TECHNISCHE UNIVERSITÄT WIEN

Energy Economics Group

ENERGY COMMUNITIES: EVALUATION OF EXISTING EXPERIENCES IN AUSTRIA AND ASSESSMENT OF FUTURE PERSPECTIVES

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Outline

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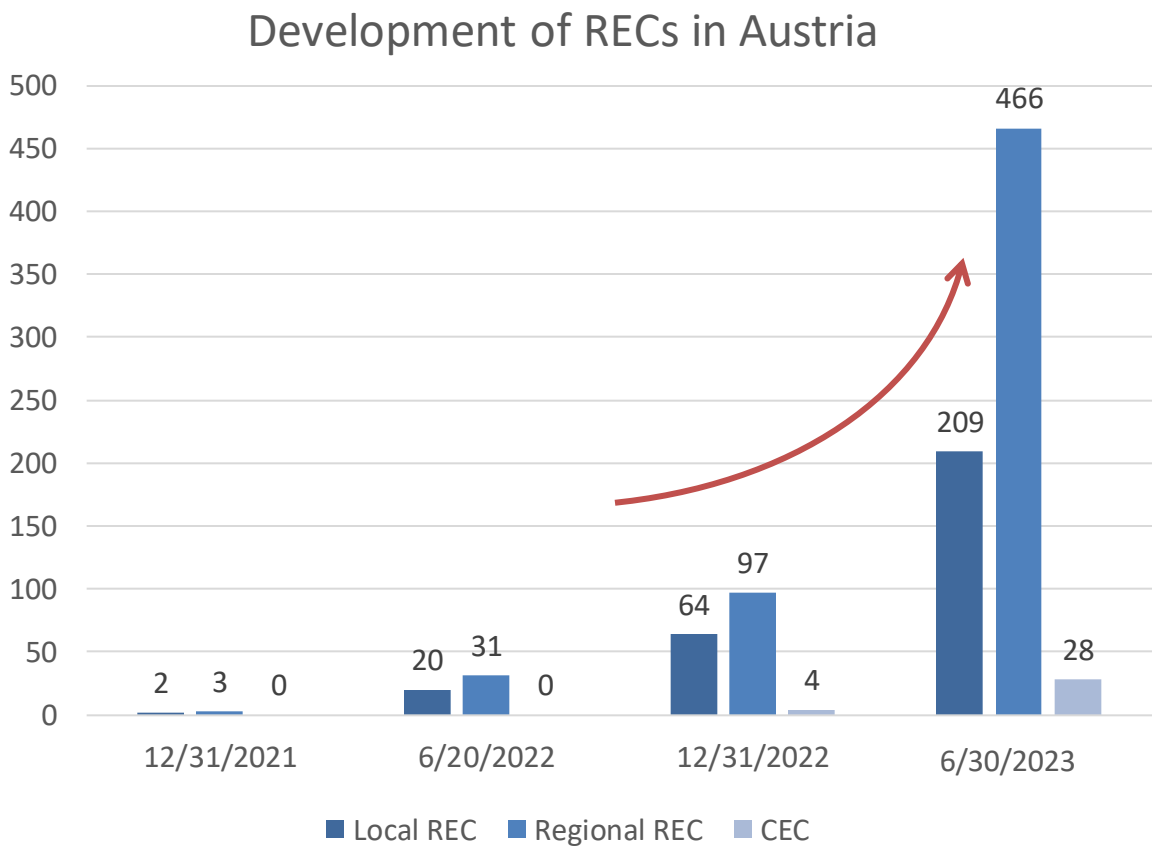
2. **Research Objective**
3. **Method of Approach**
4. **Key Results**
5. **Conclusion**

1. Introduction and Motivation

- **Clean Energy for All Europeans Package** (CEP) in 2019
- Supranational guidelines transposed in the Renewable Energy Directive and Electricity Market Directive
- Austria is a **pioneer** among EU member states.
- Proposed legislation for Renewable Energy Communities (RECs) and Citizen Energy Communities (CECs) in the **Renewable Expansion Act (EAG)**
- Foundation for Establishing RECs: Legally permissible to generate renewable energy collectively across property boundaries and share or sell it
- Since then, the number of RECs in Austria has risen sharply, shaping the Austrian energy system



