

Smart
Energy
Systems
ERA-Net



Rural Intelligent GRID

RuralRegions # Renewables
SocialAcceptance

Runtime: January 2016 – December 2018

RIGRID – Rural Intelligent GRID

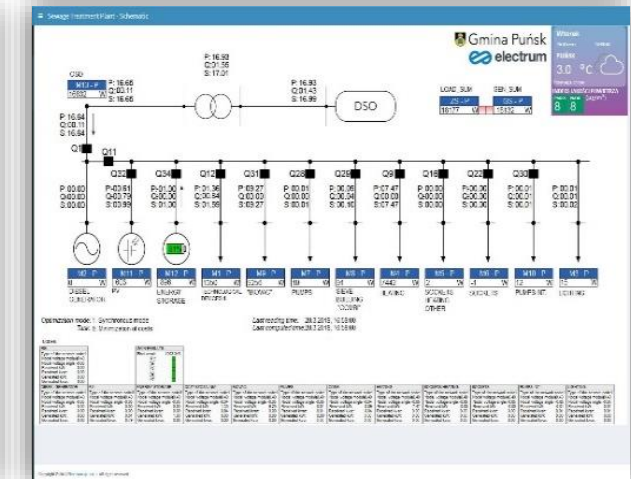
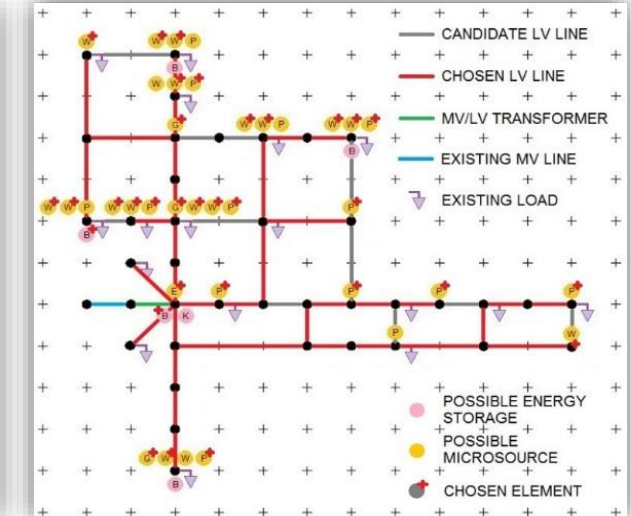
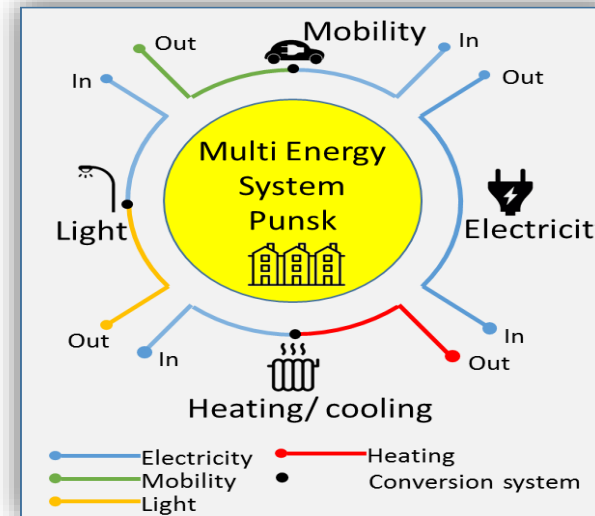
RIGRID offers ready solution for optimal planning and operation of energy infrastructures in rural areas. EMACS remotely monitors and controls the system components such as RES, storage, controllable loads and protection devices to reliably operate the microgrid.

