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SOCIAL IMPACT OF ENERGY TRANSITION: ENERGY COMMUNITIES

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Energy communities (early 1900)

— First energy communities beginning of 1900:

- Energy cooperatives of the Alps in Italy (similar initiatives in other EU countries, such as Germany)
- Rural electrification
- Established to produce and supply electricity to their members (cooperatives)
- Mainly hydroelectric and developed distribution grid



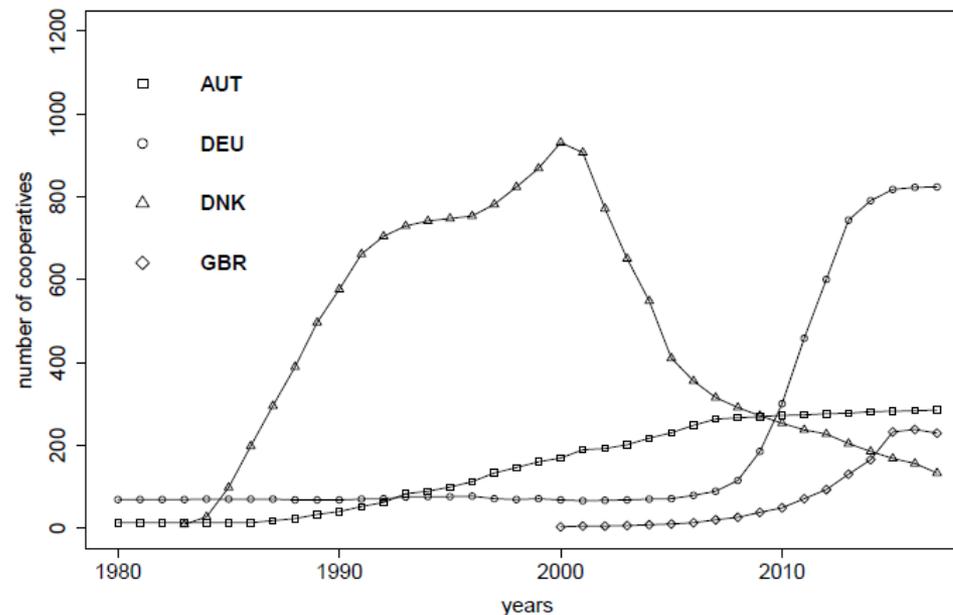
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Energy communitites (1980s)

— Associated to energy transition since the 1980s

- Wind cooperatives in Denmark (1109 initiatives ~ 40% wind installed in 2002)
- Civic society and environmental movements after Chernobyl disaster in 1986
- In Germany growth of energy communities after Fukushima in 2011 (+ impact of FIT)



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Source: Wierling A, Schwanitz VJ, Zeiß JP, Bout C, Candelise C, Gilcrease W, Gregg JS, 2018, Statistical Evidence on the Role of Energy Cooperatives for the Energy Transition in European Countries, Sustainability,

Energy communitites (since 2000s)

— “New wave” since 2000s:

- Energy transition, liberalization of energy markets (new actors, including citizens, SME and local authorities)
- Heterogeneous, different types (e.g. production/consumption cooperatives, purchasing groups)
- Rooted in grassroots and environmental movements

— Charaterized by:

- High level of citizens participation (usually imply a form of ownership or financing of energy project/activities)
- Citizens directly benefits from the outcomes of the initiatives (economic benefits, social, environmental benefits)

— Activities

- Energy supply chain (generation, supply, energy efficiency, e-mobility)
- Social and environmental activities (focus on communities development)



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Target: citizens

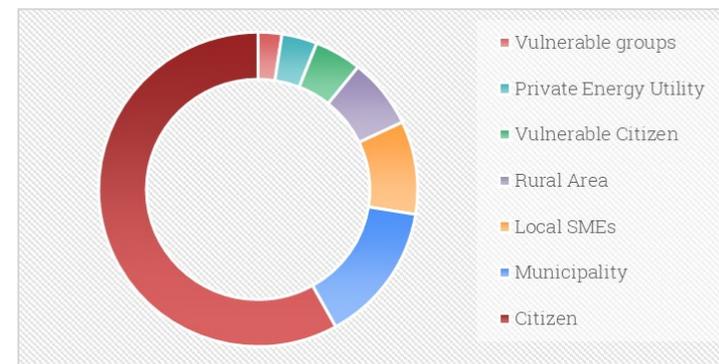
Main actors at the origin of initiatives

	Belgium	The Netherlands	Italy	Spain	Poland	Estonia	Total
Citizens	38	40	23	21	2	10	134
Municipality	15	20	9	9	14	6	73
Energy cooperatives	13	15	7	8	1	3	47
Private energy utility	4	0	8	4	11	1	28
NGO—energy related	5	5	5	2	6	0	23
Total answers	75	80	52	44	34	20	305
Total CAIs	44	47	39	25	24	27	206

