

**Smart Building
Smart Grid
Smart City**

3Smart: Vision for Smart Energy
Distribution Systems in the
Danube region

THE MAIN GOAL OF 3SMART

To provide a technological and legislative setup for cross-spanning energy management of buildings, energy grids and major city infrastructures in the Danube region.

This includes the development of a modular platform for coordinated building and distribution grid energy management. The developed platform will be installed on 5 pilot locations in 5 countries (Croatia, Slovenia, Austria, Hungary and Bosnia and Herzegovina) and comprehensive cost-benefit analysis will be performed to verify the platform's performance.

3SMART VISION

In this way 3Smart will enable economically optimal interoperation of energy efficiency measures and renewable energy sources in buildings, and will motivate installation of distributed storages to improve energy security in the Danube region.

INNOVATION BROUGHT WITH 3SMART

Major innovative moment is in vertical two-way synchronization through all the platform modules via simple interfaces to attain optimal operation of the buildings and the grid, and easy modules add-on to the existing systems.

PROJECT PARTNERS

	University of Zagreb Faculty of Electrical Engineering and Computing	Lead partner
	Hrvatska elektroprivreda d.d.	ERDF partner
	E 3, ENERGETIKA, EKOLOGIJA, EKONOMIJA, d.o.o.	ERDF partner
	Municipality Idrija	ERDF partner
	Elektro Primorska d.d.	ERDF partner
	European Centre for Renewable Energy Güssing Ltd.	ERDF partner
	Municipality of Strem	ERDF partner
	Energy Güssing Ltd.	ERDF partner
	University of Debrecen	ERDF partner
	E.ON Tiszántúli Áramhálózati Zrt.	ERDF partner
	University of Belgrade Faculty of Mechanical Engineering	IPA partner
	JP Elektroprivreda Hrvatske Zajednice Herceg Bosne	IPA partner
	University of Mostar Faculty of Mechanical Engineering and Computing	IPA partner
	Croatian Energy Regulatory Agency	Associated strategic partner
	Jožef Stefan Institute	Associated strategic partner
	Goriška Local Energy Agency	Associated strategic partner
	Regulatory Commission for Energy in Federation of Bosnia and Herzegovina	Associated strategic partner
	Hungarian Energy and Public Utility Regulatory Authority	Associated strategic partner

WHY ARE THE CURRENT ENERGY DISTRIBUTION SYSTEMS IN THE DANUBE REGION “NOT SMART”?

Technology current state analysis in the Danube region

Challenges/obstacles identified

- Renewable Energy Sources (RES)/Distributed Energy Resources (DER) are still considered a problem, not a market participant
- The information exchange between the Transmission System Operator (TSO) and the Distribution System Operator (DSO) is inadequate and needs to be clearly defined and improved
- Prosumers need to be integrated/promoted as parts of active distribution systems
- “Smart management” of distribution networks is only being tested on pilot distribution networks
- Danube region countries do not have Smart Grid strategies
- Communication technology for smart meters is not standardized
- Cost - benefit Analyses (CBAs) for smart meters are very different depending on Danube region country due to different and incomplete methodologies
- Building Energy Management System (BEMS) is not used for helping DSOs in grid issues
- Technical specifications for smart meters do not cover the possibility of communication with BEMS

Regulatory current state analysis in the Danube region

Challenges/obstacles identified

- Liquid electricity markets are a necessity to have flexible power system operation
- RES are still supported either by feed-in tariffs or premiums and are not a market player/actor
- Reserve markets are still not developed and reserves are being procured bilaterally and not fully transparent
- DER need to become full market participants, particularly on the ancillary service markets
- How should dynamic tariffs be promoted for final consumers?
- There is no framework that requires/encourages DER to provide ancillary services
- There is a need for additional regulatory incentives to promote BEMS in newly built properties

