

Renewable integration and sustainability in energy communities

Renaissance delivers a **community-driven scalable and replicable approach**, to implement new business models and technologies supporting clean production and shared distribution of energy in local communities.



This project has received funding from European Union's Horizon 2020 research and innovation programme grant agreement No 824342.

Overview

- Renaissance project is a Horizon 2020 Innovation Action supporting clean production and shared distribution of energy in local communities.
- Its aim is to deliver a community-driven scalable and replicable approach, to implement new business models and technologies.

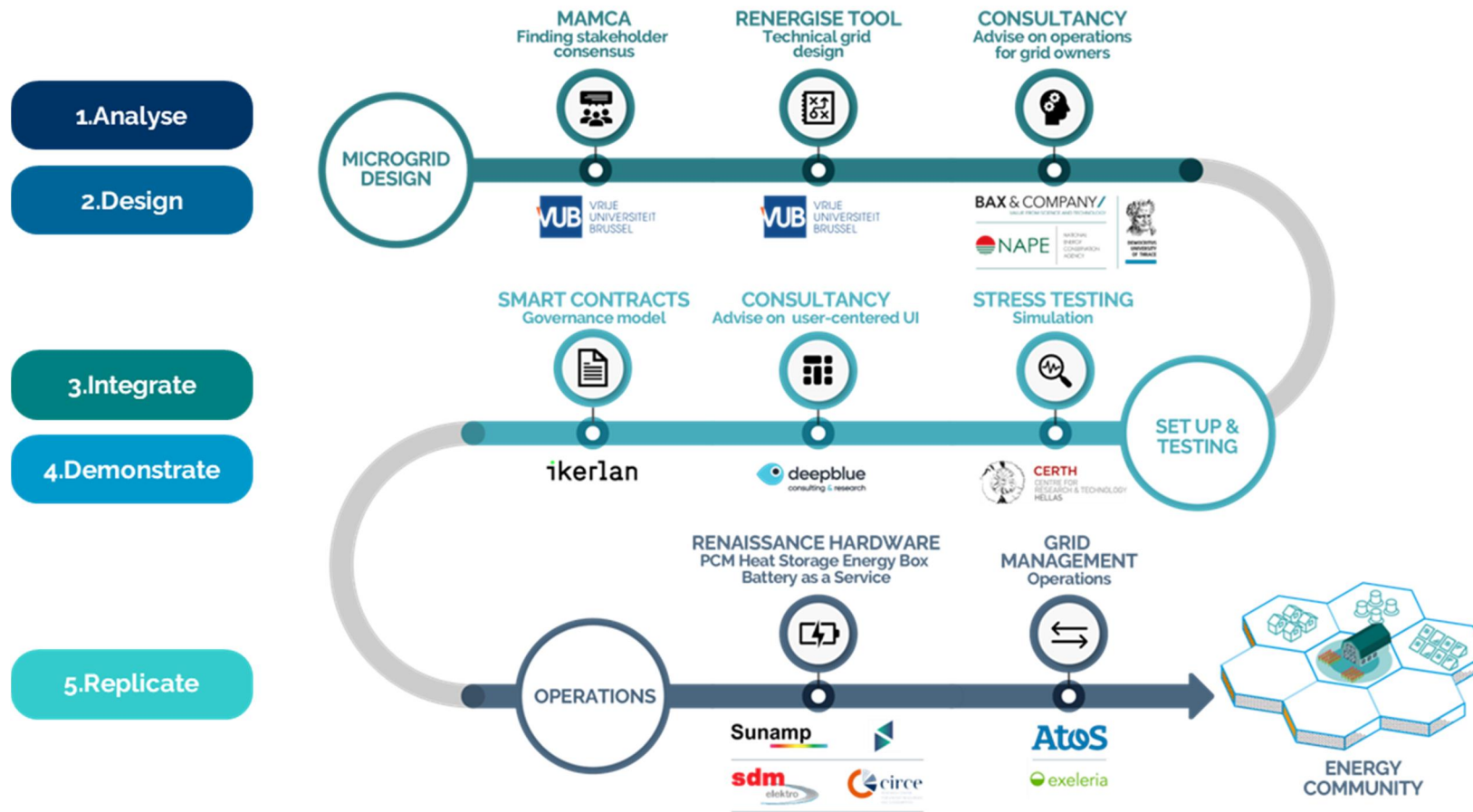


Challenge

1. Existing energy integration approaches mostly focus on technical aspects.
2. LEC approaches have failed to deliver the combination of value generation and high degrees of RES integration.
3. Missing active engagement from local communities
4. Regulatory barriers
5. Need for low-cost, hassle-free and sustainable energy at disposal of local consumers

The key challenge and ambition of RENAISSANCE is to cross the chasm from early adopters to early majority.





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Tools

1. RENERGiSE multi-vector optimization tool
2. MAMCA methodology
3. RENAISSANCE ROP platform (and smart contracts based on blockchain)
4. European Pilot Sites
5. 11 Global Replication Sites
6. Online gamification tool





RENERGISE

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<https://www.renergise.eu/>

RENERGISE Multi-Vector Optimization Tool

Powered by  Renaissance

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RENERGISE
MULTI-VECTOR
OPTIMIZATION TOOL

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RENERGiSE multi-vector optimization tool

www.renergise.eu



What's the RENERGiSE TOOL?

The RENERGiSE tool is a multi-vector optimisation web-based tool to obtain a first layout and design of future energy systems, based on the most favourite/feasible scenarios and on local meteorological, infrastructural and regulatory contexts.

