EU-SysFlex

PROJECT OVERVIEW

John Lowry

EGVI Workshop

20th June 2018

EGVI
European Green Vehicles Initiative

Horizon 2020

Over all Programme

- Financial instrument implementing the "innovation union"
- Aimed at securing EU competitiveness
- €80bn fund 2014-2020

Related Programme Competition

- Part of 'secure, Clean and Efficient Energy' programme
- €65m – 2017 call for proposal
- 4 successful Project

THREE KEY PILLARS

Disclaimer: This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 773505.

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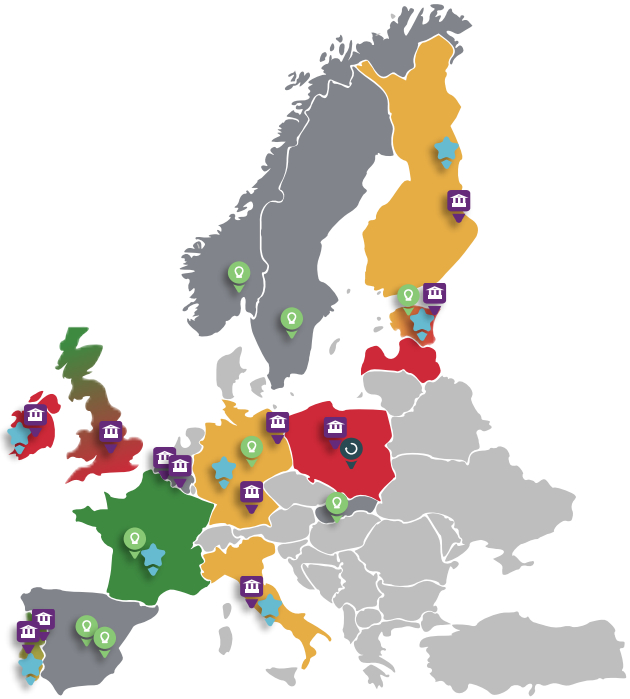
Call for proposal

*"Demonstration of **system integration** with **smart transmission grid** and **storage technologies** with **increasing share of renewables".***



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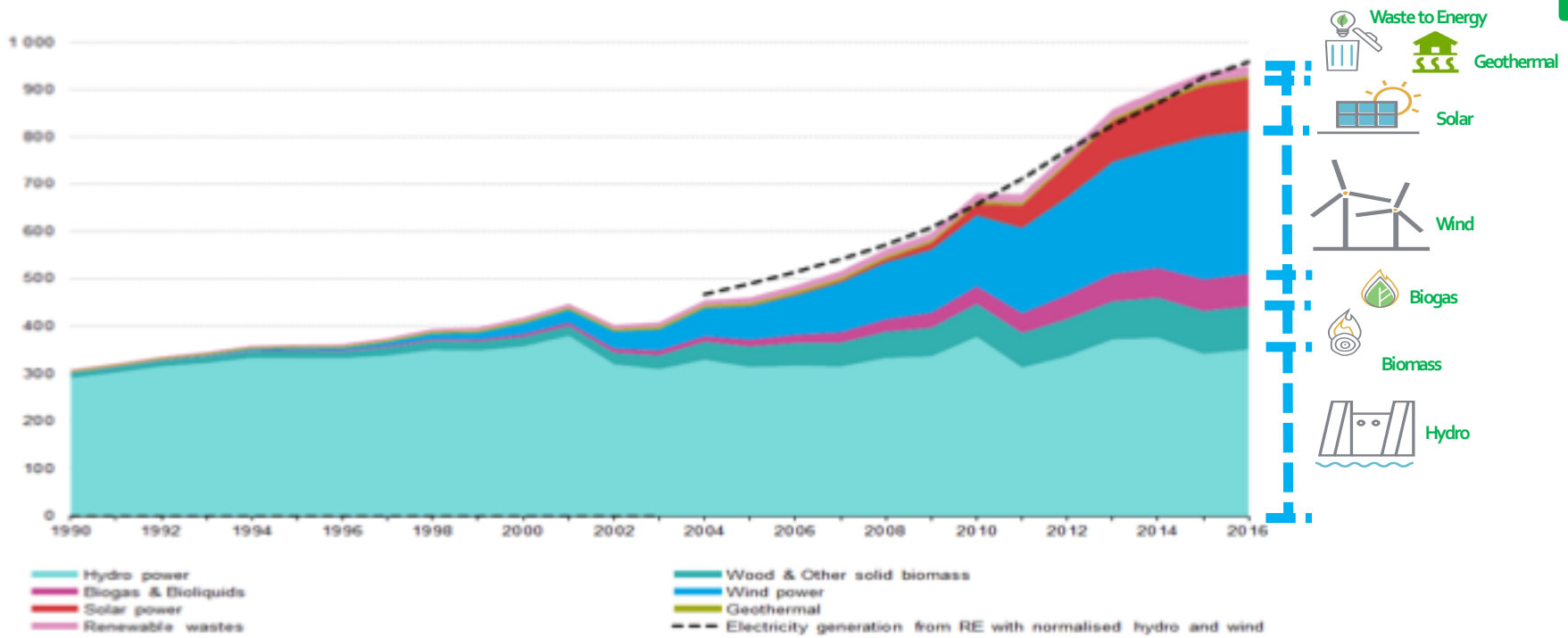
Gross electricity generation from renewables



