



National Technical
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**SMART
RUE** | smartgrids
Research
Unit
ECE
NTUA

SUSTAINABLE COMMUNITIES

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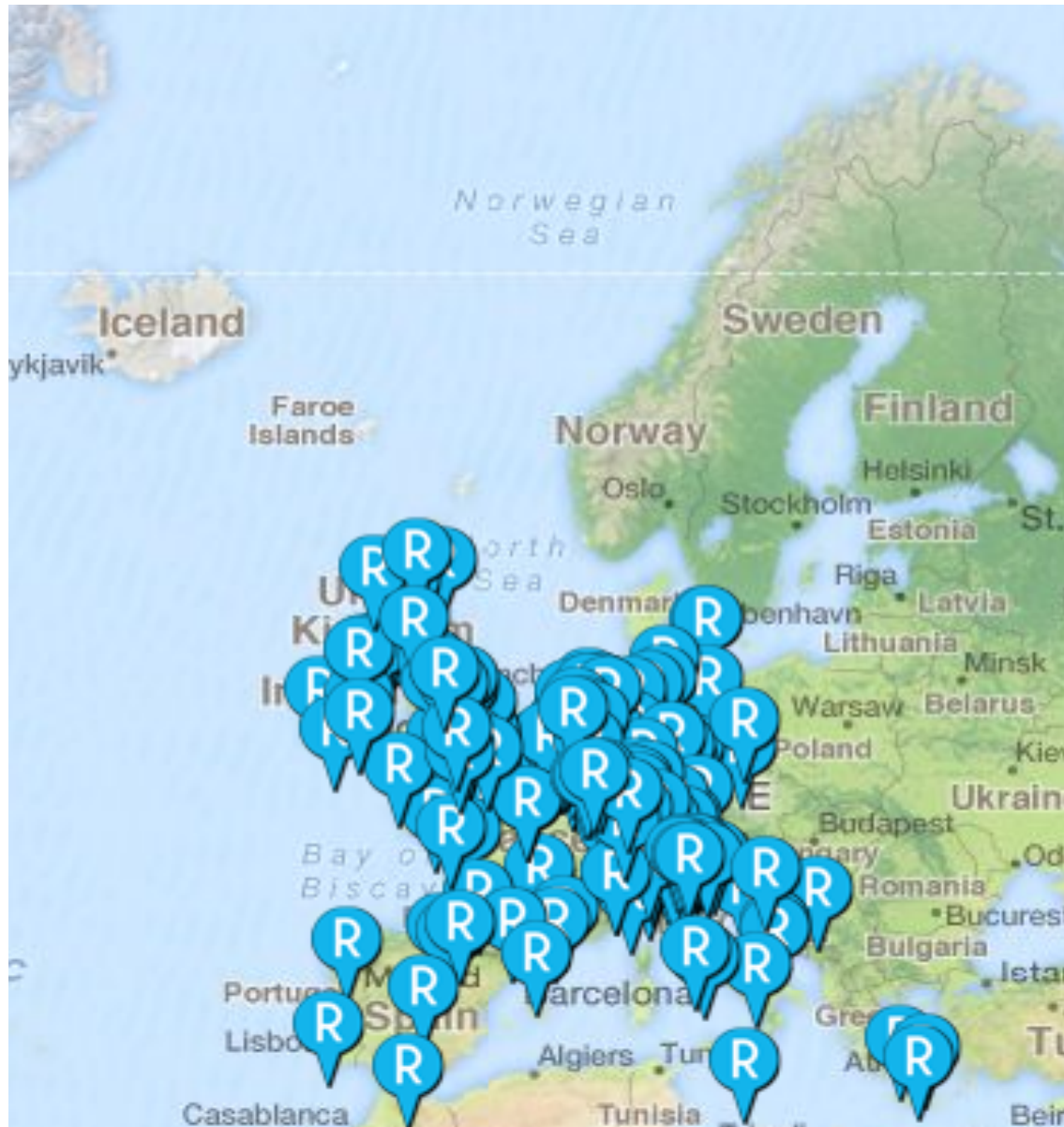
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RENEWABLE ENERGY COOPERATIVES- COMMUNITIES

- Initiatives of citizens and communities to promote the production and consumption of renewable energy
- 2400 REScoops in Europe involving hundreds of thousands citizens
- Types:
 - Only Producers (e.g. Wind Farms)
 - Producers and consumers
- Examples:
 - Denmark: Hundreds community district heating systems, often combined with electricity production (CHP). 100 active wind cooperatives
 - Germany: over 650 local utility companies that provide heat and electricity (PV systems on public roofs and biomass for heating)
 - Belgium: Ecopower supplies electricity from RES to its 47.000 members.





VISION

- Energy cooperatives and municipal companies co-exist and cooperate with government and market based institutions
- Ideas: cooperation, self sufficiency, local control, non-profit, environmental protection, energy democracy
- Revenue generated can be invested to other environmental friendly projects e.g. energy efficiency etc.
- Can decrease the not-in-my-back-yard (NIMBY) mentality



CHARACTERISTICS

- Rural, Urban, grid-connected, off-grid
- Participation of members in the decisions (democracy)
- Collective private ownership or/and municipal
- Promote sustainability and combat climate change
- Small scale (mostly)

The role of Microgrids:

- Microgrids, can constitute the “technical” realization of energy communities.
- Applicable when production is relatively close to the consumer. e.g.
 - Island systems
 - CHP based cooperatives



THE MELTEMI COOPERATIVE

- Meltemi is used as test-site of sustainable technologies
- Environmental awareness
- User participation in technical experiments



GAIDOUROMANTRA MICROGRID IN KYTHNOS ISLAND

- Off-grid settlement of 12 houses
- Intelligent Load Controllers (ILC) have been installed in each house
- The available energy is limited.
- Multi-Agent-System (MAS) for energy optimization provides a technical limitation and protection of the system to prevent over-use. This helps to maintain the good relationships between the neighbours.
- Importance of involving or at least explaining to users negotiation process to equally share the available energy - development of demonstration software
- The technical and economical aspects of system operation are evaluated positively: the system works quite reliably, users pay regularly, the maintenance and repairs of the system are well organized.



NTUA-NGO PROJECTS IN DEVELOPING REGIONS

- Indigenous communities: community mentality (e.g. common ownership of land)
- Accustomed to taking decisions in assemblies
- Not accustomed to energy saving. Energy saving was strongly advised, so that the life-time of the system is prolonged
- Education-training of local technician(s) for operation and maintenance is crucial. More people need to understand the basics
- Remote monitoring of the operation is important



CHALLENGES

- Institutional characteristics of the energy sector.
- Market and regulatory environment
- Economic feasibility
- In some cases negative experiences from cooperatives (e.g. agricultural sector)
- Individualism. Lack of cooperation culture