The tool is currently formulated as a deterministic mixed-integer linear programming (MILP) problem, implemented in Python using the Gurobi solver*



RENERGiSE multi-vector optimization tool

What do you get from it?

- ▶ Various optimal configuration of your energy system based on the different scenarios
 - > Size and location of newly installed assets, as well their optimal operational schedule
- ▶ Detailed analysis of the total costs for the new configuration
 - > Impact of different components (investment, electricity costs, incentives, etc.) on your final energy bill
 - > Suggestions on optimal operation model



The screenshot displays the 'New asset: Charger' configuration interface. At the top, there is a row of icons representing different energy assets: a power line tower, a smartphone, a battery, a car, a house, a sun, and a wind turbine. Below the icons, the title '+ New asset: Charger' is followed by the instruction 'Please insert energy data.' A link 'How do I create a new asset?' is provided. Below this, a paragraph explains that each tab represents a different energy asset and that users should navigate through the tabs, fill in the required information, and press the 'Add Asset' button. The form contains several input fields: 'default_charger', '24', '100.0', and 'chargers_powerprofile_example.csv'. There are also 'Clear' and 'Add Asset' buttons. A small icon of two overlapping documents is visible next to the CSV file input field.

MAMCA methodology

What is the MAMCA analysis?

The Multi-Actor Multi Criteria Analysis is a participatory method to include and respect objectives of the local stakeholders to design, evaluate and optimize energy scenarios



MAMCA methodology

In the energy market contexts, the MAMCA analysis is used to **engage all stakeholders**, including citizens, to build mutual awareness of their objectives and their often diverging needs. It is used to **build consensus** when different actors decide to cooperate in a project of energy transition and ultimately increase acceptance and uptake of new solutions.

The end result of the analysis is a **list of most-desired scenarios**, while the know-how gained supports future collaboration in their actual implementation.



