Flexibility 2.1: From Demand Response to Renewable Energy Communities

E-LAND

*Integrated multi-vector management system for **E**nergy is**LAND**s*

Farhan Farrukh (Researcher at *Smart Innovation Norway)*

Piloting Leader for E-LAND H2020

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E-LAND in brief

- H2020 Innovation Action
- December 2018 - May 2022 (42 Months)
- 6.2 M€ project with 5.4 M€ EC funding
- 12 European partners – 2 Indian partners
- 3 pilots in Europe and 2 simulated pilots in India
- Open innovation through collaboration with stakeholders and citizens connected to the pilots from the beginning of the project

E-LAND will transform the way energy is produced, stored and consumed in an Energy Island bringing innovation across three planes: **technology**, **community** and **business**.

A toolbox consisting of tools to build decarbonised, multi-vector Energy Islands on a foundation of advanced ICT and data analytics technologies, strong community engagement tools and a solid business development models.

The toolbox will be **modular** and **customisable** to specific local requirements, **expandable** to incorporate new tools and **interoperable** with standards-based legacy systems.


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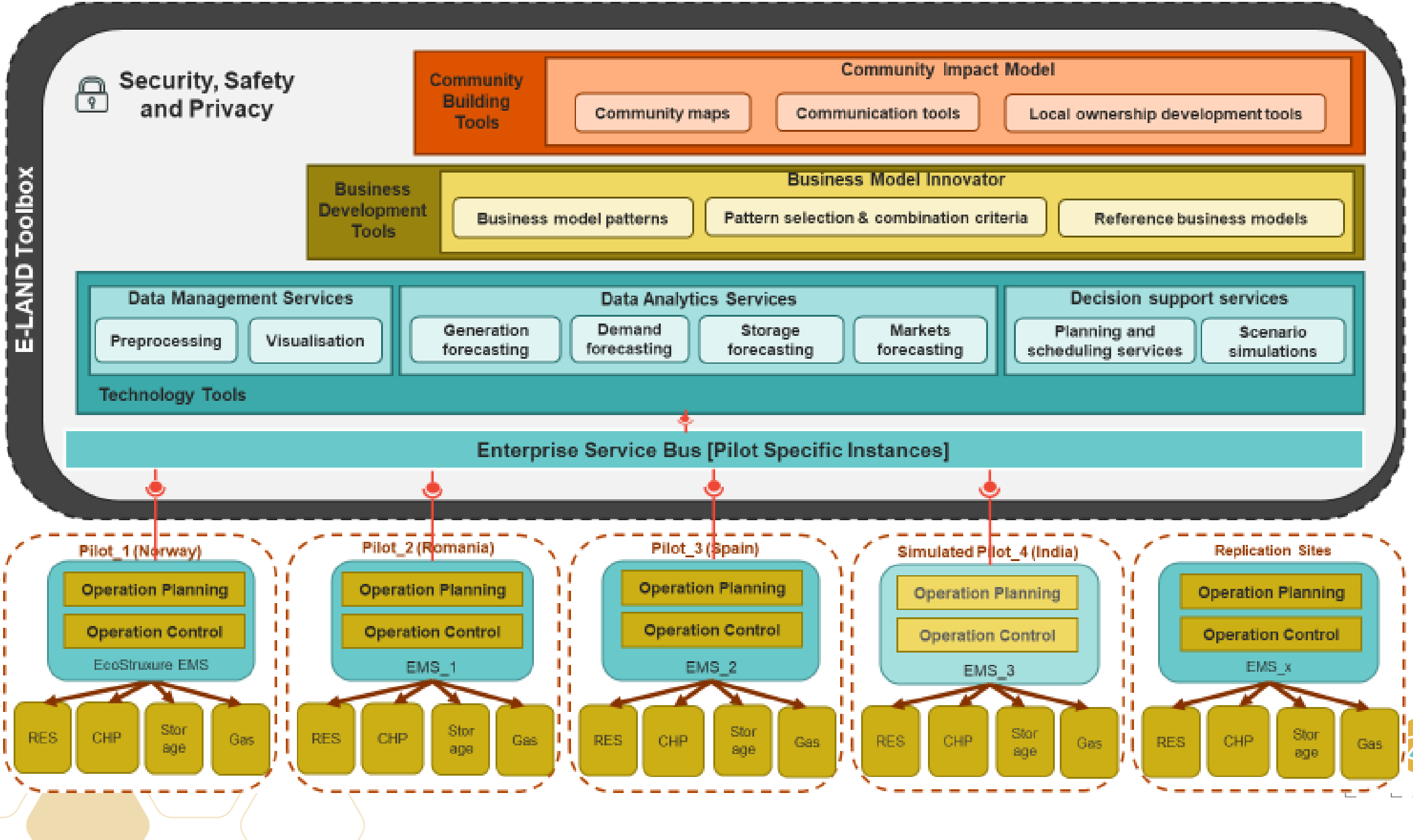
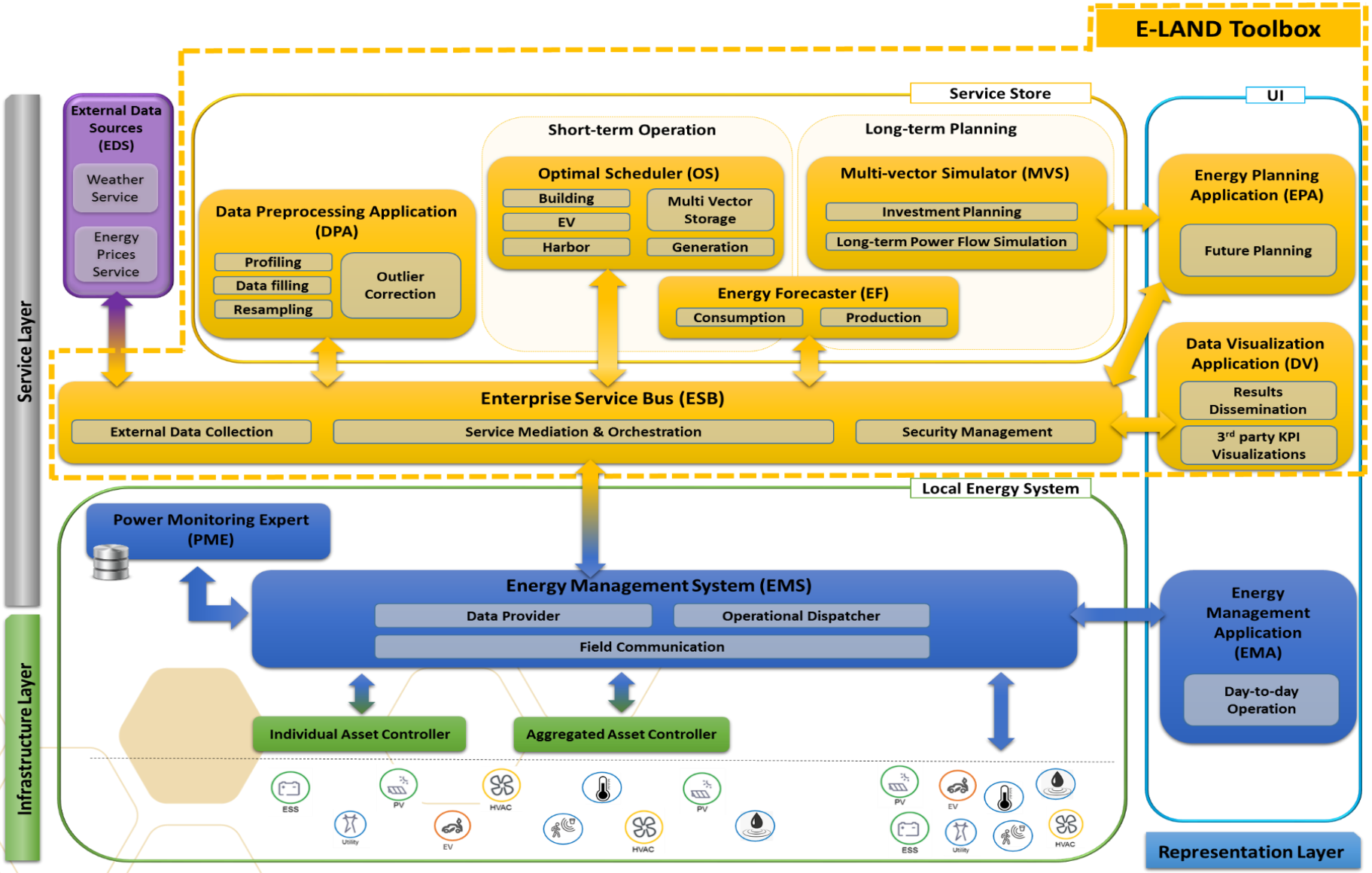
ENERGY STORAGE
CENTRAL ELECTRICITY GRID
MULTI-VECTOR ENERGY MANAGEMENT SYSTEM
HYDROGEN / GAS
LOCAL ENERGY COMMUNITY
COMBINED HEAT AND POWER PLANTS (CHP)
LOCAL RENEWABLE ENERGY
HOSPITAL

E-LAND will solve these technology, societal and business challenges by developing the **E-LAND Toolbox for Multi-Energy Islands**. This toolbox will be offering novel methodologies and tools capable to **support the decarbonisation of energy islands and isolated communities**.

