



e-GOTHAM

Sustainable Smart Grid Open System for the Aggregated Control, Monitoring and Management of Energy

EXECUTIVE *summary*

e-GOTHAM aims to implement a new aggregated energy demand model, by increasing management efficiency, raising energy consumption awareness and stimulating the development of a leading-edge market for energy-efficient technologies with new business models. It will also define a complete solution for microgrids in the residential, services and industrial sectors that include different configurations of loads, distributed generators and energy storage components.

CONTRIBUTION *to SRA*

- > Reduction of system design costs by 25%: e-GOTHAM will develop an open reference architecture so that energy solution providers concentrate efforts on dimensioning the deployment of embedded systems to monitor and actuate over energy components and on the design and modification of energy decision-support and automation technologies.
- > 50% reduction in development cycles: e-GOTHAM will generate a methodology to develop applications according to the open reference design.
- > Management of a complexity increase of 200% at a reduced effort of 20%: e-GOTHAM will define policies in order to achieve composability and robustness in dynamic systems.
- > Achievement of cross-sectoral reusability of embedded systems devices to be deployed in three different microgrid pilots for the residential, services and industrial sectors.

MARKET INNOVATION *& impact*

e-GOTHAM is driven by the sustained increase in energy demand and intends to make an impact on the societal challenge of Smart Buildings and Communities of the Future through an open microgrid solution that contributes to sustainability and energy efficiency. This is expected to have an impact in terms of eco-efficiency, eco-sufficiency, comfort and security. Also, e-GOTHAM intends to achieve cross-sectoral re-usability of embedded systems and to obtain a reduction in the cost of system design, in development cycles and the management of a complexity increase with less effort. e-GOTHAM will also impact on other goals such as the defragmentation of embedded systems in the microgrid market by creating an eco-system around the e-GOTHAM open reference architecture and beyond. This innovation environment will help to boost European industry competitiveness and leadership in the microgrid and smart energy market.

RELEVANCE & CONTRIBUTIONS *to Call Objectives*

Relevance in relation to ASP7.

- > Eco efficiency: distributed energy, energy storage management, integration of distributed energy generation, energy management, and operational efficiency.
- > Eco sufficiency: energy operation aid, sustainability and renewable energy.
- > Improved comfort and security: smart energy, self-heal, secure energy and energy for new needs.

Contribution to ASP7 specific targets:

- > e-GOTHAM will design and define an open source reference architecture to dynamically and autonomously match power demand and supply by communicating relevant elements within microgrids and the grid.
- > To help visualise sustainable urban life, e-GOTHAM will improve information data models and communication models within microgrids to automate decision-making mechanisms to optimise the microgrid and graphical interfaces that display the state of the microgrid elements as well as forecasted events. Consumers will be provided with graphical interfaces that show energy usage, statistics and means of reducing emissions.
- > Development of reference designs to achieve energy efficient microgrid management architectures.
- > Selection, adoption and extension of standards as well as HW and SW modelling frameworks and development tools promoted by ARTEMIS for high-level analysis and validation of resource usage, emphasising composability and reuse at e-GOTHAM scenarios.
- > Development of models to enable energy efficient topology management in distributed systems, with an emphasis on the dynamic reconfiguration capabilities of resource management at system and device level.

Cross-domain aspects:

- > Building of “smart environments” of smart and heterogeneous devices in energy contexts by developing a communication model and middleware to allow interaction among the devices, the environment and the user.
- > Definition of infrastructure requirements to support new interaction and interface concepts.
- > Contribution to standards for interoperability in “smart environments”.

R&D INNOVATION *and technical excellence*

The motivation for e-GOTHAM lies in the envisioned modernisation of the power grid to meet increasing energy demand and minimise its environmental impact. To handle the problem of the power grid modernisation, the e-GOTHAM underlying concept is to divide the overall power grid into localised power grids (microgrids), with increased communication capability between producers and consumers that allows action to be taken on the elements within the microgrid and operation in cooperation with the overall power grid.

To reach this objective, e-GOTHAM will design an open reference architecture and develop a middleware with seamless connectivity that provides the communications and decision support tools needed to optimise and manage microgrids in the residential, services and industrial sectors. This will facilitate the integration and management of microgrid elements through a large-scale network of embedded systems that use real-time measurements of energy related parameters to actuate dynamically and autonomously over the microgrid and so match power demand and supply. In addition, e-GOTHAM will emphasise the challenge of integrating and managing distributed energy production and storage components for sustainability in the energy sector.

To verify and demonstrate the e-GOTHAM concept and objectives, the project will implement the middleware along with other project outcomes in an incremental and iterative manner. A spiral life-cycle will be followed based on an incremental and iterative prototyping approach, during which a total of three prototypes will be produced and assessed in order to incrementally arrive at the complete predicted functionality.

PROJECT *partners*



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PROJECT COORDINATOR

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WEBSITE

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START

April 2012

DURATION

36 months

TOTAL INVESTMENT

6.84 M€

PARTICIPATING ORGANISATIONS

17

NUMBER OF COUNTRIES

5