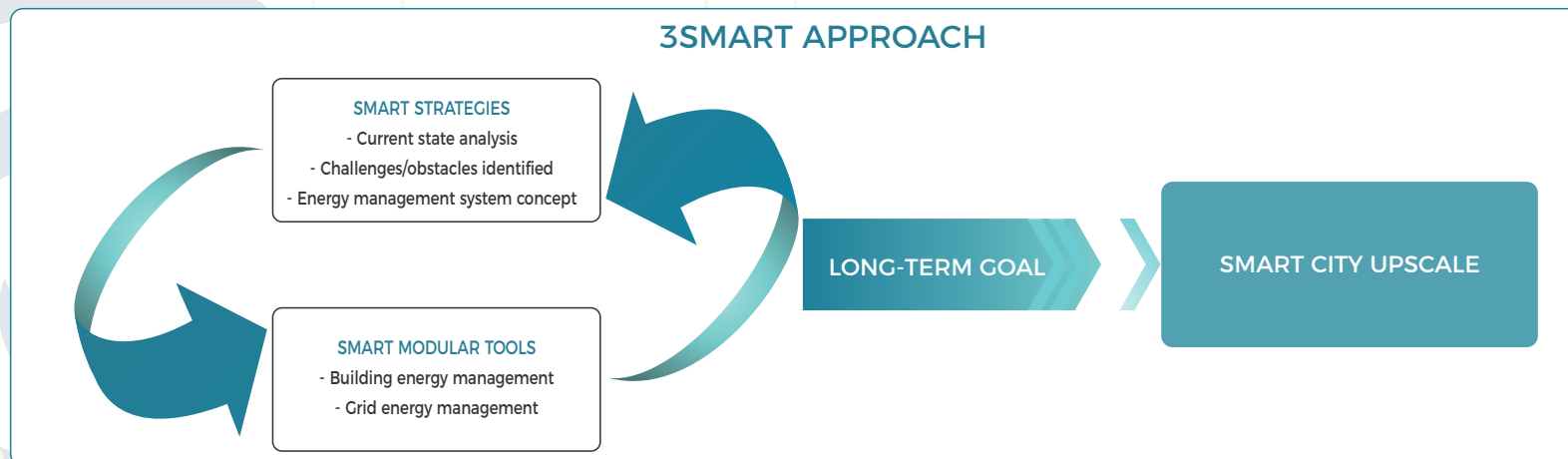
DSO current state analysis in the Danube region

Challenges/obstacles identified

- Less than 5% of final consumption points are integrated into Advanced Meter Reading (AMR) system
- Deep connection cost for DER integration might result in overbuilding and underutilizing the distribution network assets
- Optimal network layout/topology is based on experience and rarely changed
- Goals of reducing voltage deviations, power losses and increasing reliability and quality of supply (SAIDI, SAIFI) can be in conflict with current DER/RES integration practices
- Storage is mainly not recognized as a DSO asset
- Long-term network planning strategies, such as reducing the number of voltage levels, need to be integrated with smart distribution network planning concepts
- Conflicting challenges between standardizing procedures for planning future distribution networks and continuous integration of new technologies

More information may be found in documents [D3.1.1](#) and [D3.2.1](#) published on the project web page.

We are currently in the process of finalizing deliverables outlining technical and regulatory issues and barriers. We would like your feedback in order to include verified information from national authorities as well as information from the field from different energy market participants, experts and other interested parties.

