SUSTAINABLE PLACES 2022
Sep. 6 - Sep. 9, 2022 | Nice, France

NRG2 PEERS

# Peer-to-peer Energy Communities: regulatory barriers in the EU context


Ilaria Pigliautile, Ph.D.[1]
[1]*University of studies of Perugia, Italy*

S. Arko[2], S. Breukers[3], P. Carnero[4], F. Causone[5], S. D'Oca[6], S. Ferrone[5], B. Pioppi[7], A. L. Pisello[1], A. Solar[8], J. Swens[9], E. Tarpani[1]
*[2]University of Ljubljani, [3]Duneworks, [4]Instituto Valenciano de la Edificaction, [5]Politecnico di Milano, [6]Huygen Ingenieurs & Adviseurs, [7]Elettrica Valeri, [8]Alginet Distribucion Energía Eléctrica, [9]Spectral Enterprise*

# Global context

Need to reduce energy-related $CO_2$ emissions to limit climate change. … **Renewable energy** and **energy efficiency** measures can potentially achieve 90% of the required carbon reductions.

(IRENA, 2022)

**Energy transition**, a pathway toward transformation of the global energy sector from fossil-based to zero-carbon


**Sustainable Development Goals** (SDGs)
urgent call for action by all countries
Goals to be achieved by 2030
(UN, 2015)

# European context

**European Green Deal** aims at achieving **climate neutrality** and sustainability **by 2050**

Clean Energy for All Europeans Legislative Package > **Renewable Energy Directive II** (RED II)/under revision in the framework of the **Fit to 55** package

From 32% to **at least 40%** of renewable energy sources in the overall energy mix **by 2030**.

Moving towards

CENTRALIZED → **NEW ENERGY SYSTEM** → DISTRIBUTED

COMMODITY-ORIENTED → **NEW ELECTRICITY MARKET** → with DIGITAL SERVICES

Introducing:

- Renewable Energy Communities (REC)
- Peer-to-peer trade model

- Technological innovation
- Social innovation

# What is a Renewable Energy Community?

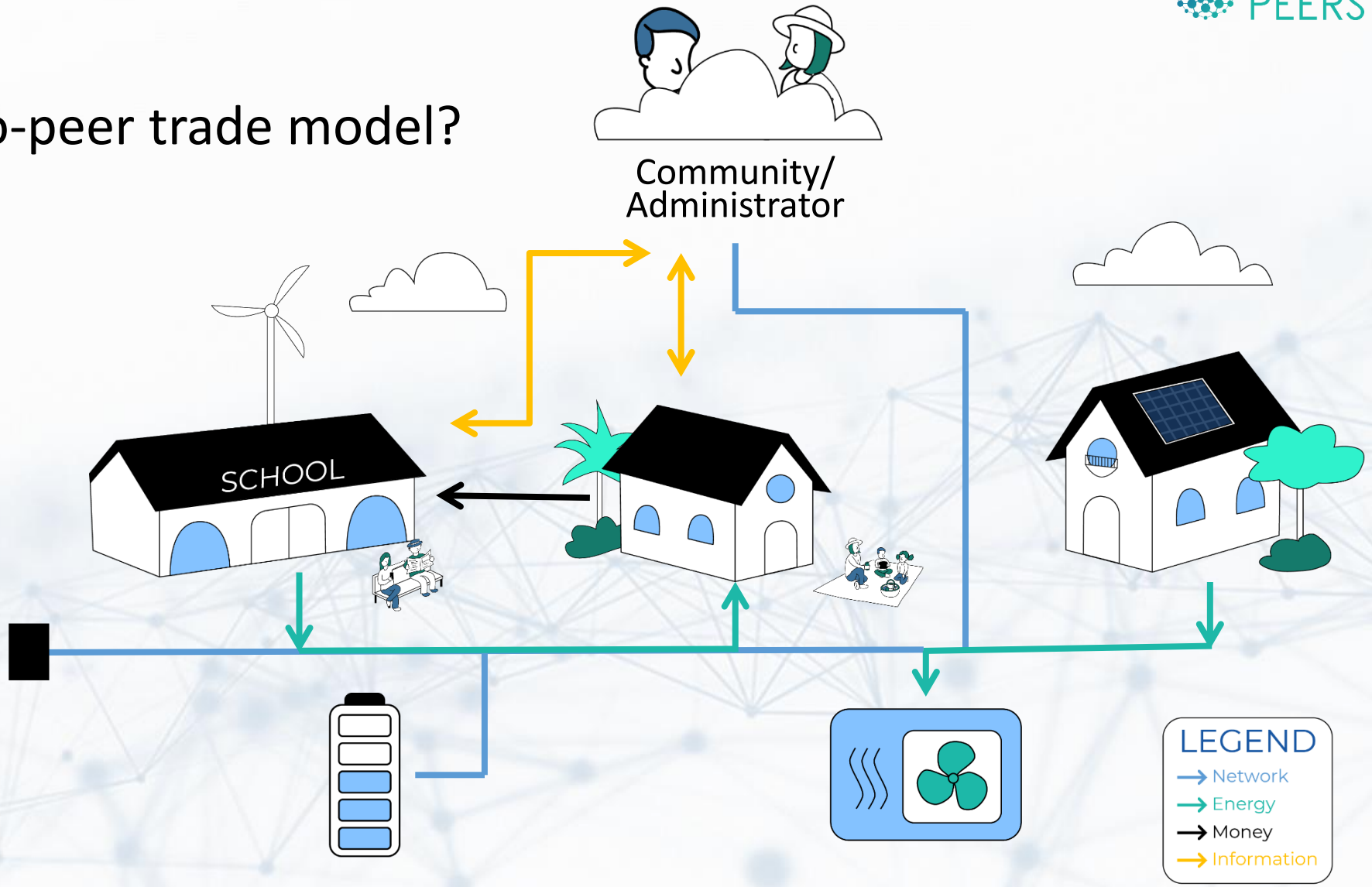
A legal entity:

- which 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;
- the shareholders or members of which are **natural persons**, **SMEs** or **local authorities**, including municipalities;
- the **primary purpose** of which is to provide **environmental, economic or social benefits** for its shareholders or members or for the local areas where it operates, rather than financial profits;

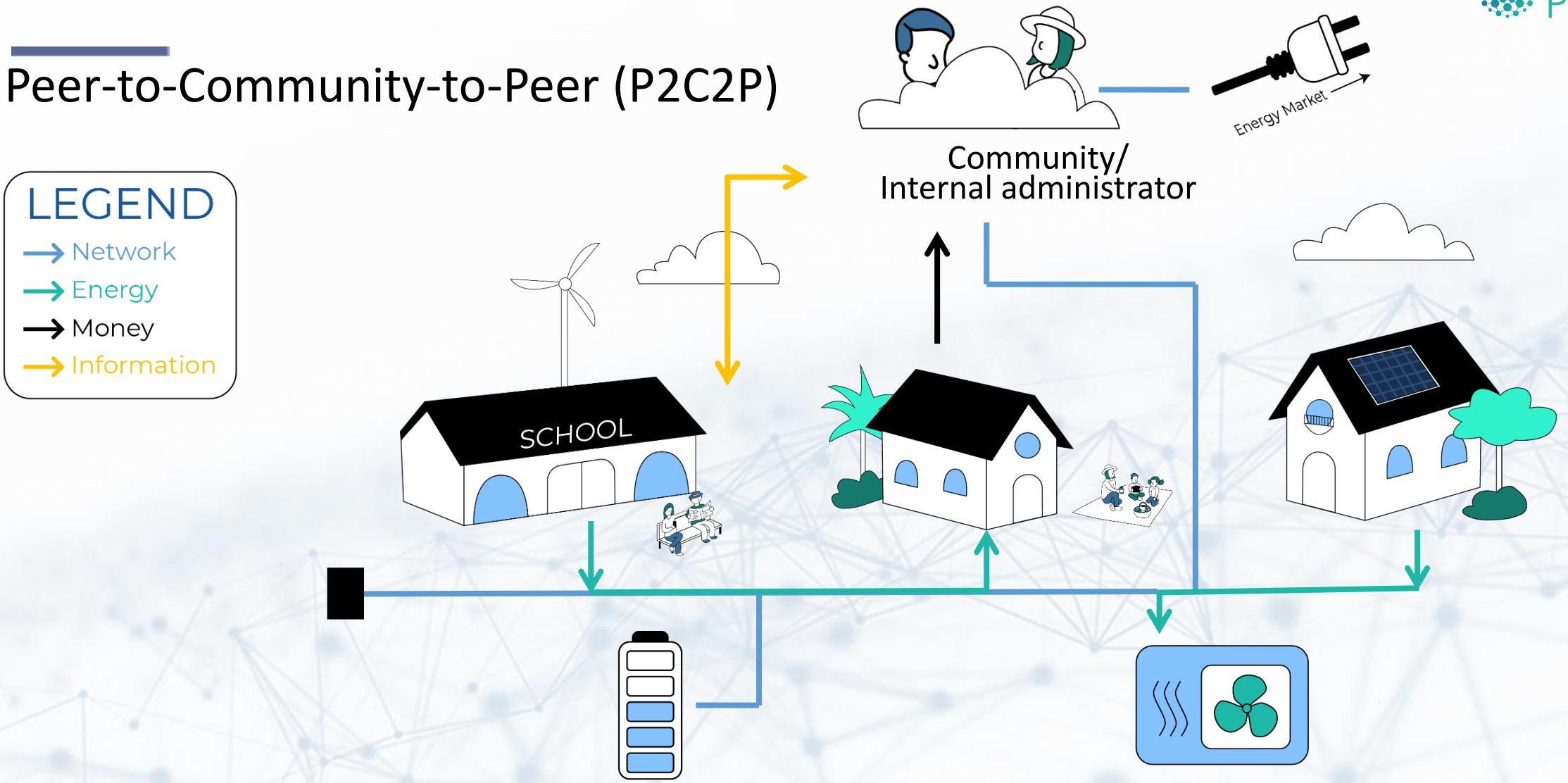
# What is the peer-to-peer trade model?

