2018 Award Theme:

SMART GRIDS FOR FLEXIBILITY

ISGAN

Award of Excellence 2018

Recognizing excellence in smart grid projects around the world

ISGAN
INTERNATIONAL SMART GRID ACTION NETWORK

GSGF
Global Smart Grid Federation

Coordinating Power Control

Sustainable Innovation | Sweden

http://www.sust.se/en/projekt/coordinating-power-control

The project "Coordinating Power Control" was founded on the belief that cooperative projects involving innovation hubs, the public, entrepreneurs, investors, and private companies can lead to smart, sustainable, and cost effective services using automation without the need for big behavioral changes.

The main project goal is to create a cost-effective optimization of a distribution grid north of Uppsala, Sweden consisting of about 14000 customers in ¬mostly rural areas. The project brings together several IoT (internet of things) smart-grid service providers, associated regulatory bodies, and the local distribution service operator (DSO) to address technical, regulatory, and behavioral challenges and to bring together a community of market actors to provide time-forward optimization of power usage. To achieve the objective, the project employs 500 connected water-based heating systems to provide more than 1 MW of flexible electricity power, 60 sites with rooftop PV, connected and measured to provide 200 kW of electricity production, 36 kW of electric vehicle charging, and 80 kWh of batteries with 60 kW of instant power flexibility.

A key objective of the project was to find a balance between incentives and regulations through close cooperation between technology providers, regulatory bodies, and the DSO. To ensure that the project's outcome provided a win-win scenario for customers, service providers and DSO, all resources are offered the opportunity to participate or opt out of the grid optimization activities and consumers participate based on their own criteria, such as comfort, ease of use, and/or energy savings. The effectiveness of alternative "bottom-up" business models is evaluated as part of the project, including a peer-to-peer solution based on a block chain sharing system.

Sustainable Innovation's overall project is implemented with several current and planned projects designed to help companies integrate flexible options for their energy use of their smart technologies. These include: (1) New Collaborative Models designed to provide 1 MW of flexible power in a DSO distribution grid resulting in a commercial usage in the local grid along with several pilots in other grids; (2) Coordinating Power Control through combining batteries, EV charging, hydronic (water-based) heating and PV micro production into a single incentive by 2020; (3) New Energy Business Models in the Distribution Grid, An ERA-Net Smart grid funded project which tests different business models including block chain; and (4) Floor Heating as a Power Reserve, which has providers together with academia, investigating the potential of connected electric floor heating and how these can participate in the power management software, with final outcomes expected in 2018.

The project is expected to continue through 2020 and has already proven that flexible energy storage can be provided at around 40 Euros/kWh through the water based energy storage systems, compared to the utility price of 400 Euros/kWh for batteries. Sweden has over 3000 3.6 kW chargers in operation provided by at least 5 different providers, which is expected to increase within the next few years and have a dramatic effect on the grid. The project approach potentially impacts the 1.5 million Swedish houses that have water-based heating systems connected to electricity. These water-based systems could potentially provide well over 3 GW of flexible energy, with at least 5 GWh of energy storage without any changes in comfort. The first years' results indicate that the participating customers are pleased with the energy savings and comfort in their homes. Future project work will combine project data with a model predictive control loop to optimize the grid even further, by using the logic as a base load controller rather than just for the peaks.

Since the time of the initial ISGAN award nomination submission, the "Coordinating Power Control" project has created a new continuous open test bed for local and international players to come and test novel ideas in real settings. So come and test new ideas on this unique platform, which is celebrating its 100th year as a customer-owned grid this year.

2018 ISGAN Award of Excellence Finalists

Instability Detector of the Gaspésie Regional Power System: DIR-Gaspésie (CGART-ALGORES)

IREQ – Hydro-Québec Research Institute (Canada)
http://www.ireq.ca

This project is a collaboration between Gentec-EO and Hydro-Québec's Research Institute and TransEnergie divisions. The project demonstrates flexibility with smart grid technologies that use an automated system to effectively integrate 2000 MW of wind power generation onto the grid while maintaining service continuity and security of the Gaspésie regional power system in Québec, Canada. The project deploys a special protection scheme based on a detection algorithm and fuzzy logic to detect and respond to any imminent instability and initiate a remedial action to maintain regional grid stability. The added protection allows for the transfer of wind generation to local demand and to neighboring systems if necessary.

Local Energy System with Customer Flexibility

EON Energidistribution AB (Sweden)
http://www.sust.se/en/projekt/coordinating-power-control

The Local Energy System (LES) is a project that aims to demonstrate the technical feasibilities of running a set of microgrid technologies and solutions in island mode using 100% renewable generation sources in the village of Simris, Sweden. The effectiveness of customer flexibility will be evaluated by testing a load steering technology in an islanded microgrid environment in response to distribution network constraints. The LES performs instant stirring of centralized and decentralized battery storages, customer loads, renewable generation, back-up generator, and grid connections. To ensure that results can be replicated, the LES project relies on commercially available technologies and IT-Infrastructure. The results from this project can be used to develop a local grid with high resiliency or to build up a microgrid in non-electrified areas.

