



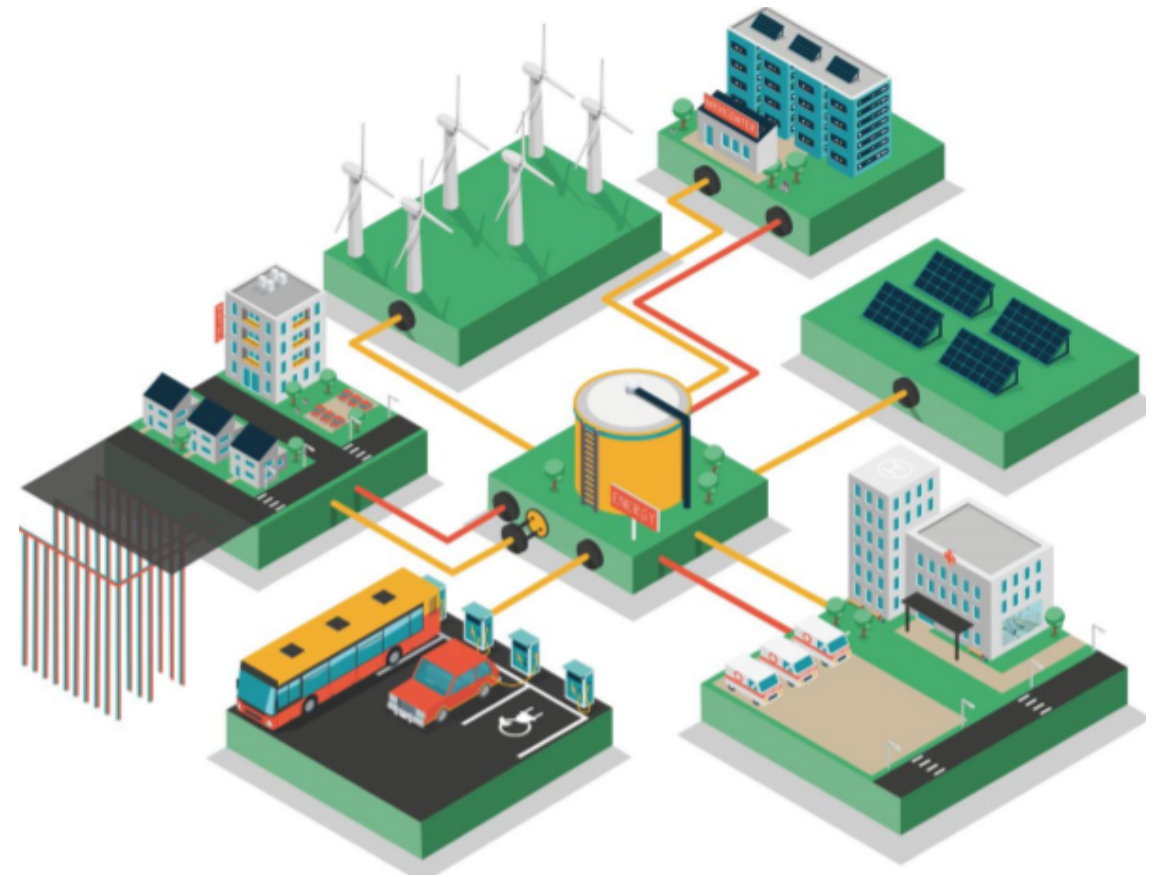
Methodologies for the assessment of energy communities: The example of Multi-Actor Multi-Criteria Analysis (MAMCA)

Dr. Maria Luisa Lode

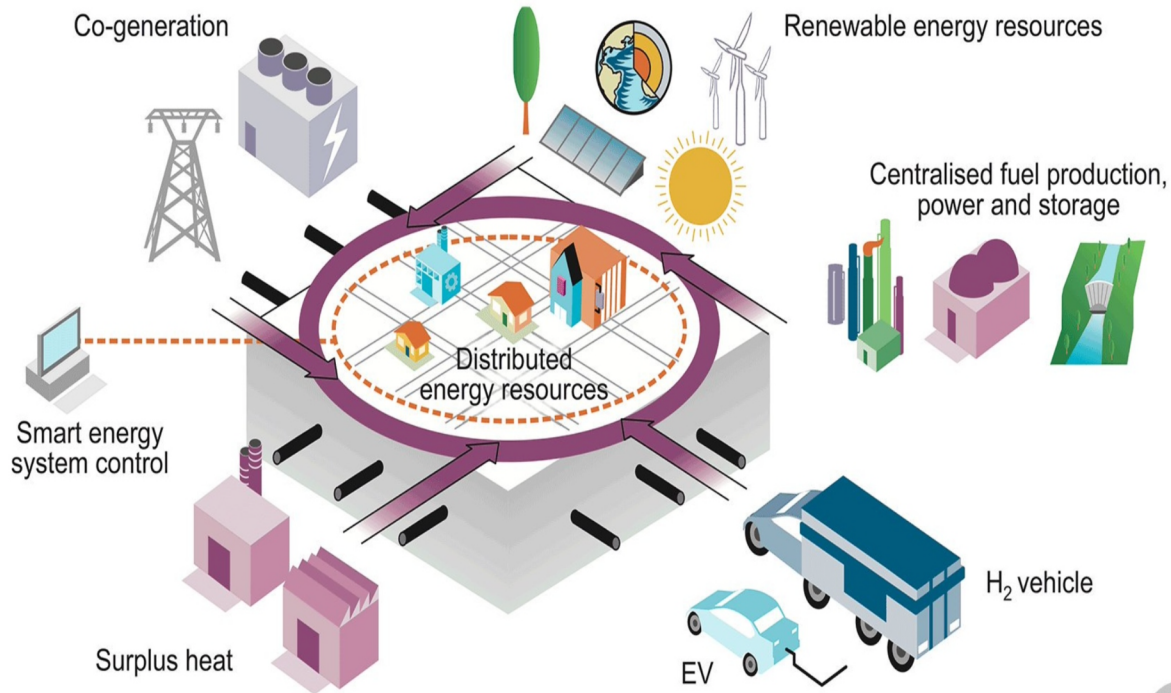


What are Energy Communities?

- Mean to combine local generation (heat, electricity, flexible demand, energy storage) to increase reliability of the local energy system and the balancing capacity of the broader energy system
- Based on voluntary and open participation with a social focus
- Developing national legal frameworks (legal entities) due to the “revised Renewable energy directive (2018/2001/EU)” and “Directive on common rules for the internal electricity market ((EU) 2019/944)”



Implications for the energy market



- Development of **new actors**
- e.g., Prosumers, Energy Communities, Energy Service Companies and **new business models**
- **Integration** of Multi-energy vectors in the current infrastructure (solar, wind, geothermal, electric cars...)
- Rise of **energy democracy** (more rights for the end-consumer)



Energy Communities

Local renewable energy sources and electricity services

Residential buildings



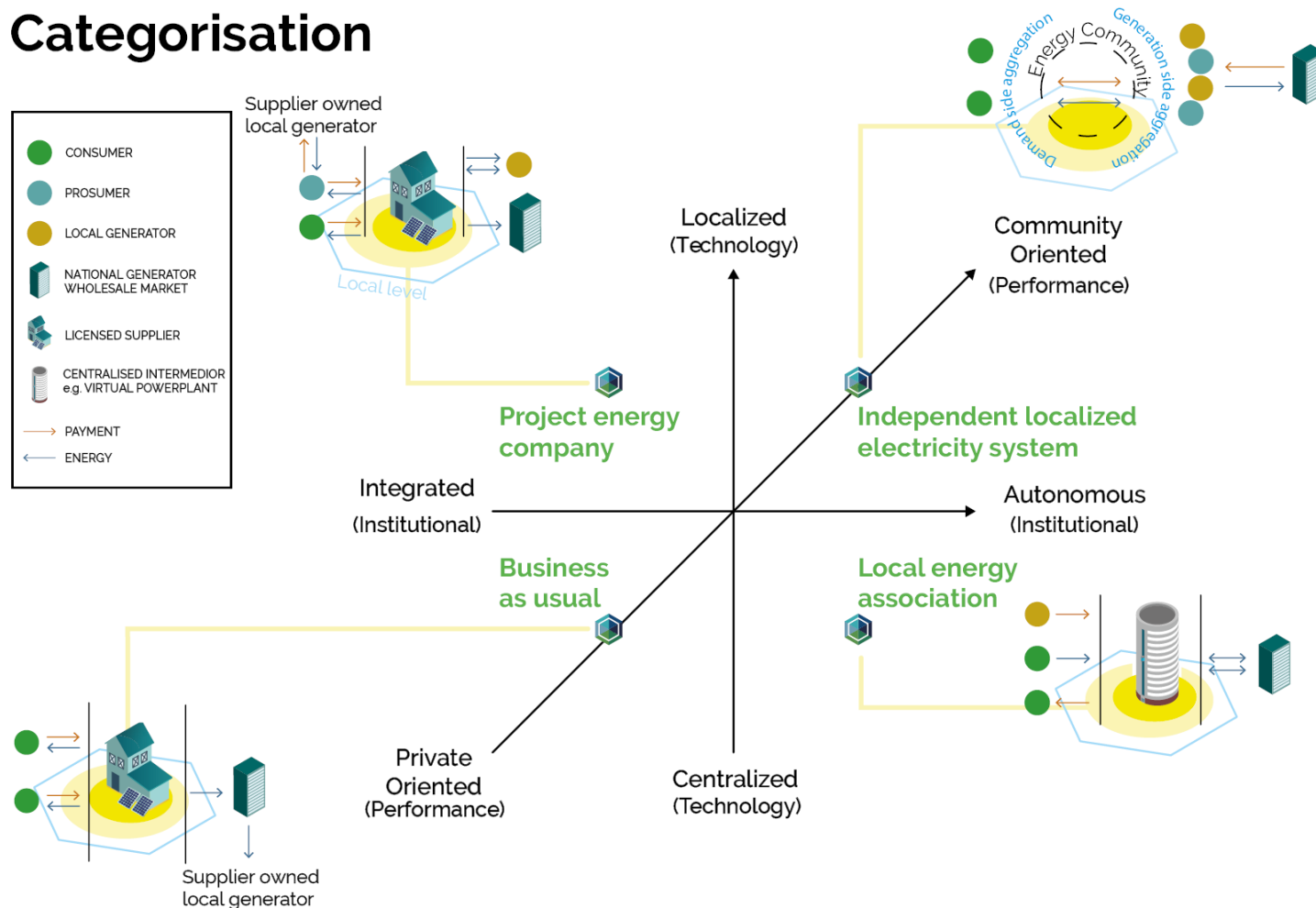
*Graphic by storyset on Freepik

Small medium enterprises
(farms, businesses)

Public institutions
(school, municipalities)