MAMCA - Results/Visualization

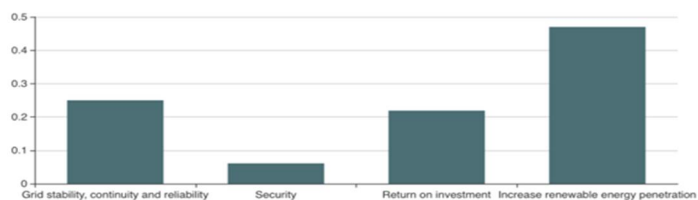
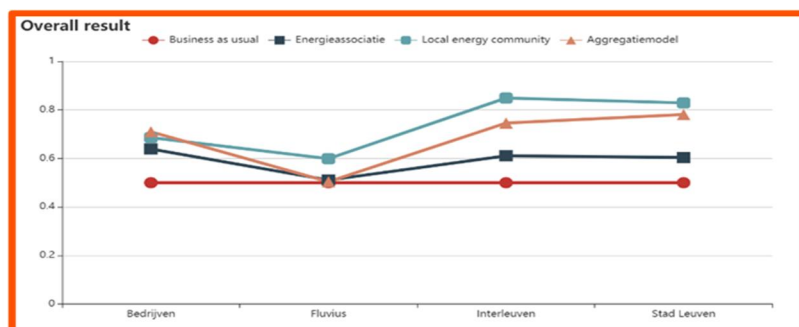


Figure 7 – Example of weighted Criteria

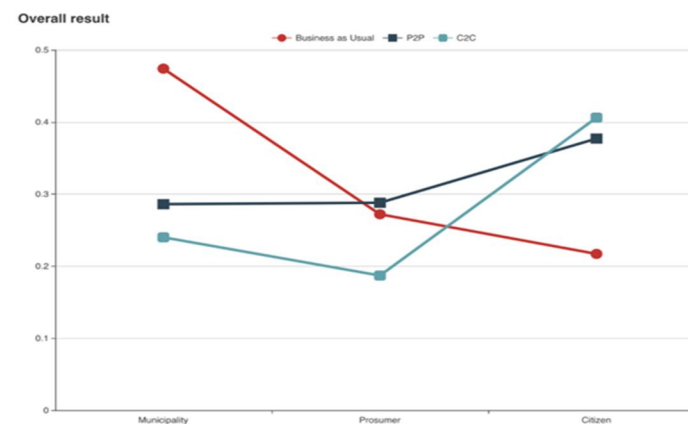
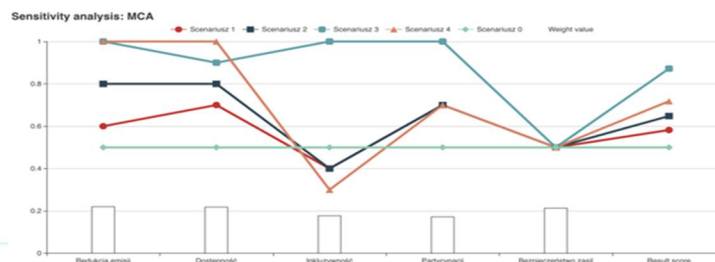


Figure 9 – Multi-Actor View MAMCA



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MAMCA - Workshops



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The screenshot displays the Renaissance Platform Marketplace interface. At the top, there's a navigation bar with 'Marketplace' and a hamburger menu. Below it, tabs for 'Transactions', 'Bids' (selected), 'Auctions', and 'Marketplaces' are visible. The 'E-Wallet' section shows a table with the following data:

Category	Amount
Available Amount	1,938.03 €
Holds	61.97 €
Total Amount	2,000.00 €

Below the E-Wallet, there's a link 'Select a Marketplace to view its available auctions'. Two buttons are present: 'P2P v1 Marketplace' and 'Load Demand Side Management Marketplace'. The 'Available Auctions (manually)' section shows two auction details side-by-side:

Auction 20

Type of Auction: **Sell - Energy**

Amount of energy (kWh): **2**

Bid price range (€/kWh): **0.1 - 0.5**

Status: **Completed**

Created: 7/20/22, 12:26 PM

Published (auction start): 7/20/22, 12:26 PM

End of bidding (auction end): 7/20/22, 12:31 PM

My bid (Auction 16)

Type of Auction: **Buy - Energy**

Amount of energy (kWh): **6**

Bid price range (€/kWh): **0.5 - 0.1**

Status: **Completed Winner**

Created: 7/19/22, 2:47 PM

Published (auction start): 7/19/22, 2:47 PM

End of bidding (auction end): 7/19/22, 2:50 PM

At the bottom left, there's a URL: renaissance.iti.gr/app/marketplace/bids.