OpenADR4Chile

Enel Global Infrastructure and Networks SRL | www.enel.com

OpenADR4Chile is a pilot project focused on demonstrating grid flexibility of non-wired technologies aimed at improving grid performance and reliability, and increasing the grid hosting Distributed Energy Resources (DER) capacity in Santiago de Chile. In the first phase, the goal is to harness the flexibility presented at the *"Smart City Santiago Building"* in Santiago de Chile, in order to reduce the load consumption in response to a grid event (e.g., grid congestion, weather conditions, etc.). OpenADR (Open Automated Demand Response) standard protocol is employed for testing, and demonstrates great potential for reaching up to 75% reductions in system loads for heating ventilation and cooling equipment. In the second phase, the integration and DER management of renewable energy sources will be tested in the *"Smart City Santiago Building"* using various DER modeling and demand response software platforms, enabling the potential flexibility and services that could be provided to the grid for voltage control and regulation, harmonics compensation, imbalances, etc.

Smart Grid Deployment Project of Korea Electric Power Corporation

KEPCO – Korea Electric Power Corporation (Republic of Korea)
http://sg.kepco.kr http://sgadm.kepco.co.kr

The Smart Grid Deployment Project stems from KEPCO's extensive R&D focused on smart grid technologies, including the Jeju Island smart grid testbed started in 2009. This latest KEPCO project involves a broad set of partnerships including government agencies and municipalities, 6 different smart grid industry partners and 8 private companies. The Smart Grid Deployment Project has successfully installed over 73,000 advanced smart meters in 12 municipal areas that provide real-time energy information in an effort to induce high energy consumers to voluntarily reduce peak demand, which in turn improves the flexibility of the grid and helps enable power utilities to quickly respond to the fluctuation of power supply.

Smart Operator – Efficient Control and Monitoring of the Low Voltage Grid

Innogy SE (Germany) | https://iam.innogy.com/en/about-innogy/innogy-innovation-technology/smart-grids/smart-operator

The Smart Operator project is an innogy SE project, with its affiliates Lechwerke AG (LEW), Westnetz GmbH as well as industry and university partners. The project focuses on testing the benefits of smart and flexible grid devices with regard to increasing grid integration of renewable electricity energy while balancing generation and consumption and maintaining power quality. The autonomous self-learning algorithm controls three low voltage grids, one within the Wertachau district of Schwabmunchen, Germany. The field test phase of this project showed that through load shifting and voltage optimization, the local grids in the test areas were able to absorb 35% more electricity from locally generated, renewable energy, and up to 20% of the electricity demand in households could be flexibly shifted with intelligent devices. More than 50 smart devices were tested in 120 households.

SysDL 2.0 – Ancillary Services from Large-Area Distribution Grids

DREWAG NETZ GmbH (Germany) | http://www.drewag-netz.de

The SysDL 2.0 project was a large collaborative projective involving multiple industry, utility, and research institute partners. The project investigates the idea of incorporating decentralized energy sources into the system operation by means of intelligent algorithms. The objectives include the development, simulation, testing and implementation of a solution allowing a flexible reactive power exchange between the transmission and two selected 110 kV distribution grids in Germany. A system architecture based on the Common Information Model standard was developed, enabling the coordination between distribution system operators, transmission system operators, and the power generating units via a graphical user interface. The module was tested in the laboratory and the field, and has the potential to increase the flexibility of reactive power provision between grid layers and increasing resilience and system security.

The International Smart Grid Action Network (ISGAN) launched the Award of Excellence competition in partnership with the Global Smart Grid Federation (GSGF) to recognize excellence in smart grid projects, policies and programs around the world. ISGAN brings together 24 countries from across five continents and the European Commission to advance the development and deployment of smarter, cleaner, and more flexible electricity grids around the world. The ISGAN Award of Excellence seeks to leverage leadership and innovation in smart grids to accelerate global exchange of best practice and promote replication or adaptation of proven concepts in other markets, countries, and regions.

Our grateful thanks to the members of the 2018 ISGAN Award of Excellence jury for contributing their time and expertise to the evaluation process.

Jury Chair: Reji Kumar Pillai (India)
Board of Directors Chair, Global Smart Grid Federation

Steve Hauser (United States)
CEO, GridWise Alliance

Jan Jaeken (Belgium)
Board of Directors Chair, Flux50

Robert George Stephen (South Africa)
Technology Master Specialist, ESKOM and President, CIGRE

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