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.

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.
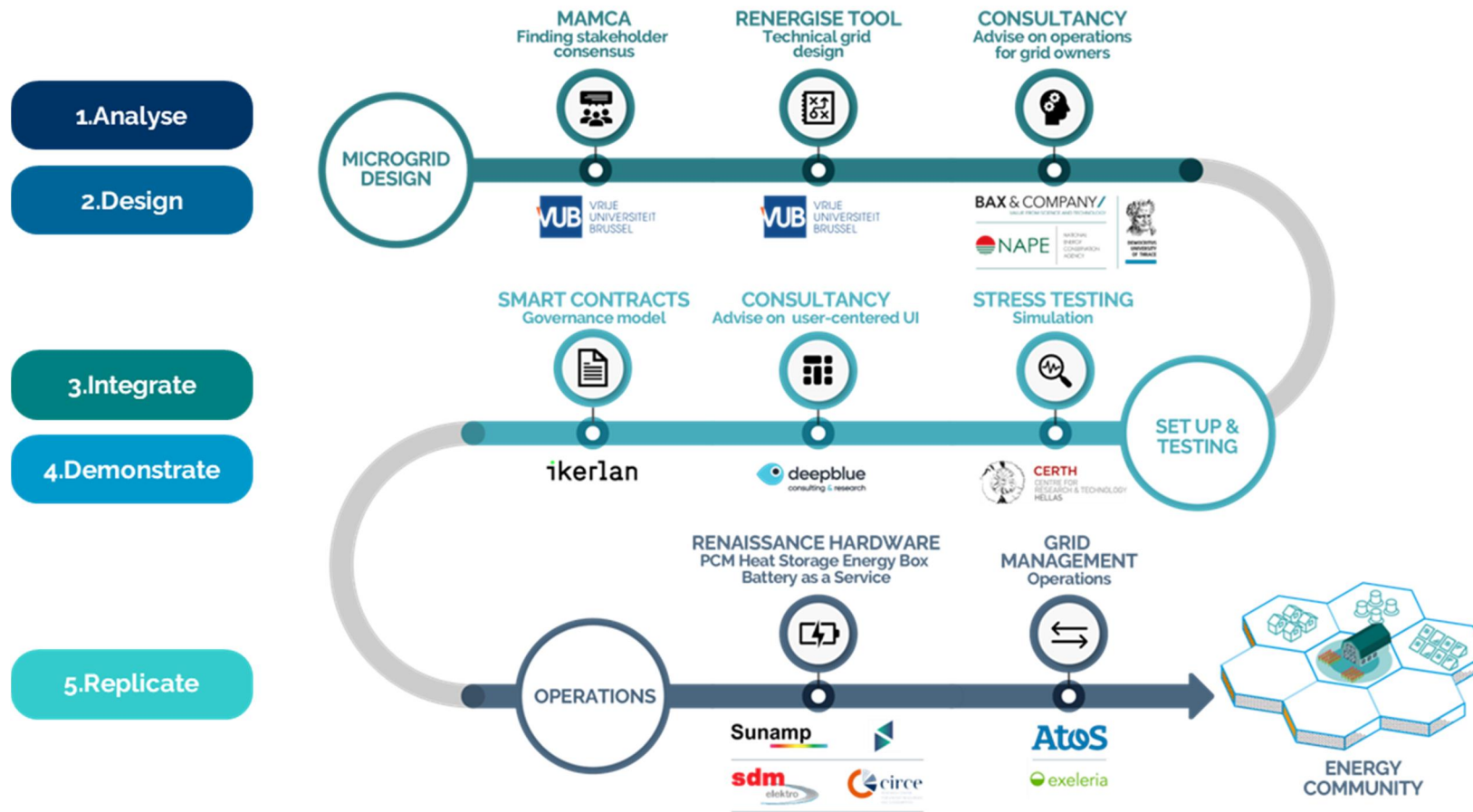
Challenge

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.

