Enabling Microgrids by Rhizomes of the EU Nobel Grid project

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Microgrids:

A technology paradigm for the future of power systems

If well designed, works well both grid-connected and (temporary) off-grid

If paired with storage means, it enables high RES penetration, up to 100%

It allows resilience or even immunity from main grid outages / blackouts

Well driven, on long term, it gives energy sustainability of local communities

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EU project **NOBEL GRID**: A 3.5 years project, finalized in June 2018

21 partners, consortium led by ETRA / Spain

5 + 1 demonstrators (UK, Spain, Italy, Belgium, Greece + Romania/UPB)

Important outcome: the Unbundled Smart Meter (USM) with its new full design, the SLAM

**USM**: enabler for many new applications

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SLAM meter is based on the Unbundled Smart Meter (USM) architecture, and is an answer to the multi-actor/multi-protocol challenge.

A meter systematisation having two parts:
- Smart Meter eXtension (SMX)
- Smart Metrology Meter (SMM)
SLAM – a smart meter to enable a multi-actor ecosystem towards a clean energy

Building rhizomes for new applications

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Enabling local energy contracts in microgrids

**SLAM** - Opening for ESCOs: unleashing myriad of services, allowing flexibility and user empowerment

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User awareness of power quality in microgrids:
Voltage level over one day

Symmetrical empowerment of both Actors:
- End-user
- DSO

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User awareness of power quality in **microgrids**: Voltage level over many days

Using Probability distribution

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Enabling prosumer connection in a microgrid

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Enabling Advanced Prosumer connection in a microgrid

SLAM

UniRCon

Prosumer Resilience zone

Resilient Loads

Legacy Loads

Energy Router

MPPT

PV

Battery

Neighbour

By design

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Unidirectional consumption for a prosumer (no back generation): UniRCon

Daily load curve ($P_{\text{day}}$)

Daily net (bidirectional) curve ($P_{\text{net}}$)

No back generation ($P=0$)

Daily UniRCON (no-back-gen) curve ($P_{\text{net1}}$)

PV meter

M1

Consumer

M1

UniRCON

M2

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Enabling Energy community connection in a **microgrid**

Energy exchange over the AC-based energy community

<table>
<thead>
<tr>
<th>Resources</th>
<th>Prosumers</th>
<th>Consumers</th>
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<tbody>
<tr>
<td>Storage</td>
<td>PV</td>
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<td>Storage</td>
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<td>PV</td>
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<td>PV</td>
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</tbody>
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**Plug-and-play & Blockchain technologies**

- **(local) Energy Exchange**
- through blockchain technology
- AC Low voltage network (legacy)

**SLAM**

- MV network
- Microgrid supply point
- AC-LV bulk renewables generation
Enabling Energy community connection in a **microgrid**

Unidirectional consumption over the AC energy community

DC-based energy community exchange

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Rhizomes of Nobel Grid over many other EU projects

**WiseGRID**
RES, storage, EVs and enhanced smart grids

**SUCCESS**
High cyber-security with PUF technology

**NOBEL GRID**
The project which pushed the concept

**ITCity**
(ERA Net LAC 2016), 2017-2020
Smart City awareness

**FISMEP**
(ERA Net Smart Grids Plus), 2017-2020
Data integration in FIWARE platform

**Storage4Grid**
Using USM for valuing prosumers with storage/EVs

**NRG5**
Blockchain technology in SMX / SLAM

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Thank you for your attention

Questions?

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