2. Research Objective

Relevance of the study

- RECs' important role in shaping the energy transition
- Empowering citizens for active participation and accelerate the deployment of renewable energy sources (RES)

- Identifying challenges and opportunities for improved adoption
- Practical experiences serve as valuable lessons for other countries

Research objective

- **Are energy communities a successful model?**
- **What are the current experiences and future perspectives of Austrian RECs?**

Contribution

- Data and experiences of RECs in Austria are analyzed, making it possible to identify strengths and weaknesses and assess future potential

3. Method of Approach

Data collection

Questionnaires

- Target group: RECs in Austria
- Survey type: Questionnaire
- Sample size: 40 RECs/feedback from 18 RECs

EDA-Data

- Multiple RECs with different combinations(number of participants, generation technologies, installed capacities)
- Analysis based on 15-min energy data
- Total consumption, share of community generation, self-coverage of community generation, surplus generation and total generation

Analysis

Qualitative approach

- Founding process
- Strucutre and characteristics
- Past developments

Quantitative approach

- Degree of self-sufficiency
- Degree of self-consumption
- Saved costs of participants

Conclusion

4. Key Results – Qualitative Indicators

Motivation:

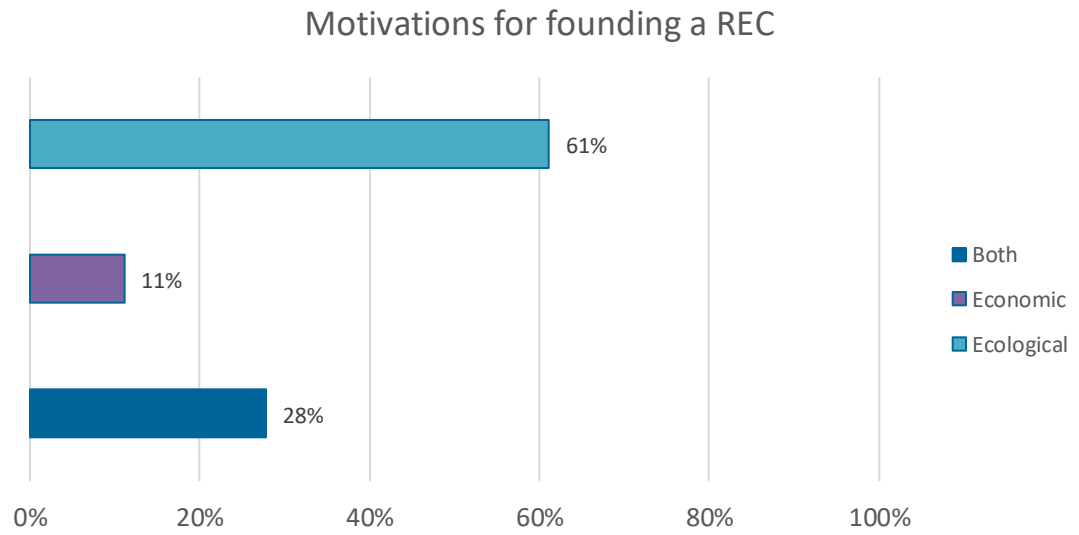
- The motivations for founding a REC are mainly based on ecological and economic reasons
- Although the main reason for establishing an energy community must not be economic !

Ecological:

- Climate protection
- Generation of green energy
- Promotion of the spread of renewable energies
- Savings in CO_2 emissions

Economic

- Stable prices through independence from the market
- Saved costs for prosumers and consumers
- Reduction in grid fees



4. Key Results – Qualitative Indicators

Who **initiates** RECs?

- RECs are mainly founded **by local communities**, followed by private persons and companies

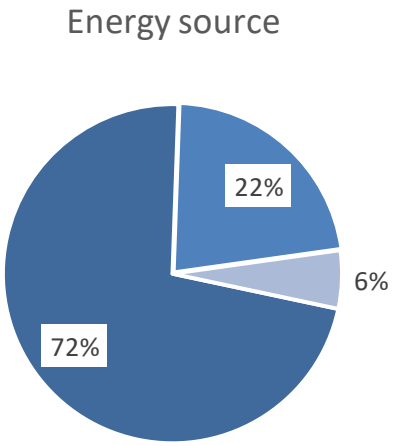
What are **the main difficulties** of the founding process?

