

Management of Renewable Energy Sources in LV and MV Networks, the EU Project INCREASE

Increasing the penetration of renewable energy sources
in the distribution grid by developing control strategies and using
ancillary services

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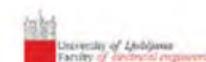
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Austria	JOANNEUM RESEARCH Stromnetz Steiermark
Belgium	Alenco Eandis Elia
Greece	Aristotle University of Thessaloniki
Slovenia	Elektro Gorenjska Korona University of Ljubljana
The Netherlands	Liander Mastervolt Technische Universiteit Eindhoven

Start: September 2013

End: August 2017

48 months

(8 months till today)



- Contribution to increasing the share of RES in electrical power grids
- 20-20-20 goals do 2020
 - Reducing greenhouse gases by 20 %
 - Increasing energy efficiency by 20 %
 - **Increasing the share of RES to a value of 20 %**

- RES which directly feed into in the low and medium voltage grids are mainly
 - Hydropower plants
 - CHP with biomass or residues
 - Wind power
 - Photovoltaic power plants

**Discontinuous, intermittent
not predictable
→ difficult to manage**



- Significant rise of DRES in distributed renewable energy sources place
 - an enormous burden on the secure operation of the electrical grid
 - impacting both the TSOs and the DSOs
- DRES in LV and MV networks leads to a bidirectional power flow which raises the urgent need
 - for new operational and control strategies
 - in order to maintain the ability of the system to provide consumers with reliable supply of electricity at an acceptable power quality level and cost

INCREASE

- enables DRES and loads
 - to go beyond just exchanging power with the grid
 - which will enable the DSO to evolve from congestion to capacity manager
- This will facilitate higher DRES penetration at reduced cost



