SUSTAINABLE PLACES

LocalRES

A case study of European small-town Renewable Energy Communities

Participatory design of supporting tools as a vehicle to engage and understand local communities and their energy related concerns

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A shift of paradigm in the energy sector

Yesterday		Tomorrow
FEW LARGE POWER PLANTS	**PRODUCTION**	MANY SMALL POWER PRODUCERS
CENTRALISED, MOSTLY NATIONAL	**MARKET**	DECENTRALISED, IGNORING BOUNDARIES
BASED ON LARGE POWER LINES AND PIPELINES	**TRANSPORTATION**	SMALL-SCALE TRANSMISSION & REGIONAL SUPPLY COMPENSATION
TOP TO BOTTOM	**DISTRIBUTION**	BI-DIRECTIONAL
PASSIVE, "CONSUMING AND PAYING" ONLY	**CONSUMER**	ACTIVE, PARTICIPATING IN THE SYSTEM (PROSUMER)

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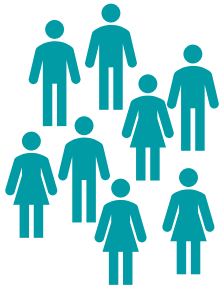
A shift of paradigm in the energy sector

The technologies for this transition is already available at high TRL

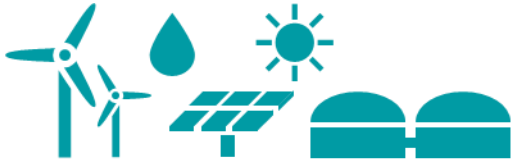
So why are we still not there yet?



ACCEPTANCE AND COMMITMENT

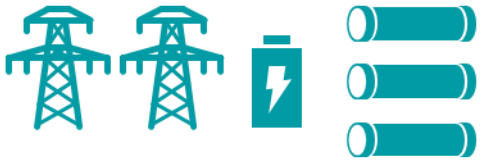
Tomorrow

MANY SMALL POWER PRODUCERS

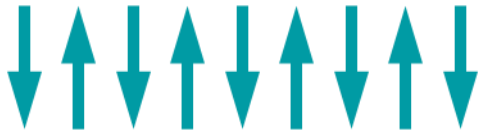


DECENTRALISED, IGNORING BOUNDARIES

SMALL-SCALE TRANSMISSION & REGIONAL SUPPLY COMPENSATION



BI-DIRECTIONAL



ACTIVE, PARTICIPATING IN THE SYSTEM (PROSUMER)

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Recent policy shift from focus on purely technical solutions towards social innovations

Technical solutions

The Clean Energy Package recently released by the EU aims at a more efficient decarbonisation and a better integration of renewable sources into the energy system. The current energy system is undergoing a change from conventional fossil fuel use towards approaches based on renewable energies and is shifting from a centralised model towards more decentralised concepts.

Social innovations

Within this transition Renewable Energy Communities (REC) are a new focal point aiming to actively involve consumers and citizens from the start of the design phase all the way to the end of the process, where a community is influencing the development of relevant energy products and services, such as for example the management of small power producers of renewable energy.

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Definition of Renewable Energy Community

According to the **EU Renewables Directive** Article 2(16) a Renewable Energy Community has been defined as a legal entity:

1. which, in accordance with the applicable national law, is based on open and **voluntary** participation, is **autonomous**, and is effectively controlled by shareholders or members that are located in the proximity of the renewable energy projects that are owned and developed by that legal entity
2. the shareholders or members of which are natural persons, SMEs, or local authorities, including municipalities
3. the primary purpose of which is 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

The REC is a vehicle to address some of the social challenges of the energy transition

