Comparison of a direct line system and a renewable energy community on the basis of a pilot plant in Thannhausen

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Agenda

- Motivation
- Direct Line System
  - General overview
  - Thannhausen pilot
- Renewable Energy Communities
- Calculation results
- Conclusion

Project Description

The presentation is based on the work of two research projects:

- SoWeiT Connected
  - Stadt der Zukunft
  - Duration: 10.2018 – 09.2022

- ALPGRIDS
  - Interreg Alpine Space
  - Duration: 10.2019 – 08.2022

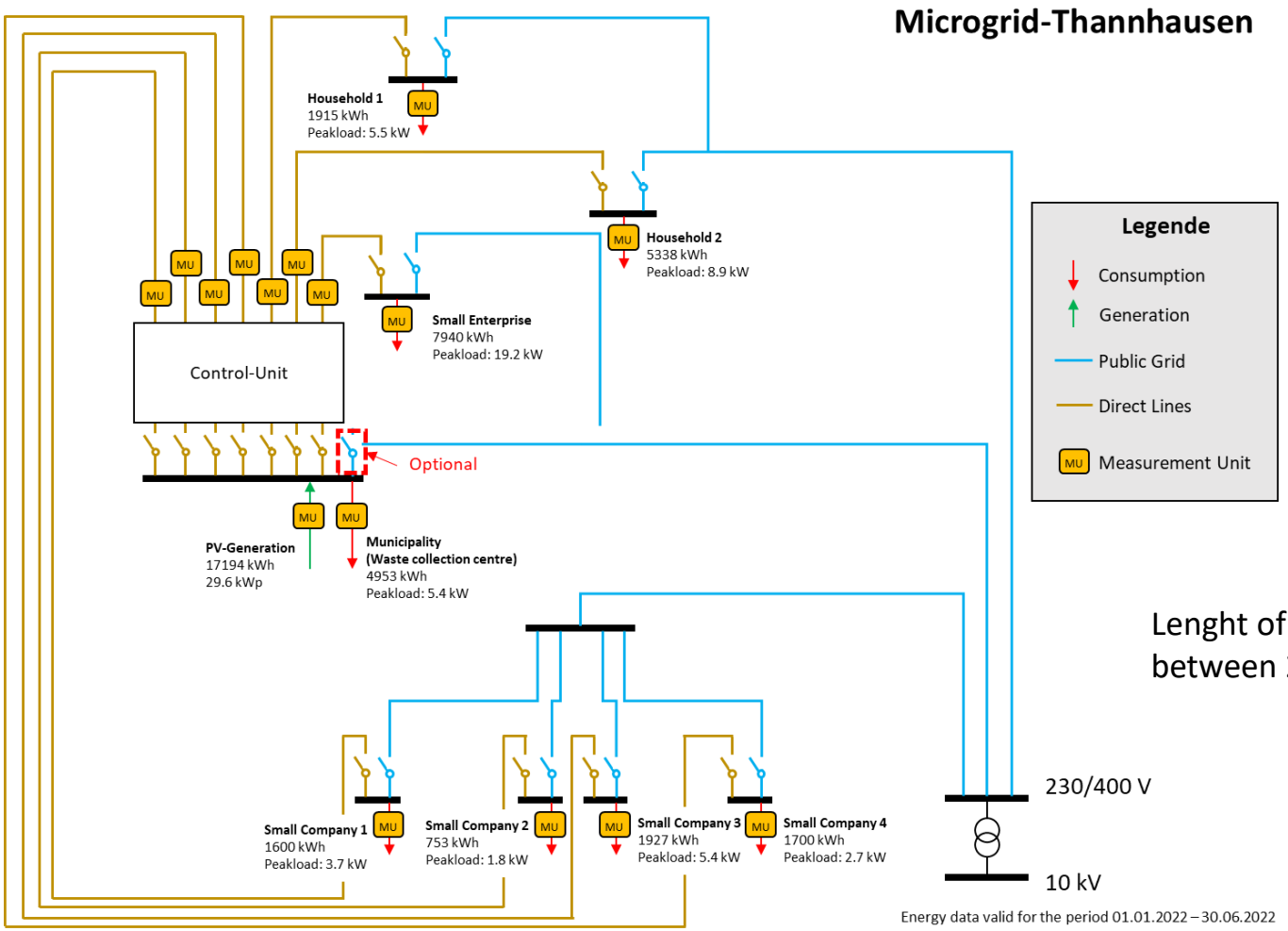
Motivation

- Enable the exchange of renewable energy between different buildings:
  - Direct Line System (DLS): only possibility before 2021 in Austria
  - Renewable Energy Community: further possibility since 2021
- Demonstration of the DLS in Thannhausen