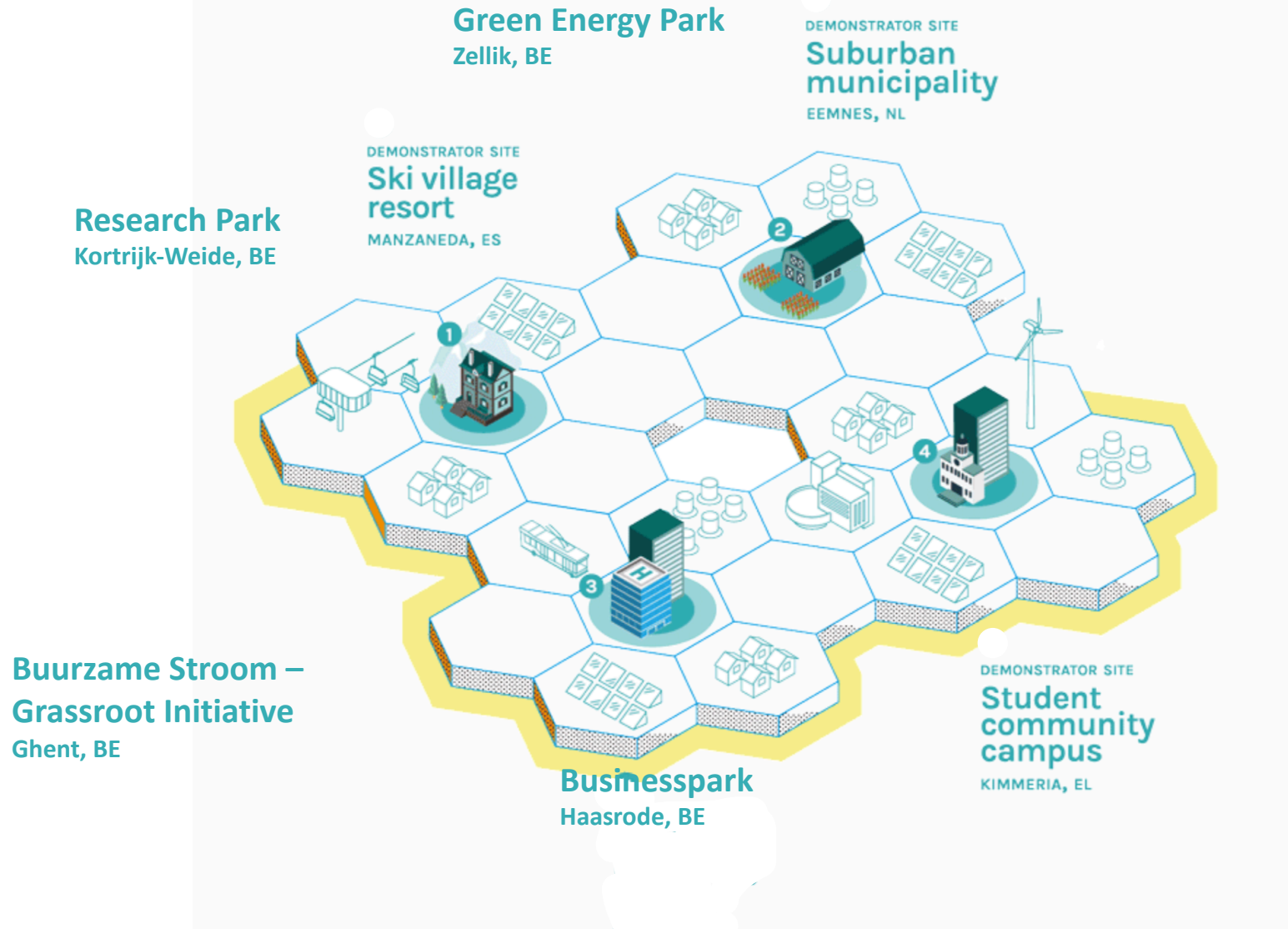
Energy Communities can take various forms

Categorisation



*Building on Arentsen and Bellekom (2014)

Examples for Energy Communities (EU)



Examples were part of the H2020 project RENAISSANCE and the ROLECS project supported by the Flemish government



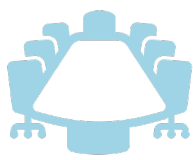
Case studies that applied MAMCA



Who could be involved/is affected?



Energy cooperatives



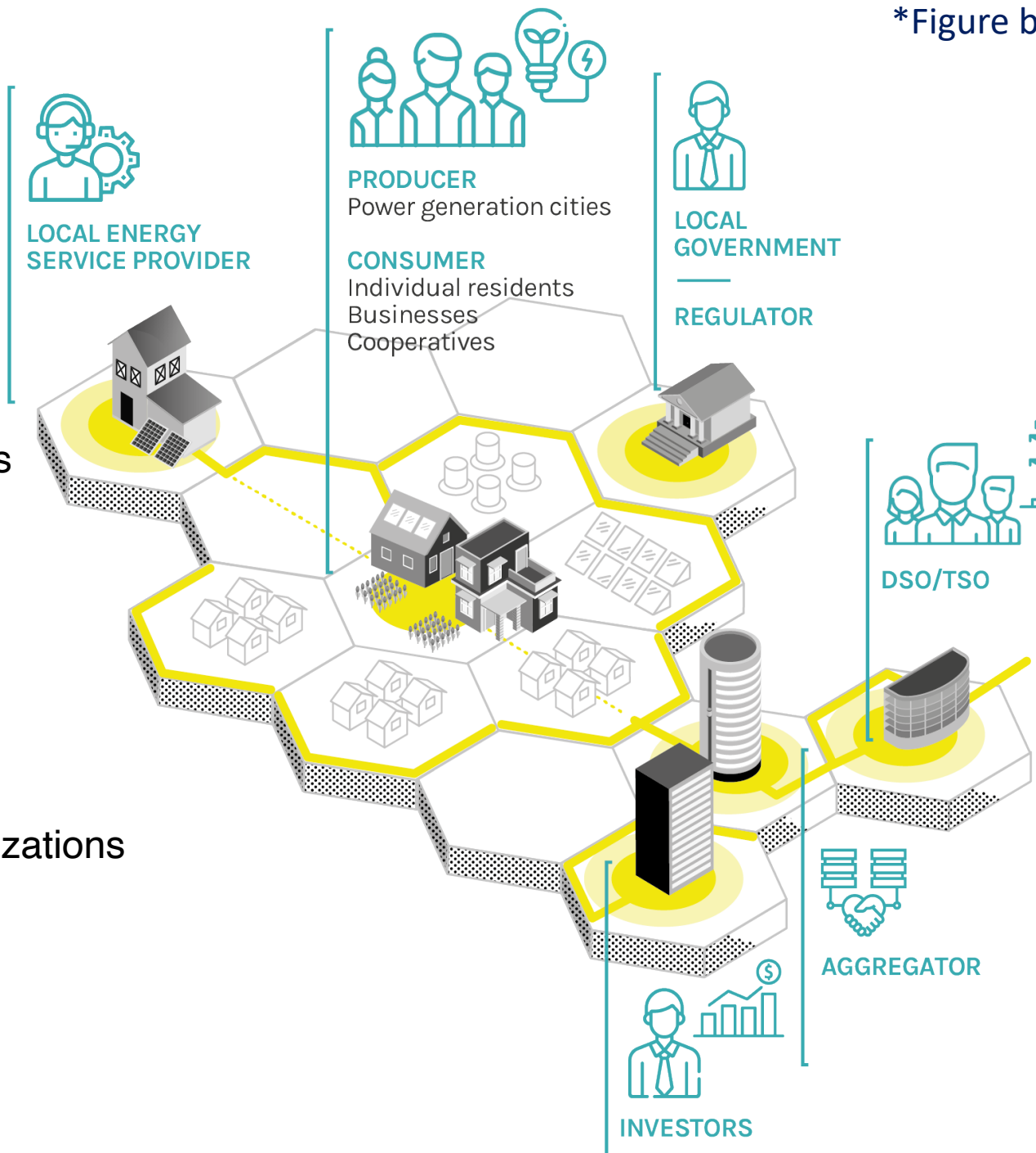
Small medium enterprises



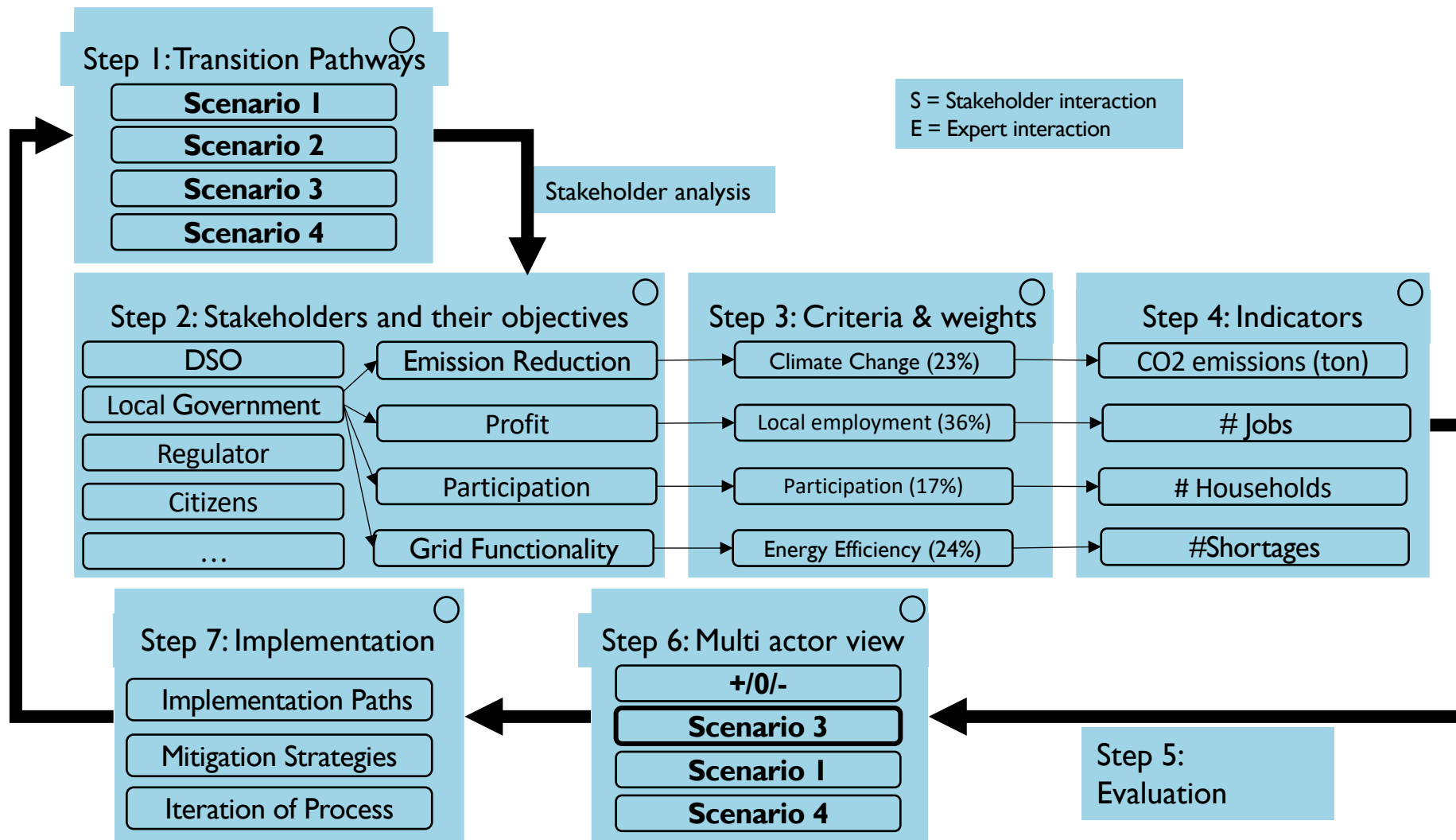
University



Non-governmental organizations



The Multi-Actor Multi-Criteria Analysis



The Multi-Actor Multi-Criteria Analysis

- 1/ Determine potential Energy Community configurations
- 2/ Determine affected entities
- 3/ Each entities defines their objectives
- 4/ Each entity weighs their objectives, according to importance
- 5/ Evaluation of the scenarios
- 6/ Group discussion about the results with all entities(workshop)