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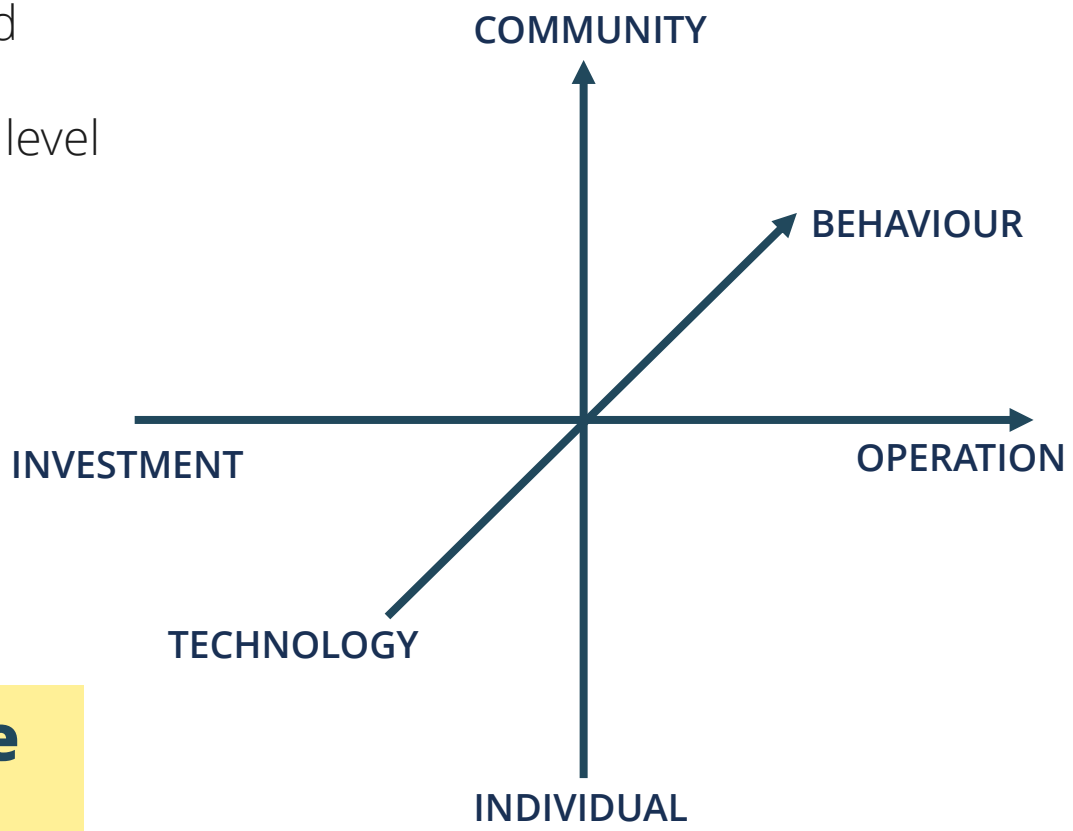
Three social dimensions of the energy transition

The energy transition requires people

- to **accept** new technologies in their daily lives and **adapt** their behaviour accordingly
- to **engage** both individually and on a community level
- to **decide** on initial investments and actively **participate** in the operation afterwards

ACCEPTANCE AND COMMITMENT



Social innovation along all these axes is necessary!