Founding and Regulatory Challenges	Stakeholder Engagement and Economic Interest	Smart Meter Management and Energy Pricing
• Complex and difficult founding process • Formal, tax and legal aspects • Tariff regulations	• Communication with grid operator • Participants' understanding of REC • Participants only have an economic interest	• Smart meters (registration, defect, long time for replacement) • Electricity price discount/electricity price brake

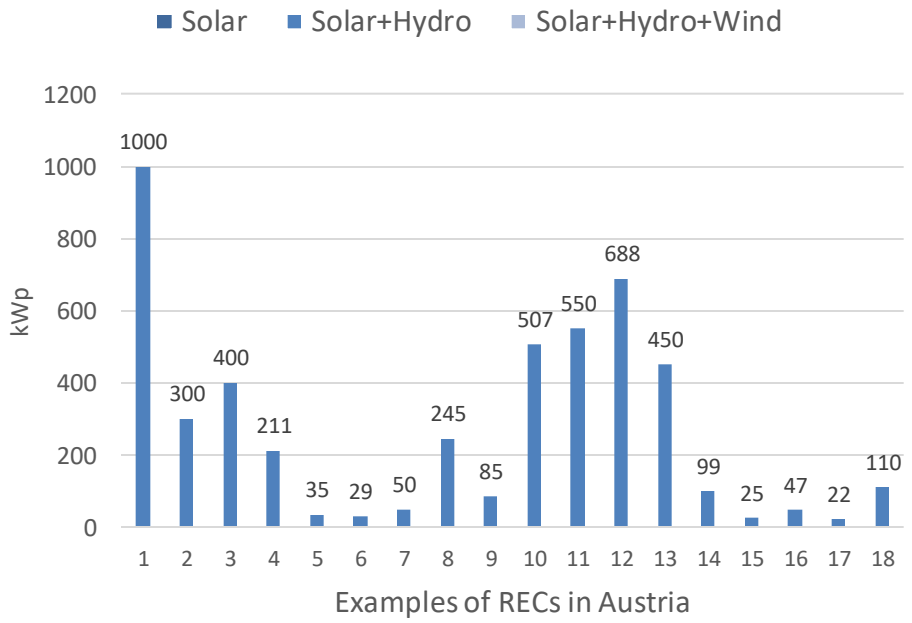
- Main reasons for the non-establishment of RECs: high efforts in founding and administration, tariff structure, need for more acceptance and understanding among citizens

4. Key Results – Qualitative Indicators

- RECs mainly share **electricity**
- The primary energy source is **solar**, with some combinations with additional hydropower, and wind
- Depending on the REC, there are members from 3 to 100 and generation units from 1 to 50 per REC



- In general, some of the members of the RECs own
  - **small storage systems**
  - **electric vehicles (5 to 30 % of the members)**
  - **large consumers** such as heat pumps, electric heating systems, and businesses can be found in every REC.



4. Key Results – Qualitative Indicators

- The **tariff structure** is mostly the same for consumers and prosumers
  - Feed-in and consumption price is **18 to 20 ct/kWh**
  - The tariff considers the creation of incentives for consumers and prosumers
  - Calculation is based on OEMAG prices and consumer prices

- RECs generally increased their generation capacity since they were founded due to new members with PV systems