Case study example: Eemnes

- Supportive and active municipality
- Presence of Energy Cooperative
- Supportive national schemes (e.g., exception for energy trading tests), NL is origin of Transition Management
- Rich community
- Community already in transition



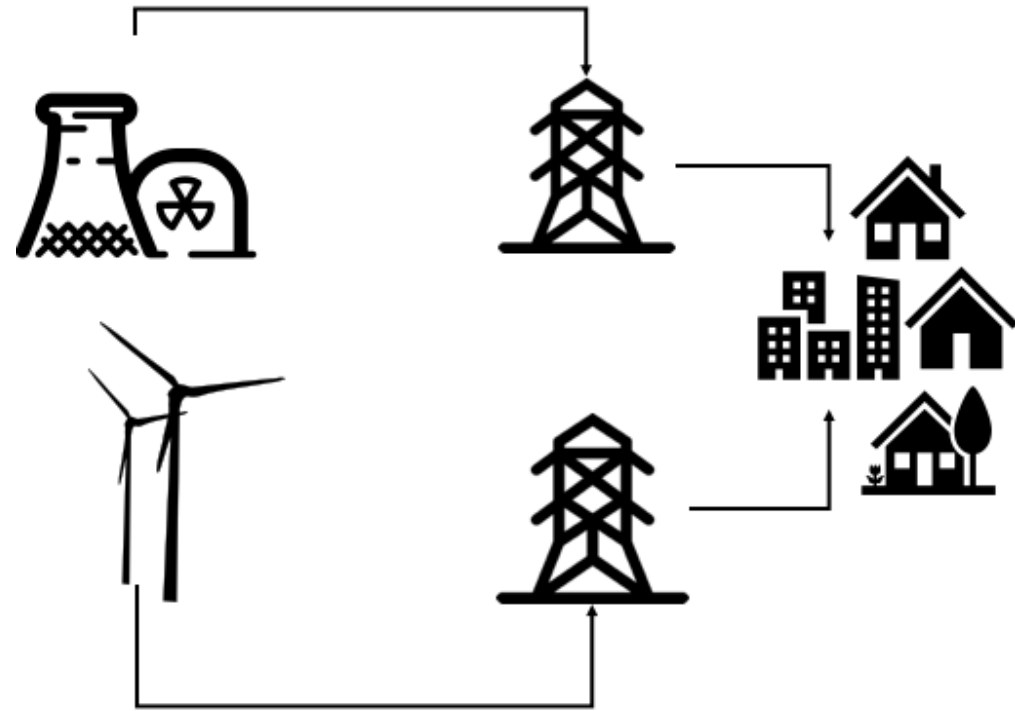


Transition Agenda: Climate Neutrality by 2030

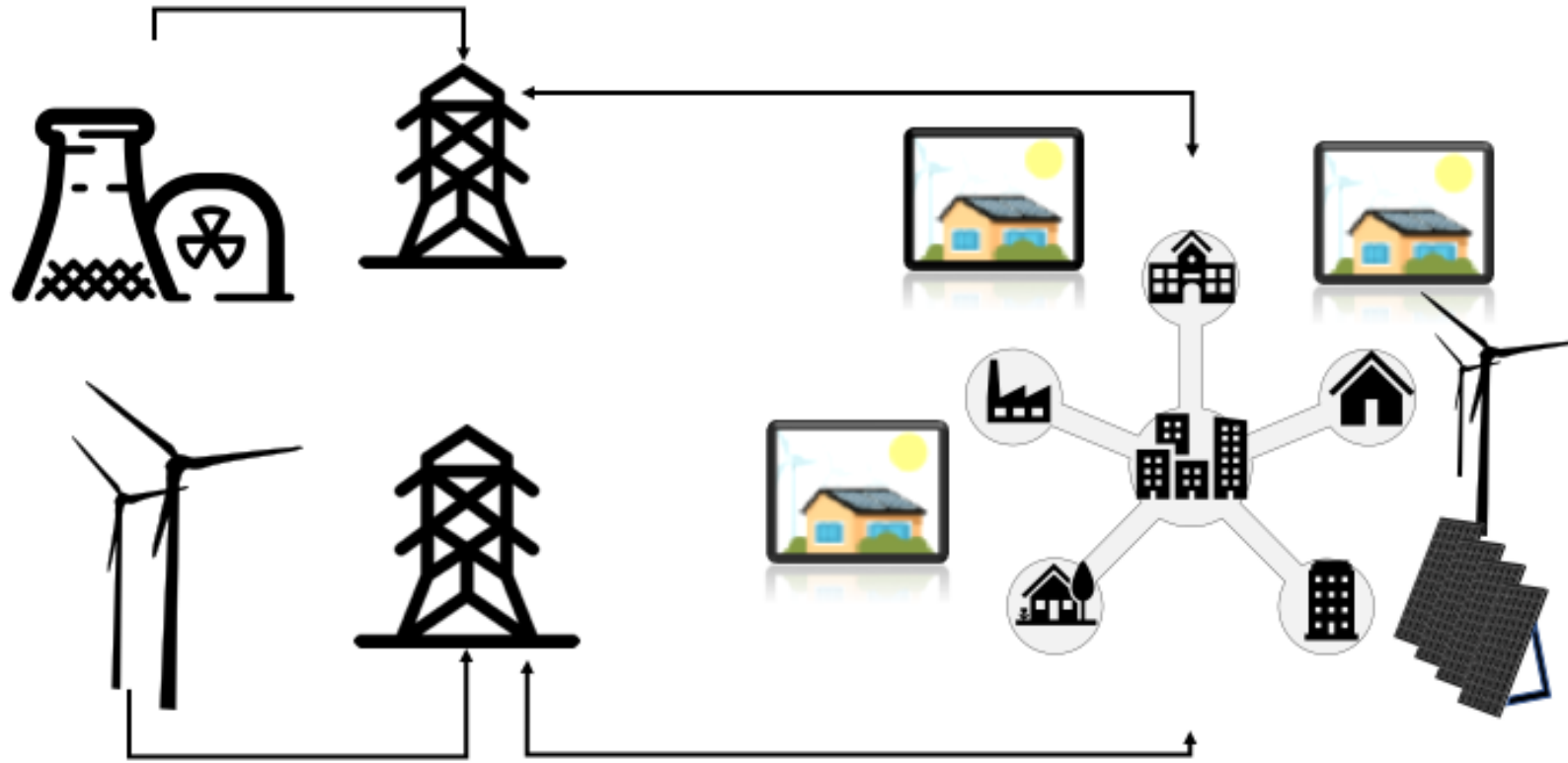
Transition Pathways?