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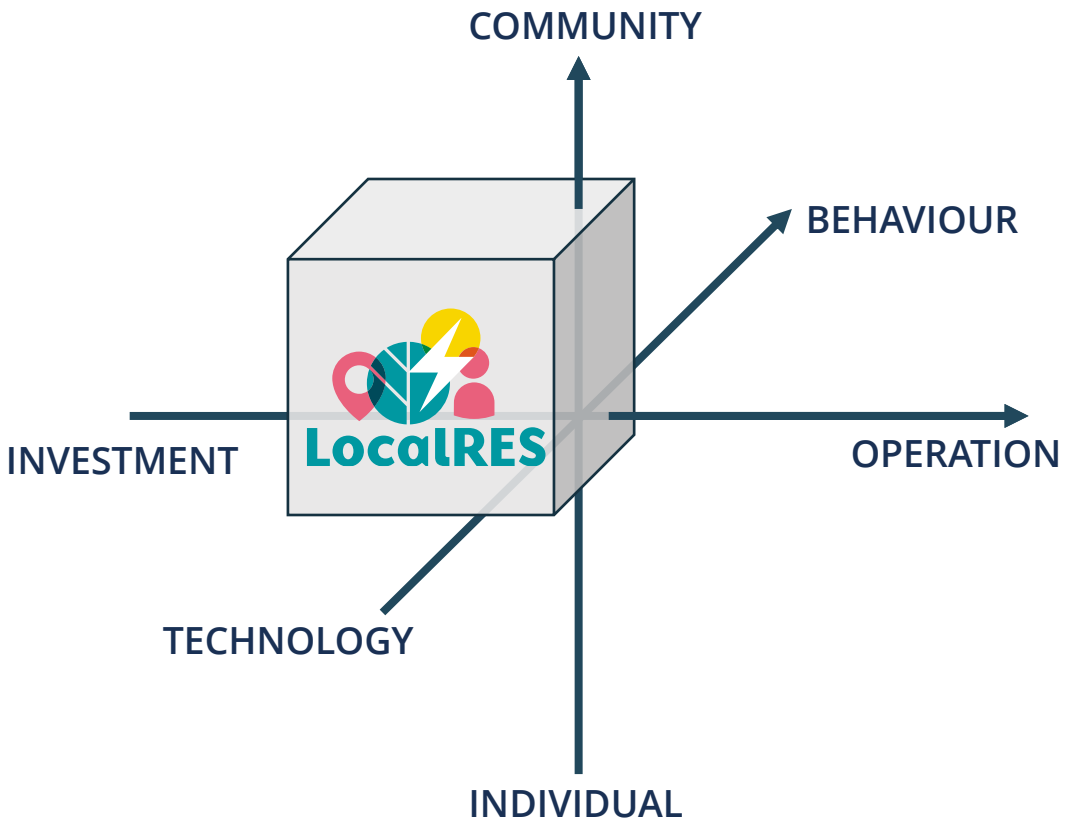
Focus of the LocalRES project

The **social innovation** envisaged for the **LocalRES** project is targeted at the following areas:

- Building **local energy communities**
- Acceptance of mainly **technological scenarios**
- Investment in assets to support **community goals**



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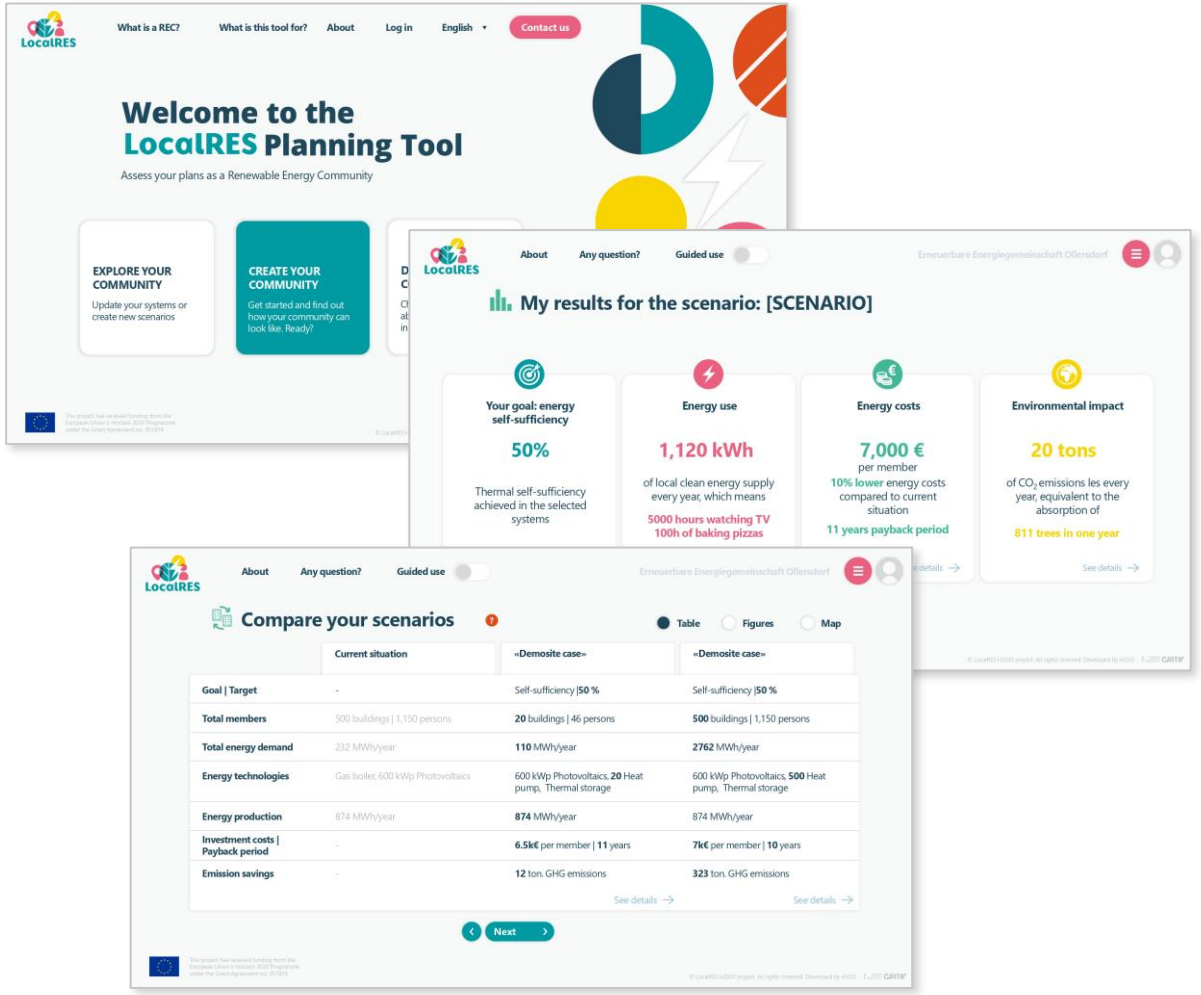
Decision-support tools for RECs