*'peer-to-peer trading' the sale of renewable energy between market participants by means of a contract governing transaction,* ***either directly between market participants or indirectly through a certified third-party market participant, such as an aggregator****.*

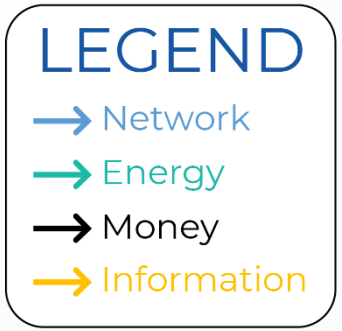
(RED II)

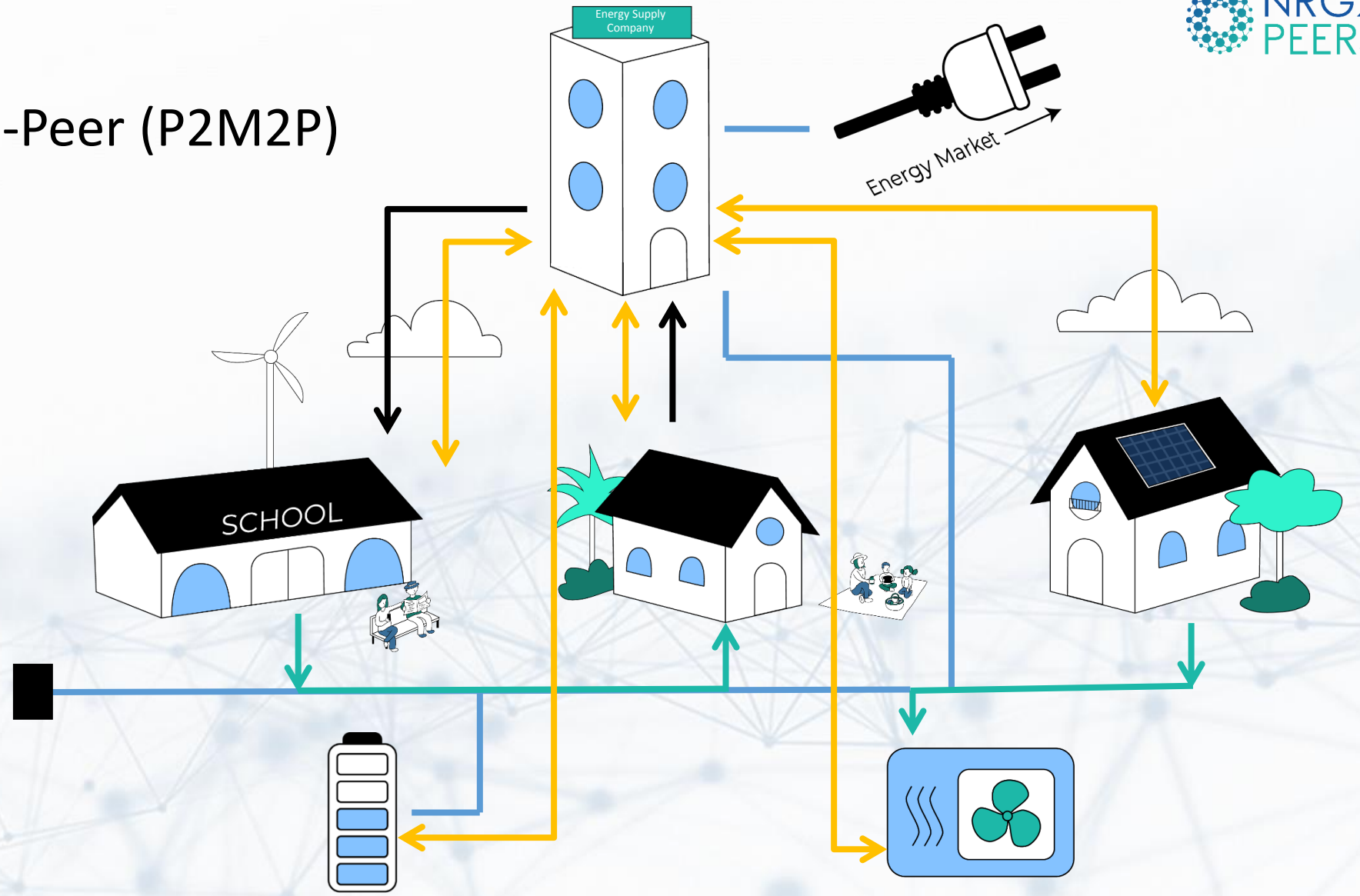


# Peer-to-Community-to-Peer (P2C2P)



# Peer-to-Market-to-Peer (P2M2P)



# NRG2 PEERS

Towards a new generation of EU peer-to-peer Energy Communities facilitated by a gamified platform and empowered by user-centred energy trading mechanisms and business models

This project has received funding from the European Union's H2020 framework programme for research and innovation under grant agreement no 890345.

Experiences from pilots for developing Readiness Level Framework Indicators

Smart demand-response mechanisms
Optimization of energy consumption and peak demand at community level

Adoption of community-based nudging mechanisms supporting the transition

# NRG2 PEERS

Towards a new generation of EU peer-to-peer Energy Communities facilitated by a gamified platform and empowered by user-centred energy trading mechanisms and business models

This project has received funding from the European Union's H2020 framework programme for research and innovation under grant agreement no 890345.

Experiences from pilots for developing Readiness Level Framework Indicators

**RLFI**

1. Organizational
2. Institutional
3. Market
4. Technological
5. User

Smart demand-response mechanisms
Optimization of energy consumption and peak demand at community level

Adoption of community-based nudging mechanisms supporting the transition

# NRG2 PEERS

Towards a new generation of EU peer-to-peer Energy Communities facilitated by a gamified platform and empowered by user-centred energy trading mechanisms and business models

This project has received funding from the European Union's H2020 framework programme for research and innovation under grant agreement no 890345.

Experiences from pilots for developing Readiness Level Framework Indicators

Smart demand-response mechanisms
Optimization of energy consumption and peak demand at community level

Adoption of community-based nudging mechanisms supporting the transition

Financial savings

Environmental savings

Local self-resilience in terms of energy

# NRG2 PEERS

Towards a new generation of EU peer-to-peer Energy Communities facilitated by a gamified platform and empowered by user-centred energy trading mechanisms and business models

This project has received funding from the European Union's H2020 framework programme for research and innovation under grant agreement no 890345.

