Next-Generation Integrated Energy Services fOr Citizen Energy CommuNities

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AGENDA

1. Project Scope

- Vision
- CEC Pilots
  - Italy
  - France
  - Spain
- Objectives

2. Key Results

- Feasibility case studies
- NEON Platform
  & Services

3. Lessons Learned

Vision

https://neonproject.eu/

NEON exploits building energy efficiency, renewable energy generation and storage, and demand flexibility to:

- ➢ Improve the performance of energy system (Increase energy savings, reduce CO_2 emissions), and
- ➢ Enhance the quality of life of European citizens.

Project Information

NEON
Grant agreement ID: 101033700

DOI
10.3030/101033700

Start date
1 September 2021

End date
29 February 2024

Funded under
SOCIETAL CHALLENGES - Secure, clean and efficient energy

Total cost
€ 1 999 812,50

EU contribution
€ 1 999 812,50

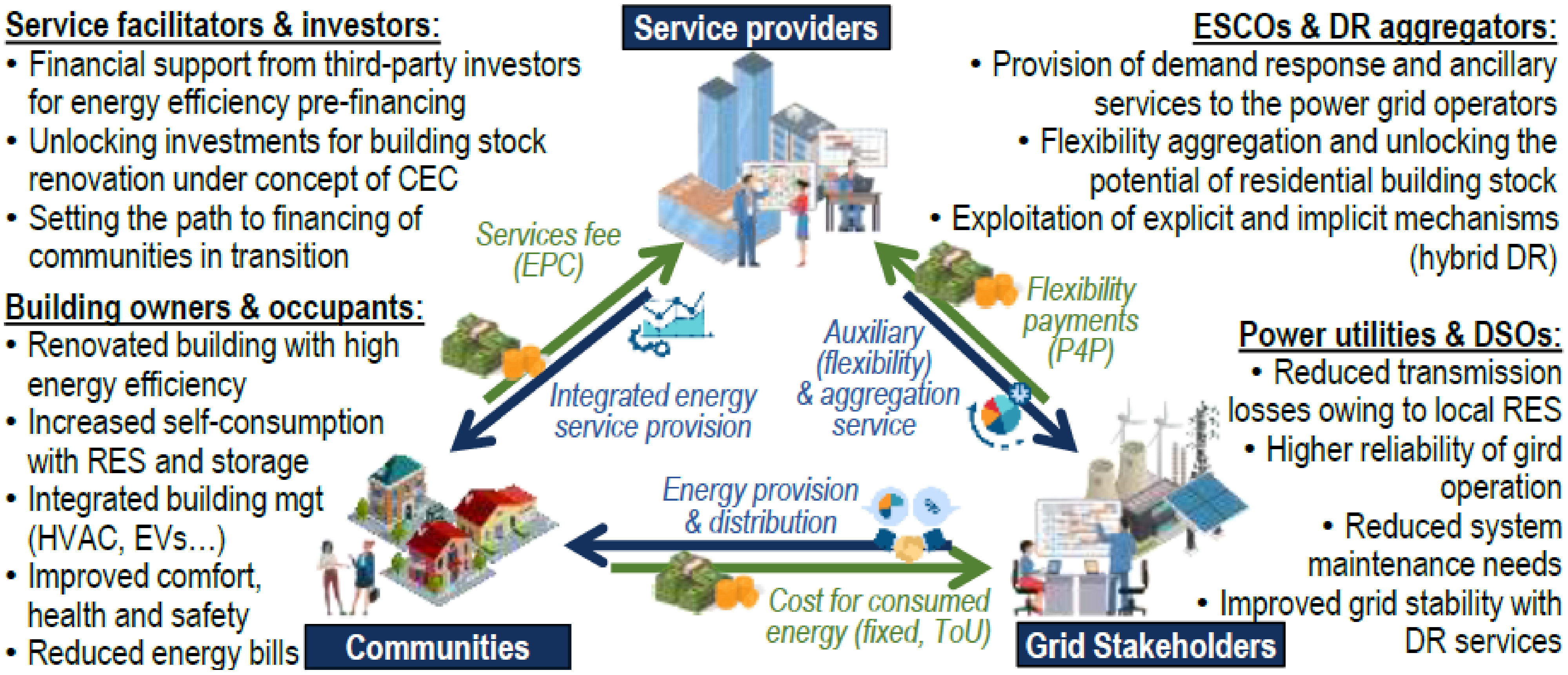
Coordinated by
ENGIE
France

Partners

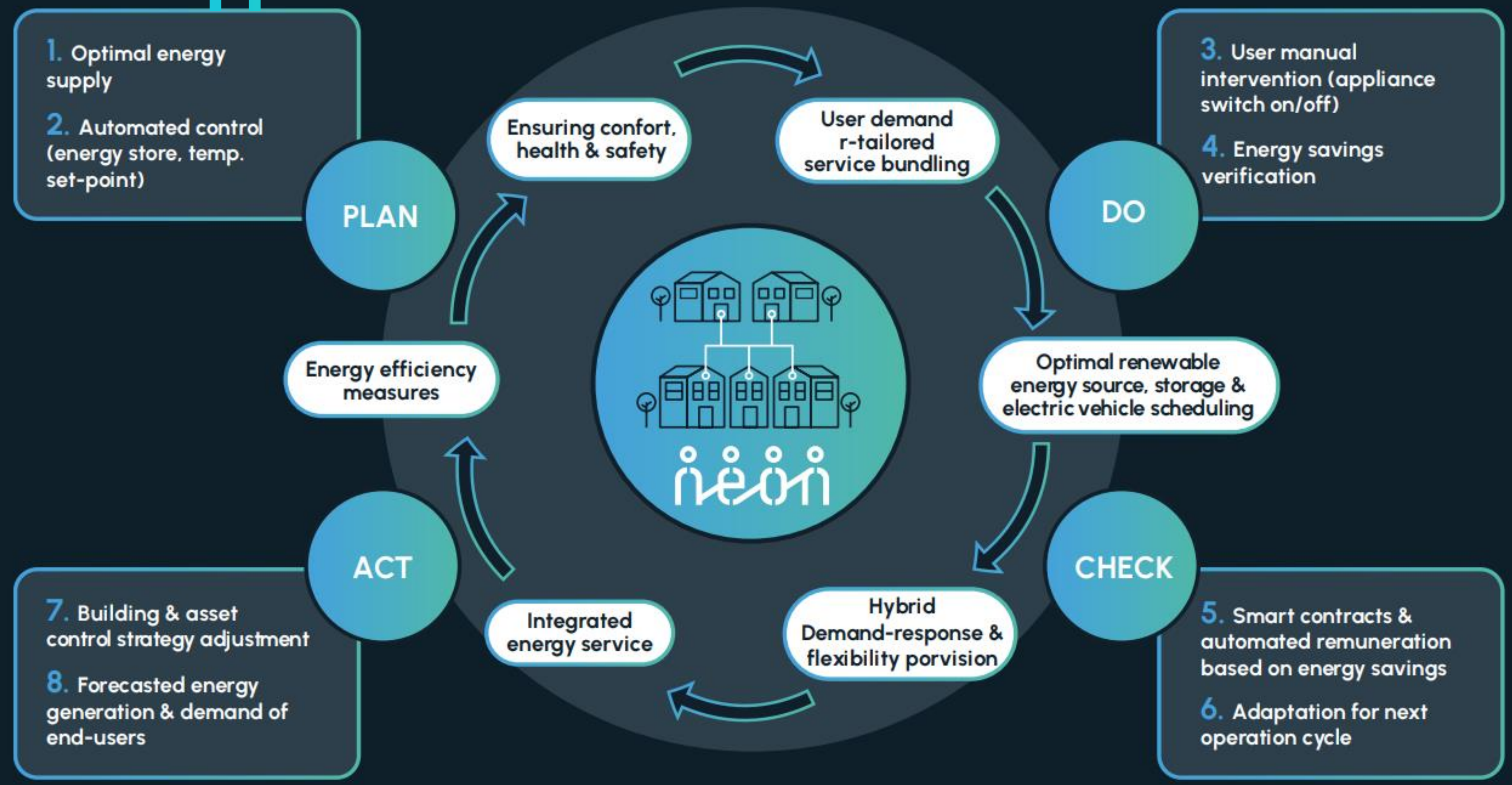