LocalRES aims to develop a **supporting tool** to **help renewable energy communities** with:

- **Building and selecting** community goals and scenarios
- **Understanding** technical, economic, environmental, and social implications
- Providing **a platform for communication** and community building



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Co-design together with the RECs

To foster acceptance and commitment **everything should be co-designed** together with the local communities:

- involving all relevant **stakeholders**
- giving participants a **voice**
- obtaining **insights** for the designers about the local context, social norms and cultural aspects

This activity can also support:

- Identifying and establishing **role models**, “heroes” or “energy champions”
- creating a **sense of ownership** to increase motivation to participate

ACCEPTANCE AND COMMITMENT

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Co-design workshops

Phase I: Representative workshops

- **Participants**
  Energy experts and local community representatives
- **Purpose**
  Identify specific community goals and scenarios

Phase II: Citizen workshops

- **Participants**
  Citizens and community representatives
- **Purpose**
  Gather qualitative and quantitative feedback on scenarios, goals, tools, needs and concerns

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Four small-town communities across Europe

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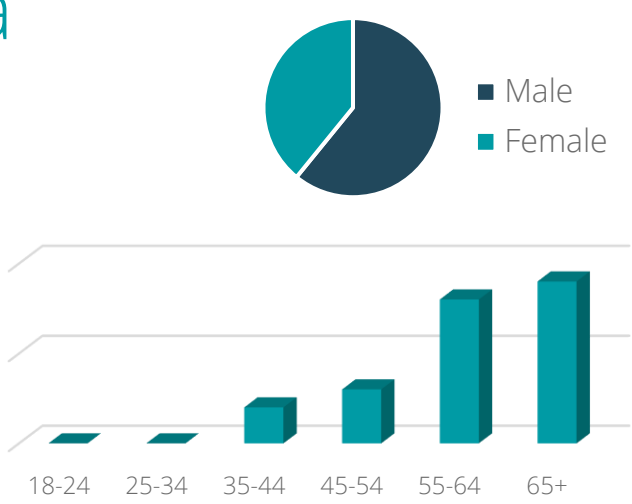
Ollersdorf / Austria