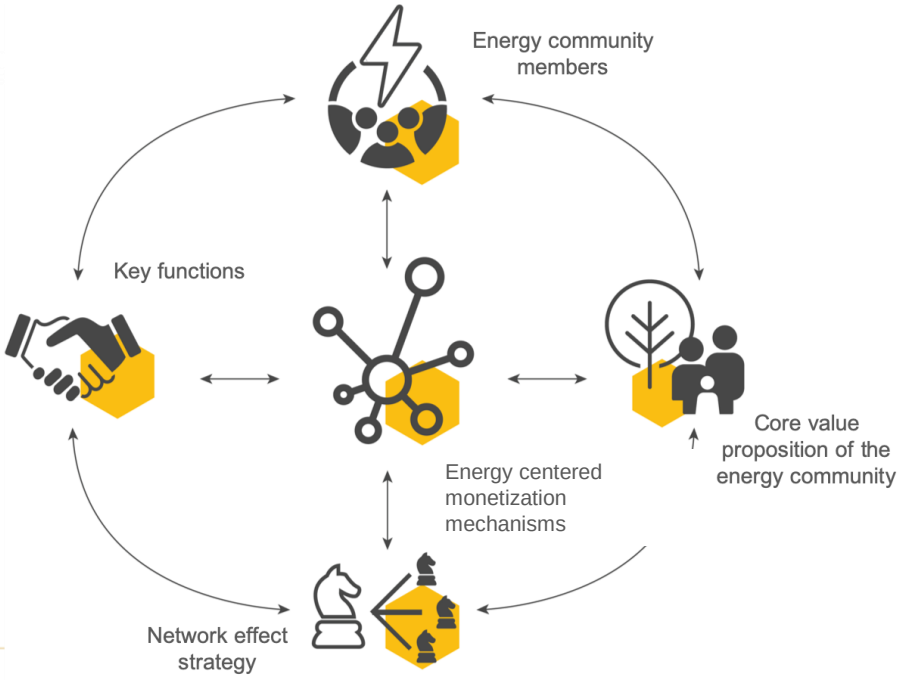
Objective
1) **Develop multi-vector energy optimisation algorithms** that take into account the current and future value of energy storage and end-user flexibility. Combining this with forecasted energy consumption and production will determine the optimal solution for the coming timespan.
2) **Develop and integrate the needed technology tools** to change the role of the Energy Island or isolated community from being a possible grid liability to an actor providing services to the grid, when needed.
3) **Increase the use of, and further develop and validate the current and most advanced innovative business models** for energy communities and key energy market players.
4) **Create new business opportunities for different storage technologies** (apart from conventional battery storage) which currently do not exist. These include the potential for seasonal storage and cross-vector storage optimisation.
5) Achieve an **economically viable system that will be self-sustaining after project termination**.
6) Understand **how the dynamics of existing communities can be explored and further developed** in order to secure impact and longevity of the introduced solutions.
7) **Enforce the role of citizens and communities as active players in implementing new technology**.
8) **Implement a modular toolbox** composed of technology, business and community engagement related tools, and **validate the viability and impact of these tools** in three regions in Europe and one region in India with different geography, demography, sociography and maturity in terms of community and end-user activities, implementation of different energy vectors including storage, amount of renewables in the local energy mix and variety of loads that call for efficient and intelligent management system and process.


E-LAND Toolbox
Security, Safety and Privacy
Community Building Tools
Community Impact Model
Community maps
Communication tools
Local ownership development tools
Business Development Tools
Business Model Innovator
Business model patterns
Pattern selection & combination criteria
Reference business models
Data Management Services
Preprocessing
Visualisation
Data Analytics Services
Generation forecasting
Demand forecasting
Storage forecasting
Markets forecasting
Decision support services
Planning and scheduling services
Scenario simulations
Technology Tools
Enterprise Service Bus [Pilot Specific Instances]
Pilot_1 (Norway)
Operation Planning
Operation Control
EcoStruxure EMS
Pilot_2 (Romania)
Operation Planning
Operation Control
EMS_1
Pilot_3 (Spain)
Operation Planning
Operation Control
EMS_2
Simulated Pilot_4 (India)
Operation Planning
Operation Control
EMS_3
Replication Sites
Operation Planning
Operation Control
EMS_x
RES
CHP
Stor age
Gas

