

Optimization of Renewable Energy Communities for flexibility services

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Objectives 2

- Comprehensive design for fair renewable energy community, ranging from technical-economic design to social dimensions
- ❑ Identification of methods of economic allocation among members of RECs
- ❑ Design and optimization of assets in RECs
- ❑ Development of aggregated user solutions for network ancillary services

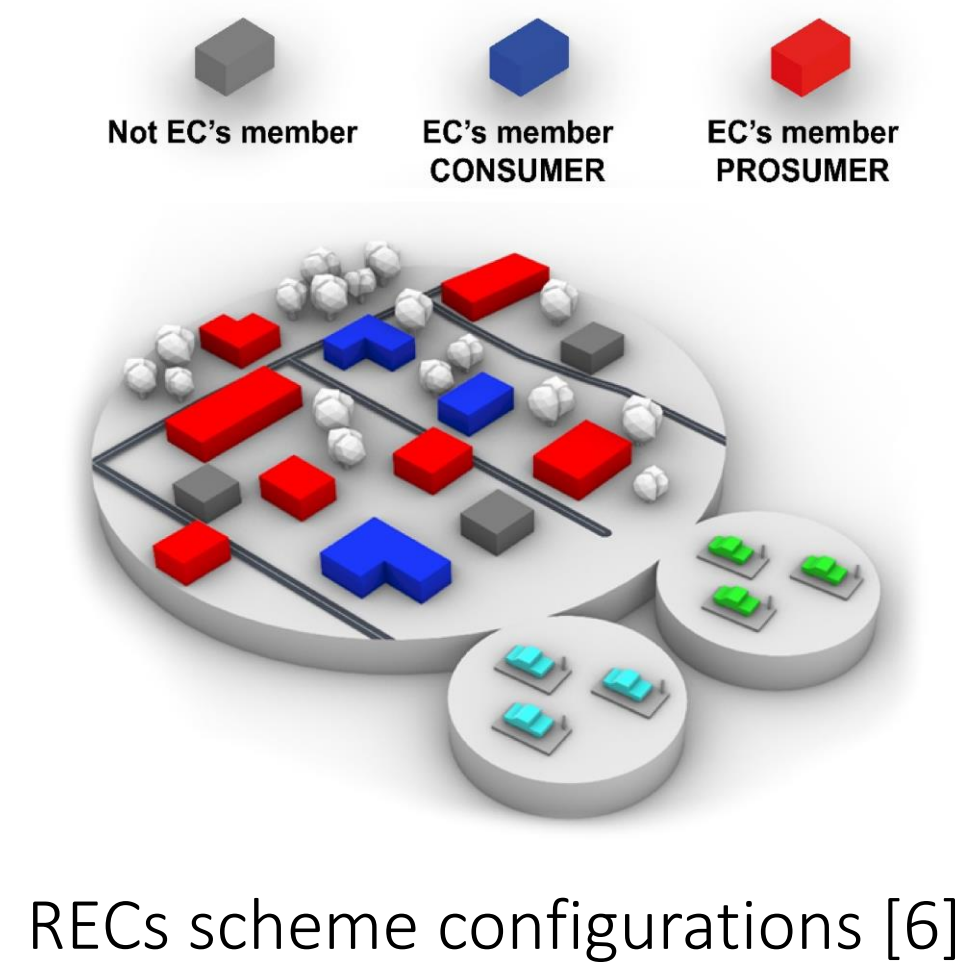
Abstract 1

The research activity carried out tries to bridge the gap between users of a renewable energy community (REC) and flexibility tools that are available to aggregates users. EnGreen's work has stimulated the creation of RECs in Italy, and it is currently active in 5 European projects. Technologies such as smart-metering, heat pumps, photovoltaic panels, and batteries could be able to shift nighttime loads during core hours, increasing self-consumption and shared energy. The open-source models developed *ECModel.jl* is trying to help practitioner and researcher to understand the potential of REC in Italy and Europe.

Keywords: renewable energy communities; flexibility; public private partnership

Introduction 3

- 35 RECs active in Italy, 41 almost established, 24 under development, mid 2023
- 10 REC under development and 4 active on Italian territory with to EnGreen



First and second year activities 4

- **Conferences:** 4 & 2 in-person attendance, 1 & 2 online attendance
- **PhD seminar organization** "Renewable Energy Communities: Italian case studies and EU regulatory framework", 12 speakers and 10 hours event
- **Publication:** 3 conference proceedings & 3 conference proceedings under publication, 3 journal article under review
- **Research PhD seminar:** 2 & 1 PhD DESTEC seminar and several webinar

Materials and Methods 1

Analysis of the various tools and models available and missing features in the Italian [1] and Spanish landscape [2] and development of RECs with EnGreen



In person data collection and community modelling in Lazio and Piedmont
 Meeting with residents, enterprises and public institutions



