Nedo project

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ELES

- Visualize information of distribution network

- Optimize voltage

- Reduce outage time

- Obtain reserve power

1. Introduction

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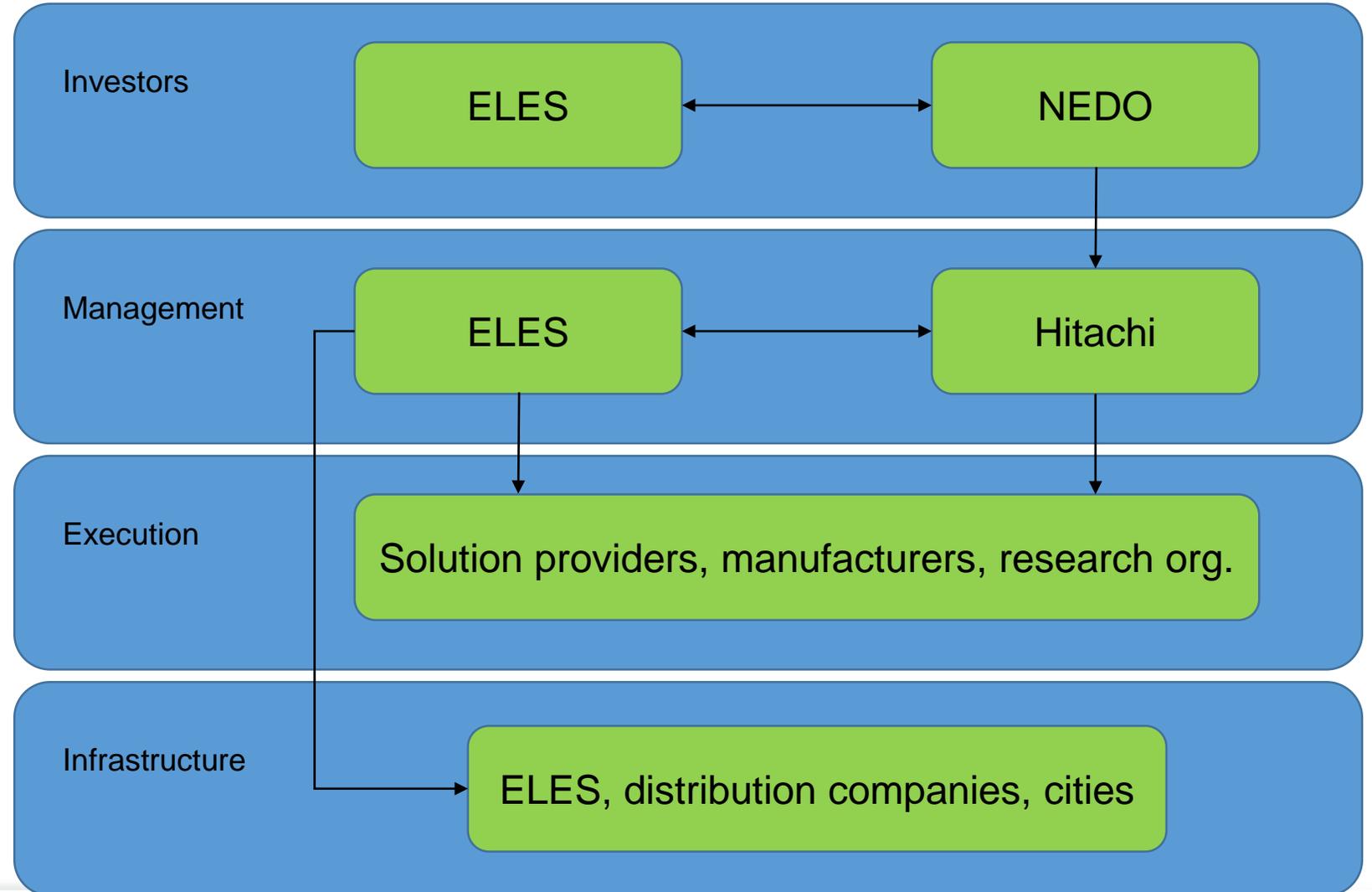
2016-2021
Split in two phases
Phase 1: 2016-2019
Phase 2: 2018-2021
Over 30 partners involved
Value: 35 million €

| Investors | ELES | NEDO |
Management	ELES	Hitachi
Execution	Solution providers, manufacturers, research org.	
Infrastructure	ELES, distribution companies, cities	