The NEON consortium is composed of 13 partners from 6 countries (France, Italy, Spain, Cyprus, Switzerland, and Serbia).

Citizen Energy Communities (CEC)

Directive (EU) 2019/944 provides legal and business foundations



NEON Approach



Pilots

1

MUNICIPALITY OF BERCHIDDA (ITALY)

The Municipality of Berchidda is leading the creation of an Energy Community, involving inhabitants of the city, cork and wine industries, local producers, and prosumers.

2

RESIDENTIAL BLOCKS IN DOMAINE DE LA SOURCE (FRANCE)

The neighbours from 3 different buildings and 25 dwellings located in a famous ski resort in the Alps mountains have teamed up to start an Energy Community.

3

INDUSTRIAL PARK LAS CABEZAS (SPAIN)

Businesses and factories from the industrial park, residents from the city of Villacañas or owners of electrical cars are getting together to codesign their own Energy Community.

4

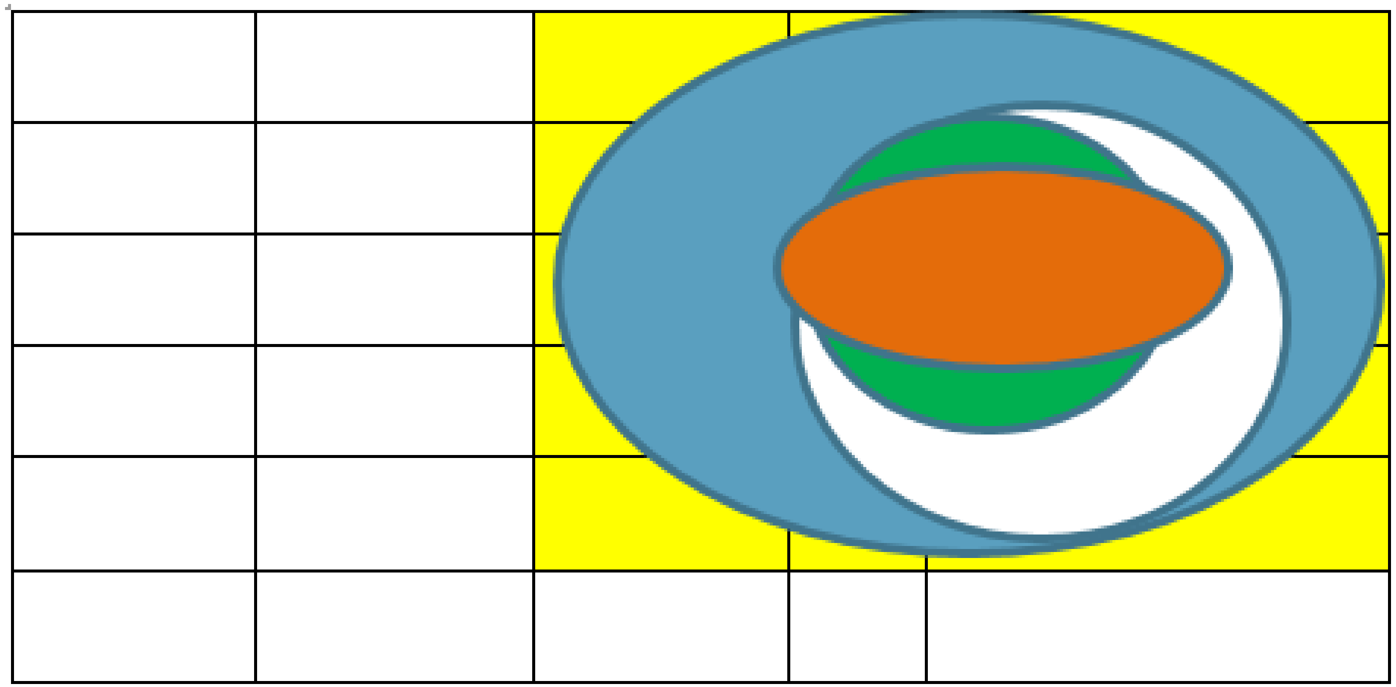
BUSINESS PARK STAINS CITY (FRANCE)