Characterisation of the community:

- Well-established and advanced community
- Already a good understanding of REC

Expectations and next steps:

- Community support tools to facilitate further developments
- Broadening the scope towards topics such as water usage or food waste

Main community goals:

- 100% renewable energy for the Community
- Energy self-sufficiency
- Energy supply security

Specific scenarios of interest:

- More PV installations
- Communal battery storage
- Waste heat recovery

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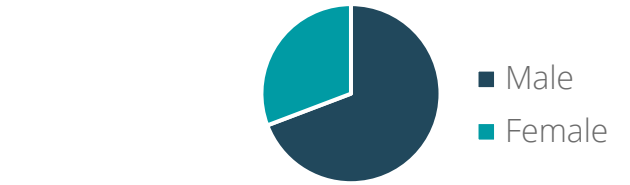
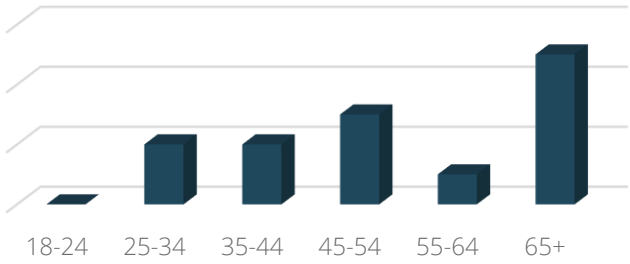
Berchidda / Italy





Characterisation of the community:

- Focus on financial concerns such as profitability, grants, cost of energy
- Pilot site for 3 EU projects (LocalRES, HESTIA, NEON)

Main community goals:

- Save on the cost of energy
- Maximise the return on investment
- Energy self-sufficiency
- Freely choose what equipment to install without jeopardising grid operation

Specific scenarios of interest:

- More PV generation
- Installation of more heat pumps in homes
- Operation of rural micro-grids
- More EV charging points in the town

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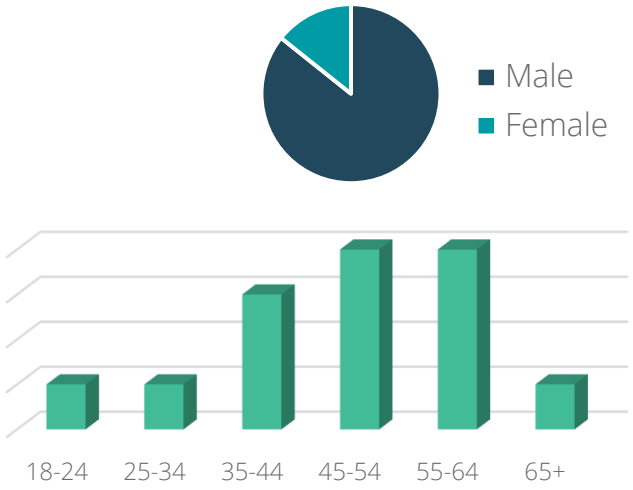
Ispaster / Spain



Characterisation of the community:

- Young community, not yet fully established

Expectations and next steps:

- Develop the community and engage more people
- Establish local “heroes” or “energy champions”
- Broaden energy focus towards other socio-economic activities to support local businesses

Main community goals:

- supply of all public buildings with 100% renewable energy and maximise self-sufficiency
- Reduce dependency on the main grid
- Promote communal energy production in the town

Specific scenarios of interest:

- School and other public building upgrades
- Community owned PVs
- Waste heat recovery

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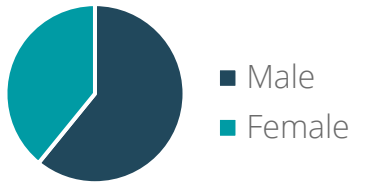
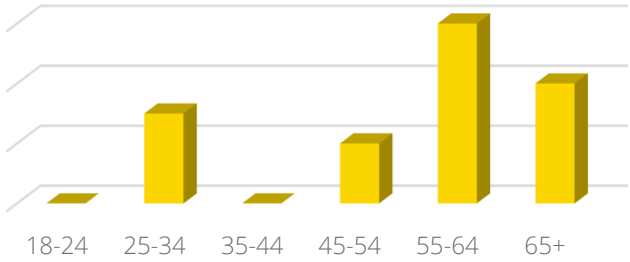
Kökar / Finland





