Regulation Perspective and Existing Gaps of Network Codes with Focus on Data

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WP Leader Regulatory & Business Models for RES

BRIDGE REGULATIONS Working Group Meeting Agenda

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CRE Romanian Energy Center

European Commission

RE-SERVE
Renewables in a Stable Electric Grid

Dr. Mihai PAUN
WP Leader Regulatory & Business Models for RES

Research & Innovation Action
H2020 call LCE-07-2016-2017

Partners:
- **COORD:** ERICSSON GmbH
- **OP:** TRANSELECTRICA, ESB
- **MARKET:** FEN
- **TECH:** GridHound UG, RWTH
- **RESEARCH:**

Romanian Energy Center - CRE,
University of Waterford,
University Politehnica of Bucharest ,
University College Dublin,
Politecnico di Torino

Purpose of the project:

Developing **new techniques & solutions based on 5G technology** to assist energy providers with:

- Balancing the **voltage** and **frequency** of the power grid to maintain a stable power supply to society,
- while at the same time **increasing the proportion** of power generated by volatile renewable energy sources, such as solar and wind energy
- Results will include **Network Code** & **ancillary services** definitions

Regulations issues faced within the project

- **Develop new elements** of harmonized set of rules expected to better address governance & regulatory issues of cross-border electricity flows & transactions in Europe, adequate to the challenging **transition towards 100% RES**.
- **Close coordination** and communication with **European TSOs**.

Expectations regarding the BRIDGE WG Regulations

- Contribution to **regulatory issues within the BRIDGE WG Regulation** → TSOs - RCC
- Feedback from other research projects regarding **Grid Codes & TSOs regulatory** issues.

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RESERVE STRATEGIC CHALLENGE

Operating the energy networks efficiently based on the use of up to 100% renewable energy sources for generation

which imply:

- **Management** of largely **decentralised energy systems**
- Harmonisation of **Network Codes** on at least at European level
- Provision of a **Communication Infrastructure** for near-real-time services combined with high reliability

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HOW RESERVE WILL MEET THESE CHALLENGES

RESERVE develops innovative techniques and solutions based on **5G technology** to assist energy providers with:

- **Balancing** the **voltage and frequency** of the power grid to maintain a stable power supply,
- **Increasing the proportion of power** generated by volatile **renewable energy sources**,
- Defining new **Network Codes and ancillary services** for the contribution of different RES technologies to a stable and safe power ecosystem,
- Developing new **Ethical Business Models** to support 100%RES integration improving market transparency

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RESERVE CONCEPTS

Research Concepts

- **Frequency Stabilisation** through Virtual Inertia
- **Voltage Stabilisation** through Virtual output impedance
- Ethical **Business Models** for Sustainability

Implementation Concepts

- **Mapping of Research Concepts** to Ancillary Service Implementations
- **Pan-European real-time Simulation Platform**
- **Harmonised Network Codes**
- **5G** based ICT for up to 100% RES

Field Trial & Laboratory Studies

- **Fast voltage control** in **Ireland**
- **Fast frequency control in Romania**

