

## Leveraging IoT and Edge Computing Infrastructures to foster Energy Flexibilities through next energy sectorial integration

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# Motivation

## Data Exchange Use Cases in the Energy Domain

### 1. Grid Digitalization

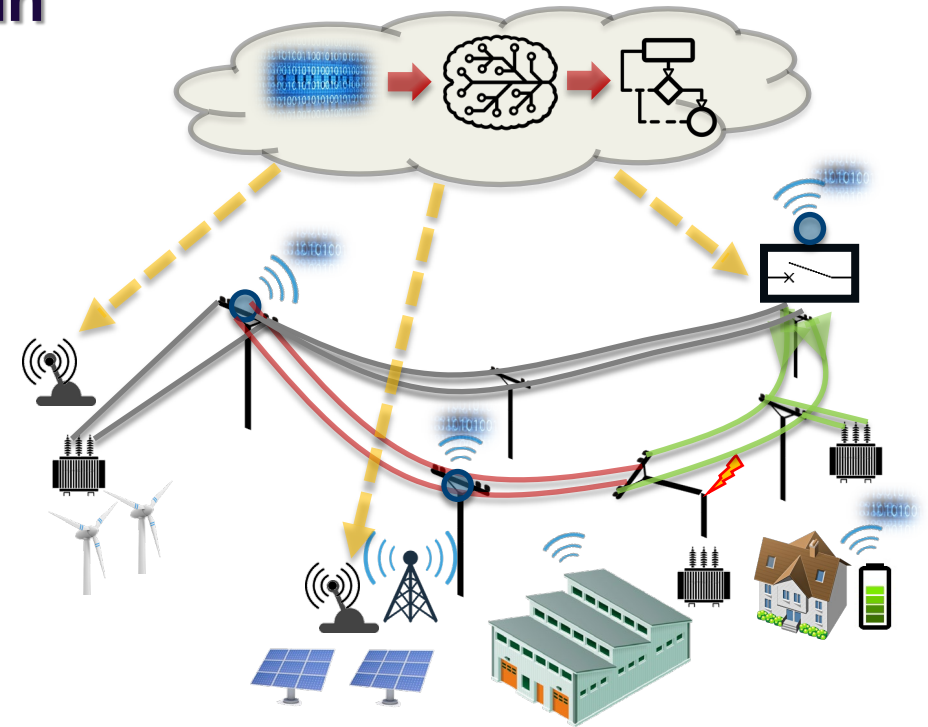
Remote control of electro-mechanical and electronic components to perform grid protection and improve efficiency

### 2. Energy Optimization for Buildings

Energy Management System (EMS) optimizes the energy consumption and storage based on weather forecasts, planned usage and energy prices