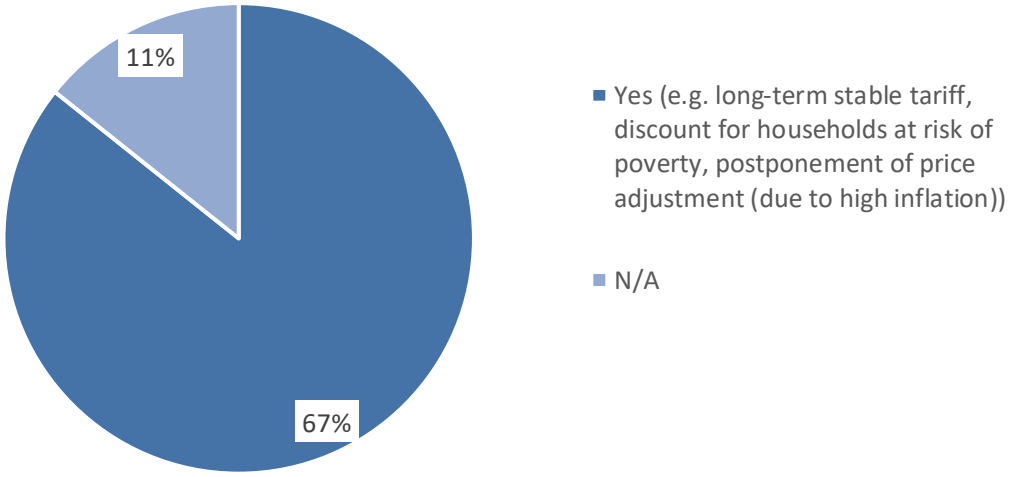
- **High electricity prices in 2022** had a substantial impact on RECs
  - De- and acceleration of implementation
  - Increased interest of consumers / Decreased interest of prosumers
  - Investment in new PV-systems
  - Increase of members

4. Key Results – Qualitative Indicators

Energy poverty:

- affects approx. 3% of the Austrian population (115,500 households)
- Households spend an average of 4.2% of their income on energy (Statistics Austria, 2019)
- Several Initiatives in Austria such as Smart cities initative, Robin Powerhood etc.

- 67% of the RECs respondents confirmed that RECs create social benefits and thus contribute to combating energy poverty, e.g., by offering stable tariffs or benefits for households at risk of poverty.



What are some social benefits?

- Active participation and raising awareness of the energy transition
- Integration of participants who do not have their own generation plant
- Supply of community homes, senior centers and social facilities

4. Key Results – Quantitative Indicators

Four examples of RECs in Austria:

Indicator	A	B	C	D
Energy source	PV (30 kWp)	PV (20kWp) + storage (20 kWh)	Hydro (90kW)	PV (181 kWp)
Participants	20	6	5	40
$\bar{\alpha}_{EG}$ **[%]**	11	32	97	44
$\bar{\varepsilon}_{EG}$ **[%]**	60	66	8	40
$\overline{\Delta E_{TN}}$ **[kWh]**	420	1407	2815	1352
$\overline{\Delta K_E}$ **[€]**	171	2045	20493	1285
$\overline{\Delta K_V}$ **[€]**	37	90	163	140