  - 1 PV-system: 29,6 kWp
  - 7 consumers: Households and SMEs
- Comparison of the direct line system with a renewable energy community

DLS – Legal Framework

- Privately owned and operated power line
- Defined in the Elektrizitätswirtschafts- und -organisationsgesetz (ElWOG)
- Basic principles:
  - There must be separation between the direct line(s) and the public grid to avoid direct exchange of electricity between the direct line(s) and the public grid
  - It is not allowed to fed PV surplus into the public grid via the direct line
  - The direct line must be operated by the producer
  - A star network, as used in Thannhausen, is not a contradiction to applicable electricity law

Technical set-up of the pilot



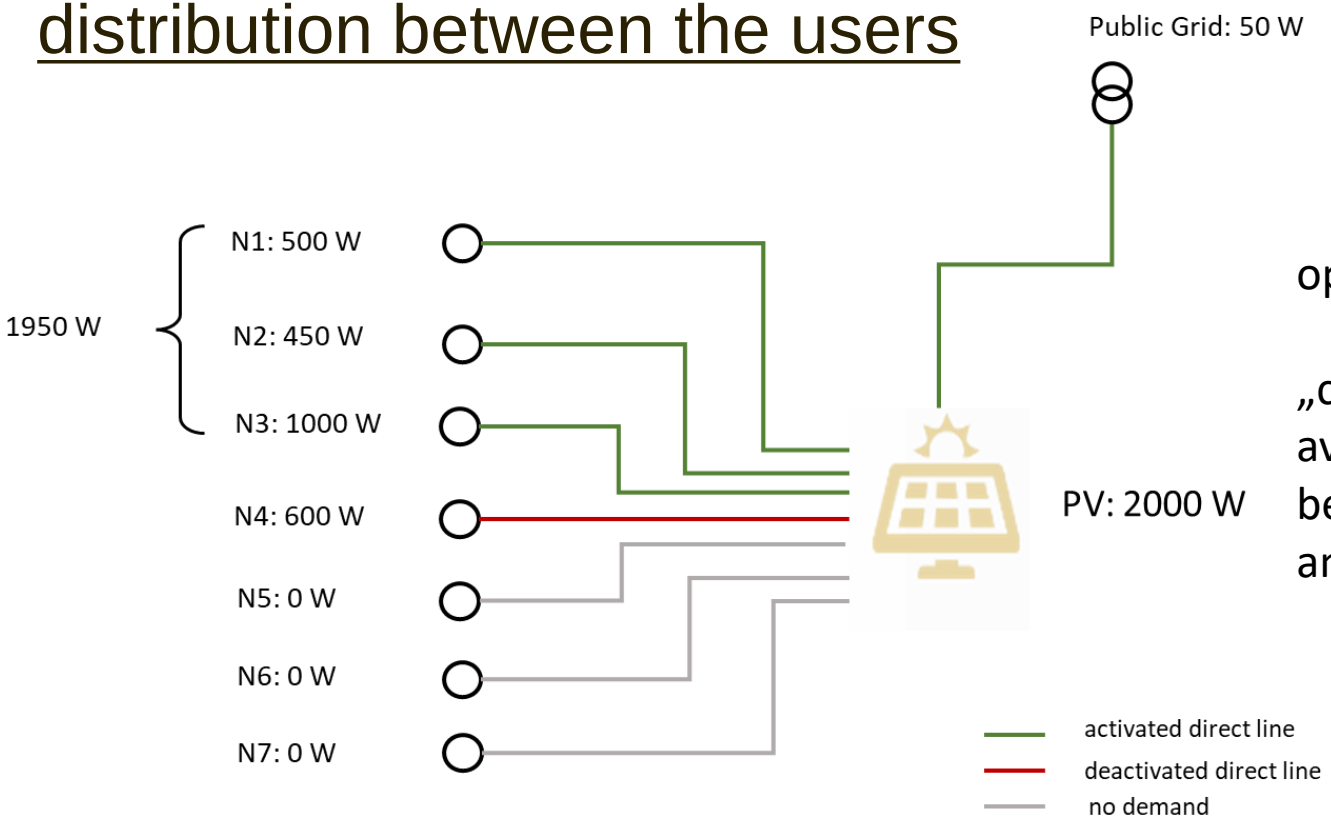
Lenght of direct lines
between 28 m – 150 m