Main initial investors

	Belgium	The Netherlands	Italy	Spain	Poland	Estonia	Total
Citizens	34	26	24	14	2	14	114
Public Grant	15	33	4	10	15	10	87
Private Bank	7	3	7	3	3	9	32
Cooperative Banks	2	4	9	2	2	0	19
Crowdfunding	4	6	2	1	0	3	16
Total answers	62	72	46	30	22	36	268
Total CAIs	44	47	38	25	23	26	203

Beneficiaries of activities



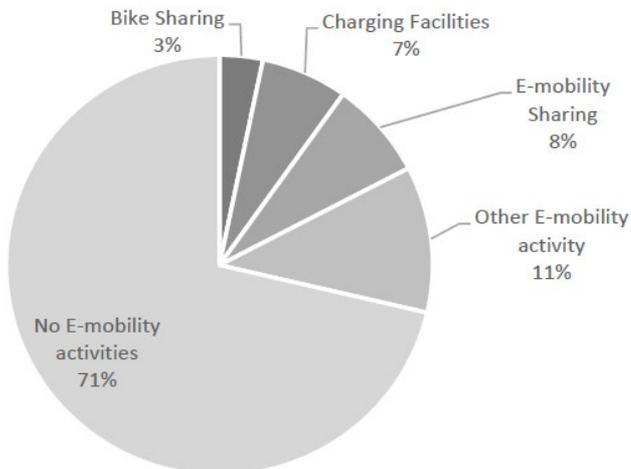
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Energy supply chain activities

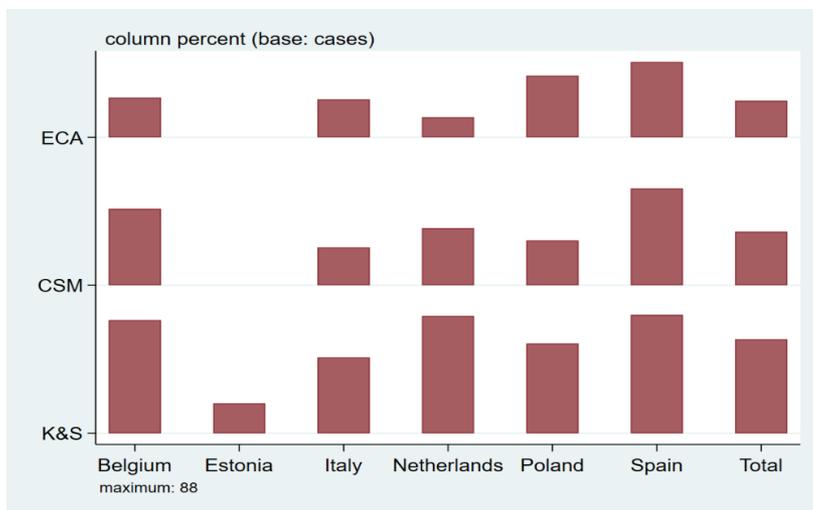
	Belgium	The Netherlands	Italy	Spain	Poland	Estonia	Total
Generation of renewable energy	32	36	24	10	10	20	132
Selling of renewable energy	11	13	13	5	5	2	49
Energy sharing	11	7	6	12	2	3	41
Operating an energy grid	4	2	8	2	1	0	17
Total answers	58	58	51	29	18	25	239
Total CAIs	44	47	36	24	22	25	198

	Belgium	The Netherlands	Italy	Spain	Poland	Estonia	Total
Photovoltaic (rooftop)	30	41	21	13	9	25	139
Wind	24	22	3	3	3	0	55
Photovoltaic (other)	5	18	8	3	6	2	42
Biomass/Biofuels/Biogas	8	2	5	3	5	0	23
Cogeneration	8	0	4	0	7	1	20
Total answers	75	83	41	22	30	28	279
Total CAIs	43	47	36	23	22	26	197



Environmental and social activities/objectives

Activities beyond energy supply chain



- Environmental care activities (ECA),
- Knowledge and skills creation (K&S)
- Civil society mobilization activities (CSM)

- Strong focus on local communities development and social inclusion

Main social objectives:

	Belgium	The Netherlands	Italy	Spain	Poland	Estonia	Total
Support local projects	23	30	17	14	7	5	96
Social inclusion genders	8	2	4	10	1	0	25
Empower youth	4	4	7	7	3	0	25
Support groups	6	4	3	2	2	0	17
Empower women	0	1	3	11	0	0	15
Social inclusion elderly	4	2	2	5	1	0	14
Multiculturalism	3	1	2	5	2	0	13
Reduce unemployment	1	2	1	2	1	0	7
Total Answers	49	46	39	57	17	5	212
Total CAIs	43	46	32	23	20	25	189