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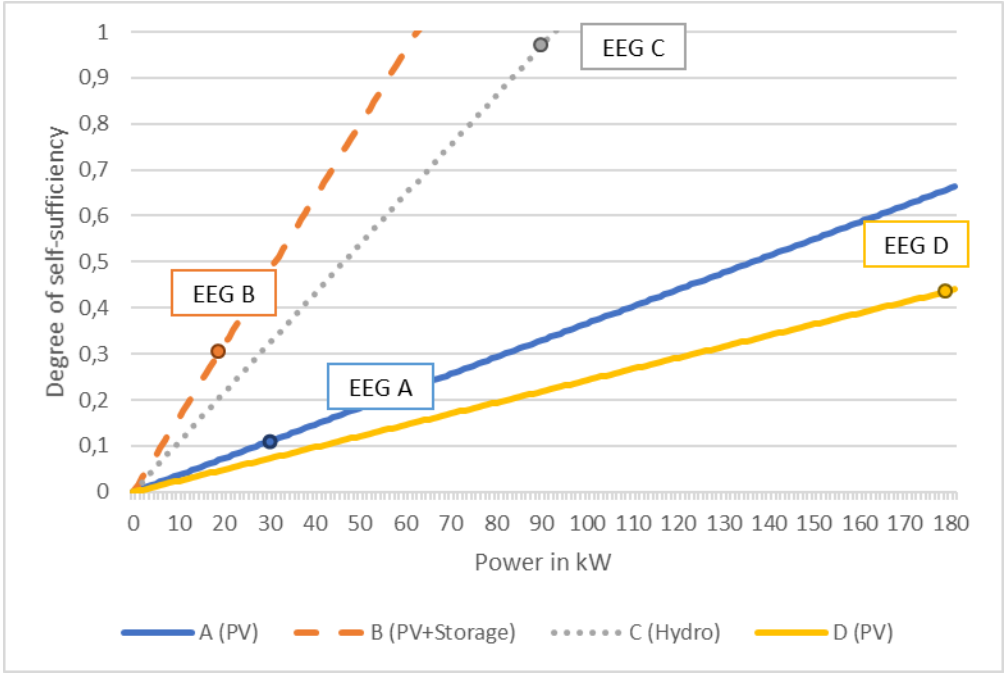
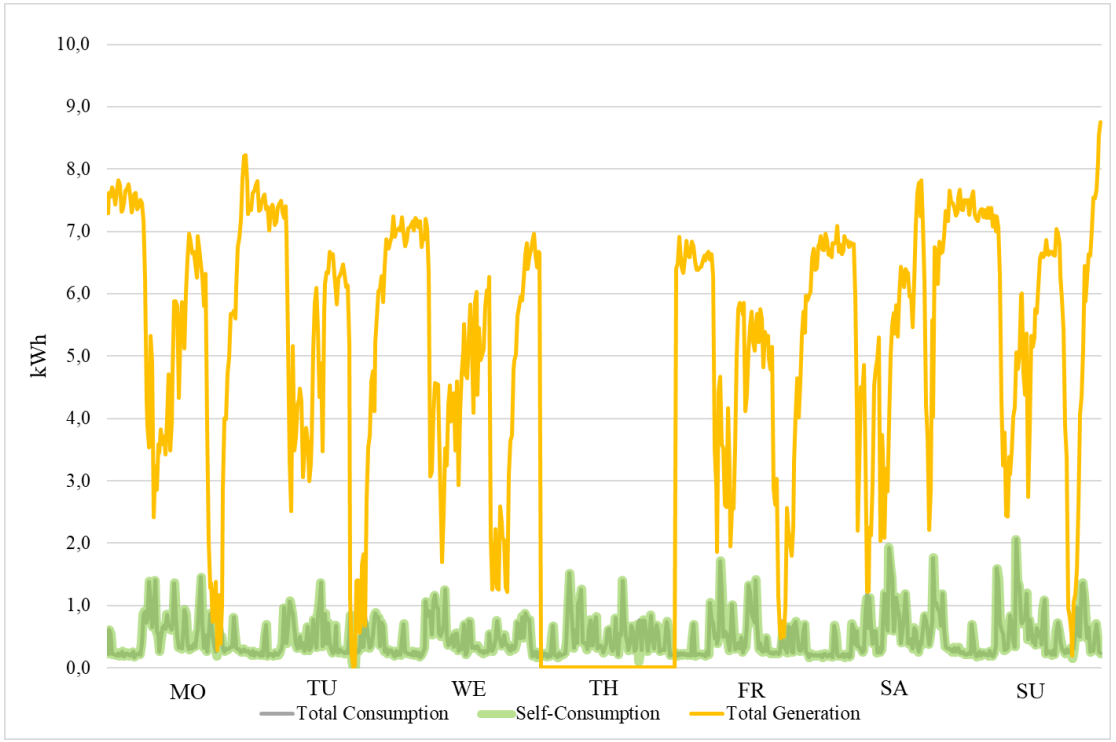