State estimation:
- Voltage control
- Conservation voltage reserve
- Reactive power provision
- Closed loop operation
- Short term nodal forecasting
- Systems integration using CIM standard

Demand side management:
- Critical peak tariff
- Balancing of system

- Multifunctional use of system storage:
  - Automatic frequency control
  - Emergency situations
- Smart Communities:
  - Energy management optimization
  - Flexibility

ELES
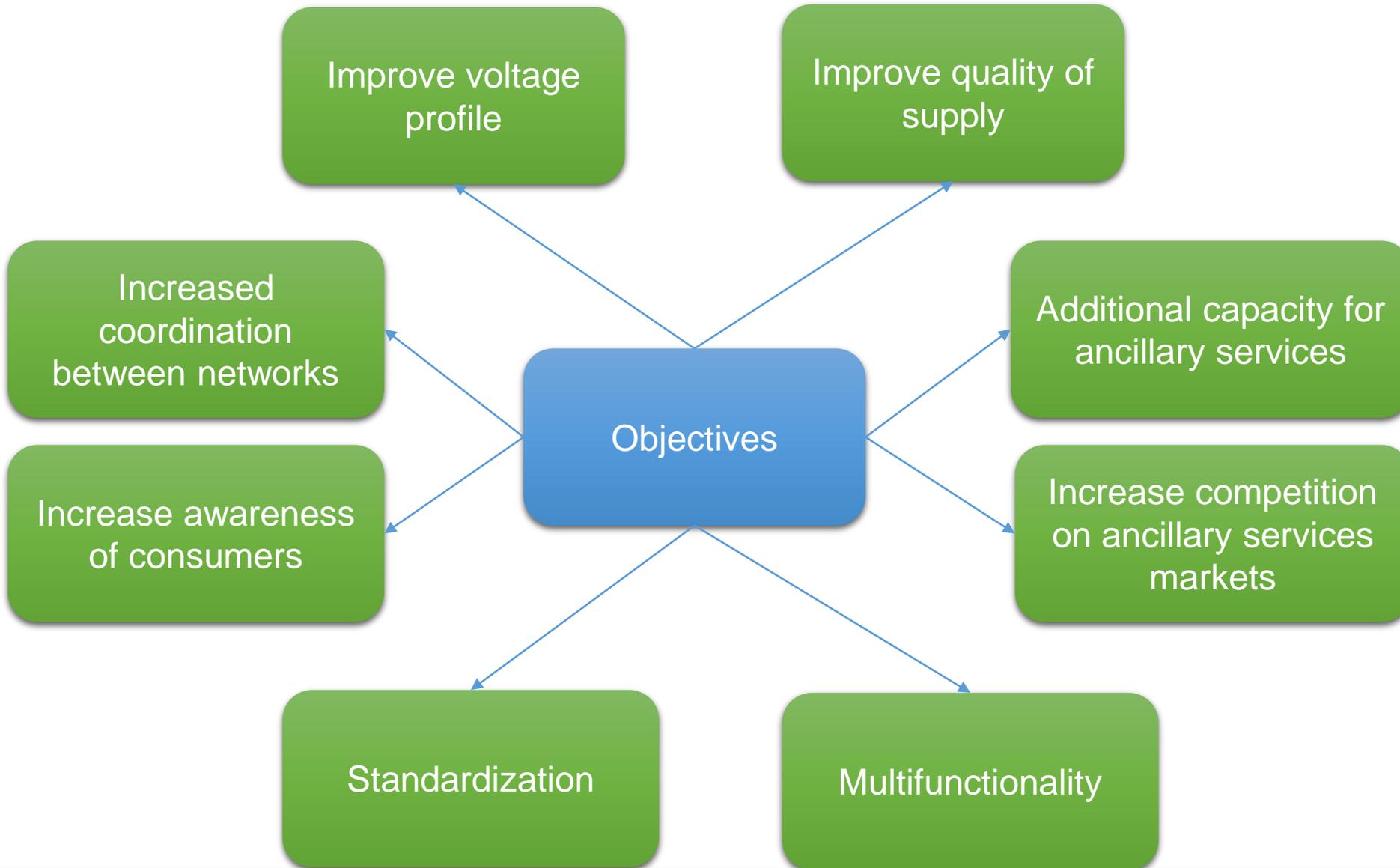
Network operators

