically unbounded mobility scenarios. Trust and authentication is guaranteed by a distributed key management mechanism based on blockchain.

Aerial Predictive Maintenance for utility infrastructures.

Use Case 2

5G traffic classes: xMBB, URLLC

NRG-5 empowers semi-autonomous swarms of drones to perform inspections and site surveys, enabling highly efficient operations, accident avoidance and fast restoration of energy networks, leading to reduced maintenance costs and increased QoE offered by utilities to their customers. The swarms of drones need to run complex, bandwidth demanding, computationally heavy and time critical applications, meeting very stringent a) operational requirements, b) communication requirements, and c) mission requirements.

Use Case 3

5G traffic classes: mMTC, URLLC

Resilience and high availability via Dispatchable Demand Response (DDR).

The stability and resilience of the energy grid in presence of high shares of renewables relies on being able to quickly balance their unpredictable power output. NRG-5 provides a 5G-powered management layer to control and reroute in real-time the energy flow from/to renewable sources, storage & batteries, and electric vehicles to minimize the imbalance in the grid. Ultra-quick response times (<5ms) are enabled by employing extensively an extended MEC (xMEC) architecture.

REAL WORLD VALIDATION AND TRIALS

NRG-5 results are validated starting Q1 2019 in 4 state of the art laboratories and 2 real life trial demonstrators in Terni (electricity) and Stublach (gas), offering multi-RAT connectivity over real world energy distribution and transport infrastructures.

IMPACT

NRG-5 balances innovation and development activities, simultaneously exposing concrete communication and standardization plans in close collaboration with the 5G PPP Initiative. NRG-5 aims at:

- Delivering 5G proof-of-concept infrastructure demonstrators, to be used by telcos, utilities and service providers.
- Driving business innovation and creating jobs and a culture of training in 5G communication and energy networks.
- Accelerating the growth of European SMEs and stakeholders and creating a roadmap for 5G communication/energy network.