The office sites of ENGIE Crigen, an energy research center, and Industreet, an innovative training campus for professionals and trades, will be part of the Energy Community of Stains City.

SGAM Analysis of Actors and Scenarios

- CEC-1 (blue)
- CEC-2 (orange)
- CEC-3 (white)
- CEC-4 (green)

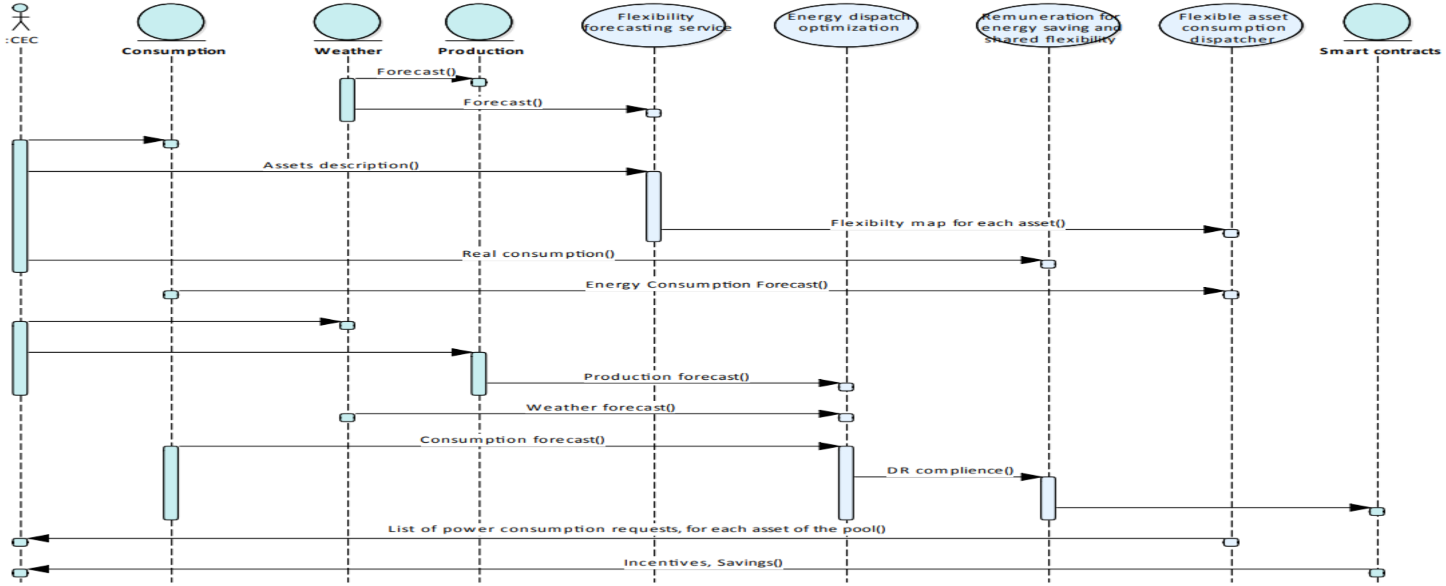
The Smart energy Grid Architecture Model (SGAM) is a three-dimensional architectural framework that can be used to model interactions (mostly exchange of information) between different entities located within the smart energy arena