Tools Introduction: Top View



E-LAND Business Model Innovator tool: 5 core components of energy communities



Business model components	Key questions
Core value proposition of the energy community	*What is the overall value generation of the energy community?*
Energy community members	*Who is part of the energy community?*
Energy-centered monetization mechanisms	*Which monetization mechanisms are access with the multi- vector energy community?*
Key functions	*Which key functions need to be fulfilled for the functioning of the energy community?*
Network effects	*Which key network effects have to be managed successfully to use their power for the benefit of the energy community?*

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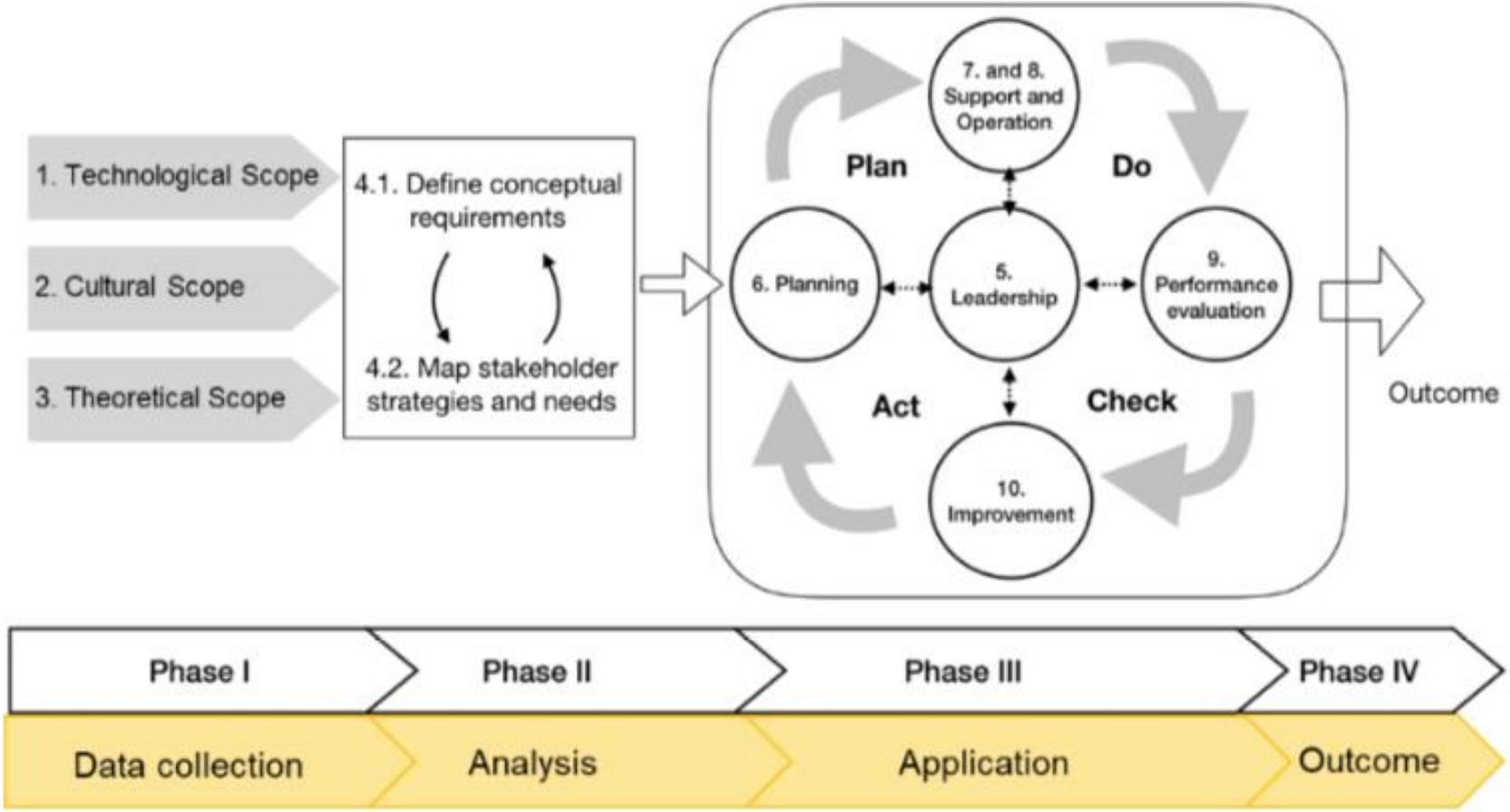
ELAND's Community Tool