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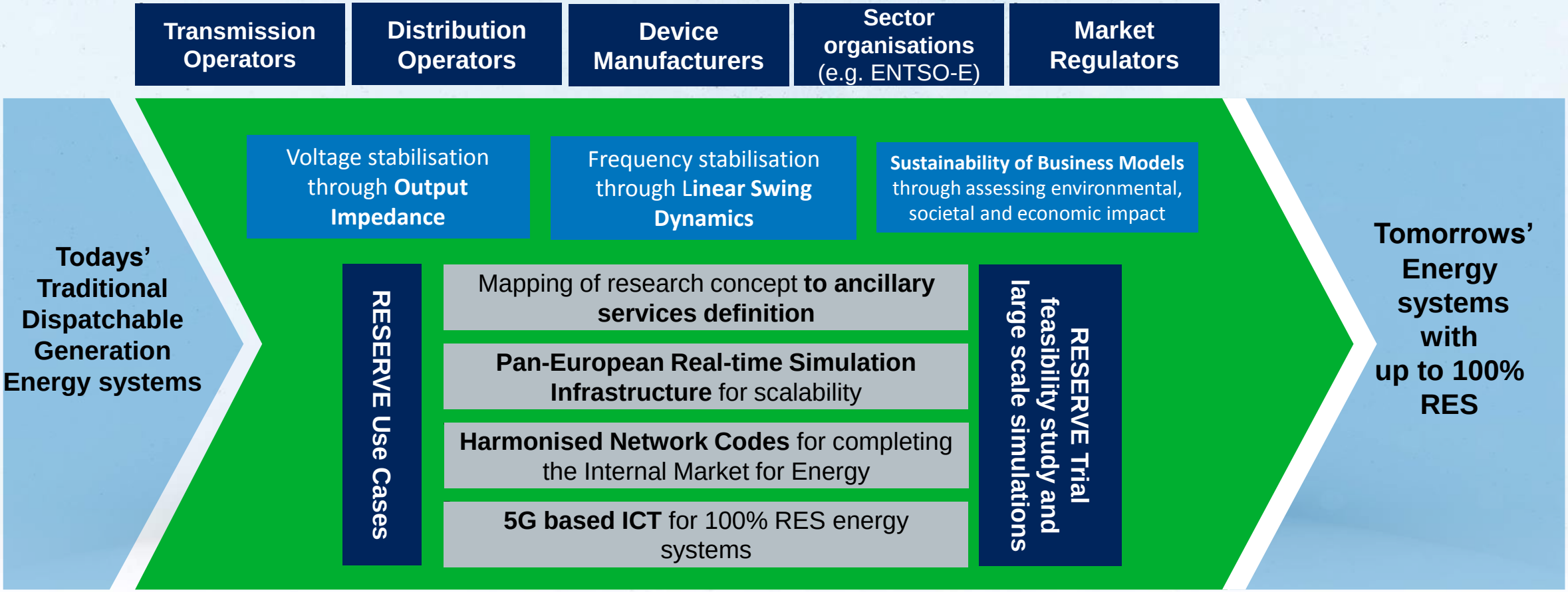
RESERVE APPROACH