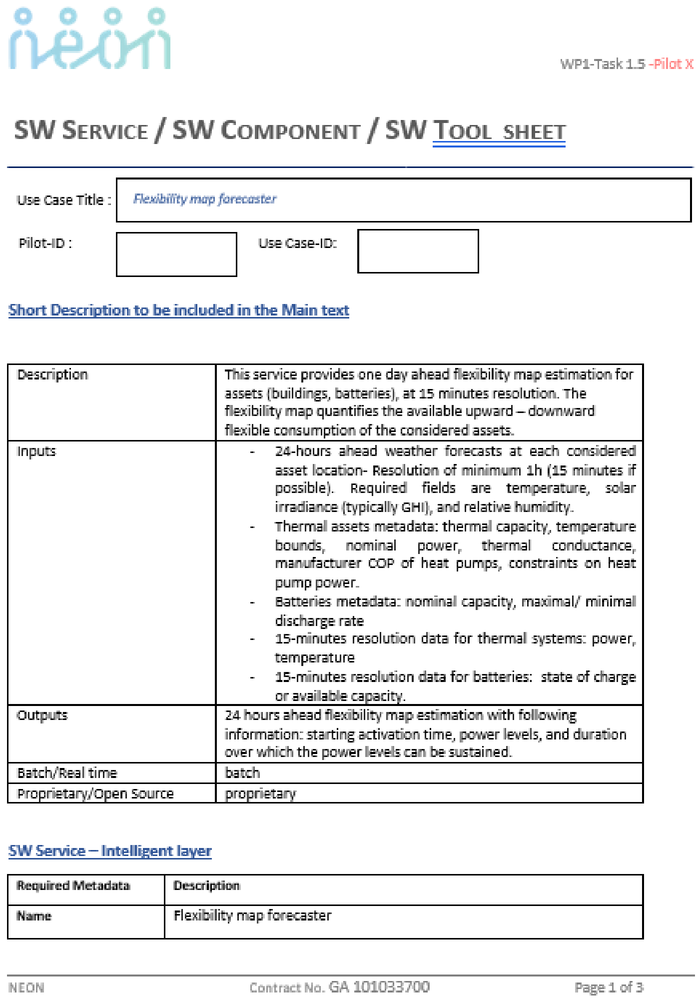


ling from the European Community's Horizon 2020 Work Programme (H2020) under grant agreement no 101033700

Analysis of Actors and Scenarios

- UML Business Use Cases / Scenarios
- Standardized Templates





WP1-Task 1.5 -Pilot X

SW Service / SW Component / SW Tool sheet

Use Case Title : *Flexibility map forecaster*

Pilot-ID :

Use Case-ID:

Short Description to be included in the Main text

Description	This service provides one day ahead flexibility map estimation for assets (buildings, batteries), at 15 minutes resolution. The flexibility map quantifies the available upward – downward flexible consumption of the considered assets.
Inputs	- 24-hours ahead weather forecasts at each considered asset location- Resolution of minimum 1h (15 minutes if possible). Required fields are temperature, solar irradiance (typically GHI), and relative humidity. - Thermal assets metadata: thermal capacity, temperature bounds, nominal power, thermal conductance, manufacturer COP of heat pumps, constraints on heat pump power. - Batteries metadata: nominal capacity, maximal/ minimal discharge rate - 15-minutes resolution data for thermal systems: power, temperature - 15-minutes resolution data for batteries: state of charge or available capacity.
Outputs	24 hours ahead flexibility map estimation with following information: starting activation time, power levels, and duration over which the power levels can be sustained.
Batch/Real time	batch
Proprietary/Open Source	proprietary

SW Service – Intelligent layer

Required Metadata	Description
Name	Flexibility map forecaster

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Technical Objectives

- Advance the energy efficiency services already available on the market and couple them with other energy services, providing an integrated approach to incorporate and optimize energy assets (RES, storage, and EVs) and consumption management.
- Enable innovative business models by joining EPC and P4P contracting schemes, and demonstrate their effectiveness, applicability, and adaptability to different business, regulatory and contractual frameworks.
- Provide consumer centered solution leveraging big data and ICT tools for bundling of energy and non-energy benefits to maintain comfort, health, and safety requirements of the building users.

Technical Objectives

- Exploit energy efficiency and demand-side flexibility through a demand response hybrid model by considering building-and-community-level energy demand to deliver economic benefits and improve grid security and reliability.
- Maximize the positive impact of multi-measure energy efficiency interventions at the demand-side by improving building operating performance for the advanced control capabilities and optimal operation of building systems.
- Incorporate advanced performance measurement and verification methodology that leverages data-driven analytical services, and automated settlement mechanisms for fair distribution of profits on the DLT platform.