The Common Impact Model



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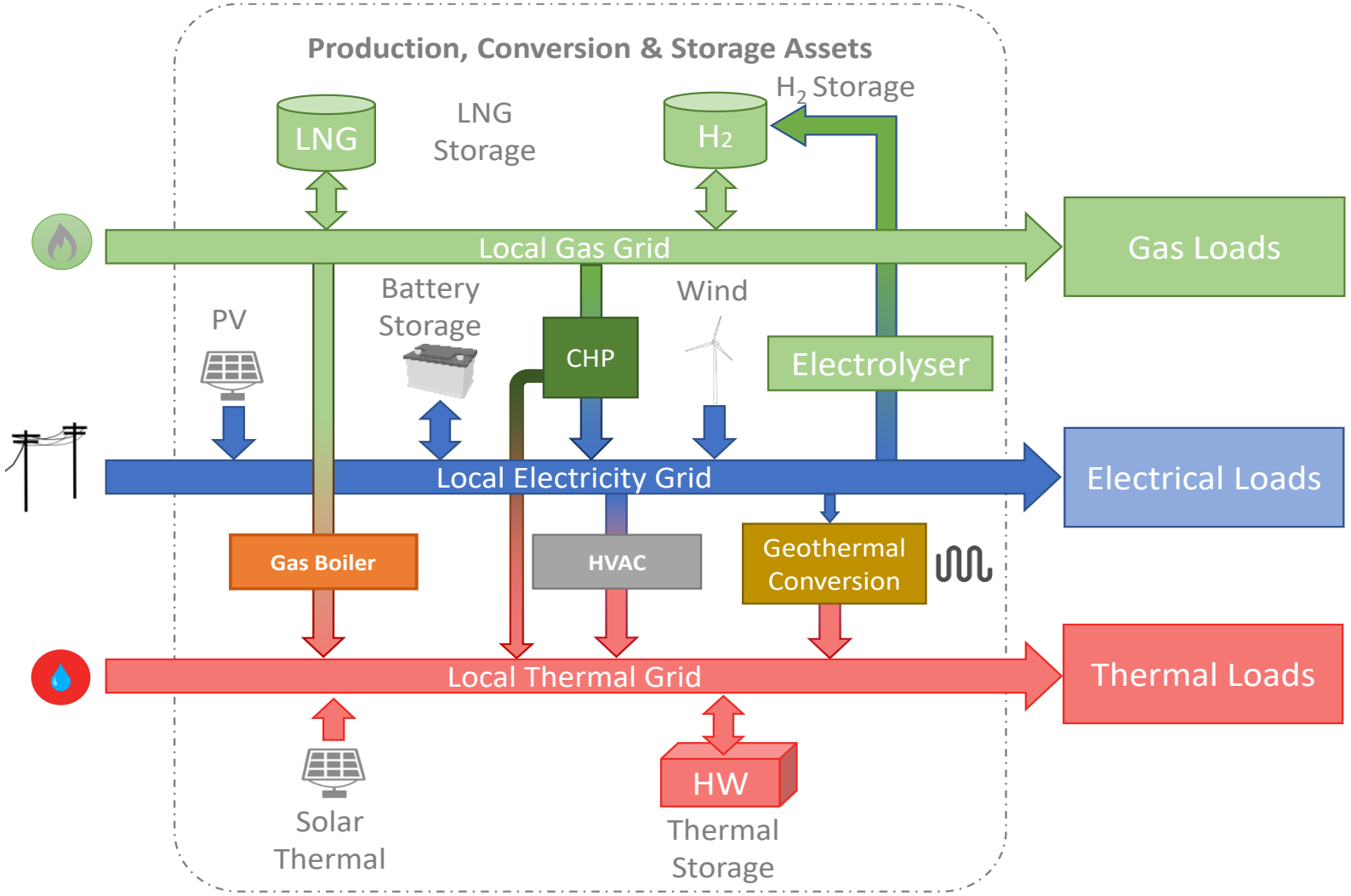
Multi-vector Local Energy System