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Energy communities in EU directives

- First formal definition of energy communities in EU directives: Renewable Energy Directive (EU) 2018/2001, Internal Electricity Market Directive (EU) 2019/944: Renewable Energy Communities and Citizens Energy Communities
 - energy communities of production (self consumption of distributed generation)
 - open and voluntary participation
 - emphasize control by citizens, local authorities and smaller businesses whose primary economic activity is not the energy sector
 - primary purpose to provide environmental, economic or social community benefits for its shareholders or members or for the local areas where it operates, rather than financial profits
- In Eu directives (2018-2019) introduce a “dual purpose”:
 - “*energy purpose*”, i.e. the need to increase local self-consumption within the energy system in order to allow higher levels of intermitted renewable generation in the energy systems
 - “*social impact purpose*”, i.e to provide economic, social and environmental benefits for members and communities

Social innovation in energy

- Energy communities are **socially innovative models** of implementation of energy projects and services (as characterized by a strong level of **citizen involvement and participation**)
- Multi-level role in the energy transition, from the techno-economic and social perspectives
- **Energy Justice** issues are key aspects of discussion, especially engaging **marginalized groups** (women, low-income households, etc) **in decision making and distribution of benefits**



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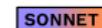
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Policy brief

Putting People at the Heart of Energy Transitions

Social Innovation in Energy:
four projects shine a light on the path forward

Prepared by the H2020 projects



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreements No. 837722, No. 837752, No. 837758, No. 837498.

E.g. : energy community and energy poverty

— Potential economic benefits to vulnerable people:

- reduction in energy bills - *depending whether /how vulnerable people participate*
- receiving additional income from selling the excess production and dividends - *depending on whether citizens have capital to participate/invest*
- Creation of local/community benefits – *depending on implementation model and internal rules on distribution/redistribution of economic benefits (e.g. creation of community benefit funds to support energy poverty)*

— Wider environmental and social benefits:

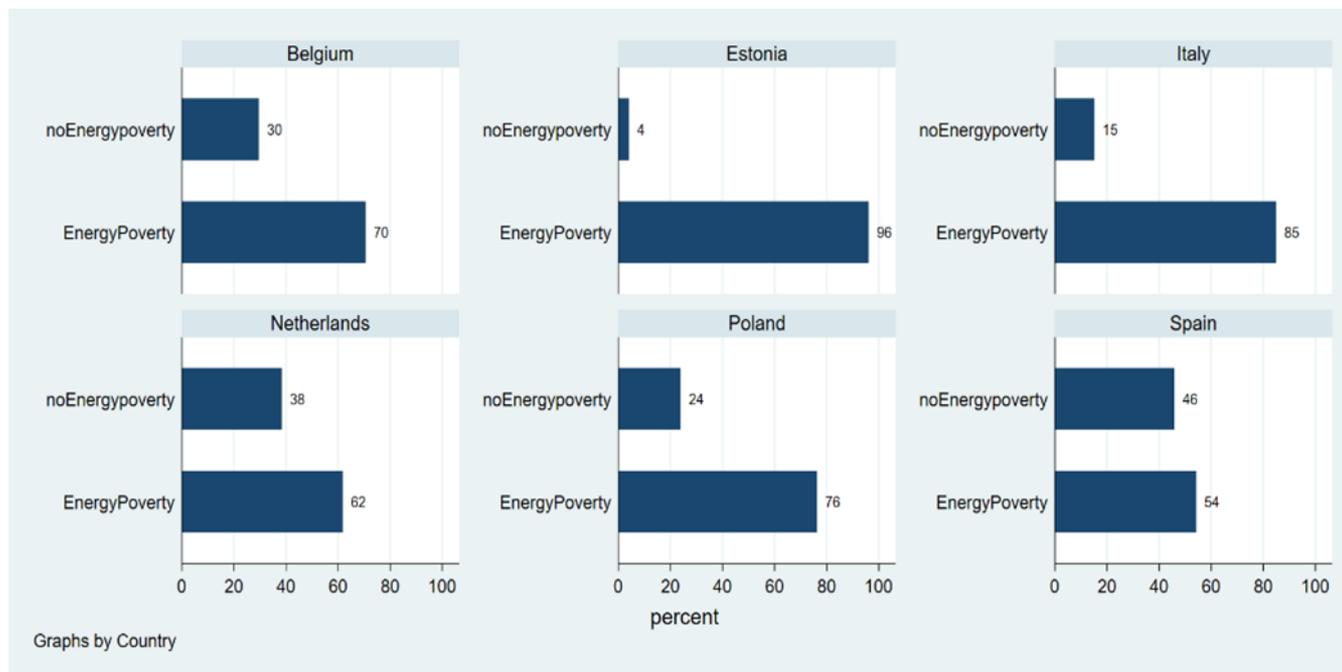
- providing energy efficiency services and energy saving advise
- promoting education and knowledge sharing
- including vulnerable citizens, increasing social cohesion and community cooperation



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Evidence?