Experiences from pilots for developing Readiness Level Framework Indicators

Smart demand-response mechanisms
Optimization of energy consumption and peak demand at community level

Adoption of community-based nudging mechanisms supporting the transition

**ADVISORY APP**

educate prosumers and EC members about the practicalities of setting up or participating in peer-to-peer / energy trading mechanisms

**& RLIT**

# NRG2PEERS pilots


pioneers

(4)
Hoog Dalem
Woerden
**Schoonschip**
De Cevuel

(1)
Alginet

(1)
Luče

(2)
Chiaravalle (MI)
**Marsciano (PG)**

laggards

Innovators &
Early adopters

Early majority

Late majority

Laggards

# Schoonschip

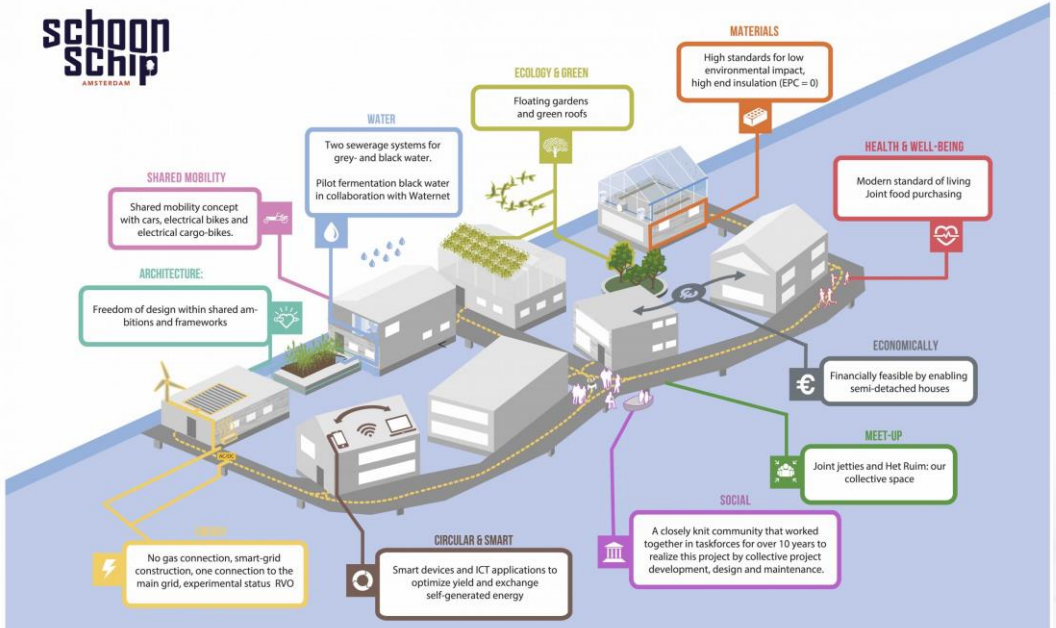
Scope: Neighbourhood
Expanse [m]: 113

Formally established as a legal entity? ✓

Possibility to operate as energy island? ✗

Granted regulatory sandbox status? ✓

*Amsterdam, The Netherlands*



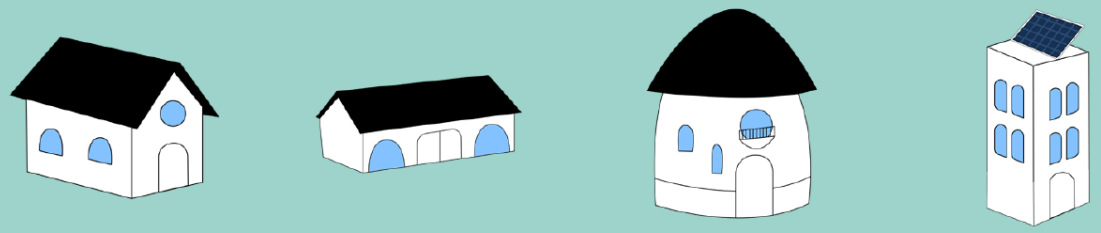

https://schoonschipamsterdam.org/en/

NRG2 PEERS

- since 2008, in 2016;
- 46 residential units – on 30 floating plots – and more than 140 residents
- a bottom-up community initiative with the ambition to create an ecologically and socially sustainable floating residential neighborhood
- Sharing society