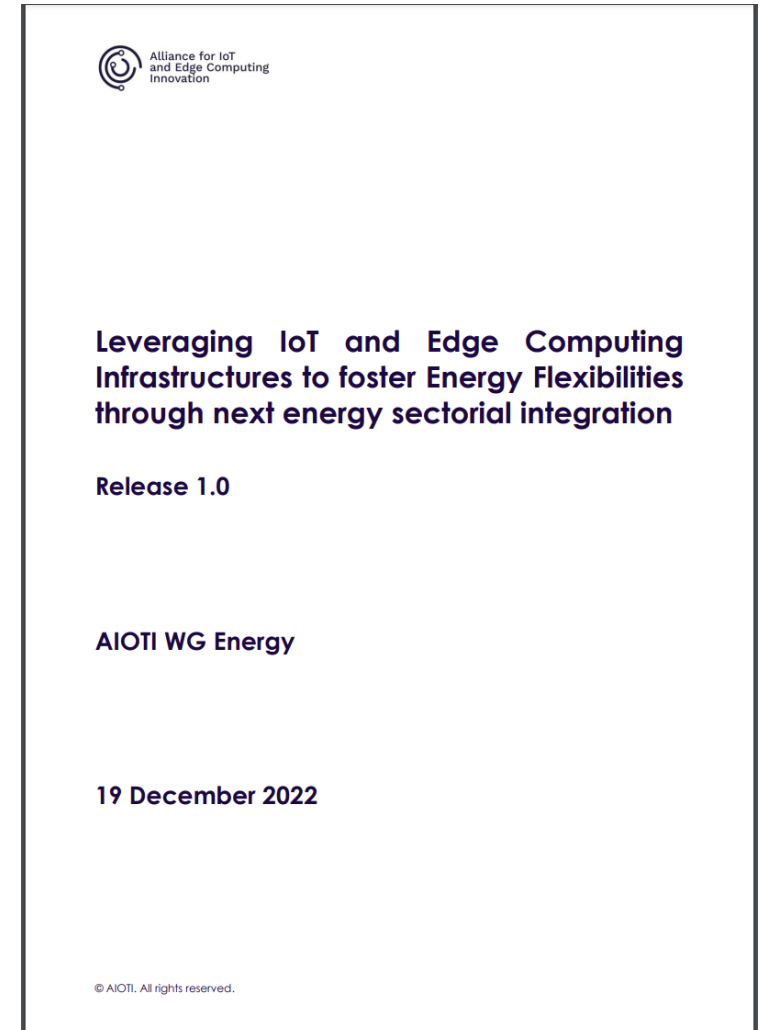
### 3. Flexibility Marketplace

Prosumers share data and agree with energy provider on planned usage (when/how), to improve the grid operations



# Table of Content

1. IoT and edge computing use cases
2. Large scale flexibility
  - Challenges and alignment on flexibility regulatory framework
  - Roadmap towards efficient regulatory framework for flexibility markets
3. Interoperability frameworks
4. Virtual Power Plant (VPP) role
5. Consumer engagement
6. Recommendations



# 2. IoT and Edge Computing use cases

## Evolution of IoT platforms:



## Data exchange across key actors:

**Prosumers and Energy Communities**  
→ Investments decision

**Energy System Infrastructure Planners**  
→ Long-term cross-sector plan

**Energy system infrastructure operators and service providers** → Energy supply and DER contracts

**Cities** → Deployment of Energy and Mobility infrastructures

# 2. IoT and Edge Computing use cases

## Control Room Architecture for Future Grids



### Ingredients:

Observability:  
location and time  
(granularity close to  
real time)

DER management

Artificial  
Intelligence

Cybersecurity

# 3. Large scale flexibility

## Challenges and Alignment on Flexibility regulatory framework:

Definition of independent aggregator model, particularly for smaller cases at residential level

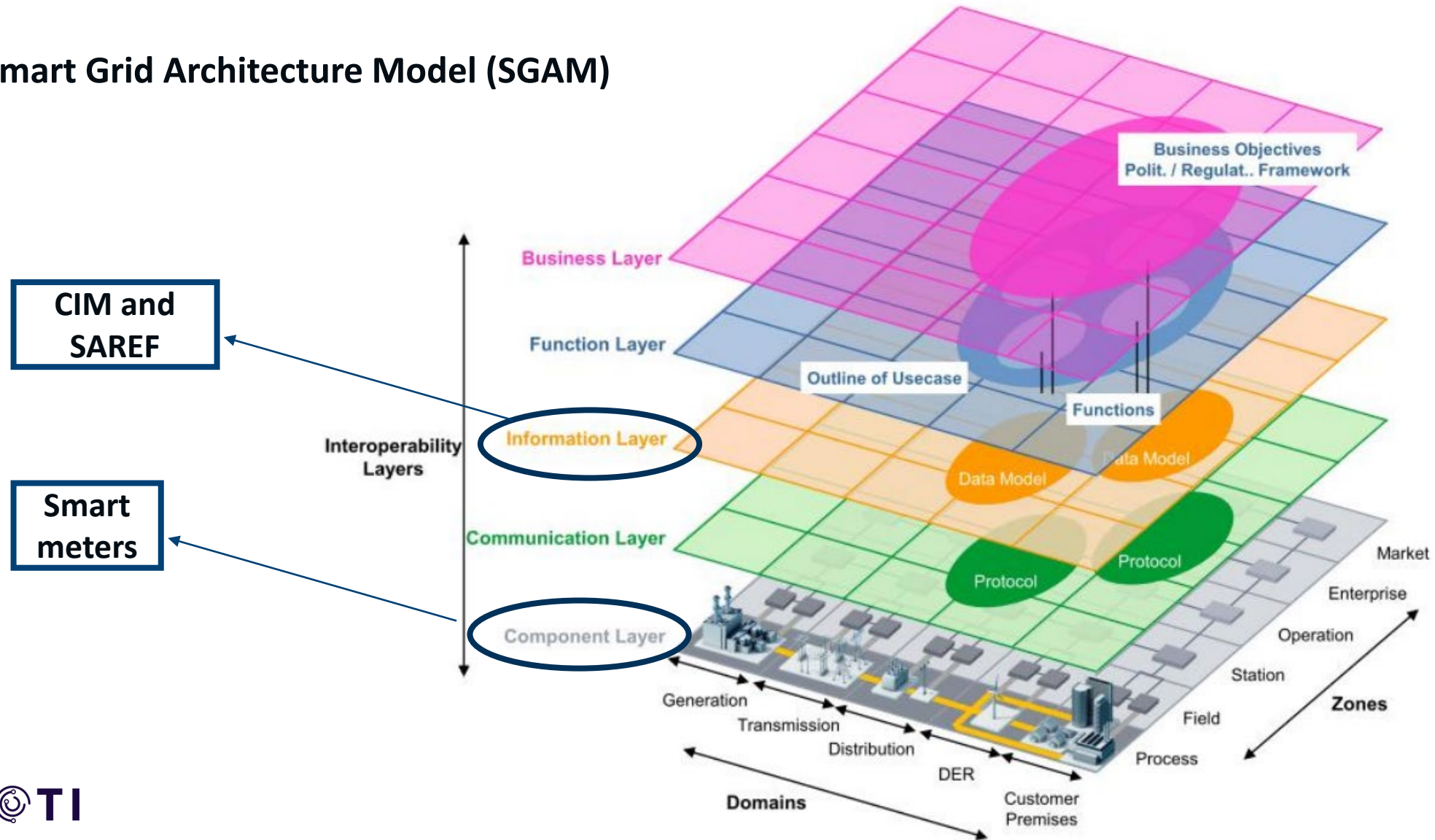
Sub-metering IoT Data: trusted exchange and protection of IoT sensors and edge computing data