Bridge the gap of missing secondary control capacity

Increased reliability of supply in rural areas

Include new consumer groups in ancillary services

25 %

50 %

100 %

Local communities

Solution providers

Lower energy consumption

-10 %

Demonstration

Source: The Surveying and Mapping Authority of the Republic of Slovenia

Kleče

Phase 1: Cloud **Distribution Management System (DMS)**

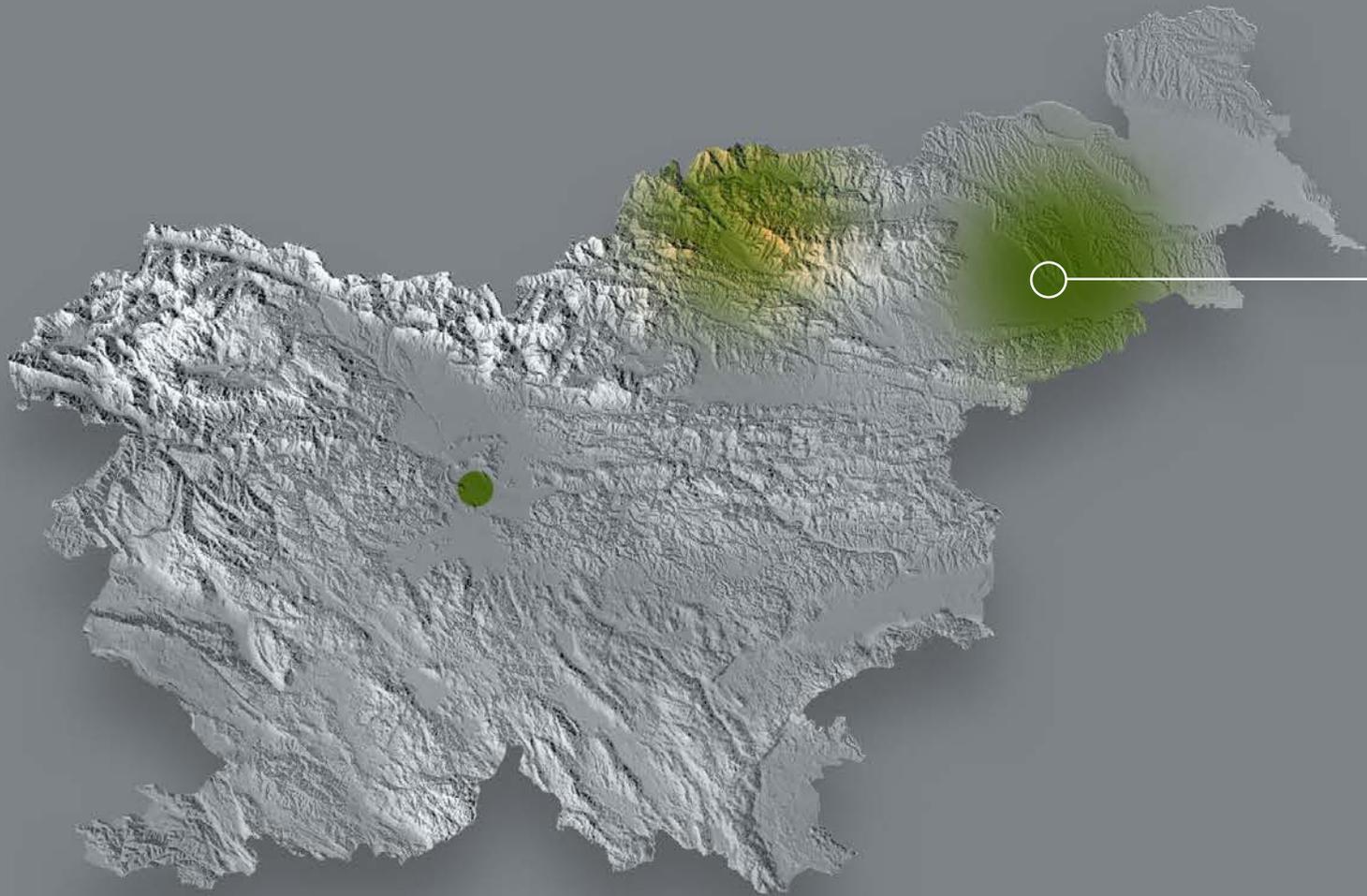Phase 2 plan: **Cloud Area Energy Management System (AEMS)**