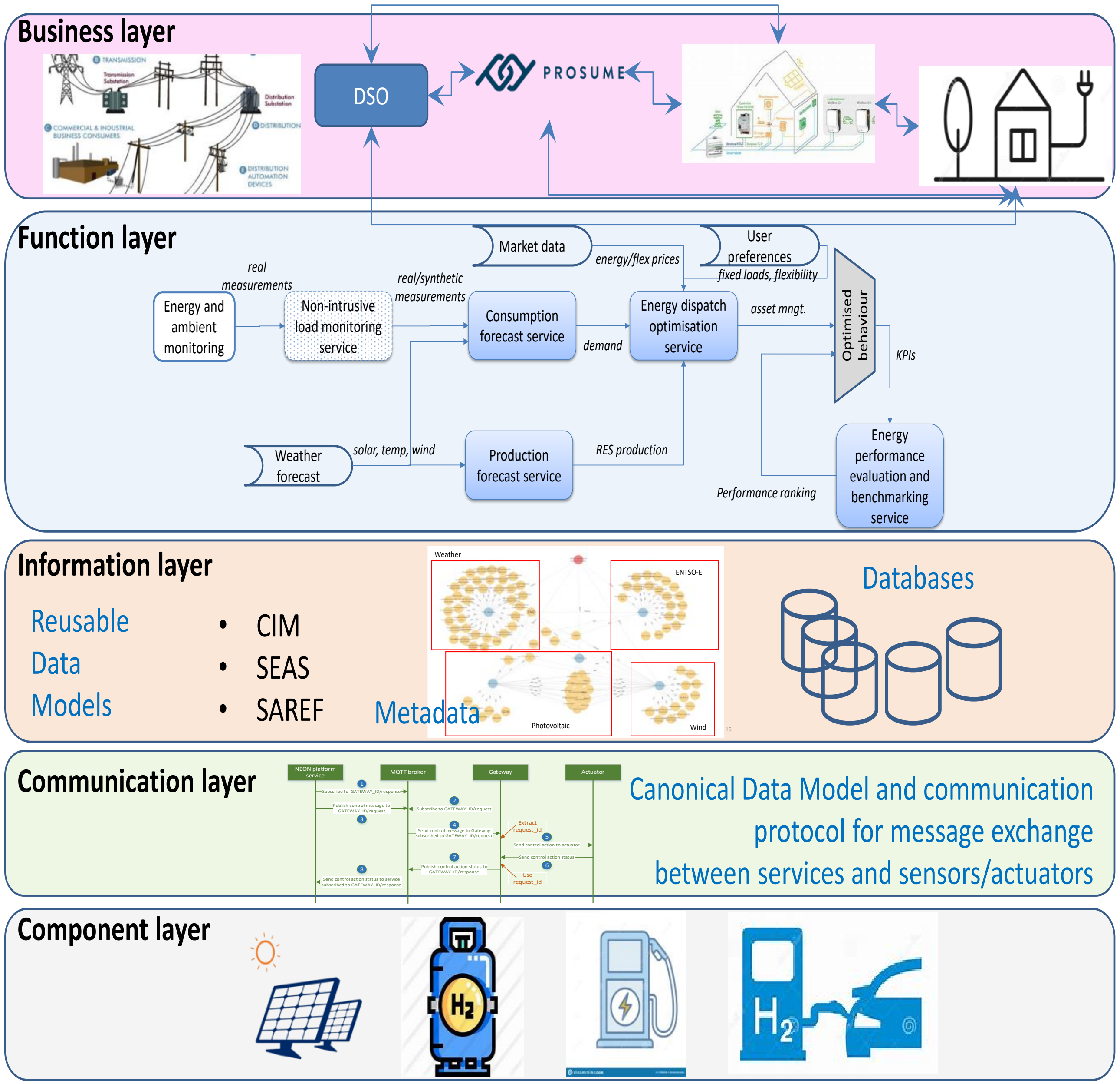
KEY RESULTS

NEON Platform
& Services

Feasibility case studies

NEON Platform

- **NEON SGAM Compliant Ecosystem**
- **Role of partners**
  - IMP leads the integration work
  - FOSS works on predictive analytics and enable non-energy benefits
  - R2M and ENGIE are involved in building control services development
  - IMP adopted the Energy Hub concept, while CSEM provided DR flexibility service
  - IMP and CSEM provide optimization and dispatch services
  - GRA provides contract schemes and remuneration module



NEON Services (WP3)

- Energy efficiency services for multi-measure building efficiency improvement.
- Optimal energy asset scheduling (Renewal Energy Systems storage and electric vehicle charging) to improve self-sufficiency.
- Advanced building control for optimal operation of heating/cooling systems, lighting, smart appliances, etc.
- Demand response services to improve the flexibility of the grid.
- Tailored services to ensure comfort, health (air quality, assisted living services) and safety requirements.

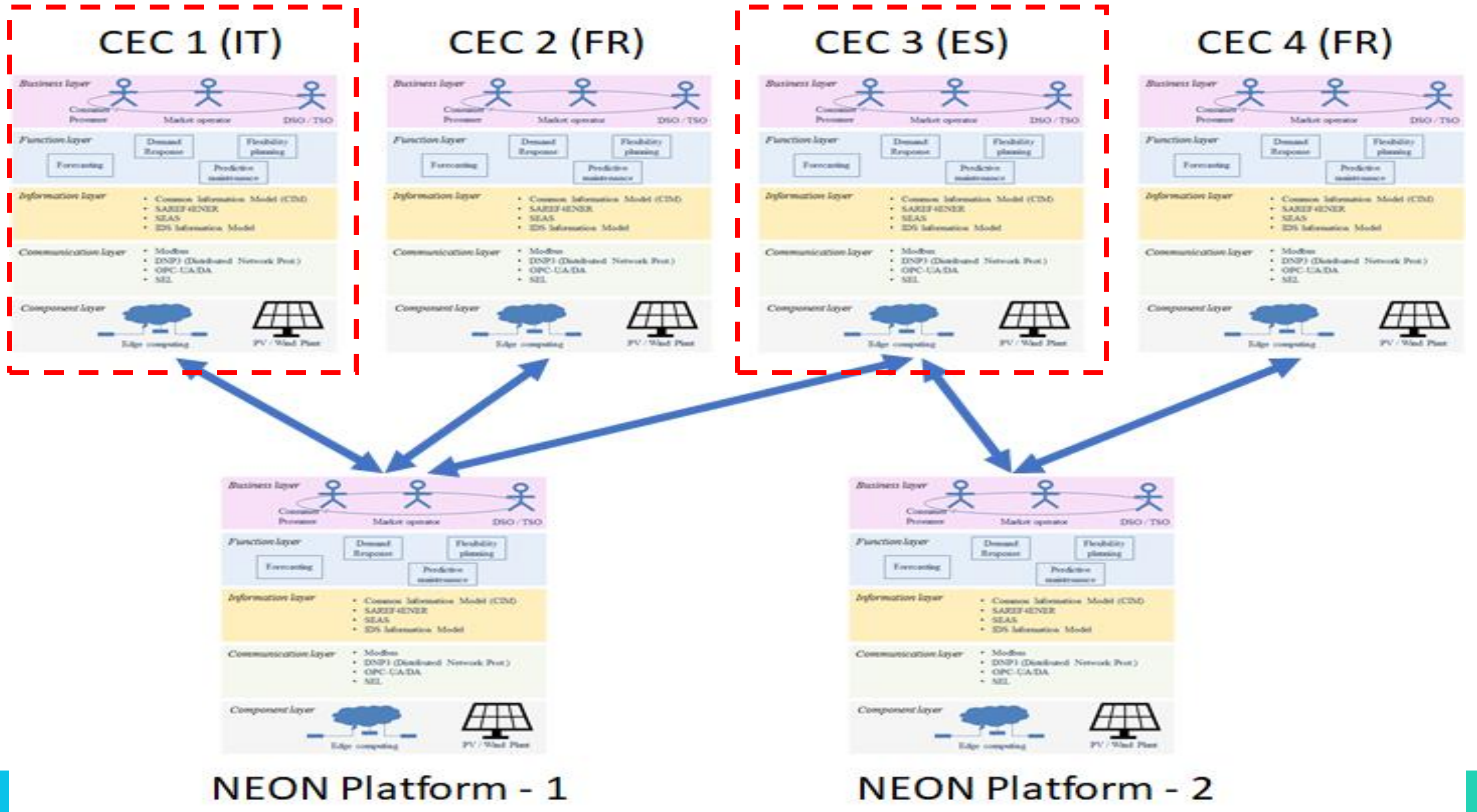
NEON Next Generation Services – Key Exploitation Results