Renaissance
RENEWABLE INTEGRATION & SUSTAINABILITY
IN ENERGY COMMUNITIES

1.Analyse

2.Design

3.Integrate

4.Demonstrate

5.Replicate

MICROGRID DESIGN

MAMCA
Finding stakeholder consensus

VRIJE UNIVERSITEIT BRUSSEL

RENERGISE TOOL
Technical grid design

VRIJE UNIVERSITEIT BRUSSEL

CONSULTANCY
Advise on operations for grid owners

BAX & COMPANY / VALUE FROM SCIENCE AND TECHNOLOGY

NAPE NATIONAL ENERGY CONSERVATION AGENCY

DEMOCRITUS UNIVERSITY OF THRACE

SMART CONTRACTS
Governance model

ikerlan

CONSULTANCY
Advise on user-centered UI

deepblue consulting & research

STRESS TESTING
Simulation

CERTH CENTRE FOR RESEARCH & TECHNOLOGY HELLAS

SET UP & TESTING

OPERATIONS

RENAISSANCE HARDWARE
PCM Heat Storage Energy Box
Battery as a Service

Sunamp

sdm elektro

circe

GRID MANAGEMENT
Operations

AtoS

exeleria

ENERGY COMMUNITY

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

Renaissance

https://www.renergise.eu/

Renaissance
RENEWABLE INTEGRATION & SUSTAINABILITY
IN ENERGY COMMUNITIES

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*

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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

➕ New asset: Charger

Please insert energy data.

How do I create a new asset?
Each one of the above tabs represents a different energy asset. Simply navigate through the tabs, fill in the required information for every asset that you are interested and then press the "Add Asset" button to include it into you configuration.

| default_charger |
| 24 |
| 100.0 |
| chargers_powerprofile_example.csv |

| Clear | Add Asset |

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

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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
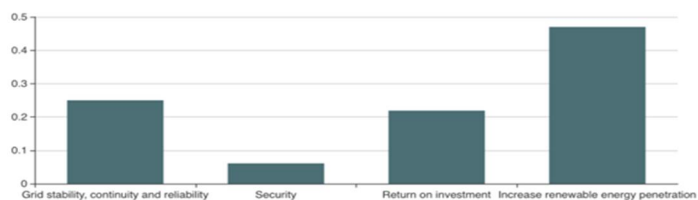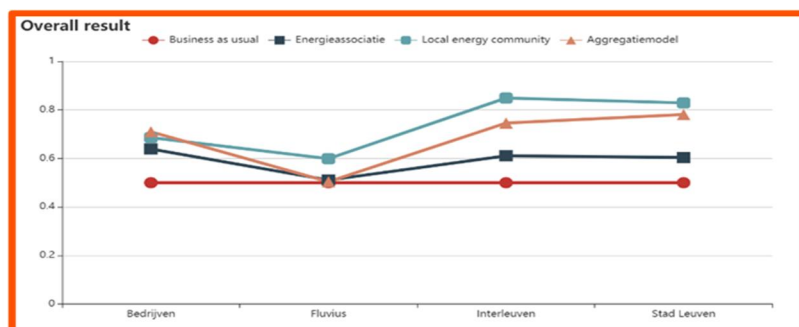
Figure 7 – Example of weighted Criteria
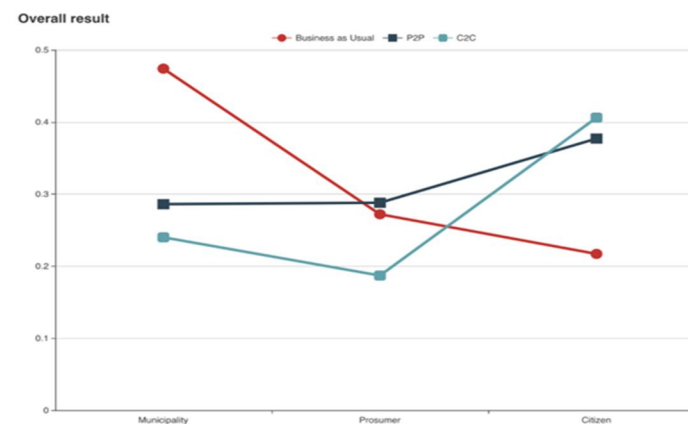
Figure 9 – Multi–Actor View MAMCA

MAMCA - Workshops

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)**

RENAISSANCE platform

Components:

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

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IN ENERGY COMMUNITIES

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

DEMONSTRATOR SITE
Ski village
Manzaneda, ES

Hotel
Restaurant
Residential households
Electric mobility

DEMONSTRATOR SITE
Suburban Municipality
Eemnes, NL

Residential village
Local businesses
Public services

DEMONSTRATOR SITE
Health University Campus
Brussels, BE

Public Hospital
Student dwellings
University buildings

DEMONSTRATOR SITE
Student Community Campus
Kimmeria, EL

Offices
Student dwellings
Auditorium

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	ENERGY VECTORS	END-USERS	SCOPE	
MANZANEDA, SP	Solar PV panels E-mobility Storage	Public services Local Households Local Businesses	Increase RENEWABLE ENERGY SOURCES uptake in local grid	✓
EEMNES, NL	Solar PV panels E-mobility Storage	Local Households Rural farms Local businesses	Regulatory exemption to launch a prosumer-driven market	✓
BRUSSELS, BE	Solar PV panels Co-generation Storage	Public services - Hospital Students in dwellings	Improve micro-grid reliability and optimise demand/response	✓
KIMMERIA, GR	Solar PV panels Wind turbines Thermal Biomass Storage	Public services - University Student in dwellings	Lowest-as-possible operational costs through gamification	✓