Substation Slovenj Gradec

50% higher reliability of supply

Substation Breg
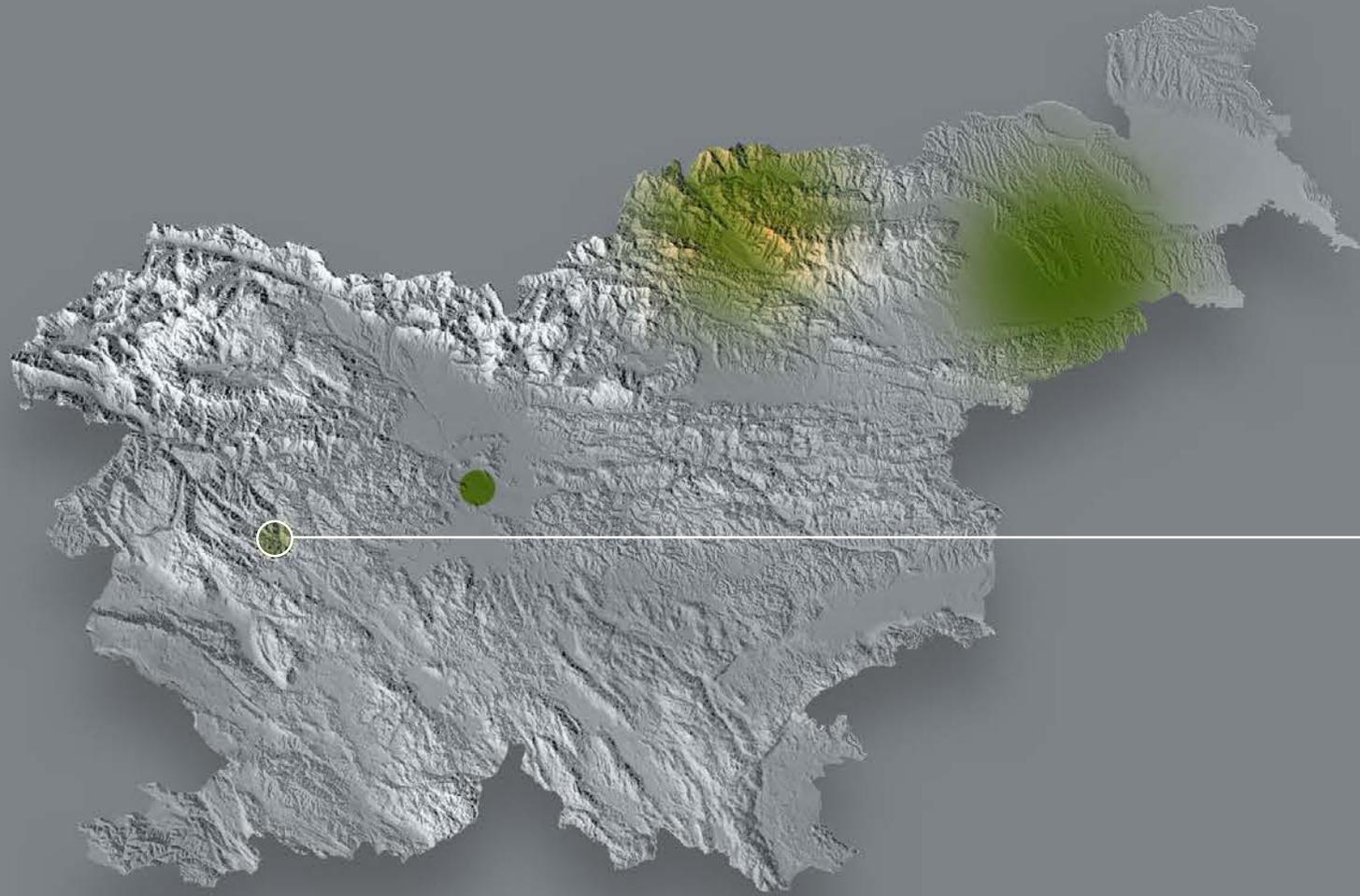
>95% Voltage within standard