RIGRID from vision:

<https://www.youtube.com/watch?v=qdEA6N4yyZc>

to realization:

<https://www.youtube.com/watch?v=DQKcRqpyKk8>



RIGRID – Rural Intelligent GRID

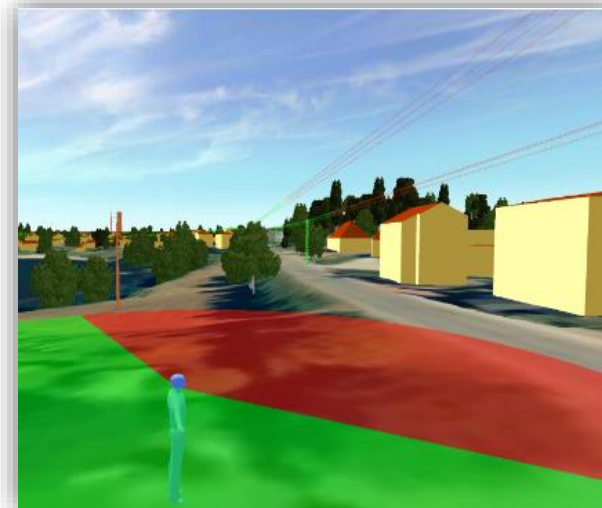
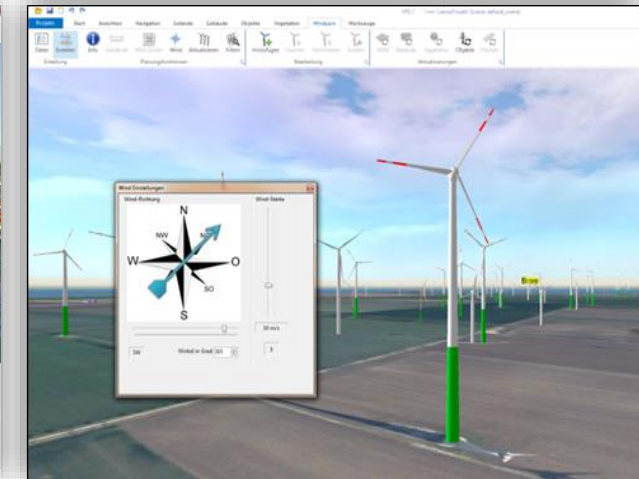
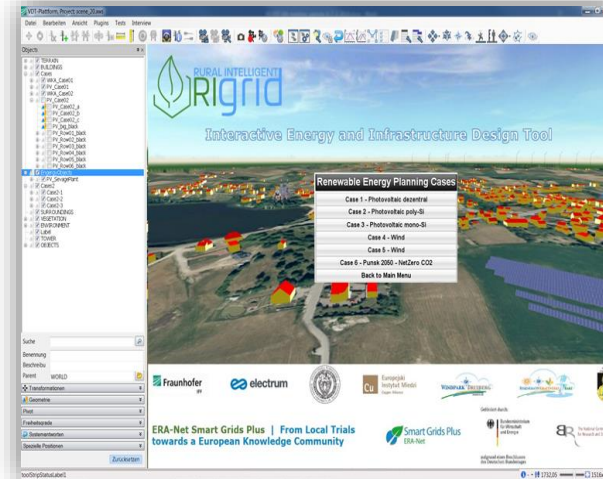
Planning of energetic infrastructures needs active participation of the population in order to increase the transparency and acceptance of the new investments. RIGRID VR-based interactive design tool enables optimal planning of RES, storage and grid structure.

RIGRID from vision:

<https://www.youtube.com/watch?v=qdEA6N4yyZc>

to realization:

<https://www.youtube.com/watch?v=DQKcRqpyKk8>



Project Outline: Results and Exploitation

Results

Technology	<p>Design and control tool for AC microgrids delivering:</p> <ul style="list-style-type: none">• optimal corridors for MV/LV lines, positions and sizes for DGS, RES, BESS, MV/LV transformers• estimation of RES and non-RES generation• evaluation of power and heat grid parameters incl. loads and consumption• optimization for minimized energy imports/ power loss/ energy generation mix/ operational costs or for maximized profits
Market	<p>Financial analysis for power plant and BESS investments considering energy costs and economic benefits (incl. feed-in incentives & coupled storage)</p>
Adoption	<p>3D virtual reality tool for visualizing local system configurations, improving communication and enabling acceptance testing with stakeholders</p>