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RESERVE TRIALS AND PARTNERS

ERICSSON

RWTH AACHEN UNIVERSITY

GRIDHOUND

Flexible Elektrische Netze

TSSG

UCD DUBLIN

ESB NETWORKS

Transelectrica®

CRE Romanian Energy Center

POLITEHNICA UNIVERSITATEA BUCUREȘTI 1818

POLITECNICO DI TORINO 1859 1906

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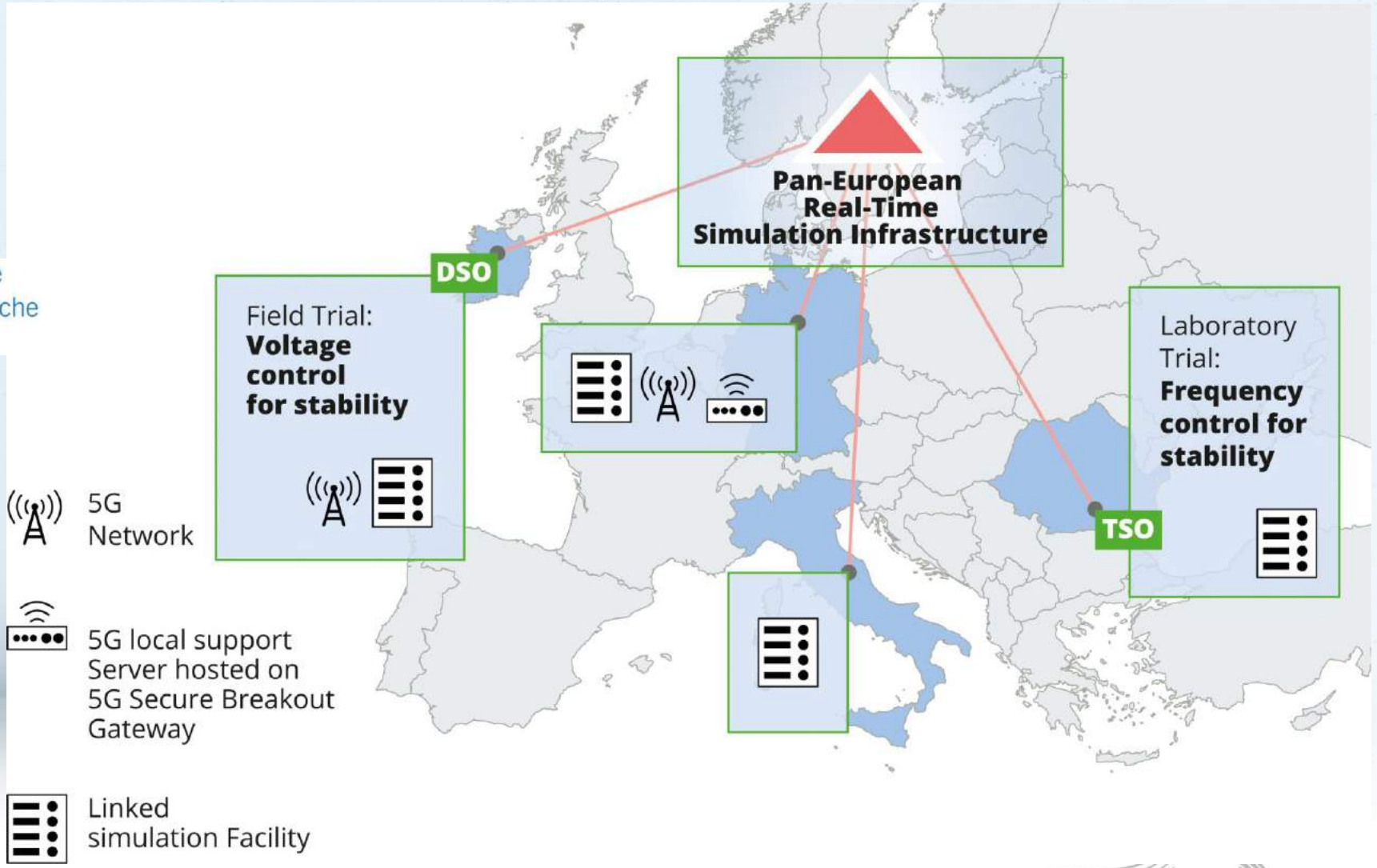