RENAISSANCE Platform

A tool for the **energy management** of local energy systems that:

- allows **consumer-centric operations** of Local Energy Systems (LES) by
- **connecting different energy vectors** in a single ICT architecture with multi-energy innovative and
- **interoperable services (e.g. Smart Contracts)**

and innovation programme grant agreement No 824342.

RENAISSANCE platform

Components:

- Physical Layer
- Data Layer
- Data Modelling and Forecasting Layer
- Decision Support System
- End-user social engine
- Trading Supervision System
- Blockchain Layer

The screenshot displays the Renaissance Marketplace web application. At the top, a dark blue header contains a menu icon, the Renaissance logo, and the word "Marketplace". Below the header, a navigation bar shows four tabs: "Transactions", "Bids" (which is active and highlighted with a yellow bar and a cursor), "Auctions", and "Marketplaces".

The main content area is divided into sections. The first section is titled "E-Wallet" and contains a table with the following data:

Category	Value
Available Amount	1,938.03 €
Holds	61.97 €
Total Amount	2,000.00 €

Below the E-Wallet section, there is a link "Select a Marketplace to view its available auctions". Underneath this link are two buttons: "P2P v1 Marketplace" (highlighted in orange) and "Load Demand Side Management Marketplace".

The next section is titled "Available Auctions (manually)". It contains two side-by-side panels. The left panel is for "Auction 20" and the right panel is for "My bid (Auction 16)". Both panels display the following information:

- Type of Auction: Sell - Energy (left) and Buy - Energy (right)
- Opens (event active from): 7/20/22, 12:32 PM (left) and 7/19/22, 2:51 PM (right)
- Closes (event active to): 7/20/22, 12:33 PM (left) and 7/19/22, 2:52 PM (right)
- Amount of energy (kWh): 2 (left) and 6 (right)
- Bid price range (€/kWh): 0.1 - 0.5 (left) and 0.5 - 0.1 (right)
- Status: Completed (both)
- Created: 7/20/22, 12:26 PM (left) and 7/19/22, 2:47 PM (right)
- Published (auction start): 7/20/22, 12:26 PM (left) and 7/19/22, 2:47 PM (right)
- End of bidding (auction end): 7/20/22, 12:31 PM (left) and 7/19/22, 2:50 PM (right)

The right panel for "My bid (Auction 16)" also features a green "Winner" label. At the bottom of the interface, a dark blue footer contains the text "This project has received funding from European Union's Horizon 2020 research and innovation programme" and the URL "renaissance.iti.gr/app/marketplace/bids".