Tools & Services

- CEC RES PRODUCTION ENERGY HUB SIZING AND PLANNING TOOL (IMP)
- COTURNIX TOOL - CONSUMPTION MANAGEMENT SOLUTION (ALB)
- BLOCKCHAIN-BASED (DLT) PLATFORM FOR ENERGY DATA MANAGEMENT (GRA)
- REMUNERATION MODULE FOR ENERGY SAVINGS AND SHARED FLEXIBILITY (GRA)
- PRODUCTION FORECASTING (FOSS)
- PRODUCTION FORECASTING (IMP)
- LOAD FORECASTING (FOSS)
- LOAD FORECASTING (IMP)
- NON-INTRUSIVE LOAD MONITORING (IMP)
- DIGITAL CONTROL ALGORITHMS (R2M)
- ENERGY CONSERVATION MANAGEMENT SYSTEM (IMP)
- HOLISTIC ENERGY DISPATCH OPTIMIZATION (IMP)
- USER ENERGY EFFICIENCY BENCHMARKER (IMP)
- FLEXIBILITY FORECASTING SERVICE (CSEM)
- FLEXIBLE ASSETS CONSUMPTION DISPATCHER (CSEM)

NEON Platform
Testing Activities

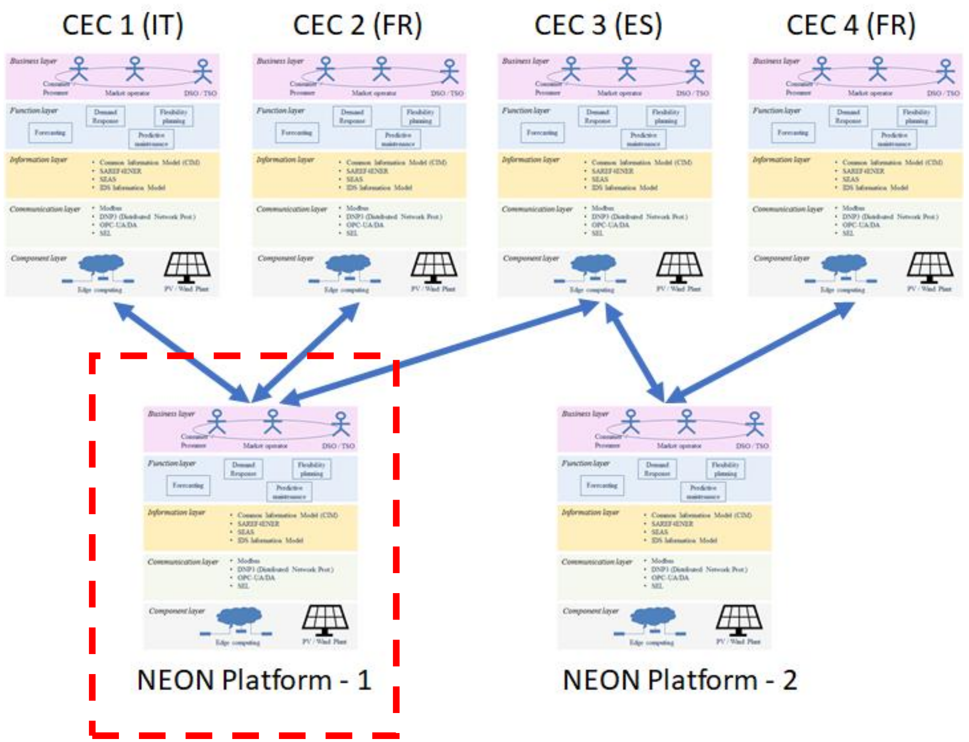
NEON ICT platform – Testing activities (M20)



NEON Platform – SW Specification

NEON ICT platform – Testing activities (M20)

- Ubuntu 22.04 LTS operating system
- HESTIA CP admin control panel
- PHPMyAdmin for MySQL management
- Weather data from weatherbit.io service
- InfluxDB for time series data
- Grafana for data visualization