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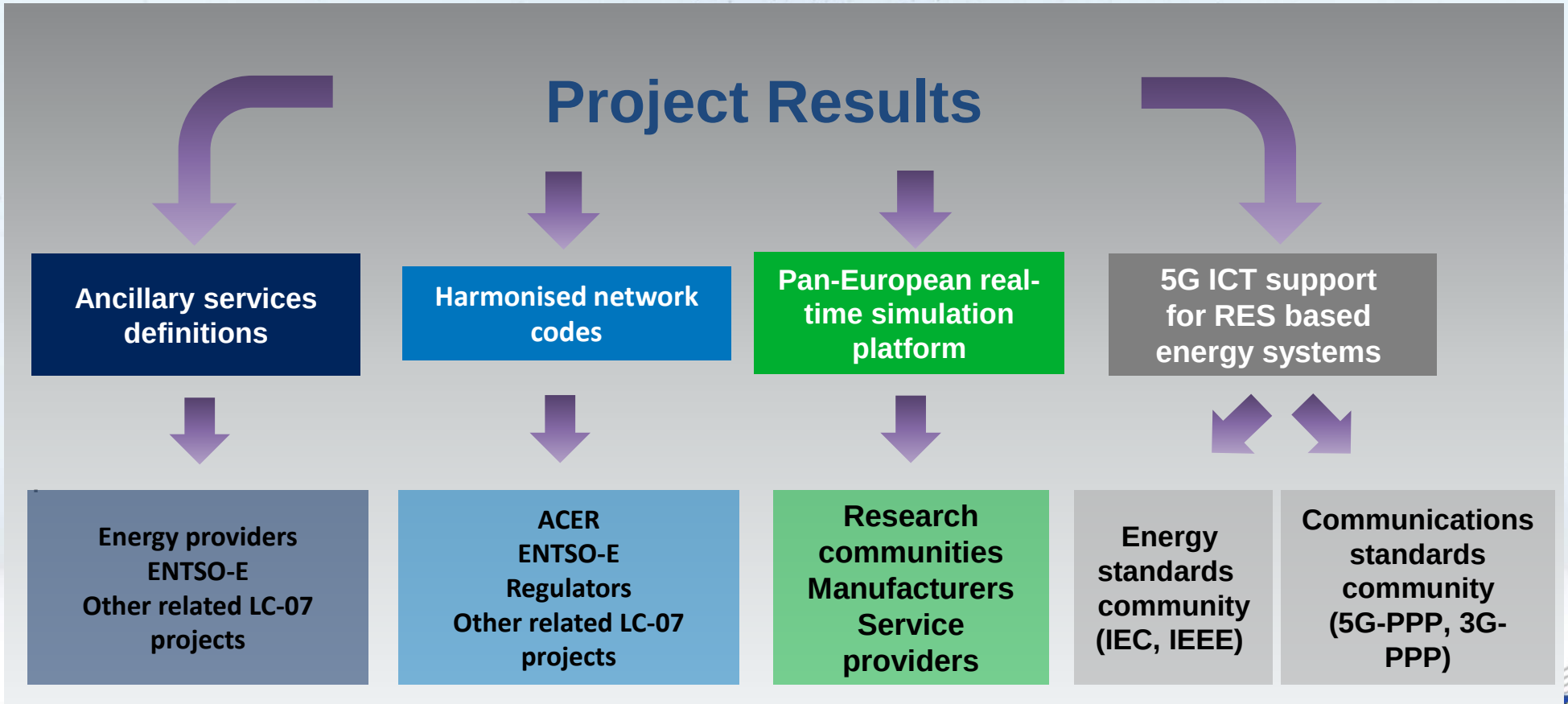
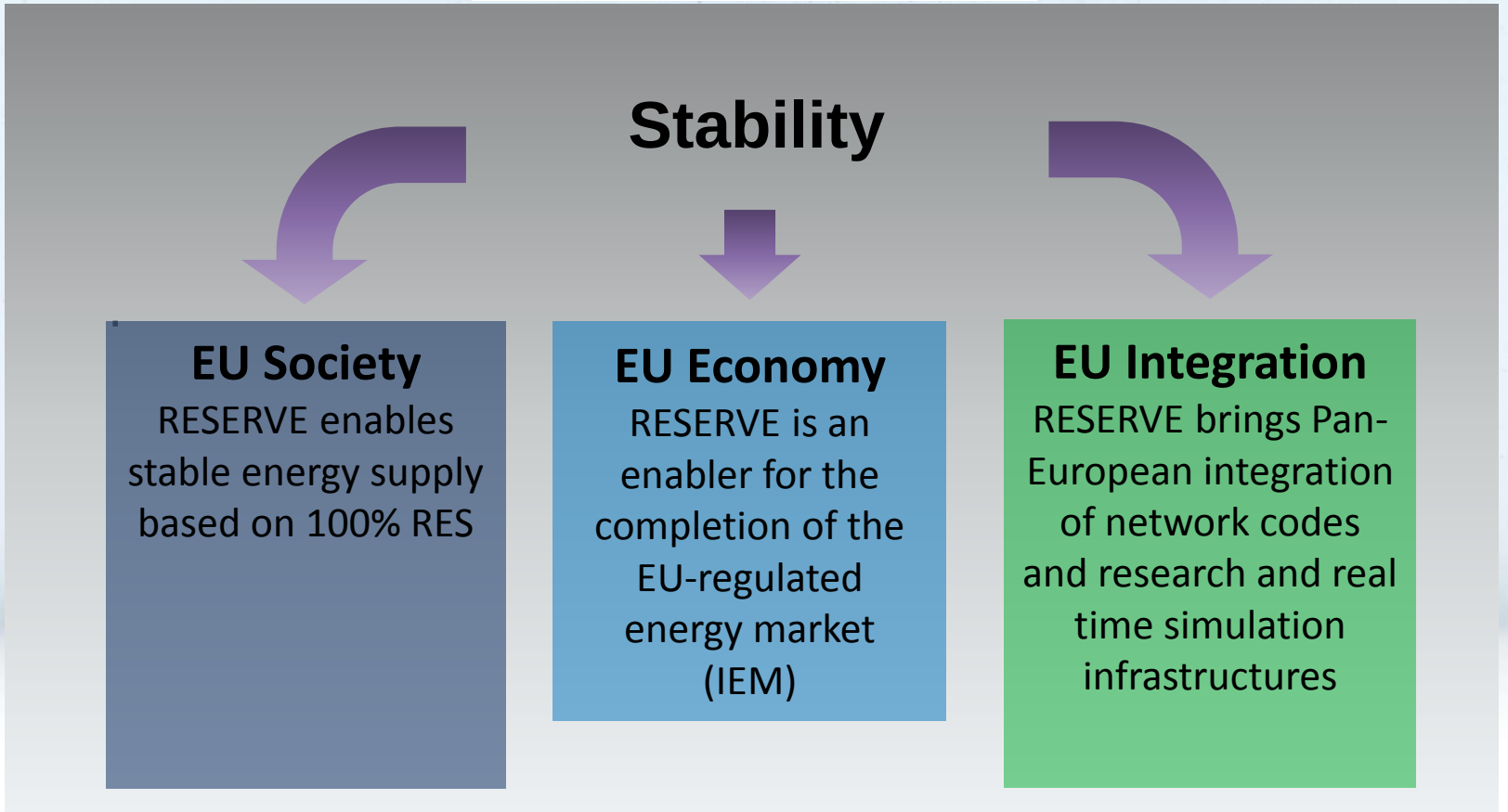
RESERVE TARGET AUDIENCE