- The majority of energy communities surveyed declare to undertake specific actions to address energy poverty or encourage the involvement of vulnerable consumers



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Lupi, V.; Candelise, C.; Sciuolo, A. "[Analyzing Typologies and Determinants of CAIs in the Energy Transition: A Survey](#)". COMETS Deliverable 3.3, 2021

Conflicting evidence?

- Energy justice tenets applied to EC & energy poverty (Hanke et al 2021, JRC), evidence:
 - *Recognition injustice*: lack of awareness or understanding of local energy poverty and vulnerability needs, or engaged with marginalized groups
 - *Procedural injustice*: most energy communities did not implement procedures to address energy poverty, broaden engagement with marginalized groups, or establish financial resources to address these shortcomings
 - *Distributional injustice*: the majority of European energy communities sampled did not provide benefits (such as lower energy prices or greater energy efficiency services) to local vulnerable populations

- Initial evidence of higher participation to energy communities for higher income people (e.g. Wierling et al. 2021)
 - -> Poverty (and access to capital) as a barrier of entry

- Energy communities are often small, not professionally skilled and under financial constraints
 - -> barrier to implementation of wider social/environmental activities



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Looking forward and research needs

- Academic and research debate going from “*getting to know them*”:
 - Mapping and characterization of energy communities
 - Analysis of conditions for deployment
 - Analysis of motivation to participate (economic versus social/environmental motivations)

 - Since EU Directives: modelling economics of implementation (pricing, sizing, optimization of consumers/prosumers benefits, economics of integration into the grid, regulatory design)

- ..to “*evaluation of impacts*”:
 - Economic, social and environmental impacts
 - Need to delve into different implementation models (proponent and type of consumers, assets’ property and financing characteristics, objectives)
 - Qualitative (case studies/surveys) and quantitative estimation (indicators, aggregated analysis)

- To support evidence based policy making
 - Assess how implementation models respond to EU Directive purposes: “energy” and “social impact”
 - Optimize policy incentives (e.g. additional/different policy support, such as grants to feasibility studies etc)

Inventory of citizen-led initiatives

scientific **data**

OPEN

DATA DESCRIPTOR

A Europe-wide inventory of citizen-led energy action with data from 29 countries and over 10000 initiatives



August Wierling ^{1,6}, Valeria Jana Schwanitz ^{1,2,5}, Jan Pedro Zeis: Constantin von Beck ^{1,6}, Heather Arghandeh Paudler ^{1,6}, Ingrid K Tobias Kraudzun ^{1,6}, Timothy Marcroft ^{1,6}, Lukas Müller ^{1,6}, Zacl Chiara Candalise ³, Simon Dufner ¹, Melake Getabecha ¹, Grete Glaa Veronica Lupi ³, Sona Majidi ¹, Shirin Mohammadi ¹, Negar Safara N Yann Robiou du Pont ¹, Philippa Roots ¹, Tadeusz Józef Rudek ^{1,4}, Gayatri Sehdev ⁵, Mehran Ziaabadi ¹ & Nahid Zoubin ¹

A Europe-wide inventory with over 10,000 initiatives and 16,000 production units in 29 countries, focusing on the past 20 years.

Citizen-led energy initiative
Name(s), country
Legal form and status
National identifier(s)
Address, website
Date of foundation or termination
Purpose
Example: Bürger-Energie Südbaden, Germany; active energy cooperative, National Identifier: C-161722, Marktstraße 1-3, 79379 Mühlheim, Germany; web: http://www.buerger-energie-suedbaden.de/ Founding date: 2012-08-30

Energy sector activities
Production of primary, secondary or final energy
Distribution of electricity and heat
Energy services (e.g., contracting, mobility, retrofitting)
Information & awareness (e.g., energy saving)
Example: Sale or purchase of production unit for the generation of electricity through solar PV, wind onshore, biomass, geothermal or hydropower.



Time-tagged information
Number of members, costumers
Ownership (full, partial)
Financial assets (funds raised, membership fees)
Number of employees
Yearly generation of electricity and heat
Example: Bürgerstrom Neckar-Odenwald reports equity of 565420.89 EUR during 2017-01-01 and 2017-12-31.

Tangible assets
Name of production unit, country
Status of grid connection
National identifier, energy product classification
Location, website
Date of building/dismantling, capacity
Example: Wind onshore park 'Großer Wald Hettingen/ Rinschheim', grid connected and commissioned 2013-11-30. Capacity: 15.85 MW.



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THANK YOU

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