**Allowed to establish a smart micro-grid serving the community members**

## Consumer grid connections: 46

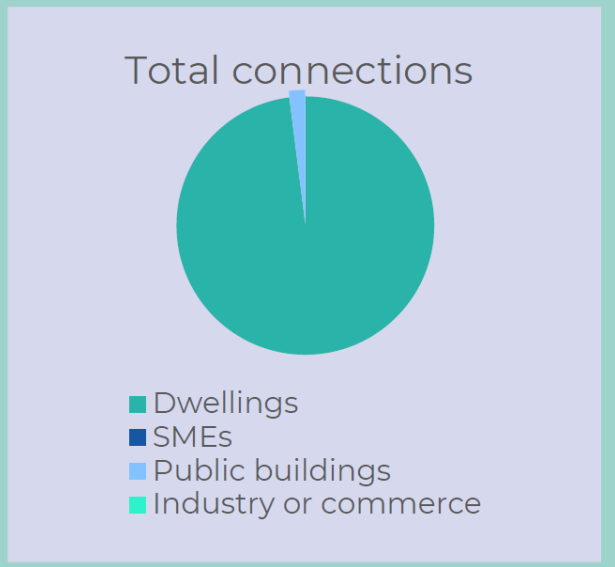


98% Dwellings
of which with on-site renewable energy production: 100%

0% SMEs

2% Public buildings

0% Industry or commerce



# Alginet

| | |
|---|---|
| Scope: | Small town |
| Expanse [m]: | 2000 |

Formally established as a legal entity? ✗

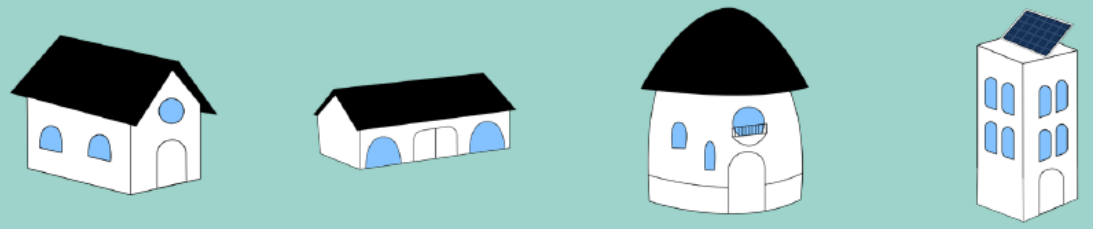
Possibility to operate as energy island? ✗

Granted regulatory sandbox status? ✗

*Alginet, Spain*

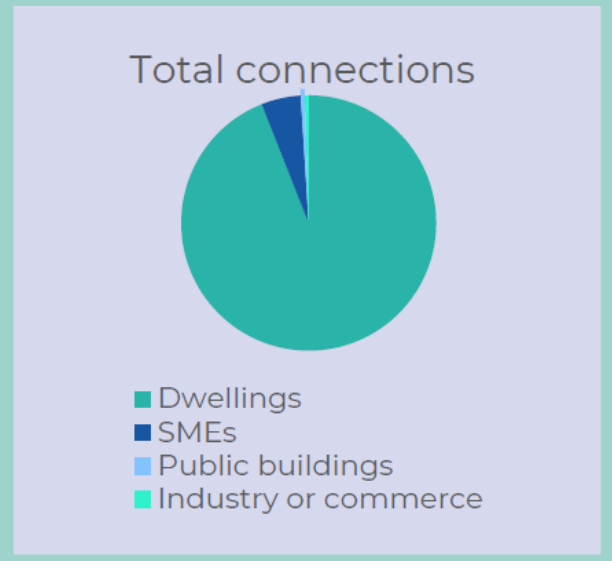
- Historical electrical cooperative, funded in 1930;
- Cooperatives, a model for the uptake of ECs in Spain.
- Alginet cooperative operates as both DSO and energy retailer
- 4000 active contracts
- 88 prosumers in the DSO network, 42 out of 88 are members of the cooperative
- Shared energy (RD Law 244/2019): ex ante split coefficients of the produced energy that each participant from the self-consumption can allocate to oneself in each billing period → ex post coefficient defined by..NOT CLEAR!