Characterisation of the community:

- Comprehensive interest in the other demo sites and the LocalRES project in general
- Desire to express personal views and ideas
- Some knowledge gaps between participants regarding the energy topics discussed

Expectations and next steps:

- Establishing local “heroes” or “energy champions”

Main community goals:

- Increase renewable asset utilisation
- Achieve energy self-sufficiency on the island
- Increase the reliability of the electricity supply
- Development of EV charging infrastructure

Specific scenarios of interest:

- Comprehensive RES update to the nursing home
- Small-scale district heating system in the town
- Development of EV infrastructure (cars & boats)

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Engagement with Renewable Energy Communities

Key findings of the citizen workshops

- Overall **male participants** have been found to be more likely to engage with REC activities, $r(61)=0.31$, $p=0.01$.
- In **Berchidda**, we found that people who would engage in REC activities would prefer to use supporting tools in a **group settings**, $r(11)=0.68$, $p=0.01$.
- In **Ollersdorf**, those who would engage in REC activities **do not think expert use** should be the primary focus of supporting tools, $r(21)=-0.48$, $p=0.02$.

How likely do you think it is in your community that people would engage in common energy related activities?

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Use of supporting tools in RECs

Key findings of the citizen workshops

- Those interested in partaking in the decision-making processes of the community would **find supporting tools helpful**, $r(63)=0.37$, $p<0.01$.
- In **Berchidda** there were strong **privacy concerns** correlated with the **perceived helpfulness** of supporting tools, $r(11)=0.7$, $p<0.01$.
- In **Ispaster** those who were interested in using supporting tools on their own found the presented tool ideas helpful, $r(12)=0.55$, $p=0.04$, while in **Kökar** the outcome was the opposite, $r(13)=-0.56$, $p=0.03$.

Do you think a tool like the one presented earlier would be helpful for the community activities?

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Target audience for REC supporting tools

Key findings of the citizen workshops

- In **Ollersdorf** older participants were less likely to prefer mainly expert use of the tool, $r(20)=-0.48$, $p=0.03$, and at the same time did not want to use the tool on their own, $r(20)=-0.57$, $p<0.01$.

- In **Kökar** those who prefer the tool to be used by experts only also think a mobile phone application would be appropriate, $r(13)=0.54$, $p=0.04$, while in this case a web page interface would not be considered adequate, $r(13)=-0.68$, $p<0.01$.

A planning tool can be designed for different levels of expertise.
Would you prefer the planning tool to be primarily used by
…an expert consultant only?
…during guided collaborative community events?
…by every individual citizen?

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Target platforms for REC supporting tools

Key findings of the citizen workshops

- Participants in **Berchidda** were more interested in a mobile application in comparison to participants in **Ollersdorf**, $t(24.6)=2.34$, $p=0.03$, and **Kökar**, $t(23.93)=2.88$, $p<0.01$, although this preference was negatively correlated with age, $r(11)=-0.72$, $p<0.01$.

- Participants in Ollersdorf were more interested in a web page than those in **Berchidda**, $t(19.69)=2.21$, $p=0.04$, as were participants in **Ispaster**, $t(21.33)=2.28$, $p=0.03$, and **Kökar**, $t(20.66)=2.38$, $p=0.03$.

What platform would you prefer the tool to run on?

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Target platforms for REC supporting tools

Key findings of the citizen workshops

- Older participants did not prefer using a mobile phone application both in Ispaster, $r(12)=-0.57$, $p=0.03$, and in **Berchidda**, $r(11)=-0.72$, $p<0.01$.
- **Non-electronic** (paper-based) means of presentation were preferred by **older** participants, $r(62)=0.27$, $p=0.03$.
- In **Ollersdorf**, female participants preferred using a mobile phone interface, $r(21)=-0.44$, $p=0.04$, while male participants preferred using a webpage, $r(21)=0.57$, $p<0.01$.