Control regime

1. The self-consumption of the municipal buildings (waste collection centre) is covered.
2. The other users of the DLS are supplied in a way that most of the PV-production is used:
   - Only users whose demand can be fully satisfied by the PV generation are connected to the DLS and separated from the public grid.
   - The internal ranking system will ensure that over the course of a certain period distribution of PV generation will happen on a fair and transparent basis.
3. Any remaining excess PV generation will be fed into the public grid

Ranking System

Trade off between max. own consumption and fair distribution between the users



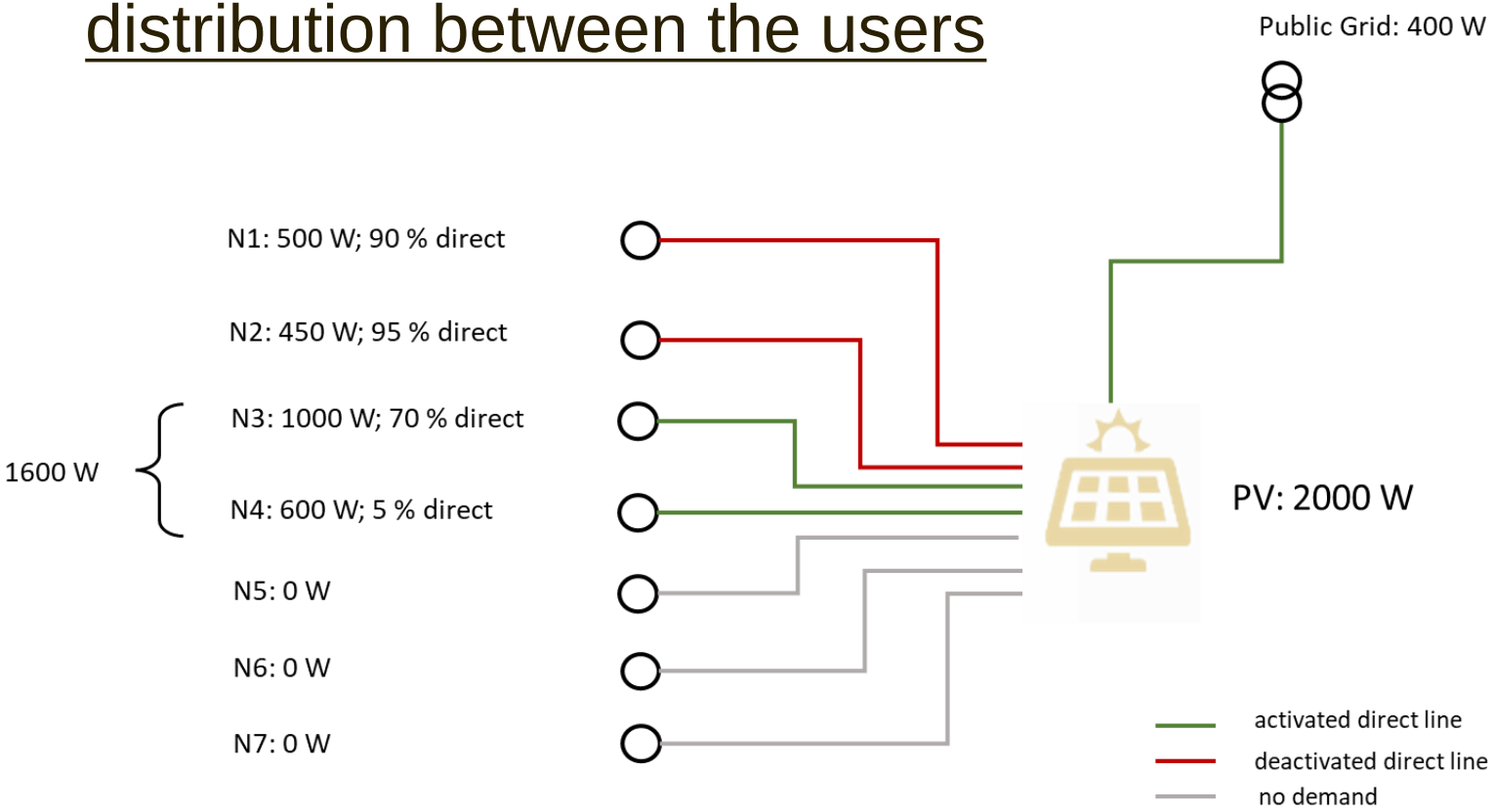
optimization every 15 s

„clocking prevention“ to avoid constant switching between the direct lines and the public grid

Example: Own consumption

Ranking System

Trade off between max. own consumption and fair distribution between the users