Kick-off meeting with municipality and citizens

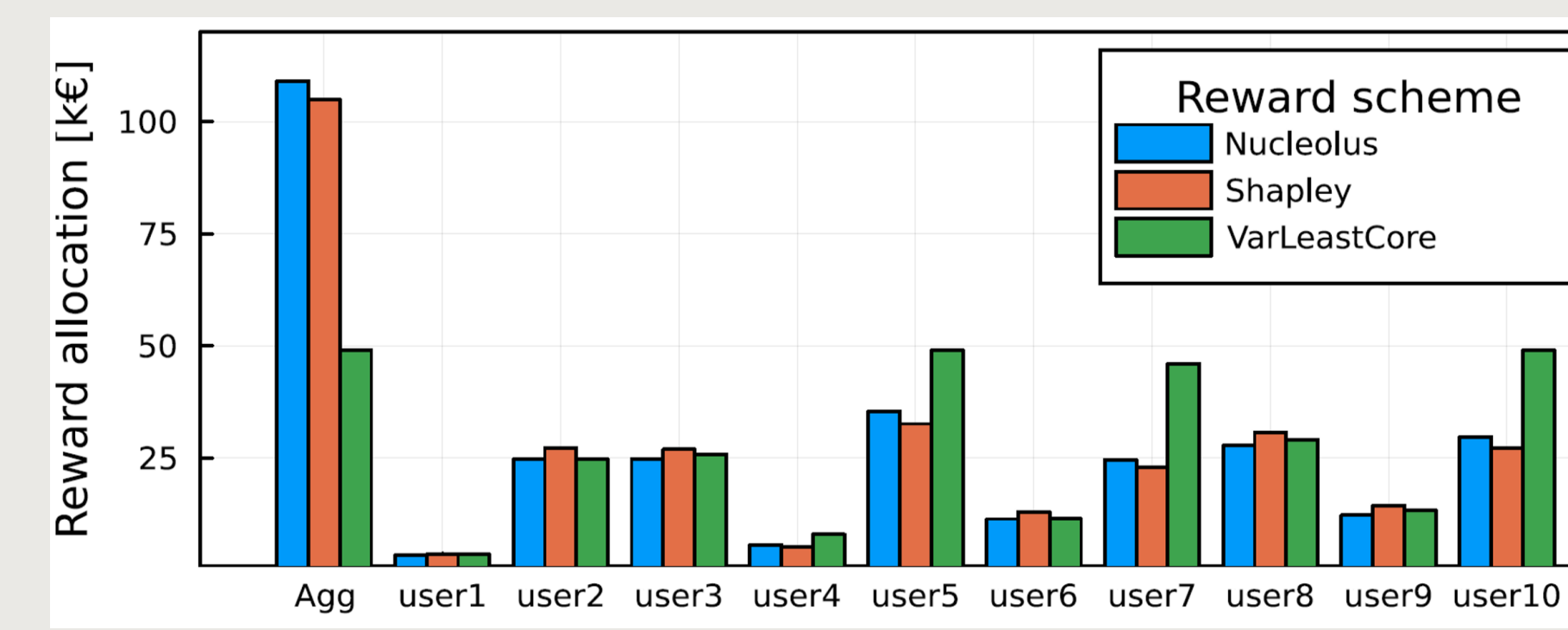
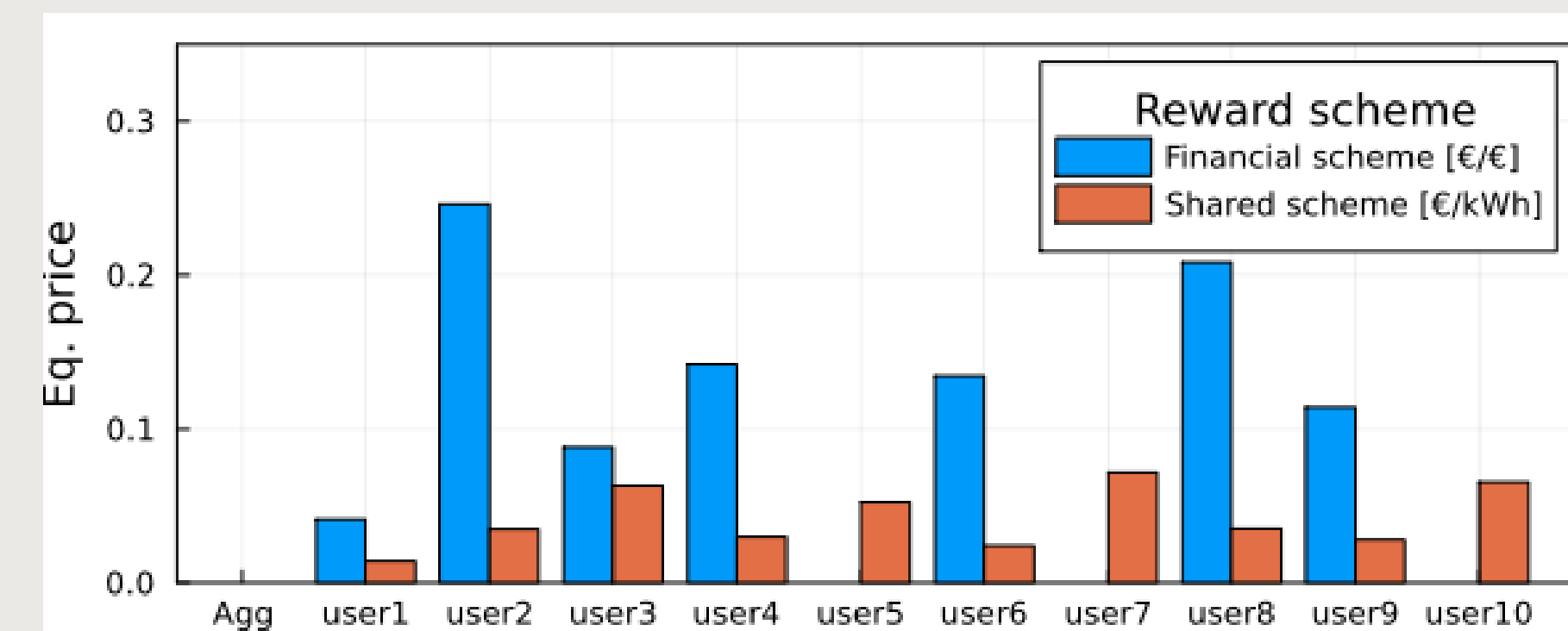
Involvement as technical expert of EnGreen in:



LIFE project on Industrial Energy Community for stakeholder involvement



H2020 project on Positive energy district for energy optimization and management

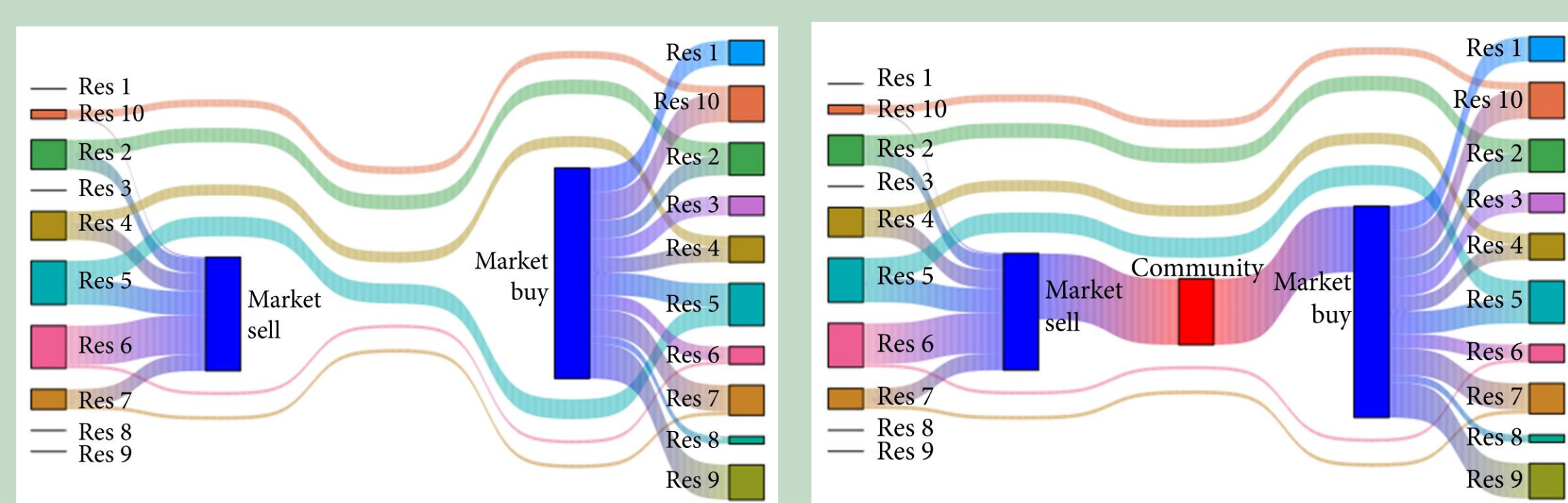


Reward allocation of ECModel [4][5]

Study of allocation mechanisms to distribute the incentive [3] and provide flexibility mechanisms to the grid [4] [5]

Next steps 6

- *EnergyCommunity.jl*: useful tools for REC, addressing the identification phase with a linear optimization model and different reward schemes



Energy flows from ECModel [3]



- Implementation of flexibility module to represent shiftable and adjustable loads for Local Flexibility Markets
- Current regulatory status prevents the development of consistent projects due to market insecurity in the incentive system

Continuation plan for subsequent years 7

Activity	Q1 Y1	Q2 Y1	Q3 Y1	Q4 Y1	Q1 Y2	Q2 Y2	Q3 Y2	Q4 Y2	Q1 Y3	Q2 Y3	Q3 Y3	Q4 Y3
Literature												
RECs creation												
IREC visiting												
Flexibility cases												
Thesis work												

Main references 8

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- [6] E. Belloni et al., Renewable Energy Communities Equipped With Electric Mobility Infrastructures: Energy and Economic Modeling With Flexible Market Data Conditions, IHTC IEEE Conference, *under publication*