

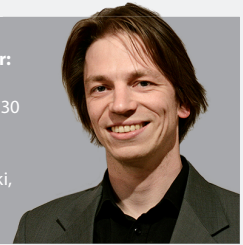


sgem

Smart Grids and Energy Markets

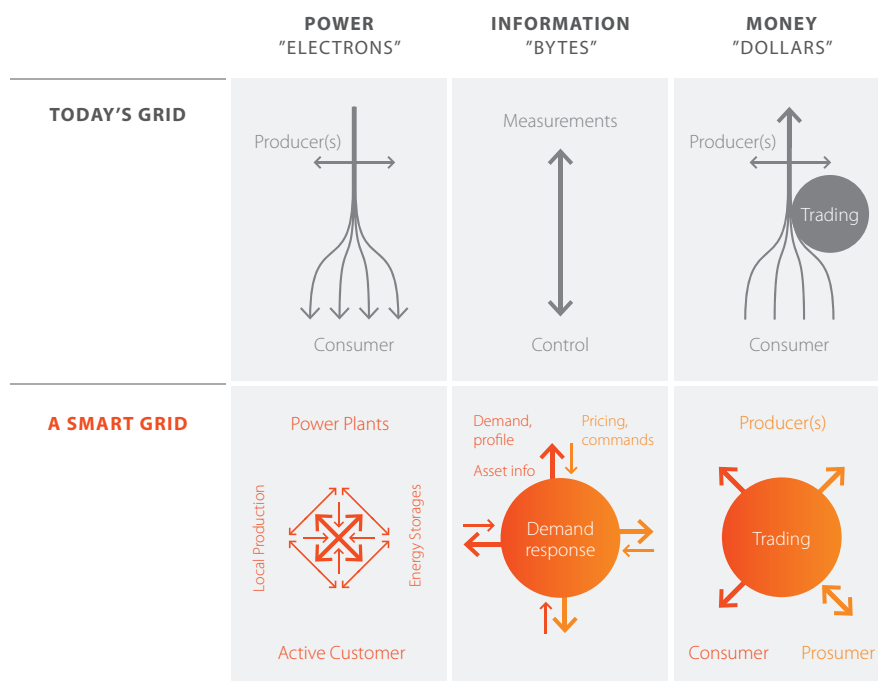
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Developing smart grids and energy markets

Changing the way we do business



The aim of the sgem research consortium is to develop international Smart Grid solutions that can be demonstrated in a real environment utilizing Finnish R&D&I infrastructure. At the same time, the benefits from an interactive international research environment will accumulate the know-how of the world-leading ICT and Smart Grid providers. The Finnish government has recognized the co-operational research model of CLEEN.

The main components of the research are:

- smart grid drivers and scenarios, market integration and new business models
- future infrastructure of power systems,
- active resources of the smart grid,
- customer interface for the smart grid, and
- intelligent management and operation of smart grids

SGEM sectors

Smart Grids Drivers and Scenarios

Concepts and visions

Relevance, Customers, Society, Migration, Demonstrations

Future infrastructure of power distribution

Primary networks

Cabling, Electronics, Microgrids, Substations, High voltage grids, Materials

Intelligent management and operation of smart grids

Secondary systems

Smart Metering, Demand response, Electric vehicles, Distributed generation, Storages, Heating solutions

Active resources

Passive grids to active

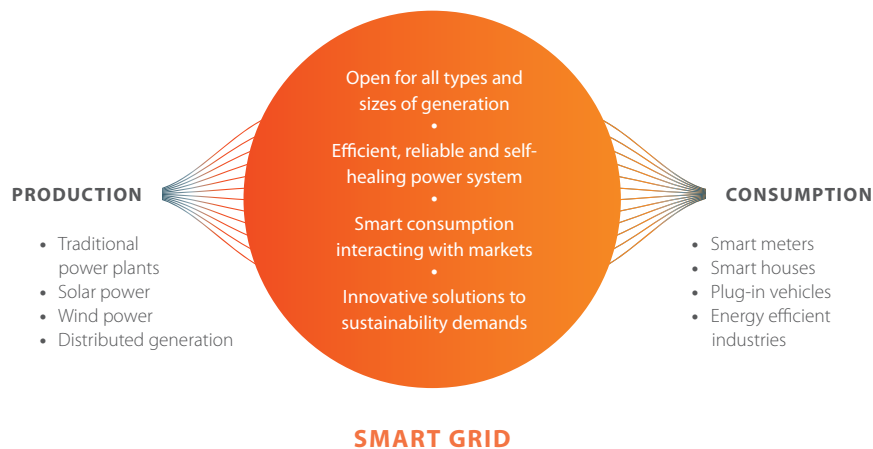
ICT for network management, Protection, Network automation, Condition management, Strategic planning