European Pilot sites

Brussels, Eemnes, Kimmeria and Manzaneda

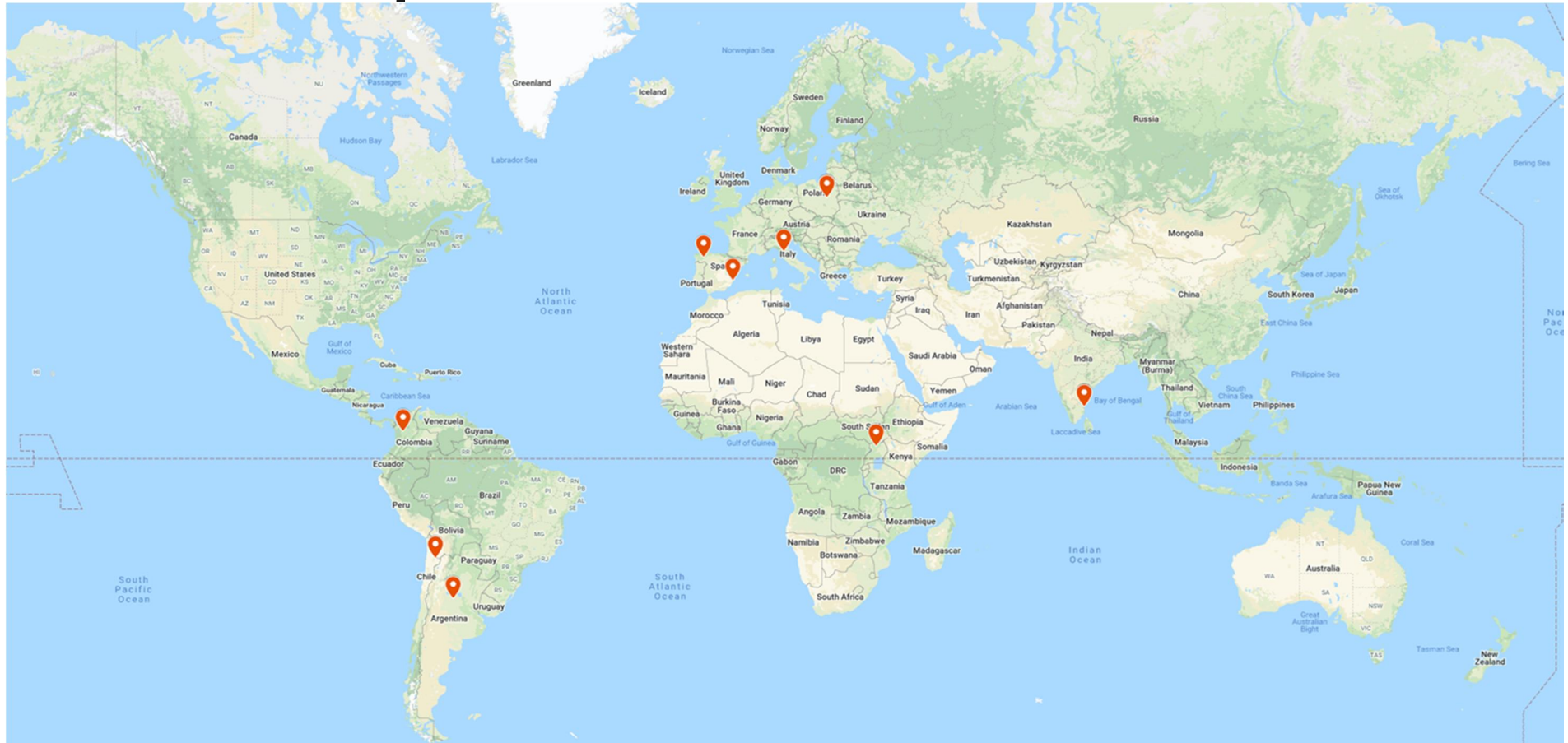
- More than 20 REC business models delivered and tested with our tools
- Regulatory landscape and barriers identified
- 15 different types of stakeholders directly engaged
- 400+ citizens and students directly involved



	ENERGY VECTORS	END-USERS	SCOPE	
> MANZANEDA, SP	<ul style="list-style-type: none"> Solar PV panels E-mobility Storage 	<ul style="list-style-type: none"> Public services Local Households Local Businesses 	<ul style="list-style-type: none"> Increase RENEWABLE ENERGY SOURCES uptake in local grid 	
> EEMNES, NL	<ul style="list-style-type: none"> Solar PV panels E-mobility Storage 	<ul style="list-style-type: none"> Local Households Rural farms Local businesses 	<ul style="list-style-type: none"> Regulatory exemption to launch a prosumer-driven market 	
> BRUSSELS, BE	<ul style="list-style-type: none"> Solar PV panels Co-generation Storage 	<ul style="list-style-type: none"> Public services - Hospital Students in dwellings 	<ul style="list-style-type: none"> Improve micro-grid reliability and optimise demand/response 	
> KIMMERIA, GR	<ul style="list-style-type: none"> Solar PV panels Wind turbines Thermal Biomass Storage 	<ul style="list-style-type: none"> Public services - University Student in dwellings 	<ul style="list-style-type: none"> Lowest-as-possible operational costs through gamification 	



11 Global Replication Sites



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Can you RENew-it?



PLAY GAME

Online Gamification Tool

“Can you RENew it?”

An online videogame to inform and attract people interested in energy communities through gamified challenges

Can you RENew it?



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Thank you for your attention!

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