1. Business-As-Usual
2. Energy Community
3. Prosumer Network

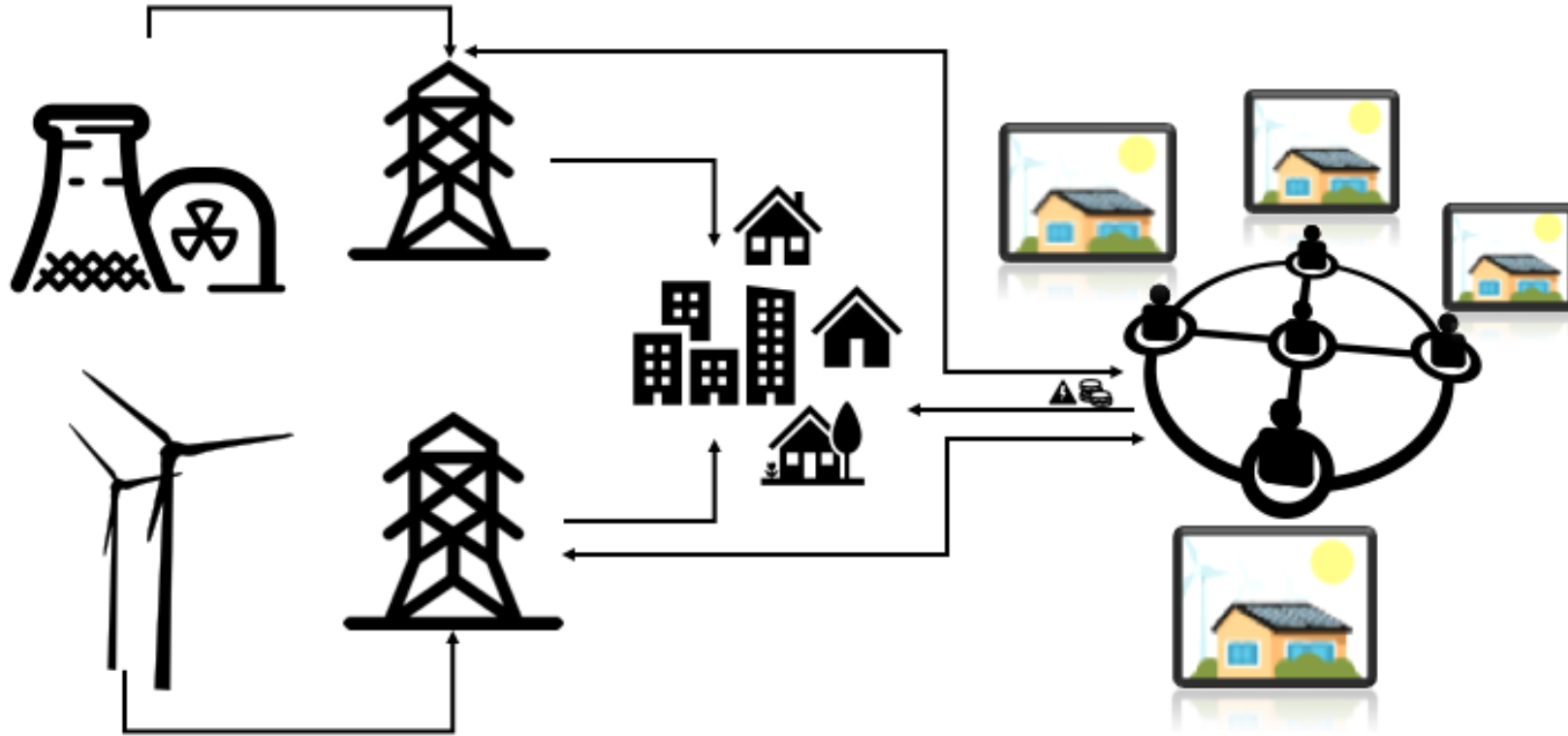
Business-as-Usual



Energy Community



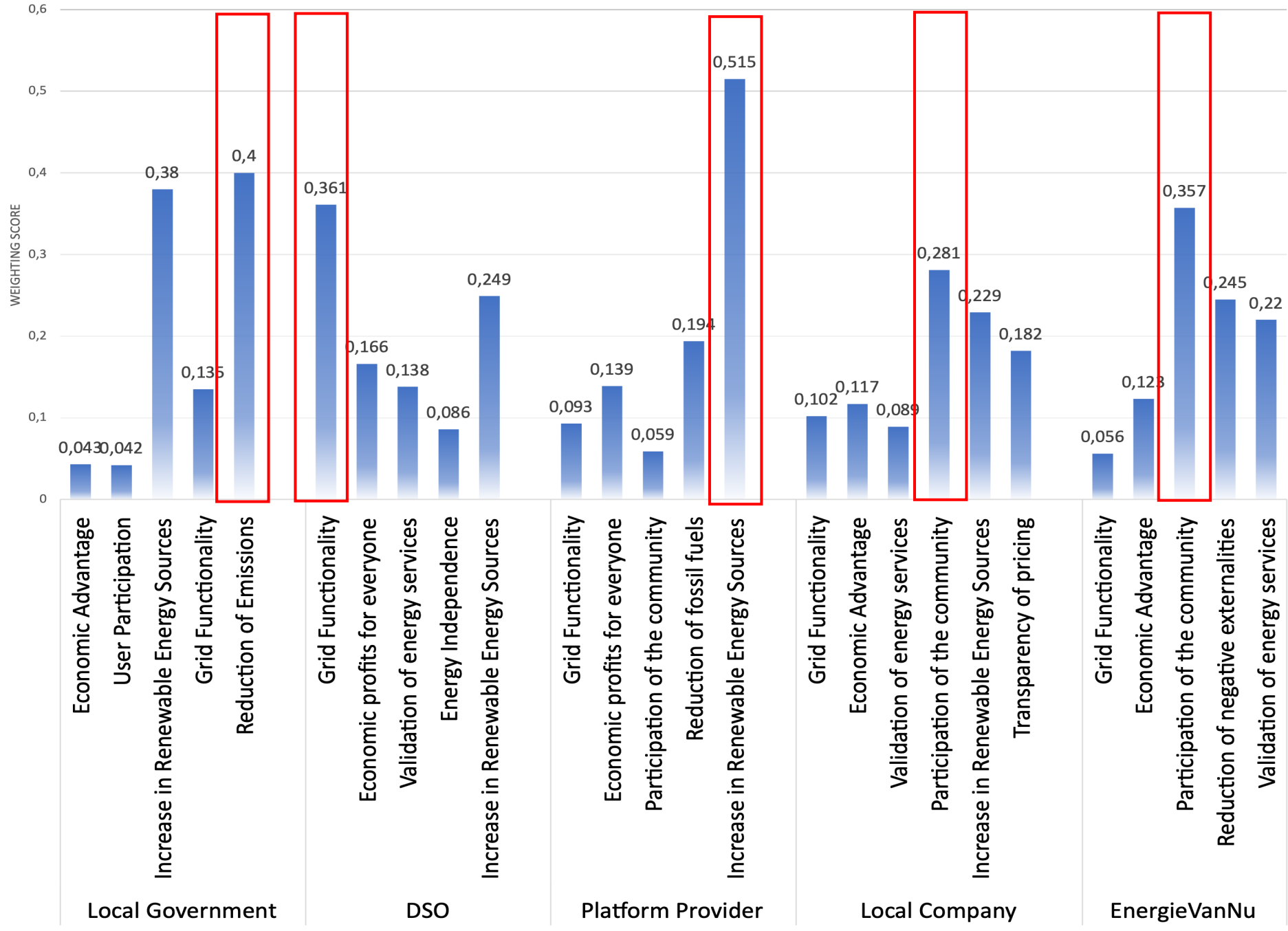
Prosumer Model



What is important to the different entities? (using the MAMCA software)



CRITERIA WEIGHTING EEMNES

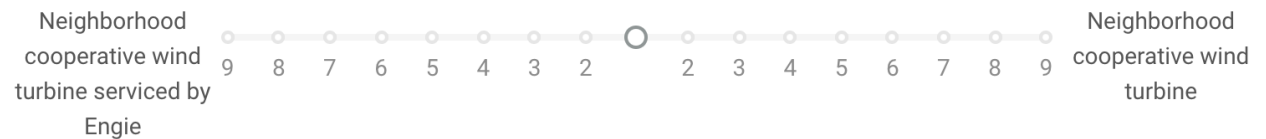
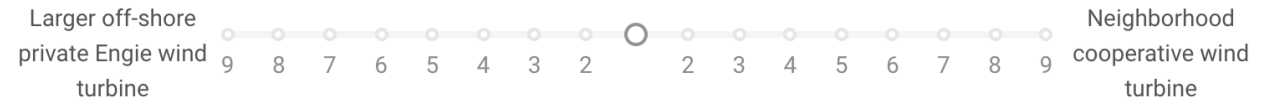
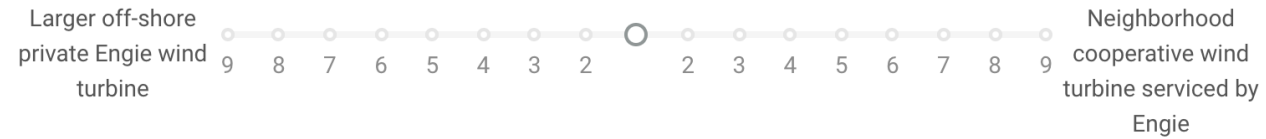
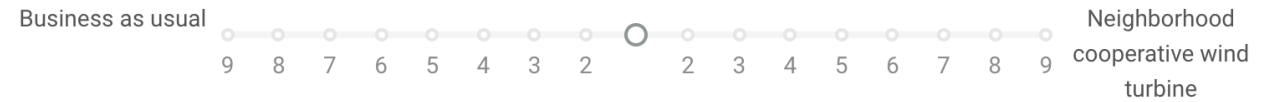
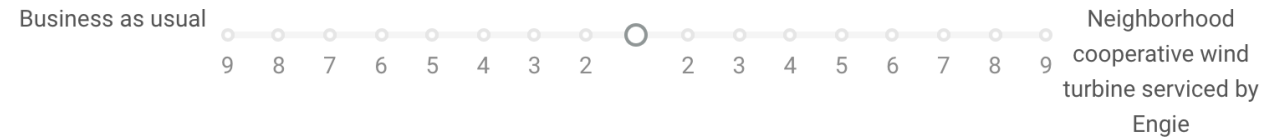
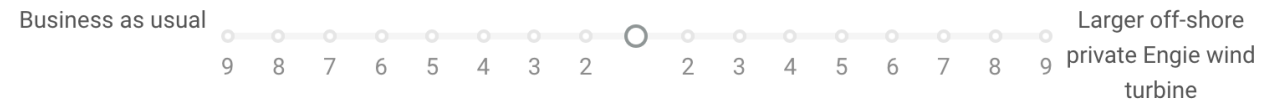


How do the different pathways perform?