## Consumer grid connections: 50



| 94% | 5% | 0,5% | 0,5% |
|---|---|---|---|
| Dwellings | SMEs | Public buildings | Industry or commerce |

of which with on-site renewable energy production: 20%



# Luče

Scope: Small town
Expanse [m]: 450

Formally established as a legal entity? ✗

Possibility to operate as energy island? ✓

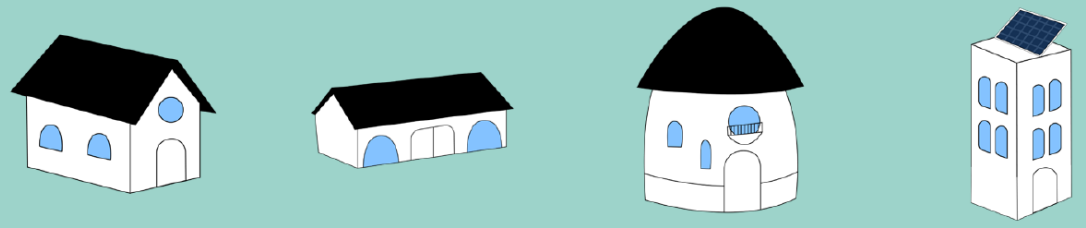
Granted regulatory sandbox status? ✓

Luče, Slovenia

- Demonstration pilot within Compile H2020 project (nov 2018)
- 8 households, 1 SME in a village of 380 inhabiltants
- All members are prosumers
- PV plants, micro wind power plant, system battery, hourehold batteries, public and smart household EV charger

According to local regulation, maximum RES installation capacity would have been 10 kW, serving the whole village [0.8 times the connection capacity of the metering point] → exception for exceeding such limits, up to 5 times achieved savings

## Consumer grid connections: 9

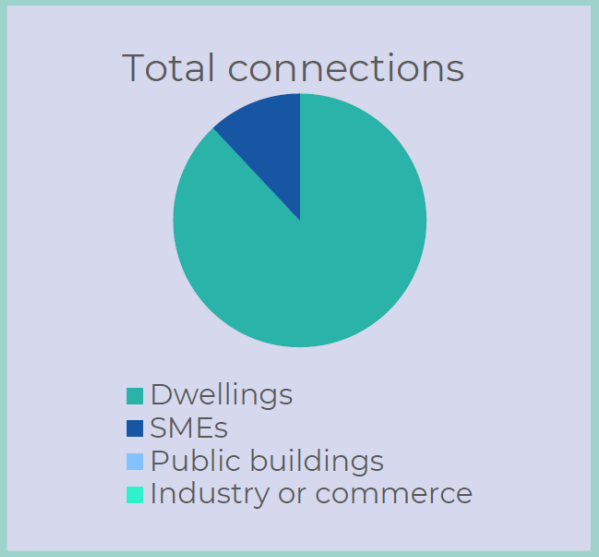


88% Dwellings
of which with on-site renewable energy production: 100%

12% SMEs

0% Public buildings

0% Industry or commerce



# Elisa

Scope: Industrial area
Expanse [m]: 100

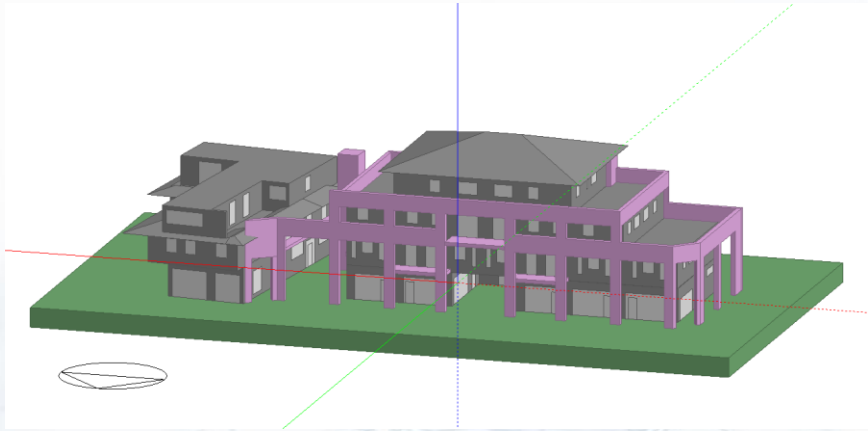
Formally established as a legal entity? ✓