Ptuj

10% lower peak load

Substation Breg

>95% Voltage within standard

Idrija plan
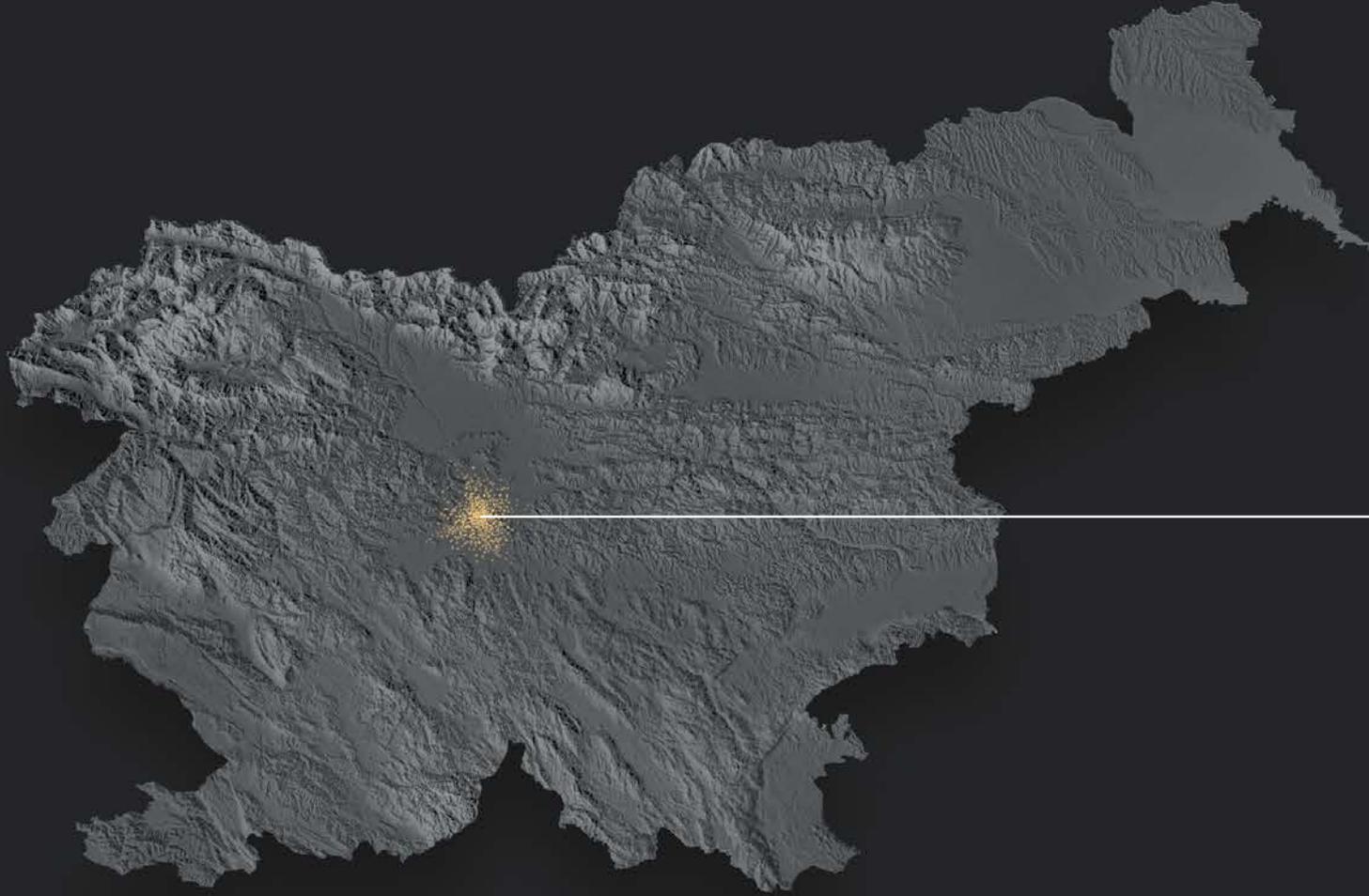
1 MW Hybrid battery

5% lower consumption in public buildings

Ljubljana plan

5 times
larger islanding area

Project plan

3x DMS

41x network control devices

5x Local voltage controller

99x Network measurements

5MW Battery Storage

2x AEMS

100 Relays

~150 xEMS

2. Achievements

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Equipment installed
- Systems integrated

Demand side management:
- Systems and equipment installed
- 10 months of testing

- Phase 2:
  - Implementation plan prepared

Critical peak price:

- 50 hours (chosen by DSO with 24 hours advance notice) the network tariff is 10 times higher, in rest of hours the network tariff is 10 % lower – network bill should remain similar if consumers don't react
- Average 20 € per consumer per year saving

- System balancing
  - 50 hours of activations (chosen by TSO with 15 minutes notice)
  - Consumers receive 25 € compensation for successful participation