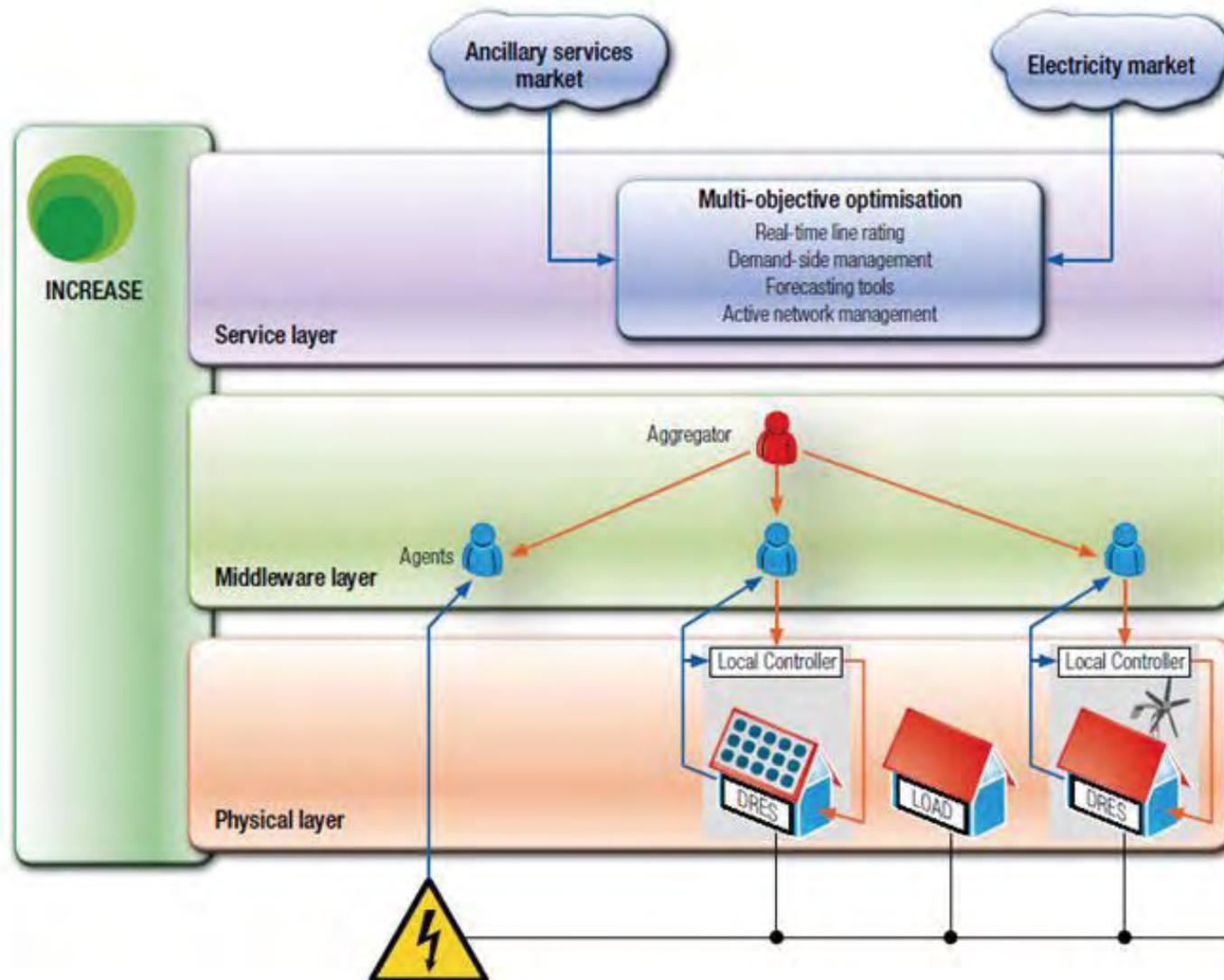
INCREASE

- will investigate
 - the regulatory framework
 - grid code structure and
 - ancillary market mechanisms
- develop a simulation platform
 - which will enable validation of the proposed solutions and
 - provides a tool for the DSOs to investigate the DRES influence in their network, and
- propose adjustments
 - to facilitate successful provisioning of Ancillary Services, necessary for the electricity grid operation
 - including flexible market products



INCREASE will develop

- a 3-phase grid inverter with functionality that enables ancillary services
- a high level control strategy based on a multi-agent aggregator concept, addressing RES to contribute in the control of the distribution network
- a complete ICT solution
 - communicating with the invertors and
 - implementing the algorithms and incorporating the required decision support systems for planning, procurement and exchange of ancillary services
- simulation and analysis tools that enable grid operators to accurately assess the impact of controls strategies

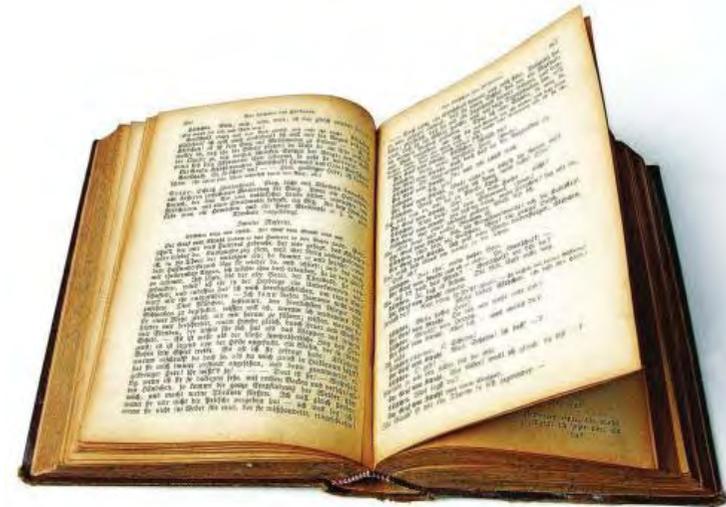


Extensive validation will be reached by

- Lab tests
 - TU/Eindhoven
 - Lemcko (UGent)
- Real field trials
 - Austria (Stromnetz Steiermark)
 - Slovenia (Elektro Gorenjska)
 - The Netherlands (Mastervolt)



- Definition and analysis of the regulatory context and market models to support/exploit the technical innovations
- A hands-on “manual” which DSOs can use
 - to connect DRES on a smart way to the medium voltage grid
 - respecting optimal coordinating strategies



- **The significant rise in DRES has placed an**
 - enormous burden on the secure operation of the electrical grid, impacting both
 - the transmission system
 - and the distribution system operators
- **The massive increase of the intermittent DRES in LV and MV networks has led to a bidirectional power flow which raises the urgent need**
 - for new operational and control strategies in order to maintain the ability of the system to provide consumers with
 - reliable supply of electricity at an acceptable power quality level
- **INCREASE will**
 - investigate, how to optimal manage renewable energy sources in LV and MV networks
 - specify ancillary services towards DSOs but also TSOs
 - in particular voltage control and
 - provision of reserve

Thank you for your attention!

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