Possibility to operate as energy island? ✗

Granted regulatory sandbox status? ✗

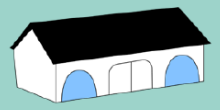
Perugia, Italy

- 4 members: medical studio, engineering studio, diary, residential
- 1 prosumer, residential unit [10 kW of PV]
- The owner and resident of the household is also the owner of the entire two buildings. Therefore, the energy community was born of their willingness to invest in installing renewable energy systems



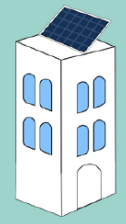
## Consumer grid connections: 4

25%
Dwellings
of which with on-site renewable energy production: 25%

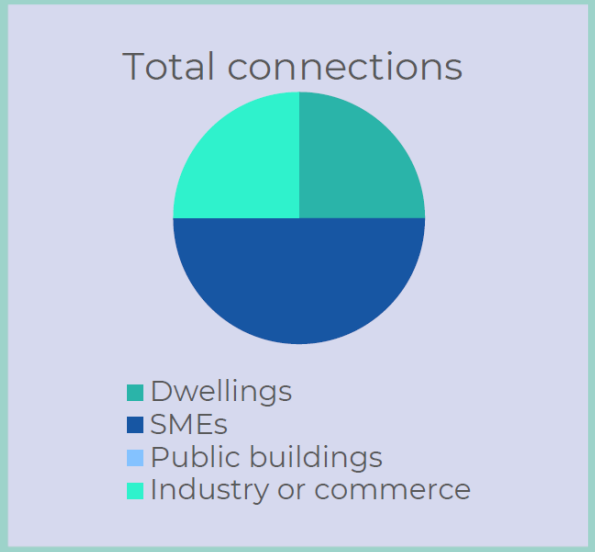


50%
SMEs

0%
Public buildings



25%
Industry or commerce



# Key recommendations for citizens engagement

## Energy community (future) members

Identify and engage **local frontrunners**

Make the role of intermediaries explicit

Support awareness-raising and capacity building

Ensure and support participation of vulnerable households

## Communities

Community **spirit and cohesion**

Support learning between communities

## Stakeholder organisations

Nurture trust

Address organisational siloes in governance organisations

Provide examples of functional **business models**

## Technologies

Ensure **trust** in technologies

**Design inclusive** technologies

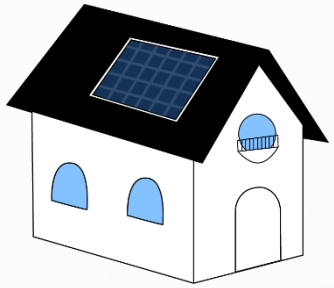
## Regulatory framework and legislation

Ensure regulatory **clarity**

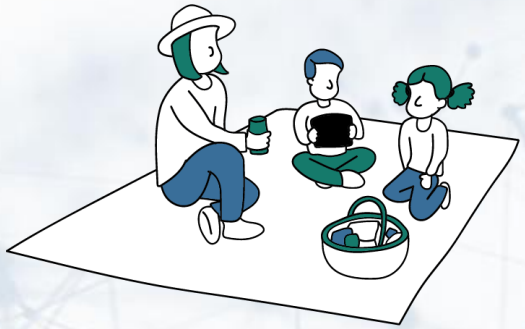
Secure appropriate **incentives**

# Coming steps in the NRG2PEERS project

Moving from the lessons learnt at the pilot sites, the NRG2PEERS team is currently working for delivering tools to support the uptake of a next generation of European peer-to-peer Energy Communities.



REGULATORY ROADMAP



ADVISORY APP

tool to assist the customers of the local community in peer-to-peer energy mechanisms

# THANK YOU FOR YOUR ATTENTION!

twitter.com/nrg2peers

linkedin.com/nrg2peers

www.nrg2peers.com

NRG2 PEERS

This project has received funding from the European Union's H2020 framework programme for research and innovation under grant agreement no 890345.