Example: own consumption + fair distribution

Renewable Energy Communities

- Based on the Renewable Energy Directive II of the European Commission
  - In Austria defined in the Erneuerbaren-Ausbau-Gesetzespaket and the ElWOG
  - valid since July 2021
- A renewable energy community is allowed to:
  - generate renewable energy itself,
  - consume,
  - store,
  - and sell self-generated renewable energy to members,
  - **by using the public power grid**
- Advantage of reduced grid fees and taxes
- Several framework conditions to consider

Tariff system

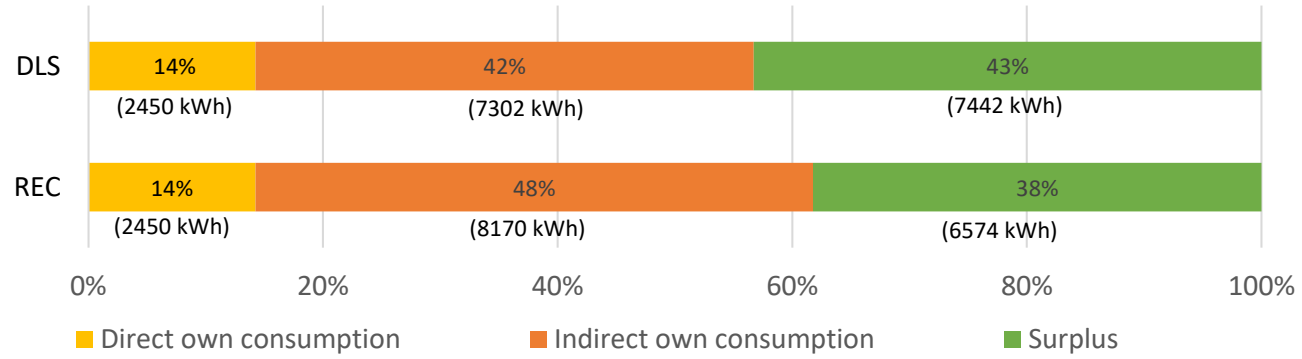
- Definition of the REC in such a way, that only the costs necessary for the operation of the REC (fees association, billing, etc.) remain in the community itself.
- Definition of the DLS in such a way, that the same benefits for the participants result.
- Chosen tariffs for the comparison:

	DLS [Cent/kWh]	REC [Cent/kWh]
Tariff for the consumption of electricity from the energy sharing scheme	41.86	42.70
Tariff for the feed-in of energy in the energy sharing scheme	41.86	32.00
Tariff for the consumption of energy from the public grid (incl. grid fees and taxes) – based on E-Control	50.17	50.17
Tariff for the feed-in into the public grid – OeMAG Tariff for the 3. Quarter of 2022	30.70	30.70

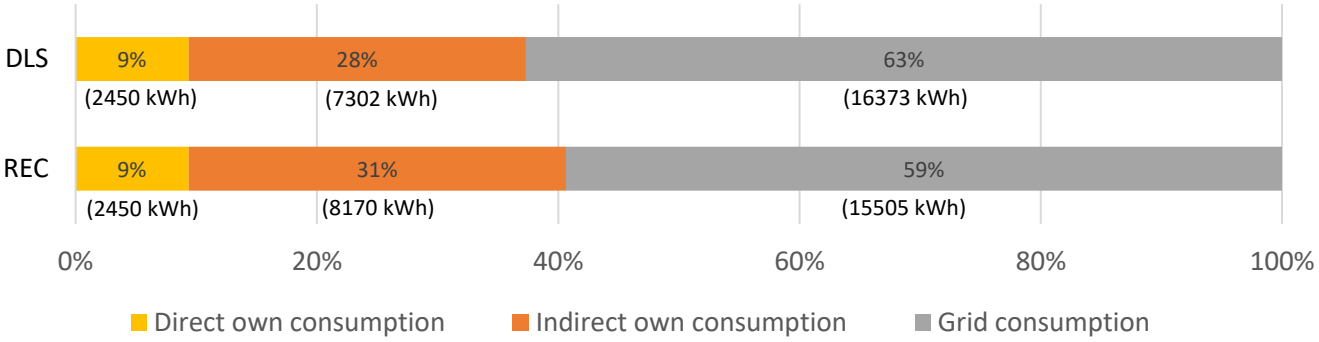
- The actual consumption tariff for the DLS in Thannhausen is 15 Cent/kWh.

Calculation results

Comparison of the own consumption:



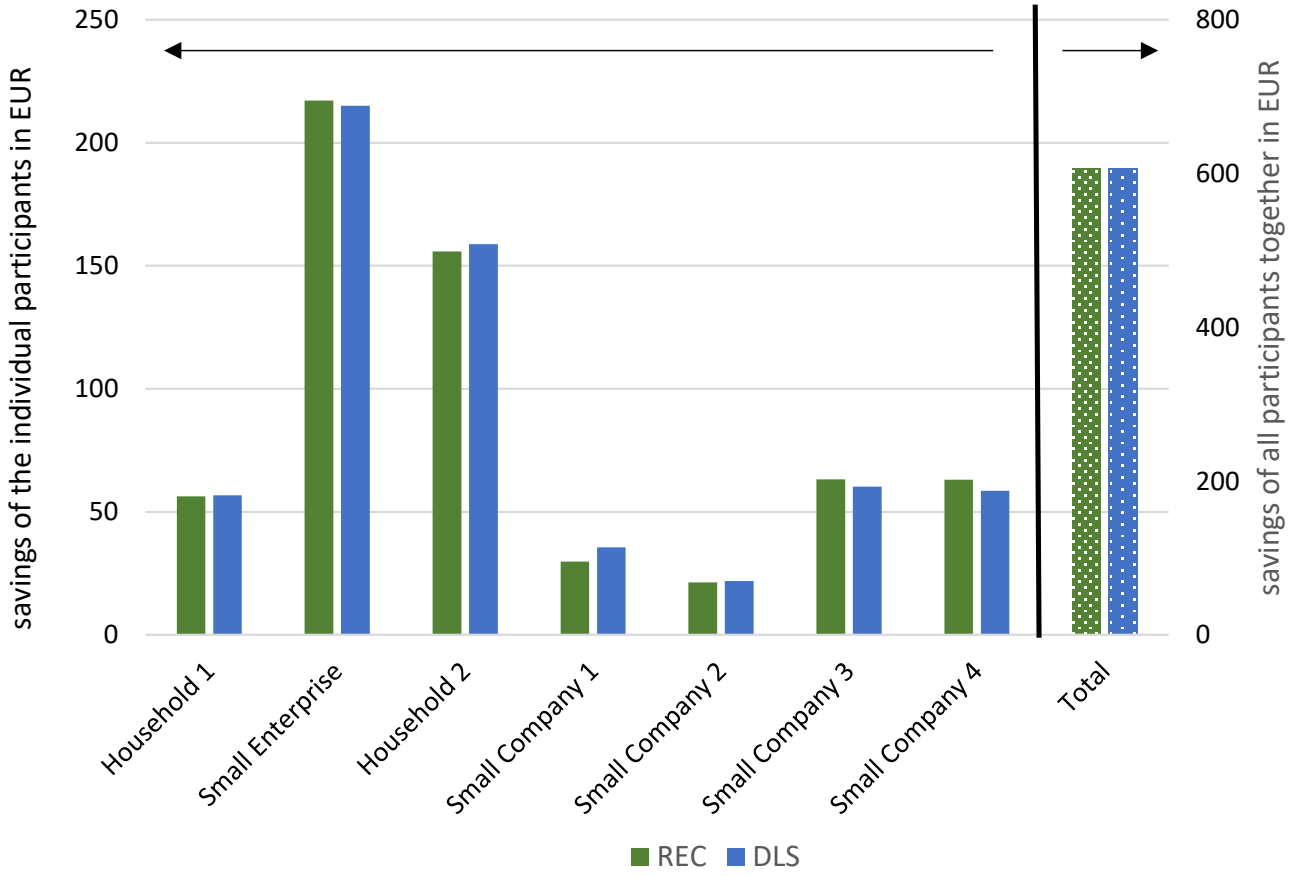
Comparison of the self supply rate:



Reasons for lower own consumption of the DLS:

- no partial supply via direct lines possible
- Clocking prevention
- „Fair“ distribution algorithm