Regulatory harmonization for flexibility across EU countries

Incentives: Considering flexibility during grid planning stages

# 4. Interoperability Frameworks

## Smart Grid Architecture Model (SGAM)

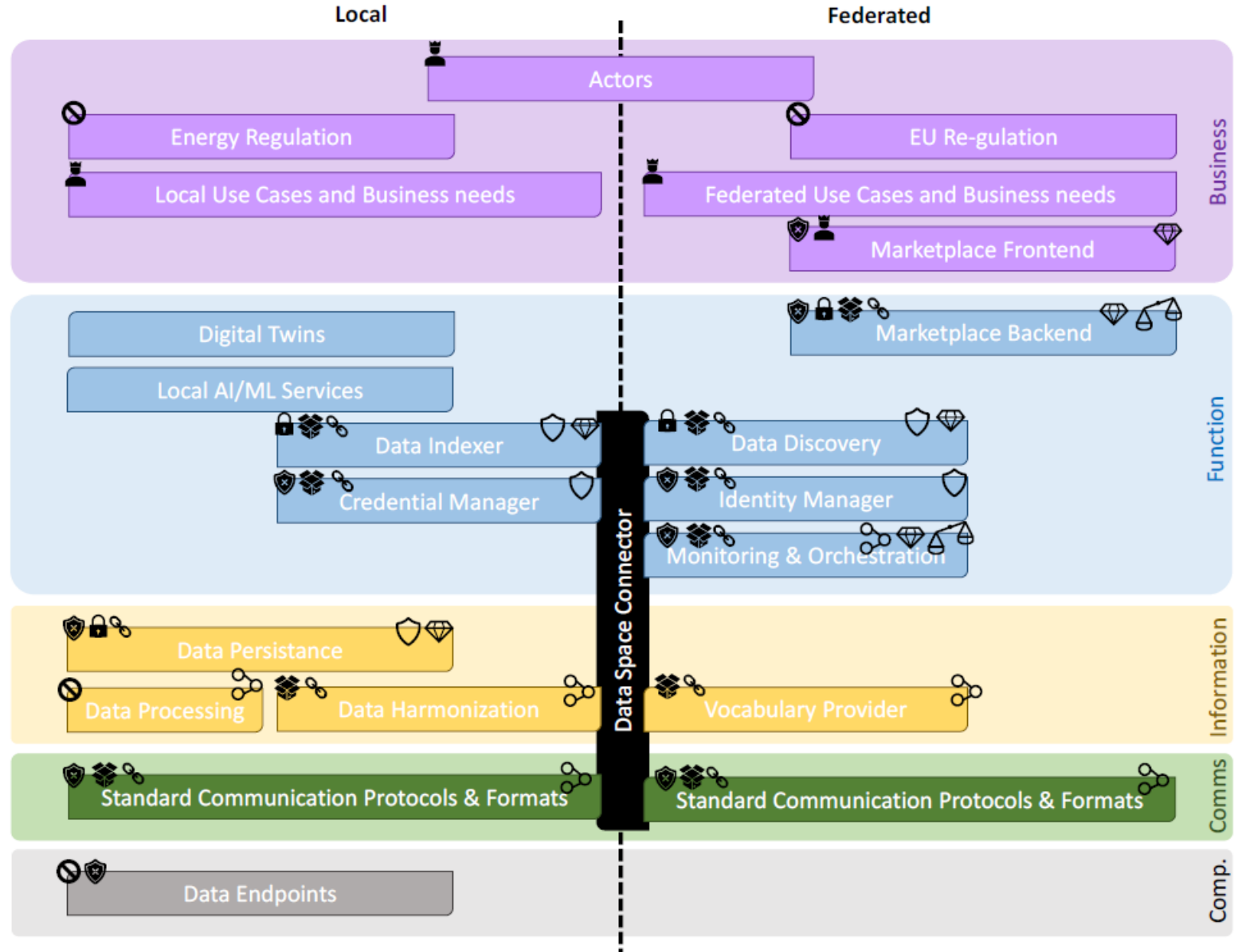