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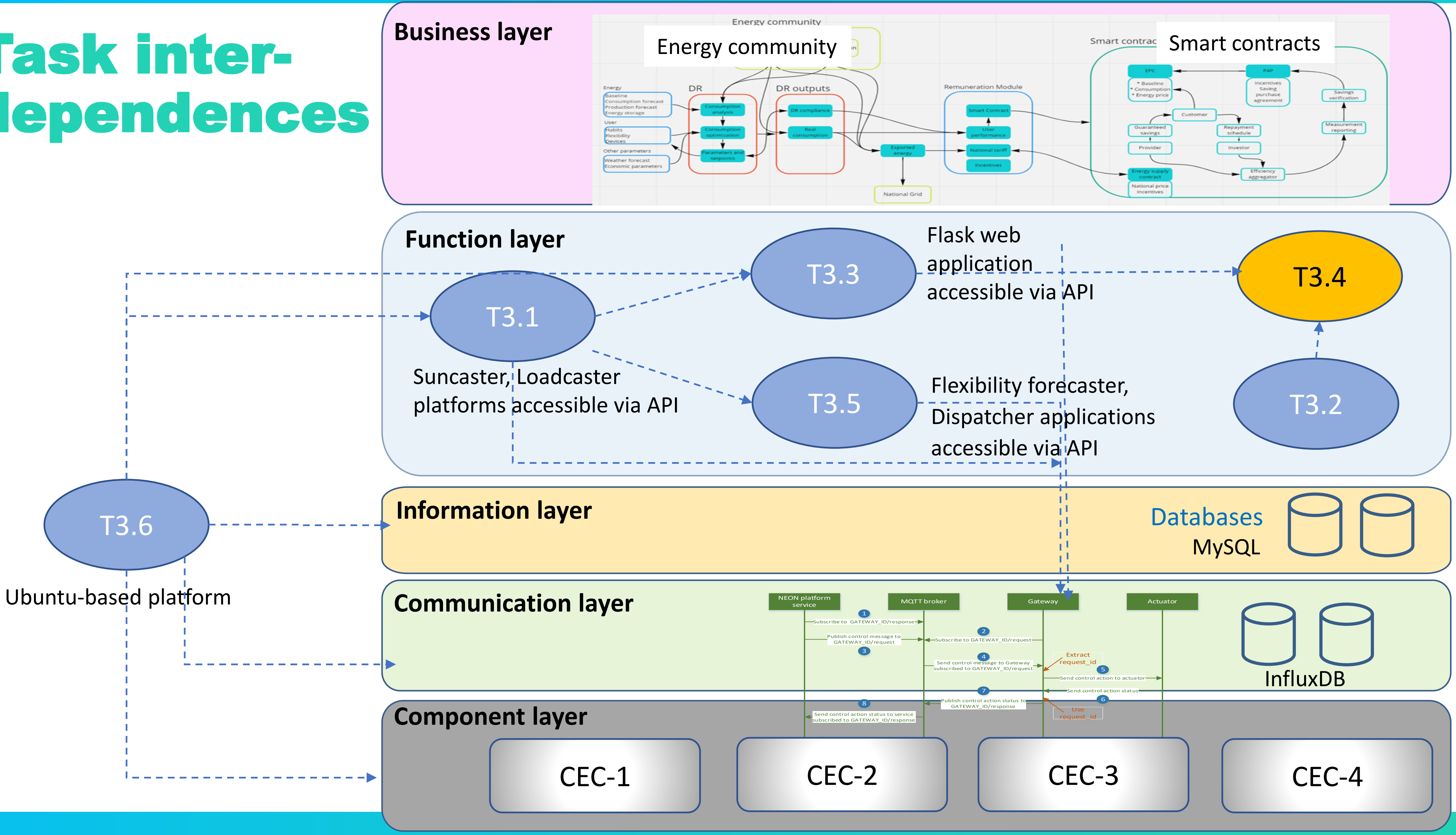
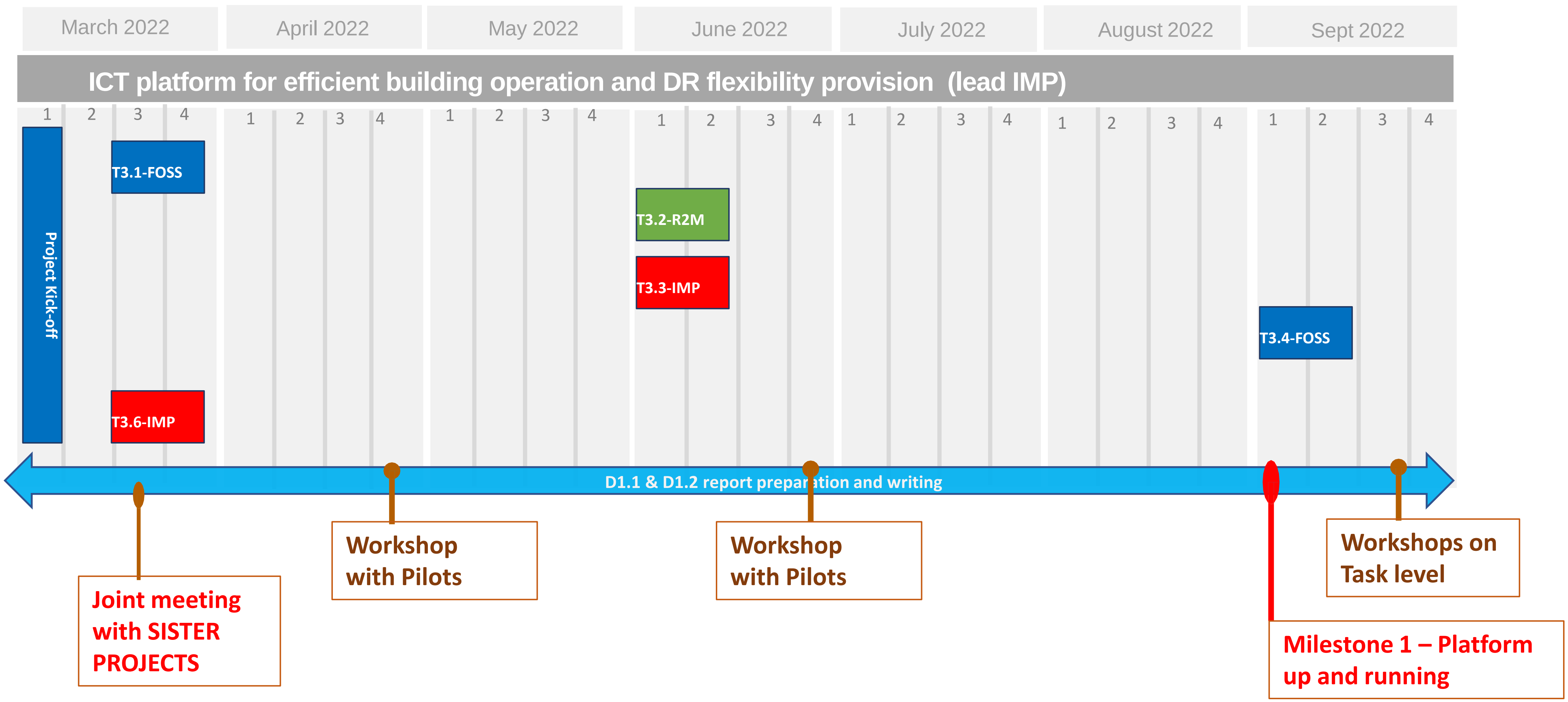
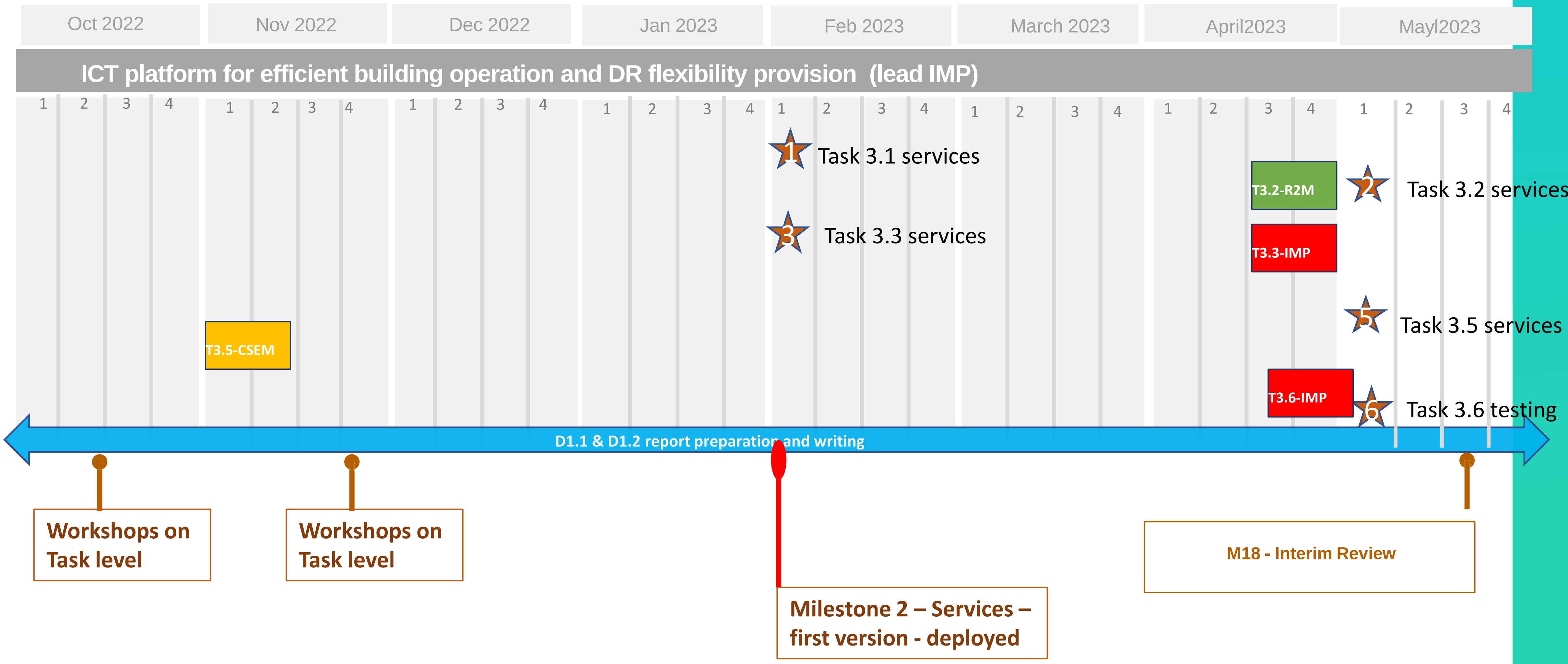
Task inter-dependences