4. Key Results – Quantitative Indicators

REC C

90kW

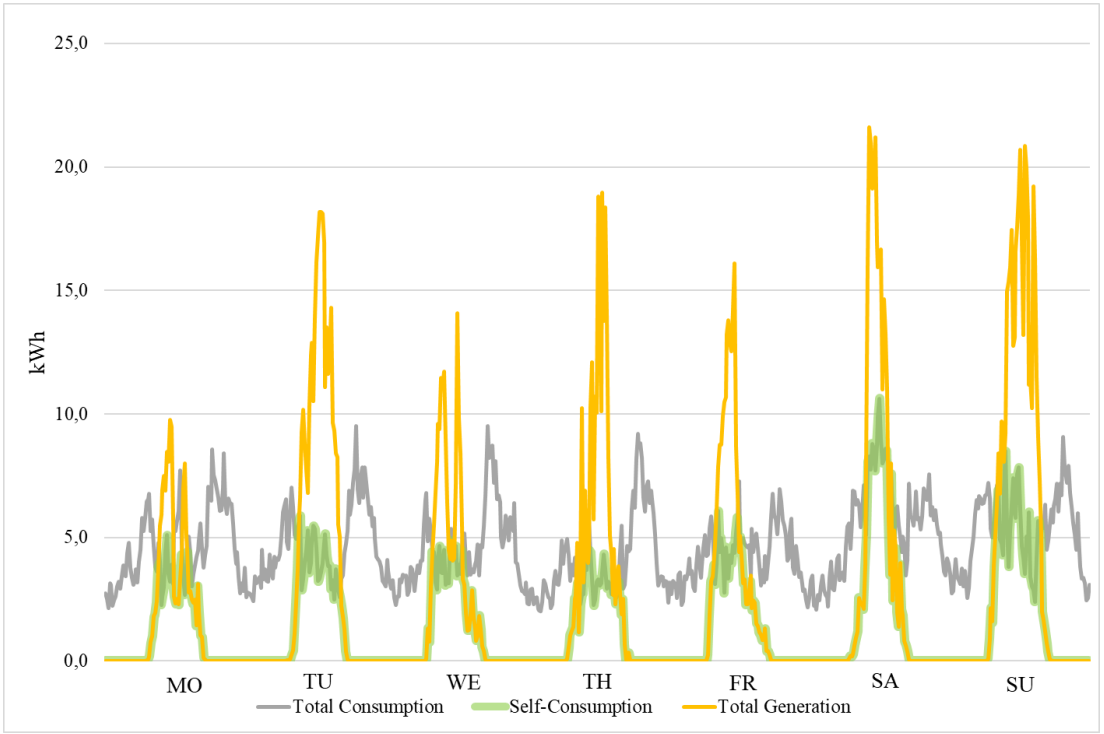
5



REC D

181kWp

40



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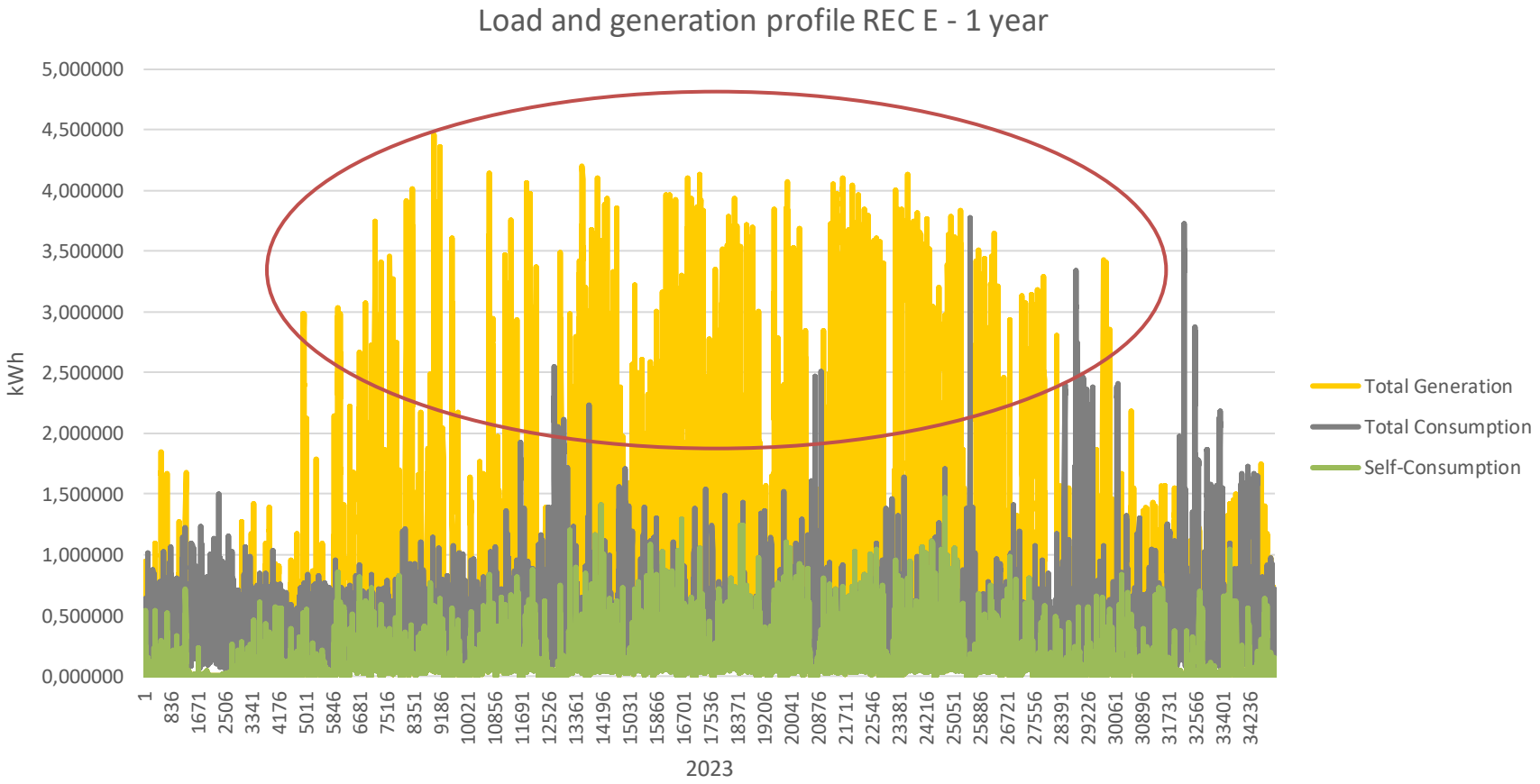
4. Key Results – Quantitative Indicators