Evaluation elicitation

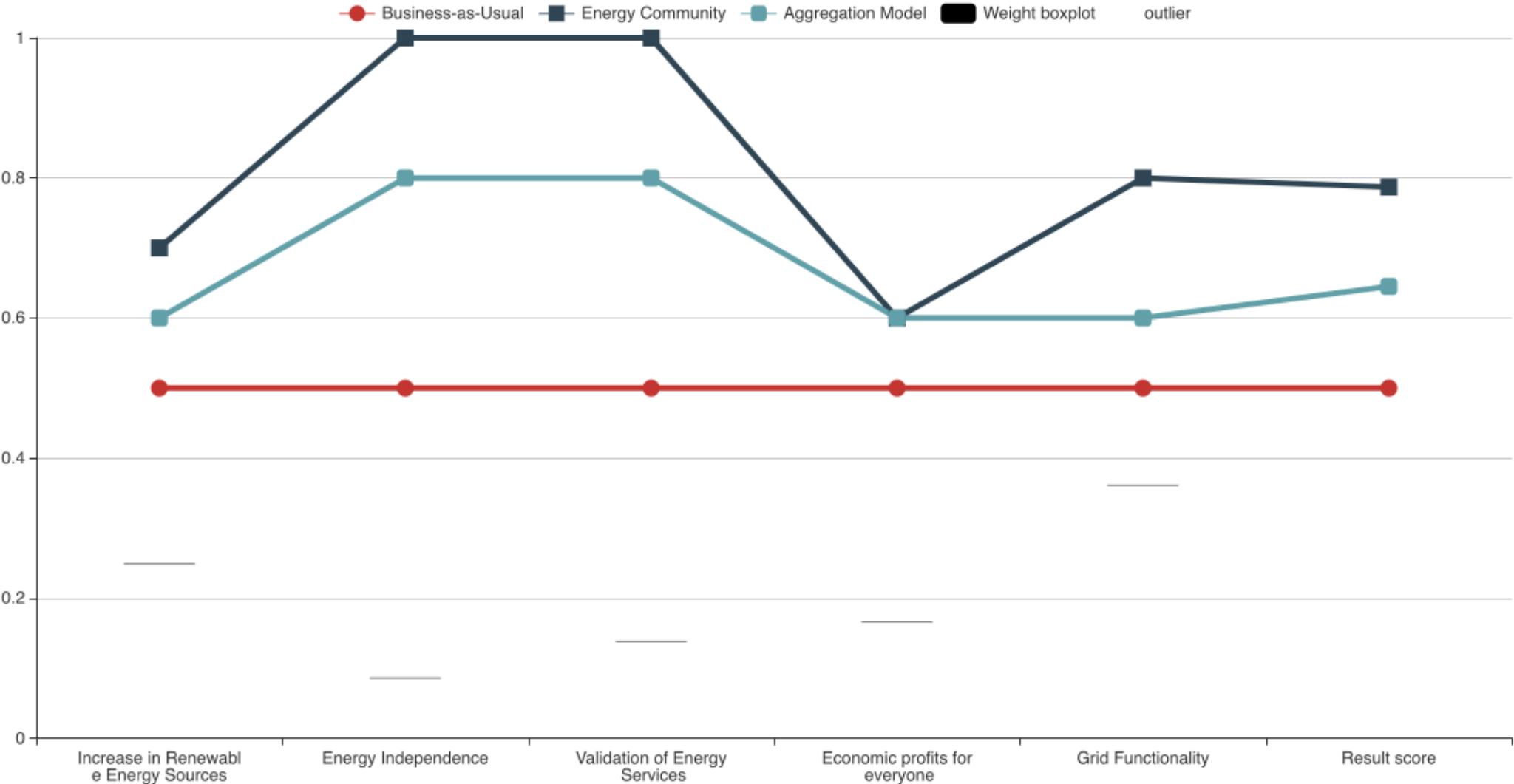
X

Awareness/Education



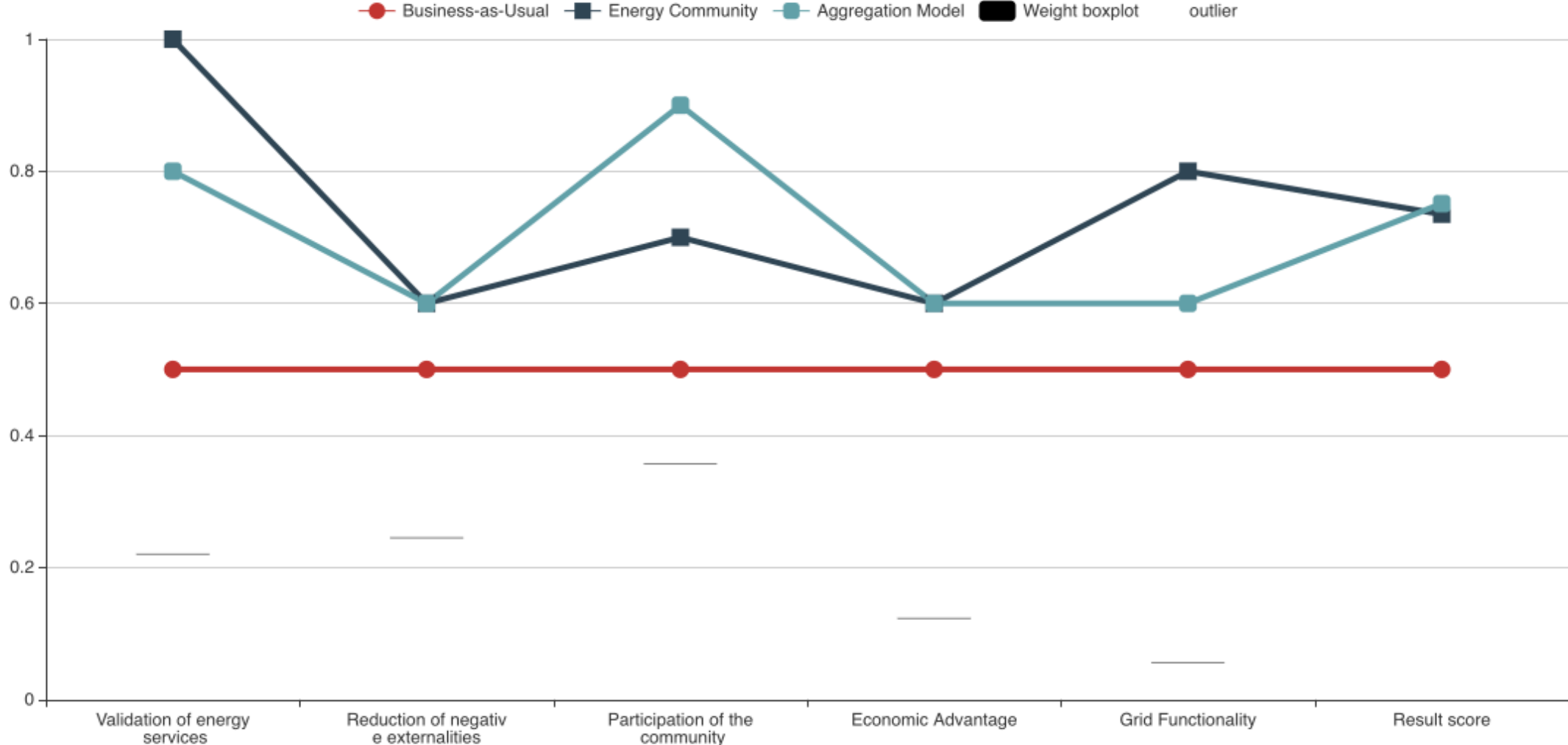
Example of Single Actor View: DSO

Actor average result: DSO



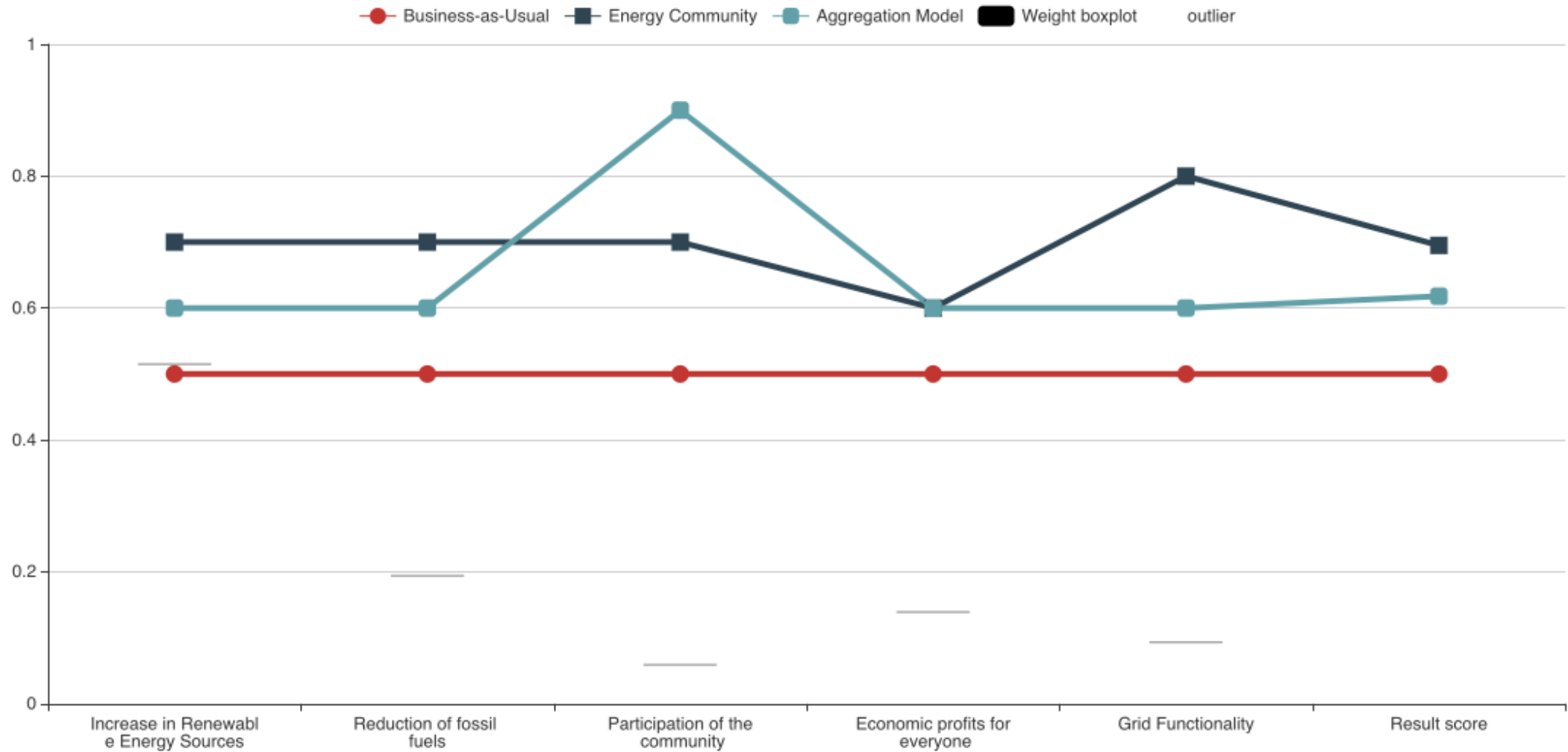
Example of Single Actor View: EnergieVanNU

Actor average result: EnergieVanNu



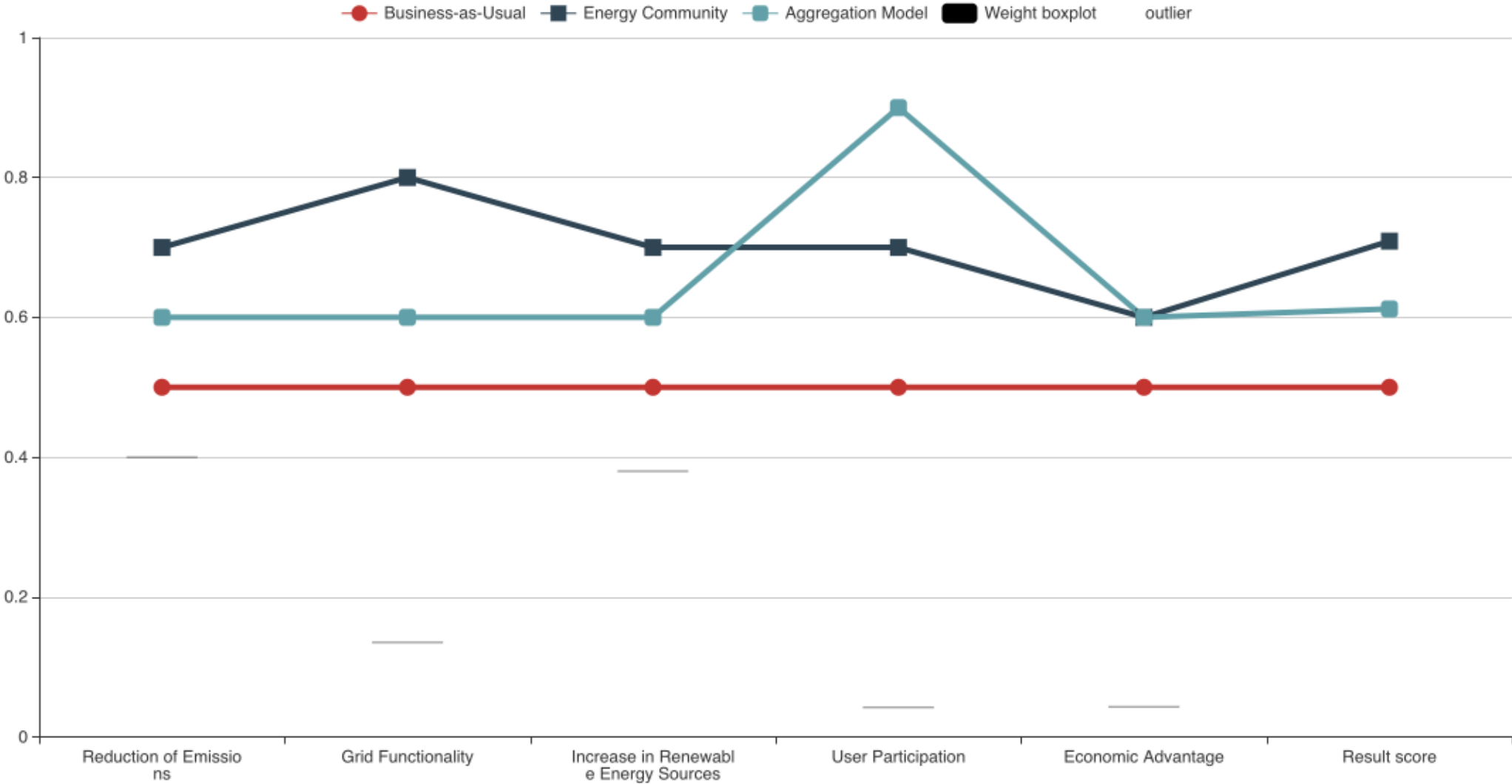
Example of Single Actor View: Platform Provider

Actor average result: Platform Provider



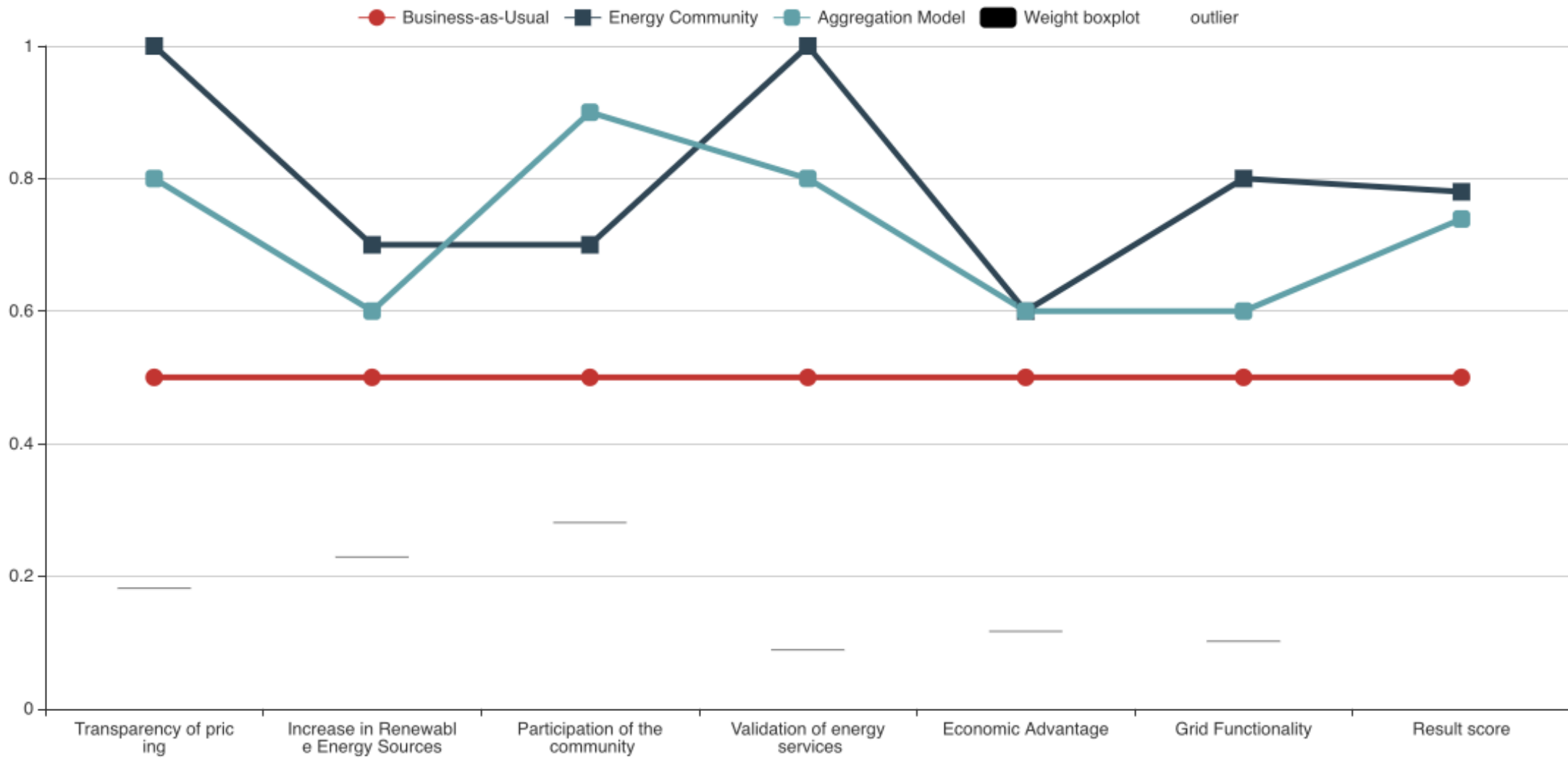
Example of Single Actor View: Local Government