WP3 Milestones M07-M13 (Workshops)



WP3 Milestones M14-M21 (Workshops)



LESSONS LEARNED

Techno-economic scenarios analysis is quite demanding task that have to take into account the heterogeneity of the community. CECs differ in terms of size, number and typology of potential members, degree of energy efficiency, PV system installed, EV charging stations, smart meters and so on.

In order to assess the feasibility of different kinds of interventions related to different requirements of each pilot, various system alternatives have to be studied (D2.4).

LESSONS LEARNED

Energy efficiency interventions are not enough if they are not coupled with an enhancement and expansion of the energy community.

CEC assets require proper hardware and communication infrastructure to orchestrate and coordinate actions within the system and with the grid.

- Next-generation services in place
- Analysis and identification of suitable financial structures that will ensure cost effectiveness of the service offer and minimize, at the same time, the business risk for the involved actors.

LESSONS LEARNED

D2.3 Guidelines for business risk distribution and minimization - Energy efficiency investment risks categories

- **Financial risk category**
- **Behavioural risk category**
- **Energy market and regulatory risk category**
- **Economic risk category**
- **Technological risk category**

BARRIERS

- Investment in infrastructure needed in order to increase self-consumption (not enough PV installations, storage batteries are not present, batteries management costs; lack of measurement systems - smart meters costs, electrical network is obsolete)
- National regulatory barriers (e.g. Permissions for CEC; Possible extra taxes)
- Skills (stakeholders understanding of energy system; lack of adequate technical and administrative skills that allow the LEC Operator to manage the development of the future Energy Community and the related energy services)

Thank you very much !