



Innovating Electricity Distribution in Europe

Frame Programme 7 - Cooperation Project
DREAM - Distributed Renewable resources Exploitation in electric grids through Advanced heterarchical Management

Project website address: www.dream-smartgrid.eu/

Foreword

This is the first issue of the newsletter published by the DREAM Project, launched in 2013 and financed by the European Commission within the 7th Frame Programme of Research and technological Development.

This release occurs at half way of the project, and offers to the readers several tangible results and a number of articles and publications on the scientific achievements by the project.

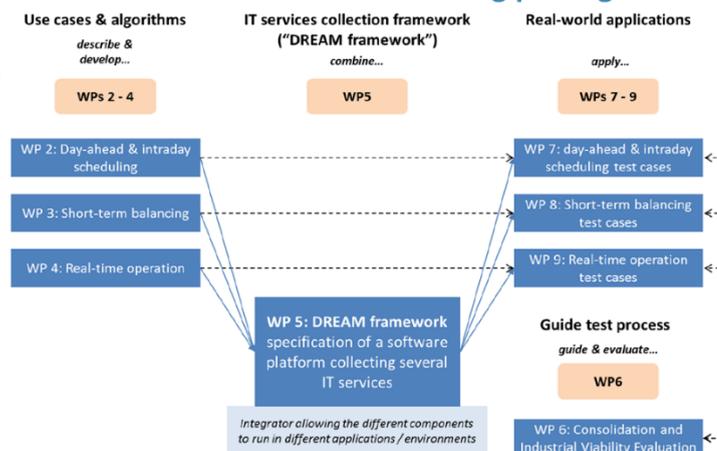
With a six-monthly periodicity, the newsletter is planned on 4 issues until the end of the project; it is made available through the project web site at page <http://www.dream-smartgrid.eu/downloads/#newsletters> and transmitted by e-mail to the [subscribers](#).

Summary description of project context and objectives

The DREAM project (September 2013 – August 2016) is building the foundations for a novel heterarchical management approach of complex electrical power grids, providing new mechanisms for consumer involvement in economic and ecological electricity use as well as stable and cost effective integration of distributed renewable resources.

Applying the principles of autonomous agent-based systems to the control and management of the electricity distribution grid will allow the system to constantly adjust to current operational conditions and make it robust to exogenous disturbances. In turn, this allows for greater penetration of intermittent resources and will make the distribution grid more resilient to failures.

Interconnection of DREAM working packages



DREAM is including several layers of controls for normal, congested and post-contingency situations that uses different coordination strategies ranging from market-based transactions to emergency demand response and create ad-hoc federations of agents that flexibly adjust their hierarchy to grid needs.

The objectives of the project is thus to create advanced tools and methodologies, for the Distribution System Operator (DSO), with a bottom-up approach spreading the necessary algorithms to take the local decisions. This intelligence, delegation from the operator, is spread inside local advanced Remote Terminal Units. These units, under the responsibility of DSOs are enabling local market operation and validating flexibility offers. Contingency analyses are as well embedded in day ahead, intraday and near real time markets. Distributed Energy Resources (DER) flexibility can be used to increase the best use of existing assets, combined with intrinsic grid flexibility (voltage management, optimal power flow, reconfiguration, among others).

The system will then transit smoothly between control layers depending on local operational conditions, so that responses to disturbances are sized precisely, margins are used parsimoniously and full network flexibility is tapped. With a bottom-up approach, the system should involve only limited data transfers and fewer centralized control, promoting extensibility, heterogeneity and easy deployment across countries with different network architectures and hardware manufacturers.

Progress of work

DREAM has reached its mid-term milestone after 18 months from start on September 1st 2013.

The progress of the activities and the main achievements are described in the published excerpt of the mid-term report to the EU Commission, downloadable from the [specific page](#) of the web site, and addressing:

- Common semantics and general methodology;
- Use Cases and related algorithms;
- Relevant standards, mapping over the SGAM architecture and Scientific and Technical (S&T) barriers;
- Planned demonstrations at trial sites and their mapping over the vertical domains (energy and short term balancing markets plus real time operation);
- First formulation of Performance Metrics and common metrics for real life demonstrators.