16 kWp

4 

Degree of self-sufficiency: 37%

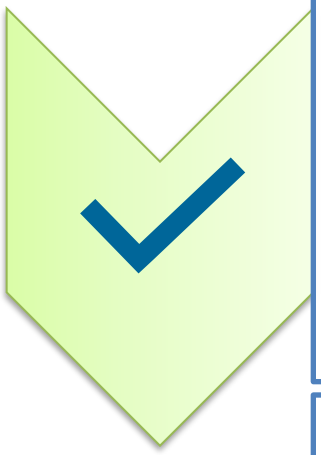
Degree of self-consumption: 25%



→ Additional consumer, investment in community storage, multi-participation?

5. Conclusion

Are energy communities a successful model?

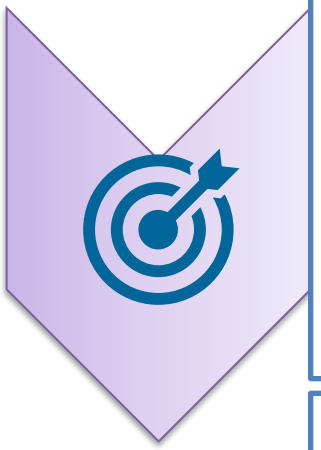


- A majority of participants see RECs as a **successful model**
- Economic and ecological goals can be achieved
- Important instrument **for increasing participation of citizens** in the energy transition and for **decarbonization** of the energy system
- Austria's journey provides insights for other nations.

- **Reduce founding effort** and Speed up member admission and financial incentives for participants
- **Simplified** and **faster cooperation with network operators**
- Finalize definition of framework conditions, e.g. tax law
- External supporters necessary and Digital tool for billing

5. Conclusion

Are energy communities a successful model?



- Future plans of the RECs primarily include **PV expansions**, the admission of **new members** with PV systems, and other expansions through **storage**
- More than 20% of the RECs are considering sharing **electricity and heat**
- Providing flexibility (DSM, Storage, DR)
- Multiple participation in RECs

- How will the tariff structure change in the future?
- How can energy communities optimize their own consumption despite the high investment costs of storage systems?
- How will the investment behavior of energy communities develop?

Thank you for your attention!

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