Benefits of the participants

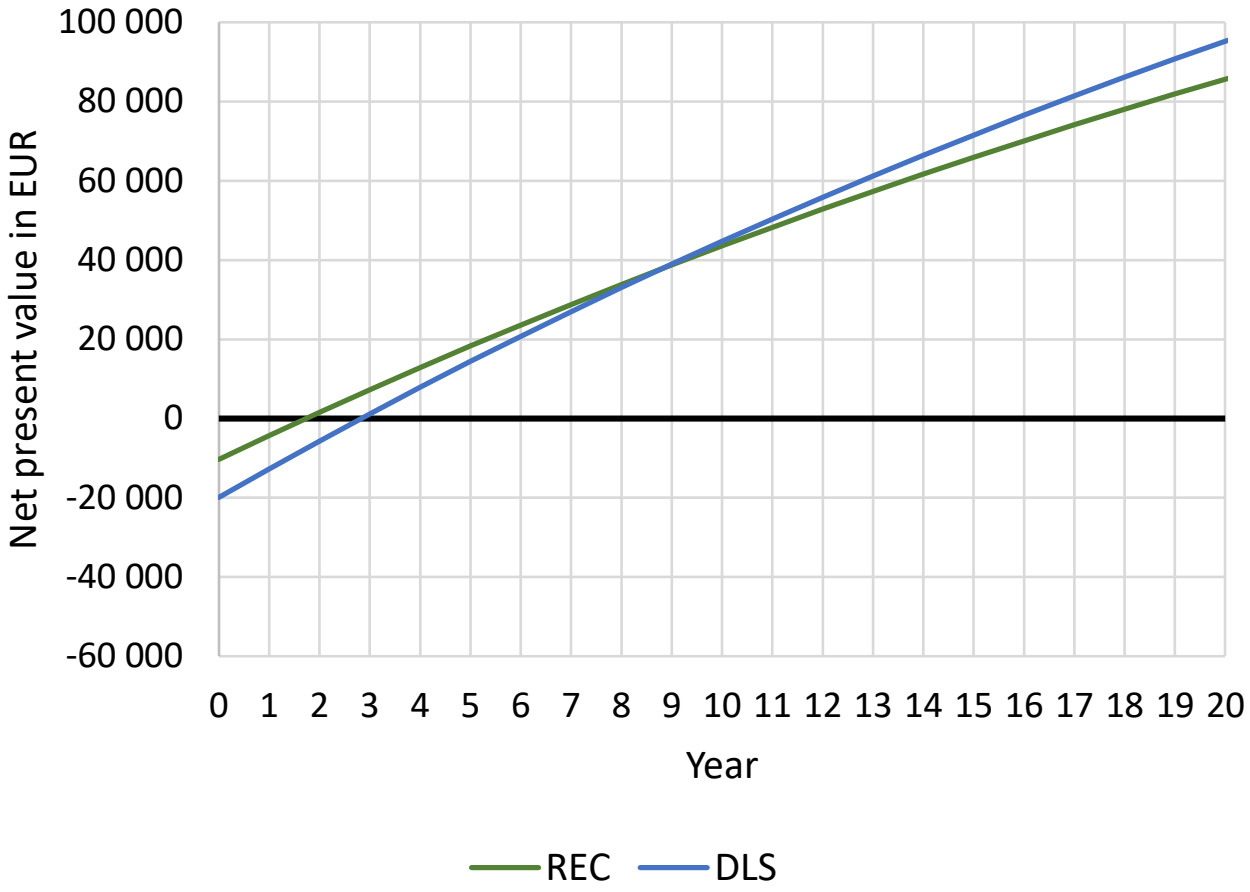


Savings between:
21 € and 217 €
per half year

Fair distribution
confirmed

Cost savings of the participants of the energy sharing schemes in comparison to a 100 % grid consumption for the period of **01.01.2022 – 30.06.2022** (half year)

Amortisation period – with funding



Funding:

- KEM-Funding
- FFG investment grand
- Covid investment grant
- Digging costs covered by fibre power initiative

Conclusion

- Both systems enables similar savings to the participants, when the subsidies granted for the DLS are taken into account.

DLS	REC
+ Islanding operation	- No island operation possible
+ no grid fees and almost no taxes and levies	+/- reduced grid fees
- close proximity of the participants is important	+ close proximity not important as long as they are connected to the same substation
- higher investment costs (digging work, etc.)	+ no / lower investment costs
- additional infrastructure necessary	+ no additional infrastructure

- REC are expected to be the common type of energy sharing schemes.
- DLS can still be interesting for specific constellations.

Thank you for your attention!

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SoWeiT Connected

Project Partner:

„Stadt der Zukunft" ist ein Forschungs- und Technologieprogramm des Bundesministeriums für Verkehr, Innovation und Technologie. Es wird im Auftrag des BMVIT von der Österreichischen Forschungsförderungsgesellschaft gemeinsam mit der Austria Wirtschaftsservice Gesellschaft mbH und der Österreichischen Gesellschaft für Umwelt und Technik (ÖGUT) abgewickelt.

ALPGRIDS

Project Partner:

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