Actor average result: Local Government



Example of Single Actor View: Local Company

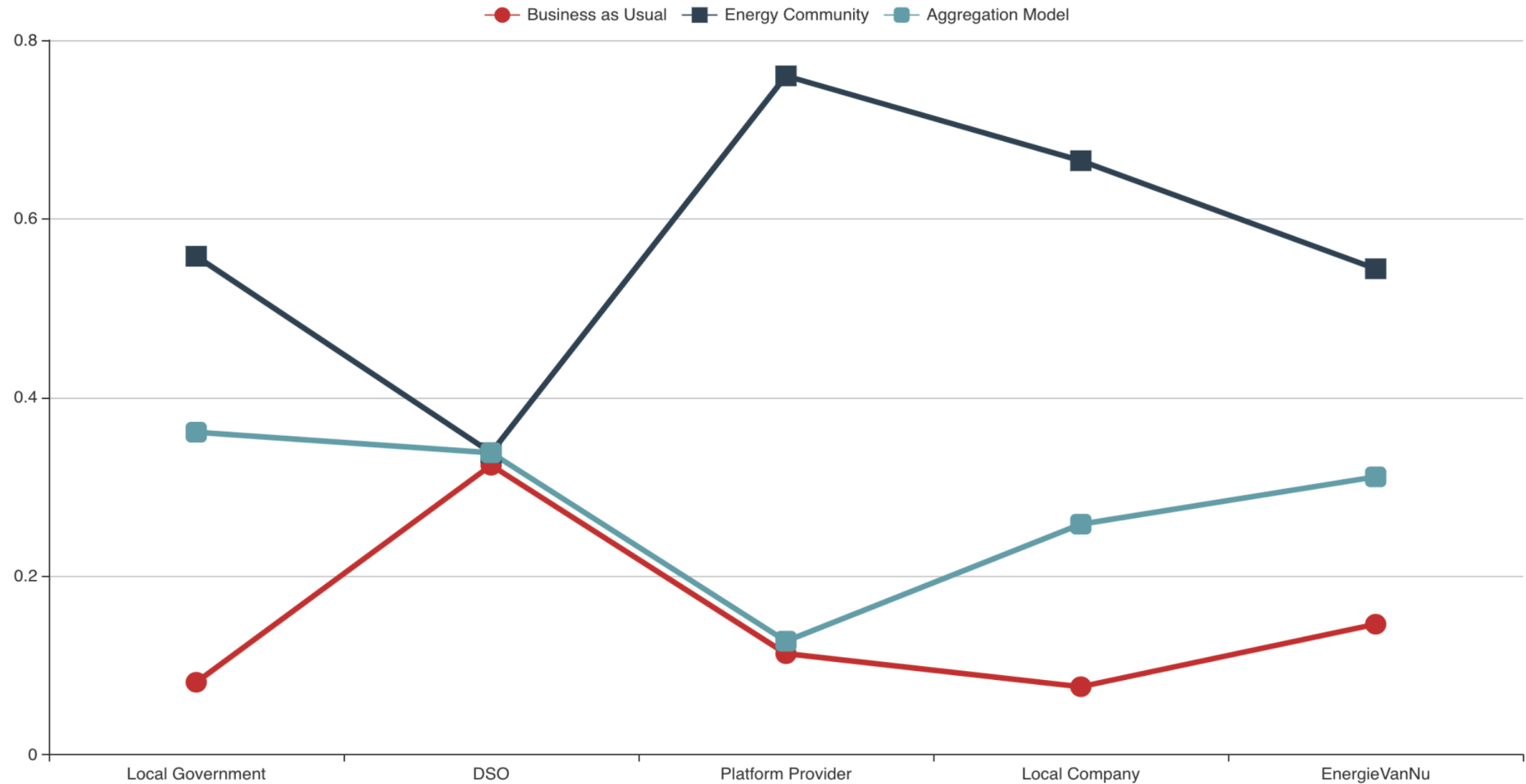
Actor average result: Local Company



Example of Multi-Actor View (Eemnes)

i. By the stakeholders
(done during workshops)

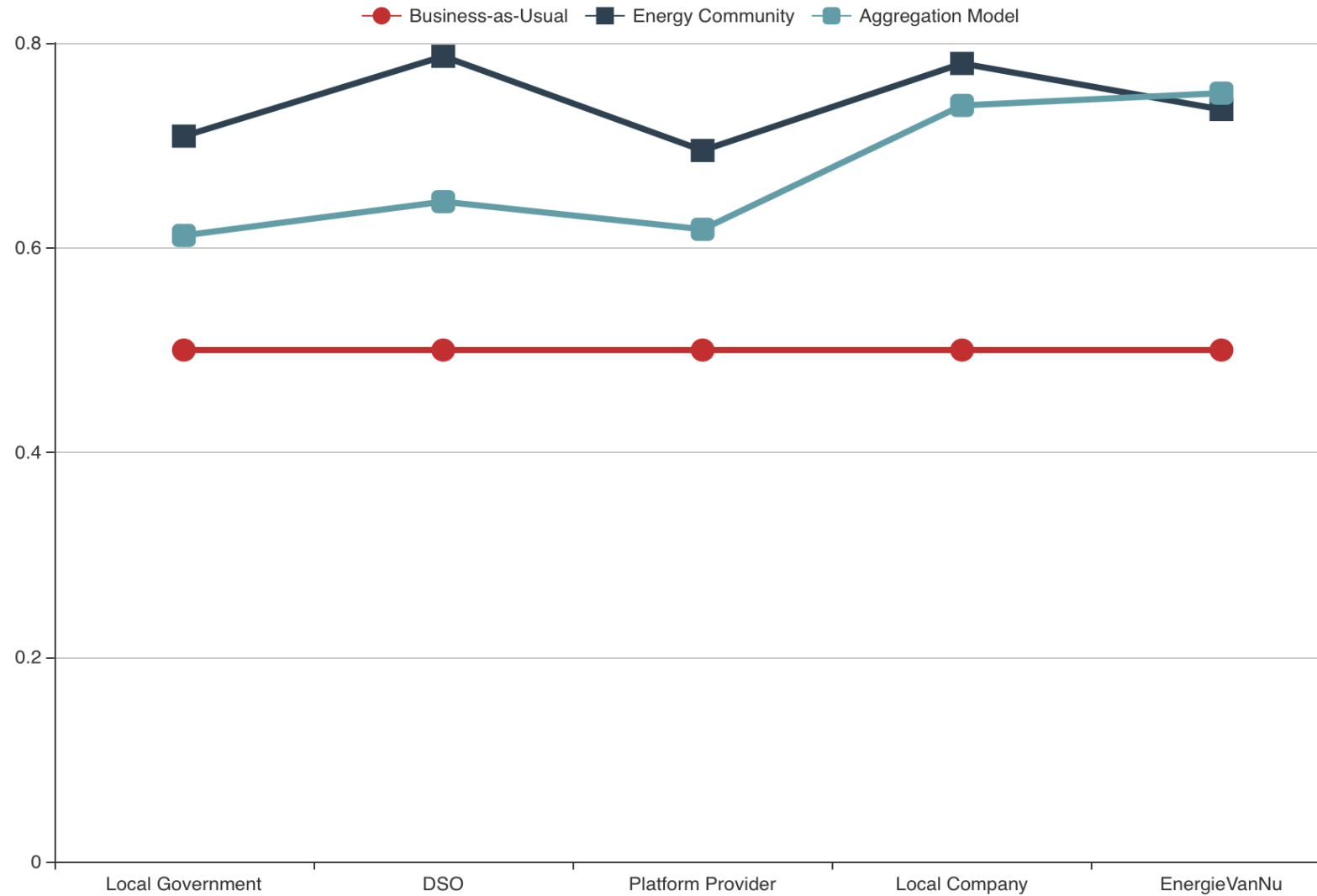
Overall result



Example of Multi-Actor View (Eemnes)

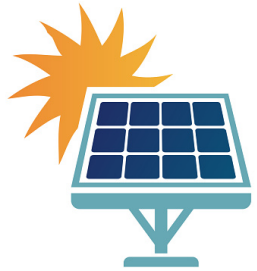
i. By the experts

Overall result

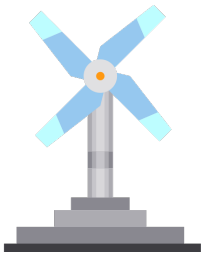


Auroville's Example (India)

SCENARIO OVERVIEW: dividing investment on 4 different steps



400 kWp



600 kW



76 kWh

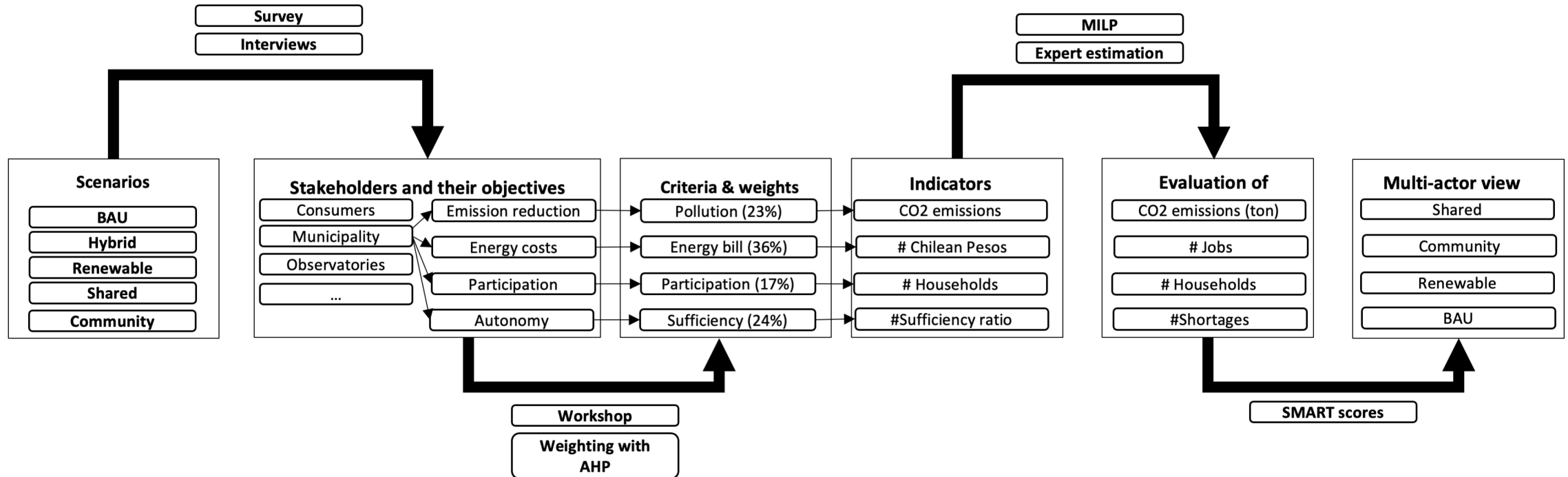


≈360 hours per year



This project has received funding from European Union's Horizon 2020 research and innovation programme grant agreement No 824342.