2 months
of communication activities

17
presentations to local communities

Web page, posters
Facebook
Press conference
Publications in local media

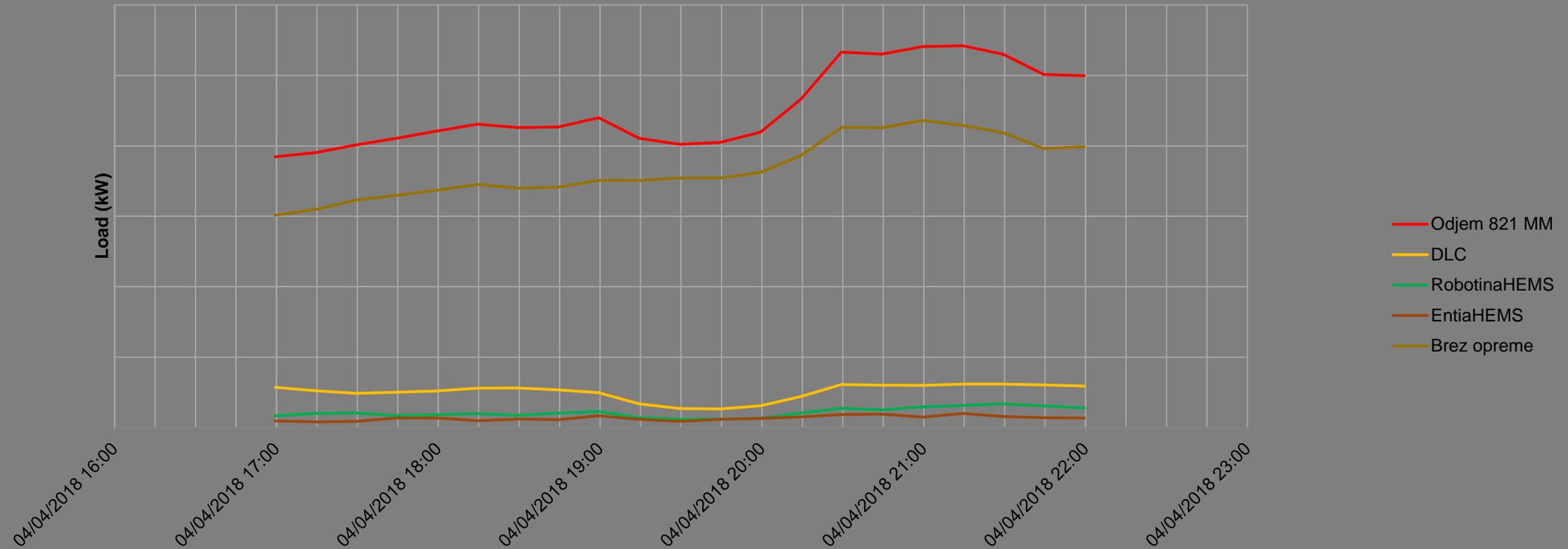830 consumers involved (10 % of all consumers in the area)
100 consumers have load automation technologies

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Aggregated data
of Critical Peak Price activation
on 17.2.2018

Winter time load reduction around 30 %, summer time load reduction around 20 %

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4.4.2018 18:51 - 19:51

Load (kW)

Legend:
- Odjem 821 MM
- DLC
- RobotinaHEMS
- EntiaHEMS
- Brez opreme

X-axis: 04/04/2018 16:00, 04/04/2018 17:00, 04/04/2018 18:00, 04/04/2018 19:00, 04/04/2018 20:00, 04/04/2018 21:00, 04/04/2018 22:00, 04/04/2018 23:00

On average around 10 % reduction, but very fluctuating

- Participants in general very satisfied with the project, willing to continue with participation and willing to recommend to others
- Bills were lower for vast majority of participants compared to traditional system
- Consumers are in general prepared to shift consumption for up to one hour – need of DSO is usually longer
- Without automation, consumers are in majority expecting at least a couple of hours advance notice
- Automation is needed for activations with shorter than 1 hour notice – only aplicable for some users

- Impossible to include high enough share of participants supplied from local nodes if participation is voluntary

- Communication is less reliable in rural areas

- Automation equipment is expensive

- Interoperability between Distribution management system and Demand response platform
- Establish nodal flexibility market
- New business models for including smallest consumers to flexibility portfolios
- New business models for including large scale number of volatile flexibility resources

Thank you for your attention

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