# 4. Interoperability Frameworks

## Data Exchange Reference Architecture (DERA) 3.0

- Non-personal data
- Security/Resilience
- User Acceptance
- Sovereignty
- Open Source
- Interoperability

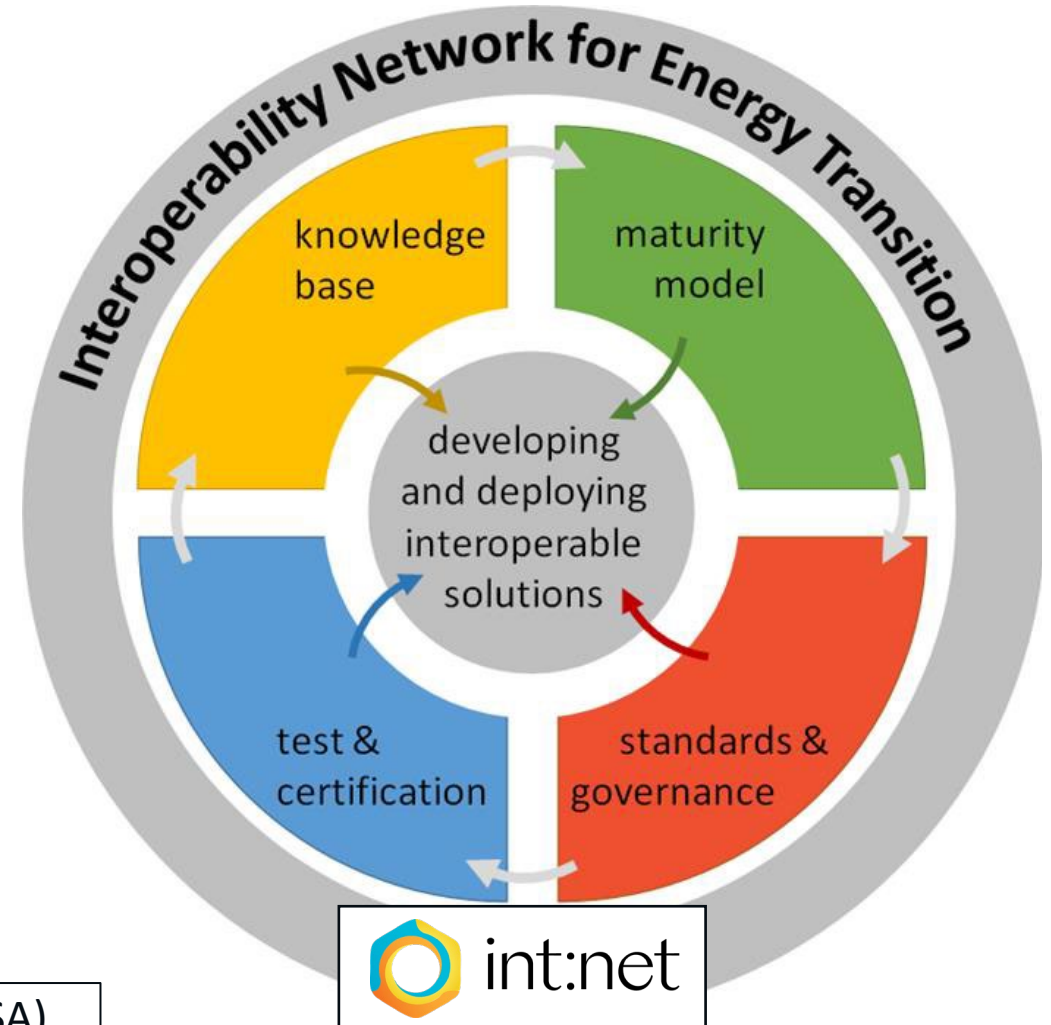
- Interoperability
- Trust
- Data value
- Governance





