



# Energy Community Luče

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**PETROL**

Energy for life



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# Background

The village of Luče is situated in the Upper Savinja Valley, Slovenia. The municipality of Luče is counting 400 people in 160 households.

Luče presents a case of a rural low voltage network with a **weak and unstable connection to the medium voltage grid**. Outages are most common during times of **extreme weather events**.

Luče also has a relatively **weak local power grid** which often faces **power outages** and **limits the further integration of RES**, as the voltage during the day rises above the limits.

The initiator of the Luč plant, home EV charging and who **engaged the**

	#	Time total	Time avg.
<b>Unplanned</b>	14	9:45:11	0:34:37
<b>Planned</b>	2	5:02:25	2:31:12
<b>Total</b>	<b>16</b>	<b>14:47:36</b>	<b>3:05:50</b>

alled PV, wind power  
ommunication central  
lish EnC.



# Final goal





# Activities

Technological and control integration of PV, small-scale and community-scale battery storage and electromobility charging points, together with control of flexible demand to increase the RES carrying capacity and self-sufficiency of the local energy system.

Complete management of EnC will enable cost minimization of power for the entire EnC and further RES penetration, which would otherwise not be possible due to grid restrictions.

Trough COMPILE it will be possible to achieve a very high grade of RES production and to solve supply issues can be successfully managed. In scenarios like inclusion of PV and storage, so to prove that security of supply and management of EnC.

Surplus of power will be used for trading on short term markets or for Ancillary Services for system operator.

The result will be the first EnC powered completely by RES.

#	PV inst. [kW]	Connection power [kW]
1	11	3.2
2	11	11
3	11	3.2
4	11	10.8
5	12.9	1
6	11	10.8
7	11	10.8
8	11	1
9	12.9	12.9
	<b>102.8</b>	<b>64.7</b>



# Technical challenges

To get all the necessary permits for community battery installation and transformer station modification

- Technical documentation to execute the project;
- DSO consent for connection of BESS to the grid;
- Land use agreements and Consensus from all involved stakeholders;
- Nature preservation opinion;
- Construction permit,
- ...

Modifications of the transformer station, to enable installation of community battery and island mode operation.

Connecting community battery to the transformer station enables islanding mode.

Establishing robust communication between all elements in the local grid and to integrate microgrid with Petrol and to some extent with DSO systems.

Operating the EnC in way that production from existing and newly installed PV is not curtailed.

A decorative graphic on the left side of the slide. It features a green circle with a white outline at the top left. A thick green line extends downwards from the circle, then diagonally to the right, and finally vertically down to the bottom edge of the slide. Three small green circles are placed along this diagonal line, each connected to a text block by a short horizontal green line.

# Social / operational challenges

To formalize the community organization in order to have a clear partner to represent the community.

To expand the community engagement process in order to offer the opportunity to all village to participate (today only a small part of the village has access to the scheme).

To enhance the relationship with the municipality in order to explore new collective investment opportunities.

Achieved through



**COMPILE TOOLS**





## Technical tools



COMPILE EnC  
Cockpit



COMPILE Building  
Energy  
Management  
system



EV management  
platform



Virtual  
Community  
platform



## Creation tools



COMPILE EnC  
Toolkit



COMPILE BM and  
VA tool



Achieved through



**COMPILE TOOLS** .....



# HomeRule

HomeRule is an **energy building management system** that informs users about consumption, production, stored energy, etc. and manage different assets from the buildings.

Among the functionalities of HomeRule, it can be found:

- Monitoring and managing of different assets from the buildings: smart meters, PVs, storage, heat pumps, cold storage, electric boiler, EV charger, ...
- Regulation of power output from the building and PV production based on grid voltage;
- Local optimization: increasing self-consumption, energy cost minimization, time-of-use optimization, ...
- Advanced data analysis and visualization and
- Machine learning capabilities.



# GridRule

GridRule is a **micro grid controller** which manages and coordinates the operation of the microgrid and its elements.

GridRule's main functionalities include:

- Energy consumption and production forecasting;
- Grid operation and battery energy system management based on the desired mode of operation:
  - Self-sufficiency & island mode operation;
  - Control feeder switches to switch into islanded mode;
  - Peak load shaving;
  - Manual frequency restoration;
  - Voltage control;
  - Reactive power compensation;
  - Frequency control;
  - Compensation of higher harmonic components.
- High-class TANGO architecture for data collection, processing, and visualization;
- Machine learning capabilities.



# Regulation

New Decree on self sufficiency from renewable sources in Slovenia came into force on May 1 2019

Enables non-discriminatory both individual and group self sufficiency

- Individual self sufficiency;
- Self sufficiency in apartment buildings;
- RES Community.

Yearly settlement.

Power restriction

- 80% of metering point connected load for individual self sufficiency.
- 80% of sum of connected loads of all metering points in apartment building or RES community.

Challenges:

- Consistency with other legislation (housing legislation).
- Onboarding and offboarding process in RES communities is not defined.

# Time Line



- Signing of contract between Petrol and members of RES EnC Luče;
- Selection and order of the community battery storage.

August  
2019  
(M10)

- Household battery storage installation;
- Home Energy Management System integration;

- EV charging point installation;
- First workshop for EnC leaders.

- Pilot site Luče operational

- Handbook chapter of demo pilot site ready;
- Plan to replicate business models and project solutions.

April  
2022  
(M42)

April  
2019  
(M6)

Now

2020

2021

- Installation of smart meters by DSO Elektro Celje;
- PVs installed and connected to the grid.
- Project documentation for transformer station upgrade and community battery integration prepared.

- Upgrade of transformer station completed;
- Community battery installation;
- Micro-grid system integration.

- Training Workshop Successful.

- Algorithms and control strategies validated and calibrated;
- Integrated algorithm and control strategies in the EnC.

- Handbook on the EnC creation.

Planning

Installation & Integration

EnC formalization

Validation & Calibration

Handbook



# Thank you

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