Partners for Further Development

- (Net zero) microgrid operators and planners
- Planners of energy infrastructure
- Researcher community around multi-criterial planning and acceptance of energy infrastructure
- Software designers employing virtual reality
- Software providers for microgrid planning and operation (including Energy Management and Control Systems)
- Local energy communities with active participation of small electric producers, consumers and prosumers
- Experts for mechanisms and regulations for microgrids offering services to ESO/DSO

1. Interactive Energy and Infrastructure Design Tool

RIGRID Result

RIGRID VR-tool is a modular application for technical and socio-economic planning and operation of new emerging energy infrastructures in rural areas. Technical solutions of microgrid structures can be visualized using Virtual Reality tool. Thus several scenarios can be tested to find optimal placement of PV, wind, storage, lines, cables. Active participation of citizens in the planning process increases the acceptance of new infrastructure and accelerates investment.

Partners for Further Development and Uptake

- Rural regions/ municipalities
- Energy clusters/ cooperatives
- Engineering/ design offices
- RES investors/ Energy system operators

More Information

<https://www.youtube.com/watch?v=DQKcRqpyKk8>

https://www.researchgate.net/publication/325988031_Multi-Criteria_Planning_Tool_for_a_Net_Zero_Energy_Village

Impression



Mapping

Innovation layer: Technology, Adaptation

Level: 6-7

2. Energy Management and Control System

RIGRID Result

EMACS remotely monitors and controls system components such as RES, storage, controllable loads and protection devices to reliably operate the microgrid. It exchanges data between PLC controllers and server router via a UMTS cellular network using communication protocols ModBus, IEC61850 GOOSE, OPC, DLMS, IEC60870-5-104, IEC61850 GOOSE and MMS. Visualization of work status, measurements and control information takes place in graphic tool of EMACS web server. Tested and demonstrated in Pusk/ Poland.

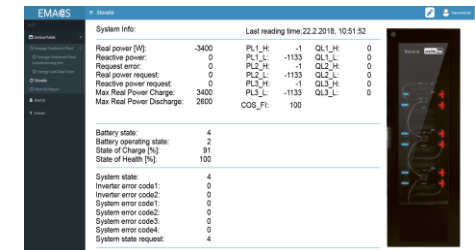
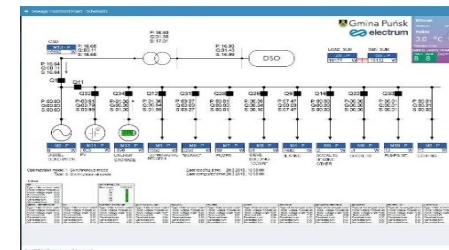
Partners for Further Development and Uptake

- PV parks, wind parks, microgrid owners/ operators
- Energy clusters/ cooperatives
- Components providers, e.g. storage, PV.

More Information

<https://www.youtube.com/watch?v=DQKcRqpyKk8>

Impression



System Info		Last reading time: 22.2.2016, 10:51:52			
Real power [W]	-3400	PL1_H	-1	QL1_H	0
Reactive power	0	PL1_L	-1133	QL1_L	0
Request error	0	PL2_H	-1	QL2_H	0
Real power request	0	PL2_L	-1133	QL2_L	0
Reactive power request	0	PL3_H	-1	QL3_H	0
Max Real Power Charge	3400	PL3_L	-1133	QL3_L	0
Max Real Power Discharge	2800	COB_Ft	100		
Battery state	4				
Battery operating state	2				
State of Charge [%]	81				
State of Health [%]	100				
System state	4				
Inverter error code1	0				
Inverter error code2	0				
System error code1	0				
System error code2	0				
System error code3	0				
System error code4	0				
System state request	4				