Overall approach



Real-life example

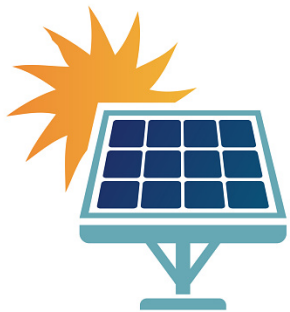
SCENARIO OVERVIEW: dividing investment on 4 different steps

REFERENCE - Just Auroville as it is nowadays, no extra investment

Additional investment on PV - photovoltaic panels allowed

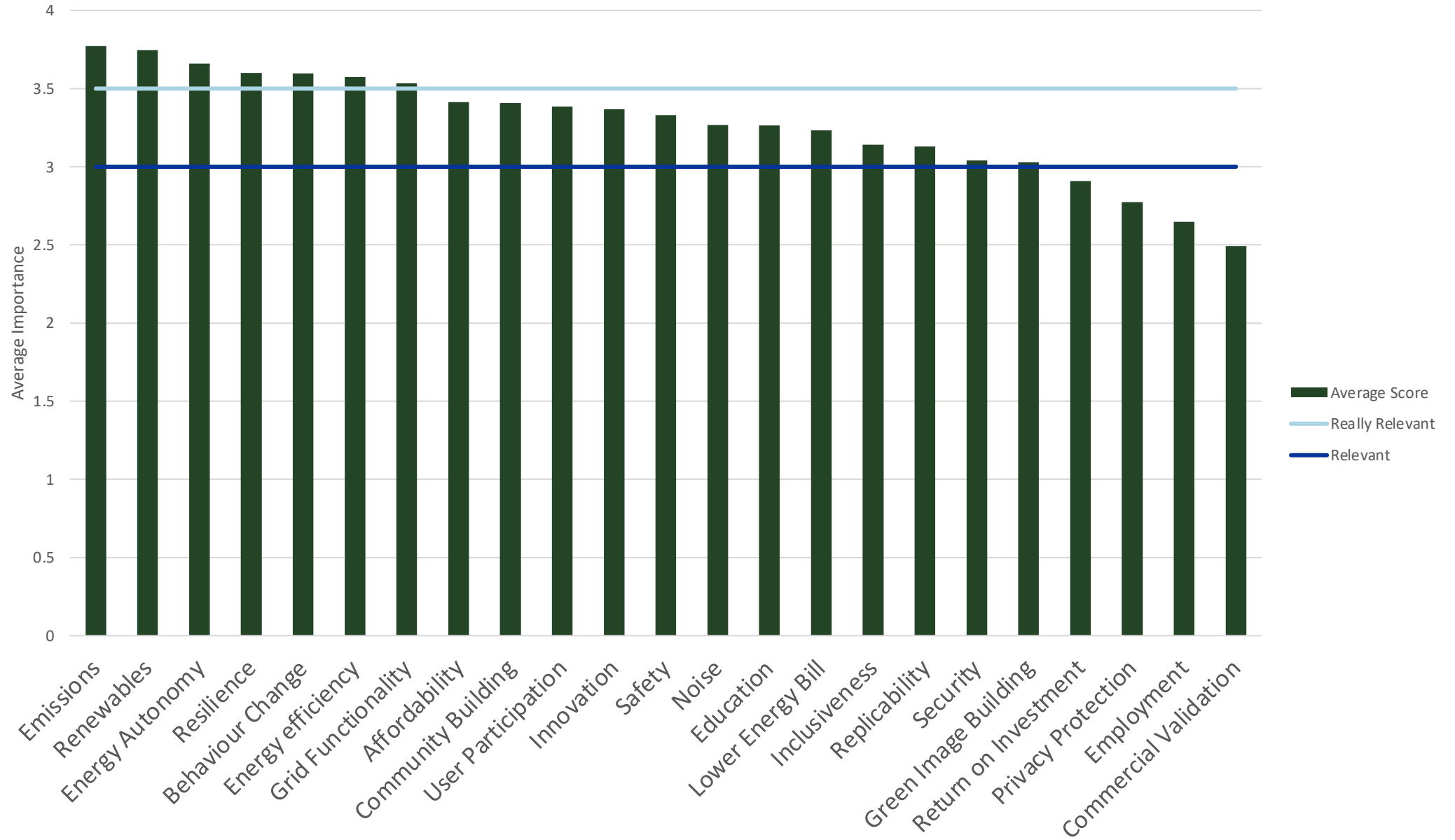
Additional battery investment allowed

Blackout counteract

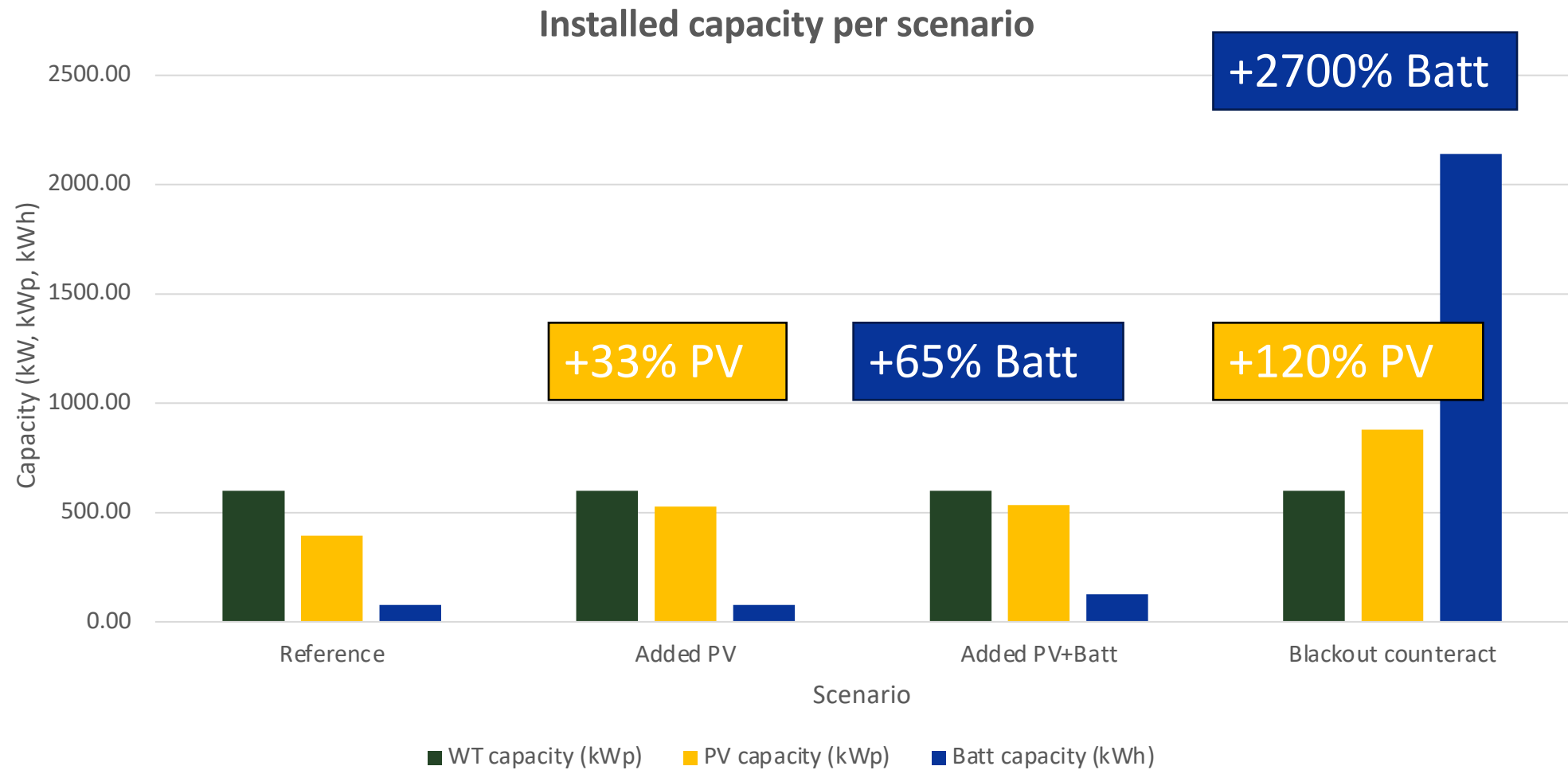


≈350 hours per year

Auroville Objectives

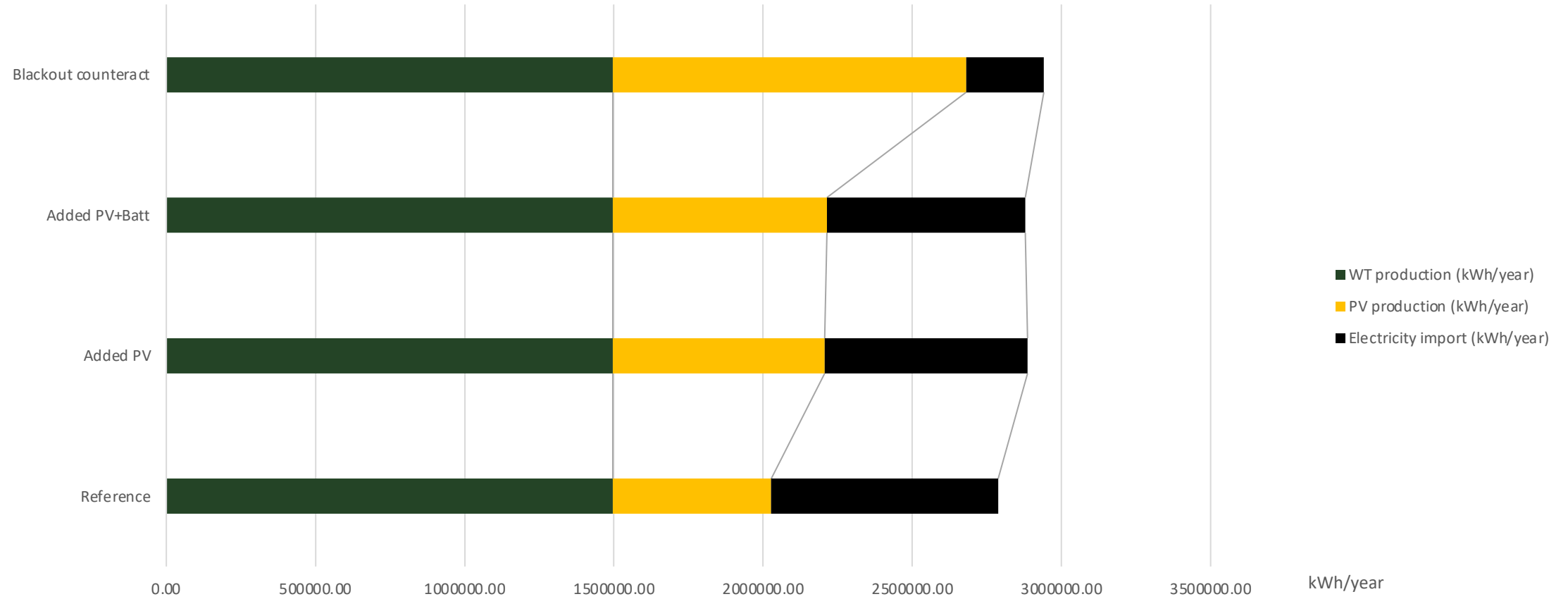


Auroville's case-study



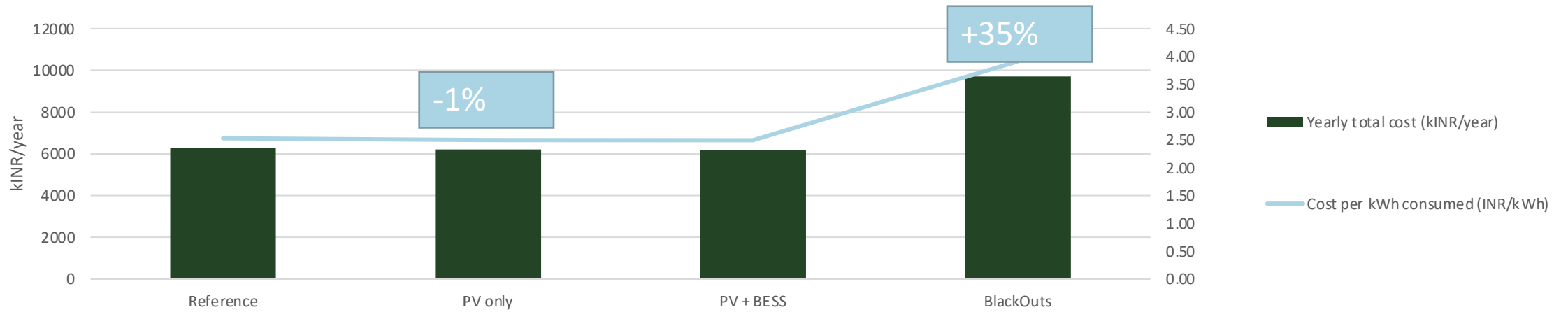
Auroville's case-study

Energy mix per scenario

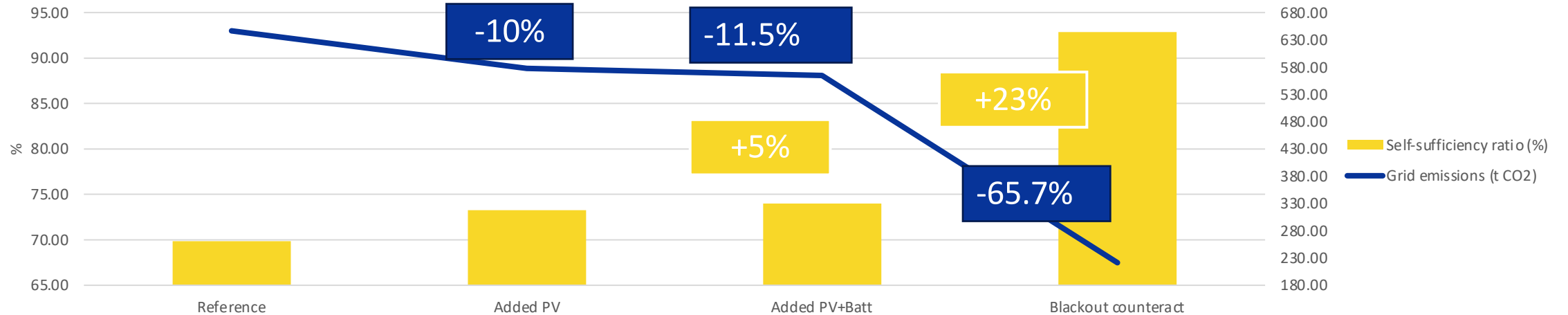


Auroville's case-study

Economic Impact

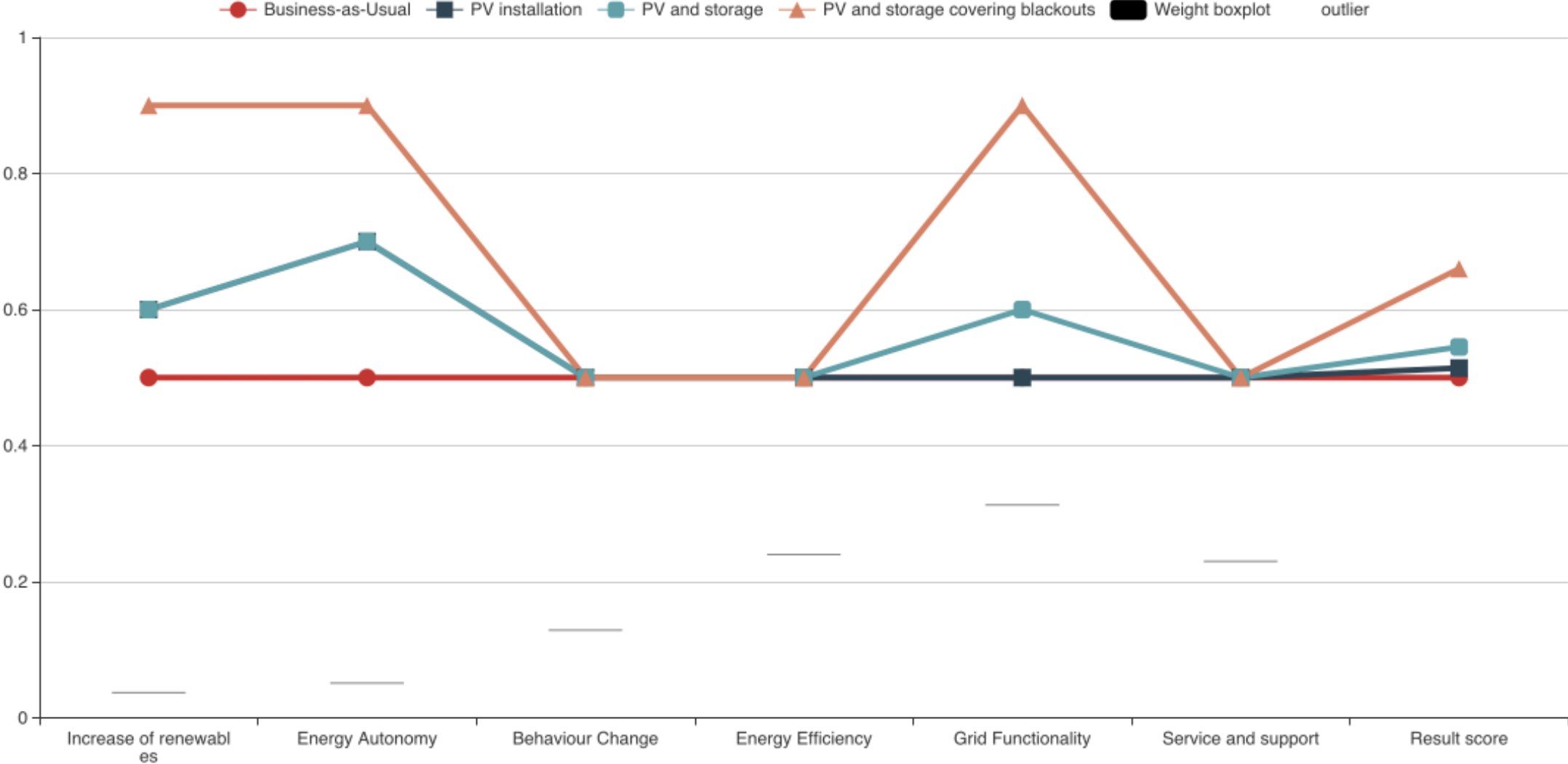


Environmental Impact



Overall results

Actor average result: PTDC





Identified advantages of MAMCA