RESERVE IMPACT TARGETS AT EU LEVEL



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SUMMARY: FROM CHALLENGES TO EXPLOITATION

CHALLENGES OF 100% RES ENERGY SYSTEMS	RE-SERVE APPROACH TO STABILISING ENERGY	EVALUATION AND TRIALS OF THE RE-SERVE RESULTS	BEYOND RE-SERVE: EXPLOITATION AND IMPACT
• Stabilisation of energy systems without the inertia of fossil fuel turbines • Decentralisation of energy systems • Dispatchable energy Resources • Need for new ICT solutions to support decentralised systems	• Virtual impedance and inertia to enable voltage and frequency control • Pan-European Real-time simulation platform • Live 5G ICT solutions in field trials and Hardware in Loop (HIL) simulations • Build on the SUCCESS secure platform	• Live solutions field trial • Feasibility study of fast frequency concepts • Pan-European simulation lab preparation for commercial use as start-up company • Continuous interaction with broad range of stake-holders for validation of concepts	• Large scale simulations for energy systems are reality • Solutions enabling up to 100% RES to TRL 4-5 available • New ancillary service definitions for the Internal Energy Market • European leadership in RES integration demonstrated • Jobs and economic growth created in Europe
2016	2017	2019 (End of project)	2019+

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THANK YOU!

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- **RE-SERVE** is developing new techniques and solutions based on **5G** technology to assist energy providers with
  - Balancing the **voltage** and **frequency** of the power grid to maintain a stable power supply to society,
  - while at the same time **increasing the proportion** of power generated by volatile **renewable energy sources**, such as solar and wind energy
  - Results will include **Network Code** and **ancillary services** definitions.

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Potential Barriers/Obstacles to Innovation

- New concepts must be **validated in simulations and trials**
- **Regulations** will need **to be adapted** to the new concepts and techniques
- The **roles of the distribution and transmission network operators** will **need to change** to support the use of the new concepts and techniques

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