



## Strategies and operator tools for grid restoration with massive renewable energy sources

### Cluster

### Resilience

### Topics

supply security, restoration strategies, control center tools, RES utilisation, smart ancillary service

### Results Technology Market Adoption

- T** Modelling strategy for artificial LV- and MV-grid
- T** Residual load models for restoration process studies
- T** Supporting tools for system operators for grid restoration in grids with a high share of RES
- M** Specification and implementation guidelines for restoration tools
- M** Strategies for future grid restoration
- A** Overview on grid restoration challenges considering high shares of renewables

[www.t1p.de/4kzt](http://www.t1p.de/4kzt)



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 **TECHNISCHE UNIVERSITÄT  
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### Partners for Further Development

- Transmission system operators
- Distribution system operators
- Control center manufacturers



ERA-Net SES receives funding from  
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## FIWARE for Smart Energy Platform

### Cluster

## Grid Management

### Topics

smart grids, automation, smart energy, cloud platform

### Results Technology Market Adoption

- T** Design and implementation of open source automation services for MVDC networks
- T** Platform with distributed architecture and semantics for energy efficiency, performance and user-based adaptation of energy systems
- T** District Heating Energy Management (CESO)
- T** ERO app for residents' energy usage
- M** Innovative SOA platform as open source for rapid implementation of IoT solutions and newly built apps
- M** Test sites for complex testing of platforms
- A** Use case evaluation with standards like SAREF and other ontologies
- A** Methods for engaging customers to test flexibility
- A** Supporting new business models for e.g. customer involvement

[www.fismep.de](http://www.fismep.de)



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## Partners for Further Development

- Open source technology providers
- Distribution system operators
- RDI projects
- Developers of energy management systems
- Energy providers
- Municipalities
- Housing associations



## Large-Scale Smart Grid Application Roll-Out

### Cluster

## Grid Management

### Topics

resilience, smart grid applications, security, software deployment

### Results Technology Market Adoption

- T** Knowledge-based deployment process for smart grid applications
- T** Method for identification of security and safety critical issues
- T** Resilient optimal rollout schedules through rollout analysis and validation
- T** Evidential networks for the identification of root causes of rollout failures
- M** Software maintenance for field devices as a service
- A** Guidelines and best practices for seamless, safe and secure application deployment for grid and customer
- A** Templates for communication and workshops with stakeholders

[www.largo-project.eu](http://www.largo-project.eu)



## Partners for Further Development

- Utility operators
- Energy management operators
- System integrators
- Scientific community
- Communication/ICT operators



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## From micro to Mega-GRID: Interactions of micro-grids in active distribution networks

### Cluster

## Local Energy Communities and Microgrids

### Topics

micro-grids, interface, storage, demand response, distribution system operators, aggregators, renewable energy sources

### Results Technology Market Adoption

- T** Optimization tool for energy scheduling of multiple grid-connected micro-grids
- T** ICT interfaces for physical and commercial micro-grids validated
- T** Algorithms to control and exchange information to enable load sharing among micro-grids
- M** Demonstrated, coordinated optimal operation of two battery energy storage-based MG-EMS
- M** Assessment of the impact of market design aspects on the overall market efficiency
- A** Procurement strategies and quantification tools for flexibility for network issues

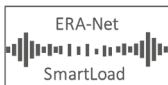


## Partners for Further Development

- DSOs facing capacity issues
- Developers of software for the management (of DSOs and EMS) of micro-grids
- Testbed for local energy communities
- Designers of products and services for local grids
- Research community around incentives for loss reduction and optimal operation
- Aggregators, planners and operators of local microgrids







Joint Call 2016



Smart  
Energy  
Systems  
ERA-Net

## Smart Meter Data Analytics for Enhanced Energy Efficiency in the Residential Sector

### Cluster

## Demand Response and Consumer Activation

### Topics

data analytics, smart meter, machine learning, forecasting

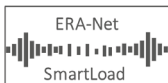
### Results Technology Market Adoption

- T** Machine learning prediction methods for household efficiency characteristics and consumer behaviour
- T** Algorithms to identify electricity base load of households
- M** Targeting tool to identify customers likely to switch to an eco-tariff
- M** Prospecting tool to identify customers willing to invest in sustainable energy systems for generation and storage
- A** Customer segments with interest to adopt sustainable energy products
- A** Design principles for prediction systems to individualize offers and consultancies for end-customers