Energy markets

Changing the business environment

Business models, Active market participation of customers, Market development, Multi-utility

Smart Grids – Evolution towards a sustainable energy system



Smart Grids: Flexible, energy-efficient, reliable, transparent

A Smart Grid delivers electricity from many suppliers to consumers using state-of-the-art technology and an intelligent monitoring system that keeps track of all electricity flowing in the system. Smart Grids enable controllable multi-directional power flow over long distances and locally.

Even if Smart Grid research includes mainly development of intelligent applications, the physical infrastructure plays an important role. Even in the case of Smart Grids the biggest investments will be made to the primary network. This calls for new methodology for primary network strategic planning in order to guarantee efficiency through optimal utilization of network assets. Efficiency comes from several technology upgrades such as high voltage direct current (HVDC) that cuts transmission losses over distance, or large-scale cabling of distribution networks that reduces interruptions and maintains the service time of the network at maximum.

A Smart Grid flexibly incorporates various active resources, and guarantees interoperability at all times. These active resources consist of intermittent energy sources such as wind and solar, energy storages for balancing the grid and also of controllable loads. Reliability emerges from active moderation of demand: a two way system allows the network to switch on time-independent domestic appliances during periods of low demand, or switch off appliances at peak demand. Decentralized power generation provides greater transparency and allows creation of microgrids when needed.

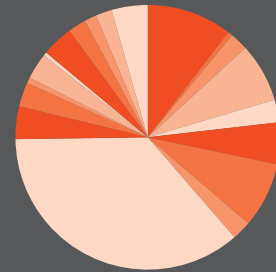
Intelligent operation and management of the Smart Grid is essential, as without a novel and cost-efficient ICT layer on top of the electricity transmission and distribution layer the whole benefit of new active resources and the new infrastructure is lost. Also no new proactive energy markets and customers can be spawned without the support of the information and communication structure.

Interactive customers having electric vehicles, energy storages and distributed energy production are new and very important players in the Smart Grid environment. Smart metering is much more than the remote reading of energy use. It is a part of an intelligent interactive consumer gateway that enables advanced energy management functions and new kinds of value-added services for consumers. Domestic and commercial consumers can also become suppliers using smart bi-directional metering.

Apart from the increased reliability, efficiency and safety of the power grid, the society benefits from flexible energy sourcing, better management of demand to ensure supply, and green collar jobs.

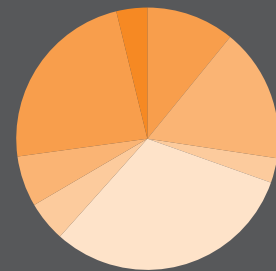
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SGEM consortium members



Industrial Partners 56%

ABB Oy 6%, Aidon Oy <1%, Alstom Grid Oy 1%, Elektrobit Wireless Communications Oy 2%, Empower Oy 4%, Emtele Oy 2%, Fingrid Oy 3%, Fortum Sähkönsiirto Oy 5%, Helen Sähköverkko Oy 1%, Nokia Siemens Networks Oy 20%, Oy Cybersoft Ab 1%, Suur-Savon Sähkö Oy 1%, Tekla Oyj 2%, Telia Sonera Finland Oyj <1%, The Switch Engineering Oy 2%, There Corporation Oy 2%, Vantaan Energia Sähköverkot Oy <1%, Vattenfall Verkkö Oy 2%, Viola Systems Oy 1%



Research Partners 44%

Aalto University (TKK) 5%, Lappeenranta University of Technology 7%, MIKES 1%, Tampere University of Technology 14%, University of Eastern Finland 2%, University of Oulu 2%, University of Vaasa 3%, VTT 10%

About CLEEN

The sgem consortium is managed by CLEEN, the strategic research center for the CLuster for Environment and ENergy. Clean Ltd was founded in 2008. The 44 shareholders are all major actors in the sector, with 28 corporate shareholders and 16 research institution or university shareholders.