Input for and by stakeholders

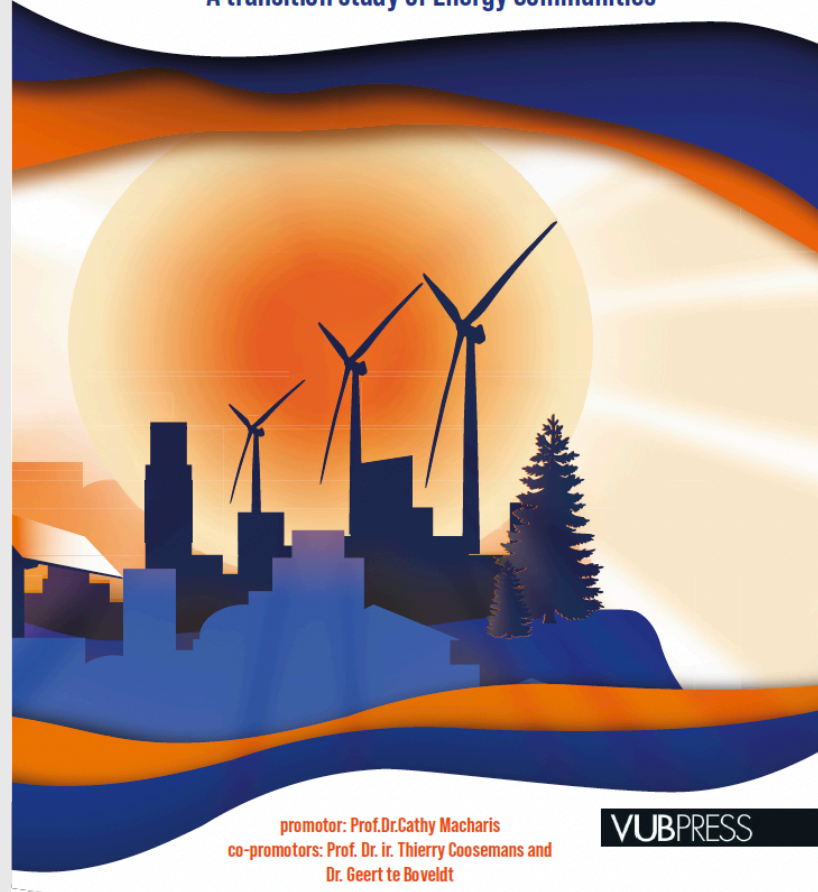
Engagement is essential to come to a successful project:

- > Creating empathy => willingness to compromise
- > Identifying user needs and concerns => translate into the technical design
- > Increasing knowledge and awareness of users => increased understanding and enthusiasm
- > Creating a sense of involvement => identification with the project



Maria Luisa Lode

SOCIO-TECHNICAL TRANSFORMATIONS FOR DECENTRALIZED ENERGY SYSTEMS: A transition study of Energy Communities



Thank you!

Contact us!

www.house-of-sustainable-transitions.be

Questions?

Maria.Luisa.Lode@vub.be

More information found here:

https://www.researchgate.net/publication/371044006_Socio-technical_transformations_for_decentralized_energy_systems_A_transition_perspective_on_Energy_Communities