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High Level Use-cases

HLUC 1: EMS integration with DER and BMS

HLUC 2: Optimization of operation of Local Energy System

HLUC 3: Optimal sizing of a Local Energy System

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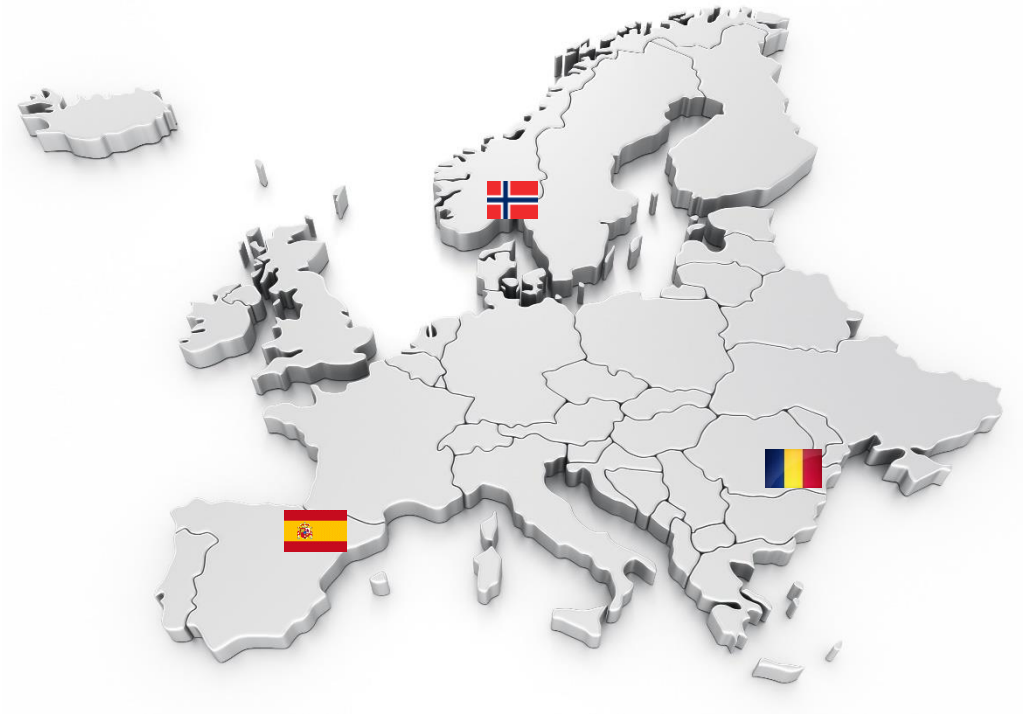
Port of Borg
NORWAY

UVTgv Campus
ROMANIA

Walqa Technology Park
SPAIN



The Industrial Metropolitan
BYPL, INDIA

LOCATION

New Delhi

India

ENERGY

BYPL is licensed to supply and distribute electricity in central and north of Delhi. The industry actors are for example food industries, incinerators, recycling plants, care providers, and companies within energy production, storage, and distribution

VISION

With new government initiatives on promoting EVs, BYPL wants to be prepared in a cost-effective way to fulfill this additional electricity demand.

PILOTING

The piloting will be conducted using the simulation tools part of E-LAND toolbox, giving a long-term investment plan for pilot site and also day-ahead schedules for Multi Vector sources

IMPACT

The local pockets which are constrained by transformer capacity limits will be enhanced, which in turn increase value for 1.6 million customer

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Energy Community
Auroville, INDIA

LOCATION

Auroville
Chennai

India

ENERGY

The rising temperatures in the region together with growing energy consumption, are placing huge stress on its on-site energy assets and state-owned distribution transformers feeding Auroville.

VISION

Auroville aims to be a self-sufficient energy community by developing a robust energy system within the area that can operate in an islanded mode.

PILOTING

E-LAND toolbox will help Auroville in simulating the investments and optimization needed for Auroville to implement the vision of the islanding mode of operation.

IMPACT

By becoming self-sufficient for energy needs, Auroville can be a truly net zero emission community in India.

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Replication plan & Replication toolkit

Replication plan

"With the support of the consortium, Indian partners shall develop a replication plan which sets a roadmap for implementing outcomes generated from the project"

Replication Toolkit:
Toolbox Documentation + Replication Guidelines.

"To provide valuable insights for communities to build a low-carbon, economically sustainable energy island"

1- "Actionable guidelines to develop and carry out your own project"

2- Concrete examples from real-life experience (EU and Indian pilots)

3- Easy-to-use documentation for those who want to utilize the E-LAND toolbox
(community, business and technology tools)

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THANK YOU!

Any questions or comments?

farhan.farrukh@smartinnovationnorway.com

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