What platform would you prefer the tool to run on?

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Selected qualitative feedback from citizens

Technical realisation and potential upgrades of the energy system

"it allows to do simulation with multiples scenarios that are reliable"

"Too scientific"

"If to be used by citizens, it has to be much simpler and more specific"

"It is always good to have a plan when something is to be done"

"real data collection"

"adjusted to the existing reality and is updated correctly"

Financial and economic implications of investments

"Personal benefits need to be made visible"

"energy savings"

"Everybody could calculate the best option for themselves"

"independence from utility companies"

"lower the energy cost"

"Investment costs, savings, amortisation"

"awareness about the importance of the self-consumption"

Social dimension & communication between community members and other relevant stakeholders

"Better communication and networking"

"Coordination & communication"

"summarise different thoughts from different people"

"decide who should participate in the project"

"promote more participation processes in other areas"

Involving those people who have doubts about the importance of the energy community"

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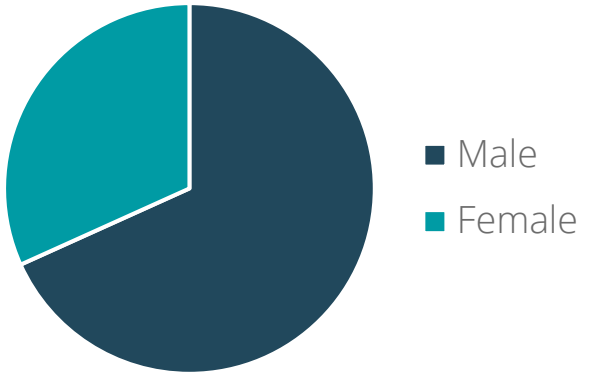
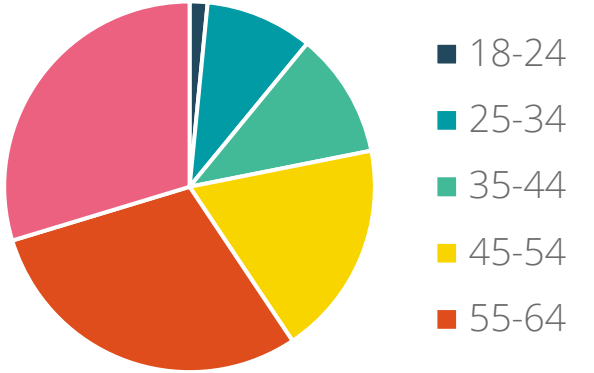
Limitations

Selection bias:

- Only interested parties participated in the workshops
- Significant overrepresentation of older, male participants
  (78% of participants were older than 45, and more than 30% of participants were older than 65. Only 1/3 of the participants were women)





COVID:

- Disengagement caused by delays of in-person workshops
- Concerns about face-to-face meetings

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Implications for Renewable Energy Communities

To form and sustain a successful REC people need **support to decide on:**

- the **technical realisation** and potential upgrades of the energy system, i.e., visualising energy generation and consumption on an individual and a community level
- the **financial and economic implications** of investments, i.e., calculating costs and return on investment for the individual and for the community
- the **social dimension and communication** between community members and other relevant stakeholders, i.e., helping with community building and community engagement

Decision have to be made on both **the community and the individual level:**

Tools supporting this activity need to

- adapt to the **specific requirements** and circumstances of each town
- consider the **needs of the individual** end users including their **technical literacy**

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Conclusions

- **Renewable Energy Communities** are a novel approach to address decarbonisation and decentralisation of the energy system
- The focus is not exclusively technical and economic, but a **social and community dimension** must be addressed for the energy transition
- **Co-creation** is a valuable methodology not only to gather information but also **to foster active engagement** within the community
- This **empowers citizens** to make informed decisions on community goals and scenarios and to participate in the design and operation of the local energy system

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Thank you for your attention

Questions

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