Mapping

Innovation layer: Technology, Market

Level: 7-9

3. Multi-criterial planning of Net Zero Energy System

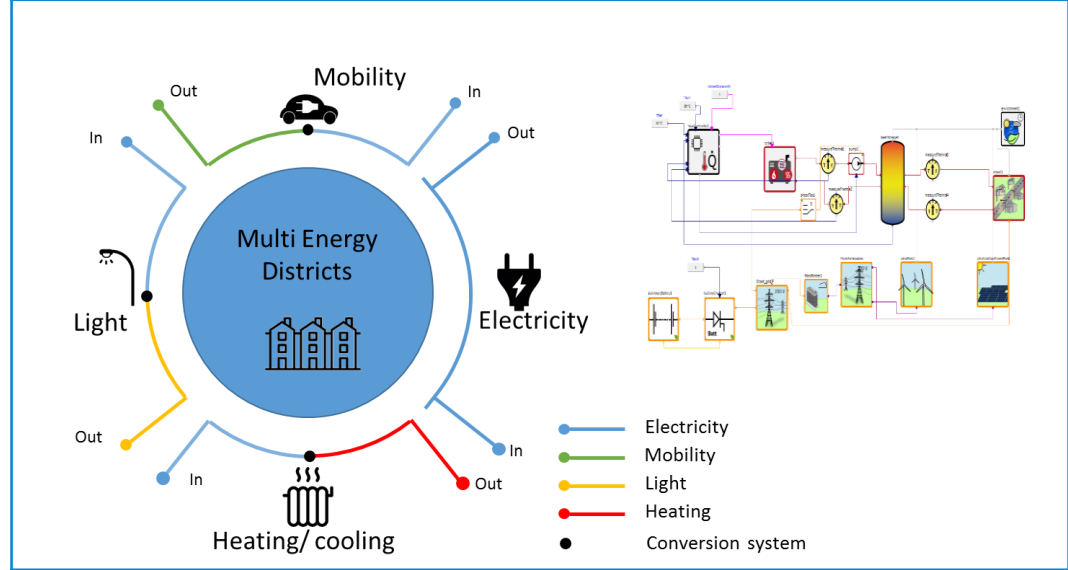
RIGRID Result

Multi-energy systems (MES) can be planned as NZES. The district system (electric, thermal and transportation) is analyzed and modelled considering building's typology, weather conditions, etc. RES based power plants, heat pumps, storage are selected (according technology) and optimally sized to cover all the energy demanded by the system. Economic tool evaluates total investment (TI) required, net present value (NPV), internal rate of return (IRR) and levelized unit energy costs (LUEC) to choose suitable business model.

Partners for Further Development and Uptake

- Scientist, researchers, technology developers
- Municipalities, Energy clusters/ cooperatives

Impression



Mapping

Innovation layer:	Technology
Level:	4

More Information

https://www.researchgate.net/publication/325988031_Multi-Criteria_Planning_Tool_for_a_Net_Zero_Energy_Village

[Example Project Name]: Topics for Exchange

HELP US WITH...

(OPEN QUESTIONS TO DISCUSS)

- 🌱 Further experience with local markets
- 🌱 Scenarios for reactive power procurement
- 🌱 End-user engagement research and experiences
- 🌱 Piloting experience
- 🌱 Exploitation enhancement across the ERA-Net family
- 🌱 'Flexibility market' business models from different countries

WE OFFER EXPERIENCE IN...

(AREAS OF EXPERTISE & EXPERIENCE TO SHARE)

- 🌱 Developing a market framework for automatized regional trading
- 🌱 Implementing a cascade from clearing algorithm to device control
- 🌱 Deploying HW/SW tools in two (very) different European Countries
- 🌱 Understanding and developing a regulatory framework to enable congestion management and local balancing

[Example Project Name]: Further Information and Contact

FURTHER INFORMATION

- 🌱 [Short profile](#) on the ERA-Net SES Website
- 🌱 [Detailed profile](#) on the expera project database, accessible for registered members
- 🌱 Project website: www.example-project.eu

CONTACT

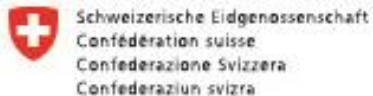
- 🌱 Contact Person:
John Doe, Example University, j.doe@ex.edu.es
[expera profile](#) (accessible for registered members)



ADEME



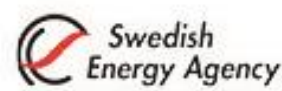
Agence de l'Environnement et de la Maitrise de l'Énergie



Swiss Federal Office of Energy SFOE



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra
Swiss Confederation
Innosuisse – Swiss Innovation Agency



Smart Energy Systems ERA-Net

Funding Partners



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