11 Global Replication Sites
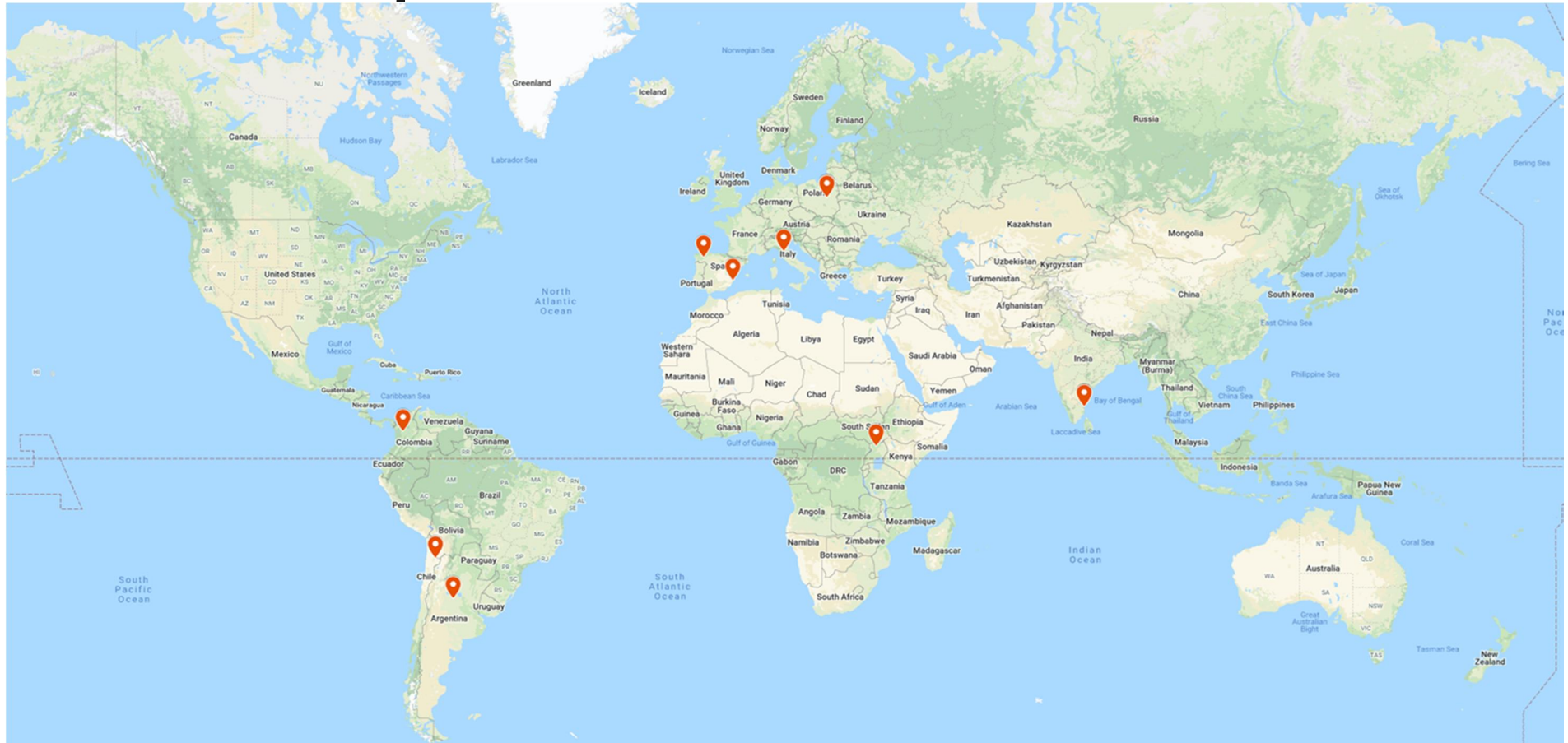
Online Gamification Tool

"Can you RENew it?"

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

Can you RENew it?

Thank you for your attention!

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