Runtime 2017–2020

TRL

4 — 6



[www.t1p.de/wnnx](http://www.t1p.de/wnnx)



**CKW.**

 **BEN** Energy



## Partners for Further Development

- Energy utilities
- Electricity retailers
- Vendors of renewable energy systems like heat pumps or photovoltaic installation
- Research communities interested in energy feedback and dissemination of sustainable products
- Data analytics/artificial intelligence vendors



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## New Energy Business Models in the Distribution Grid

### Cluster

## Demand Response and Consumer Activation

### Topics

business models, participation, prosumer, consumer, peer-to-peer market, blockchain

### Results Technology Market Adoption

- T** Python package for short-term forecasting tool
- T** Simulation environment with grid simulation tools for agent-based modelling of interaction between end-users and grid
- T** Ethereum smart contracts for energy markets
- M** Mechanisms for the right definition of the electricity market price
- M** Criteria for the evaluation of the economic profitability of energy communities
- M** Design for a mutual win-win market, with a benefit and cost pooling system
- A** Consumer/prosumer requirements for different business models and market designs
- A** User-centered approaches enhancing social acceptance and user collaboration



SUPSI



## Partners for Further Development

- Local municipalities in cooperation with their citizens
- Communities of pro- and consumers
- Distribution grid operators and related business administrators interested in business models for distributed energy resource (DER) integration
- Researchers interested in user-centered design of self-consumption communities
- Researchers interested in acceptance and gamification concepts for DER management





Joint Call 2016



Smart  
Energy  
Systems  
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## Efficient Demand and Supply Matching by Incentivizing End-Users in Buildings

### Cluster

## Demand Response and Consumer Activation

### Topics

smart grids, flexible demand-response, user acceptability, control systems, intelligent buildings, living labs

### Results Technology Market Adoption

- T** User-proof building energy management systems
- T** Scalable, automated ICT platform for supply-demand matching
- T** Automated control designs based on algorithms for innovative, integrated future demand-supply management
- M** Models for local energy markets
- M** Management schemes for energy savings
- M** Analysis of key incentives for promoting demand-supply matching
- A** Integration of social aspects in models
- A** User control preferences
- A** Motive-based incentives and interventions

Runtime

2017-2020

TRL

2 — 7



[www.matchit.info](http://www.matchit.info)



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## Partners for Further Development

- Network operators
- Distribution and micro-grid operators
- Developers of energy management systems
- Energy service companies
- Energy companies aiming to provide energy feedback and automated control solutions
- Owners and managers of buildings
- (Local) governments and policy makers



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## Smart Community Markets

### Cluster

## Demand Response and Consumer Activation

### Topics

local markets, end-user engagement, digitalization, business models

### Results Technology Market Adoption

- T** ICT platform for a decentralized, local energy market with neighbourhood battery as market center supported by software agents
- T** System for providing flexibility to TSOs based on aggregating residential offers and smart charging
- T** Monitoring, forecast and optimization tools for the provision of flexibility
- M** Validated business model for stacked flexibility services for the frequency market
- M** Flexibility services for households
- A** Approaches for negotiating with local authorities
- A** Guidelines for local market designs including best practice for implementation



## Partners for Further Development

- Technology suppliers for battery storage, ICT and hybrid technologies
- DSOs and TSOs of distributed grids with high renewables share and frequency market
- Building owners aiming to improve the building environment
- Research and development community of flexibility market, smart energy and EVs
- Experts with AI technology in energy fields





## Energy Management Building Set

### Cluster

## Demand Response and Consumer Activation

### Topics

demand response, aggregator, energy cooperatives

### Results Technology Market Adoption

- T** ICT architecture for an heterogeneous multi-vendor system
- T** Energy monitoring and controlling architecture
- T** Forecasting tool to optimize the provision of thermal and electric energy
- T** Automated control application for local optimization based on different data sets (price, weather, consumption)
- M** Strategies for optimizing KWKG benefits
- M** Sensitivity analysis for CO<sub>2</sub> pricing, e.g.: Energy Sources Act
- A** Feedback from EMBS prototype installation at partner side
- A** Feedback from EMBS backend installation (security, firewall, backup)

### Runtime

2017-2020

### TRL

5 — 7



### Partners for Further Development

- Model developers
- Modelers of design tools
- Integration architects
- Energy communities
- Energy contractors
- Housing associations
- Power system integrators
- Local energy communities