Collaboration with other projects

DREAM partners are committed to seeking for best collaboration opportunities with the projects selected for funding within the energy topic 2013.7.1.1 in the SMARTCITIES-2013 call (namely evolvDSO www.evolvdso.eu , INCREASE www.project-increase.eu , and IDE4L <http://ide4l.eu/>), in order to allow for enhancing individual results on the basis of proper exploitation of synergies.

A collaboration framework had been initiated at start of projects, leading to a very effective share of knowledge and approach. This interaction and common meetings have shown great results so far.

Interaction is also active through the various other national and EU projects that the partners were or are involved in.

Winter School at Grenoble INP

Next collaboration opportunity with other research and innovation projects is the Winter School in Grenoble, to be held from 16th to 19th of December 2015.

With the planned active involvement of DREAM and other collaborating projects' researchers, the Winter school is both an educational event for students and an opportunity of enhancing the interaction across the collaborating projects.



The updated agenda of the Winter School is available on the DREAM web site.

Next conferences and published papers

DREAM is committed to promote its scientific and technical/industrial publications, and to pursue an open access policy to the maximum extent.

To that end, the project web site is used also to provide information on participated conferences and on published papers (<http://www.dream-smartgrid.eu/downloads/#conference-papers>).

Whenever possible, the web site is used also as green access repository, as well as to provide information on published papers (including e.g. associated abstracts and relevant publication media).

In the following, we provide a list of papers that will be included into the proceedings of Conferences to be held at short term.

CIREN 2015, Lyon, 15 -18 June 2015

- "LV4MV: a concept for Optimal Power Flow management in distribution grids, using DER flexibility"; VANET Emmanuelle, LEBEL Gaspard, CAIRE Raphaël, HADJSAID Nouredine, BEDIUO Stéphane, GLATIGNY Alain
- "Cost Benefit Analysis of households energy boxes deployment in Europe: impact of the spot prices"; Gaspard LEBEL, Raphaël CAIRE, Nouredine HADJSAID, BEDIUO Stéphane, GLATIGNY Alain
- "Distributed and coordinated Demand Response for the supply of Frequency Containment Reserve (FCR)"; Gaspard LEBEL, Raphaël CAIRE, Nouredine HADJSAID, Karel KUYPERS, Stéphane BEDIUO, Alain GLATIGNY
- "Agent-based distribution grid operation based on a traffic light Concept"; Elisabeth Drayer, Jan Hegemann, Marc Lazarus, Raphaël Caire, Martin Braun
- "The DREAM innovative software architecture for high DG-RES distribution grids"; Kamphuis, René - Wijbenga, Jan Pieter - Macdougall, Pamela - Van der Veen, Jan Sipke - Fäth, Matthias

IEEE Powertech, Eindhoven, 29 June - 2 July 2015

- "Control strategies for a decentralized, real-time operation of distribution grids"; Elisabeth

Drayer, Franziska Meyer, Jan Hegemann, Martin Braun

- "Sensitivity analysis of local flexibilities for voltage regulation in unbalanced LV distribution system"; E.Vanet, R.Caire, N.HadjSaid
- "Applying Innovative IT Modelling Methods to Low-level Grid Information for DSO Operations"; Jan Sipke van der Veen, Jan Pieter Wijbenga, Rene Kamphuis
- "Distributed and Coordinated Demand Response for Frequency-controlled reserve supply"; G.Lebel, D.Wang, R.Caire, N.HadjSaid, S.Bediou, A.Glatigny
- "Convergence Acceleration of Gossip Protocols Applied for Decentralized Distribution Grid Management"; Despina I. Koukoula, Nikos D. Hatziargyriou
- "DREAM: an ICT architecture framework for heterarchical coordination in power systems"; René Kamphuis, Jan Pieter Wijbenga, Jan Sipke van der Veen, Pamela Macdougall, Matthias Faeth