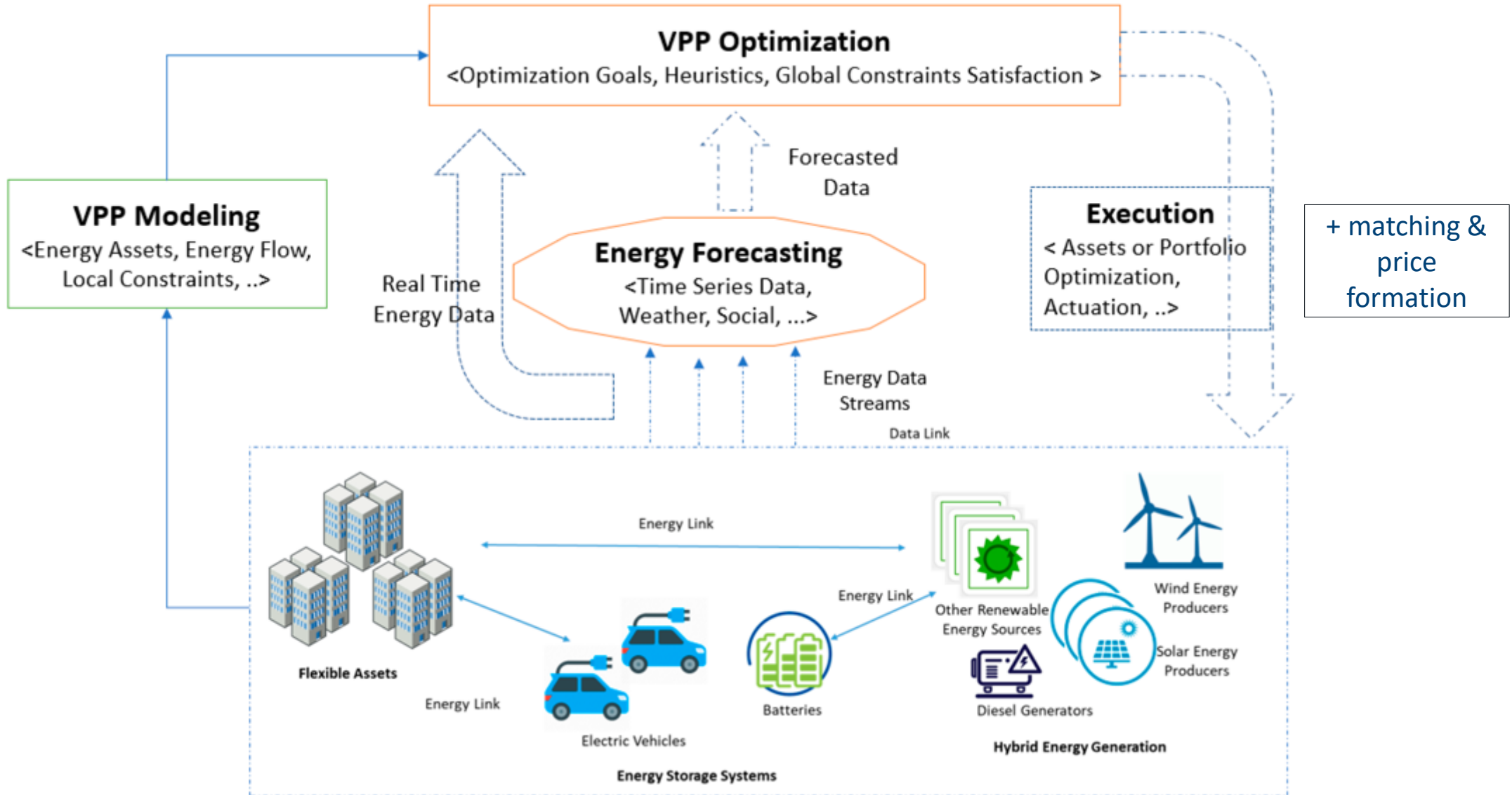
# int:net – Interoperability network for energy transition

- Common knowledge base for interoperability activities on energy services in Europe
- Interoperability Maturity Model (IMM)
- Framework for interoperability testing in a network of testing facilities
- Community network of standards and regulatory environment for a European interoperability ecosystem
- Energy data spaces



Coordination and Support Action (CSA),  
from May 2022 to April 2025

# 5. Virtual Power Plant (VPP) role



# 6. Consumer Engagement

Engagement of Consumer  
Empowerment of Consumer  
Collaboration with Consumer



Urgently necessary for DSOs,  
with simple and clear mechanisms

## Control incentives category:

- Flexible access and connection agreements
- Dynamic network tariffs
- Local flexibility markets
- Obligations (for technology neutrality)



Different situations and regulations in member states to be considered