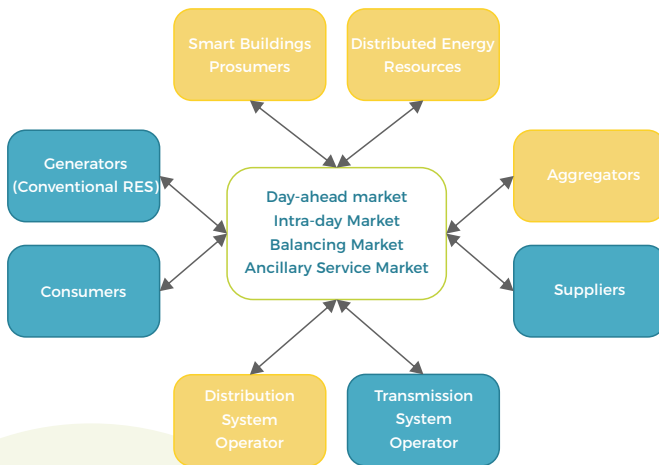


FROM IDENTIFYING PROBLEMS TO CREATING SOLUTIONS

MARKET CHALLENGES/OBSTACLES - PROPOSED SOLUTIONS

Current market design is based on balancing groups (BGs). The distribution level (DSO is one BG) is still rather passive and services are procured from the upstream system only. The concept shown in figure on the right demonstrates a general idea of market changes needed to make a transition to smart, liquid markets. An important aspect is including DSOs in the market process. This means that enabling DER as wholesales market participants also implies including DSOs in aspects of network security and feasibility of contracted schedules, reliability and quality of supply. The DSOs need to recognize opportunities of using DER flexibility for distribution network services. To enable DER to participate in provision of flexibility services, it is important to develop retail markets with clear definition of the role of aggregators.

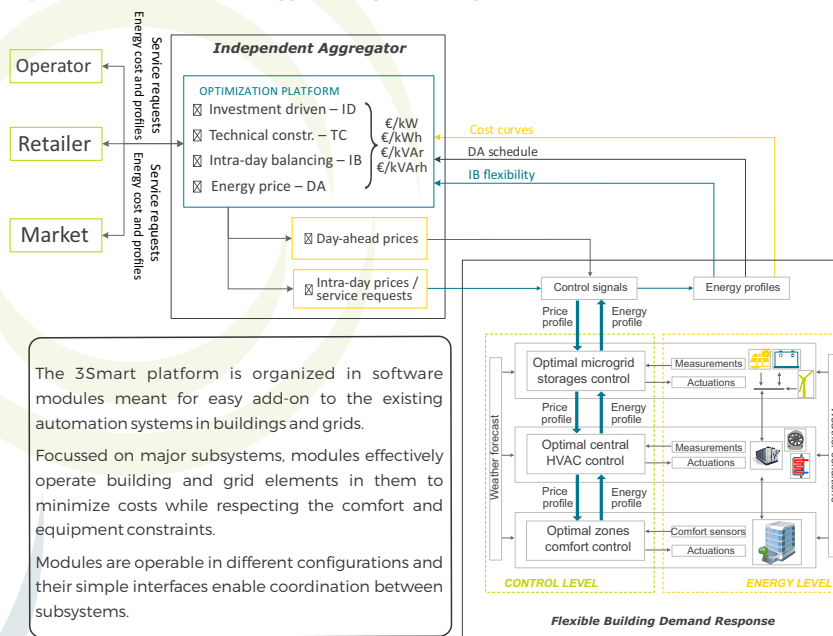
3Smart market concept



PROSUMERS CHALLENGES/OBSTACLES - PROPOSED SOLUTIONS

Recognizing prosumers as market participants and flexibility providers also creates opportunities for integrated building-grid energy management systems. Prosumers flexibility services can be offered to both TSO and DSO. However, to make this functional, strong collaboration and communication between system operators needs to be established. For example, coordinated grid-building operation can help the DSO in achieving goals of mitigating voltage peaks/sags, reducing power losses or improving reliability and quality of supply indices. On the other hand, this prosumers flexibility can be used as a service to the TSO for balancing the power system. Establishing a framework for system operators collaboration is recognized as an important task for inclusion of prosumers as active system participants.

The planned modular energy management system outlook within 3Smart



The 3Smart platform is organized in software modules meant for easy add-on to the existing automation systems in buildings and grids. Focused on major subsystems, modules effectively operate building and grid elements in them to minimize costs while respecting the comfort and equipment constraints. Modules are operable in different configurations and their simple interfaces enable coordination between subsystems.

We sincerely ask to send us any feedback you might have on this brochure or on the linked documents. We hope to commonly pave the optimal route for smart energy systems development in the Danube region. Thank you in advance!

More on the 3Smart concept may be found in documents [D4.1.1](#) (building side) and [D5.1.1](#) (grid side) published on the project web page.

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Danube Transnational Programme



The Interreg Danube Transnational Programme supports transnational cooperation in the heterogeneous Danube region and solves common challenges and needs in the following four specific areas – innovative and socially responsible Danube region, culturally and ecologically responsible Danube region, better connected and energy responsible Danube region, well governed Danube region.

<http://www.interreg-danube.eu/>