File:Figure 5-Gross electricity generation from renewable sources EU-28 1990-2016.png

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Overall increase in system complexity

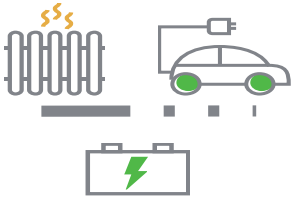
2030>>
50% RES

Mix and scale of RES

GREATER RELIANCE ON VARIABLE SOURCES OF ELECTRICTY

New Dimensions

ELECTRIFICATION OF HEAT, COOLING & TRANSPORT



LARGE SCALE DEPLOYMENT OF BATTERY STORAGE

SMARTER LIVING

System Structure

BECOMING MORE DECENTALISED AND DISTRIBUTED

... 2050>> ELECTRICTY USE IS ESTIMATED TO INCREASE FROM 20% OF THE OVERALL EUROPEAN ENERGY USE TODAY TO 40% OF ENERGY NEEDS.

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CREATING A ROADMAP TO ADDRESS FUTURE SYSTEM OPERATION COMPLEXITIES

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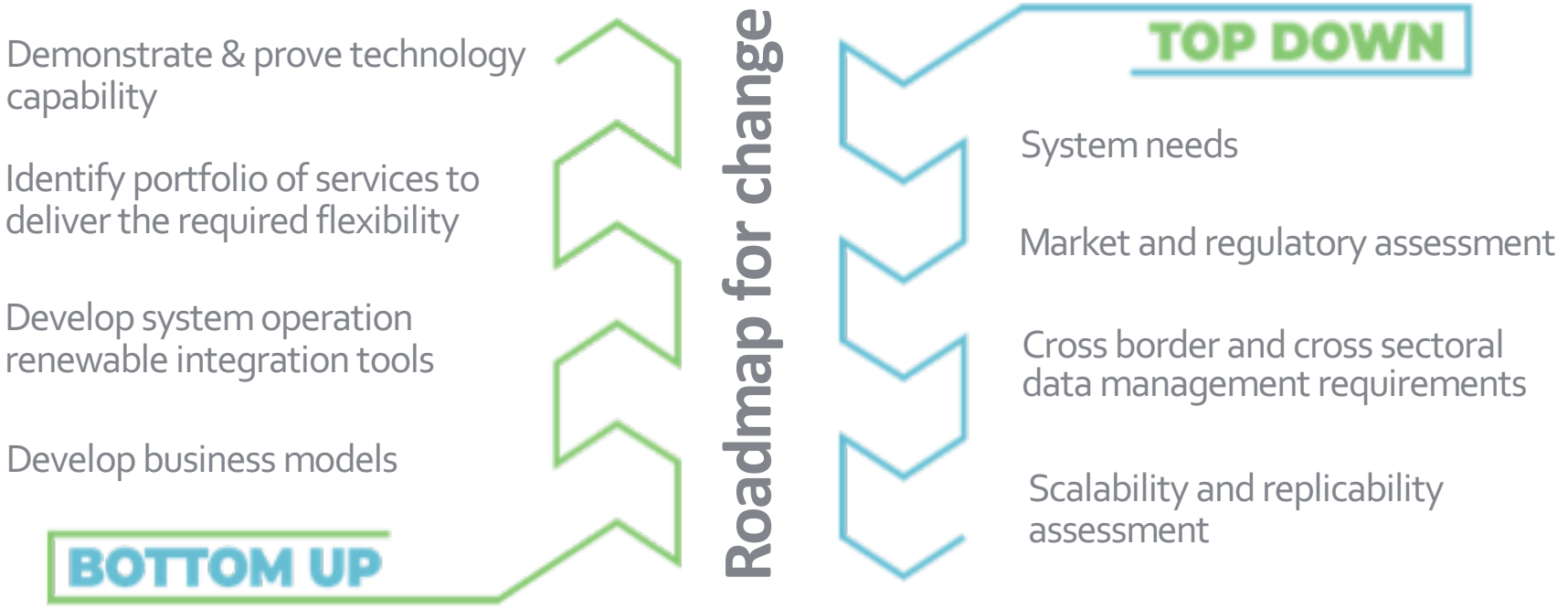
EU-SysFlex approach



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Consortium – Cross sectoral

TSO

EIRGRID SONI elering

PSE AST

DSO

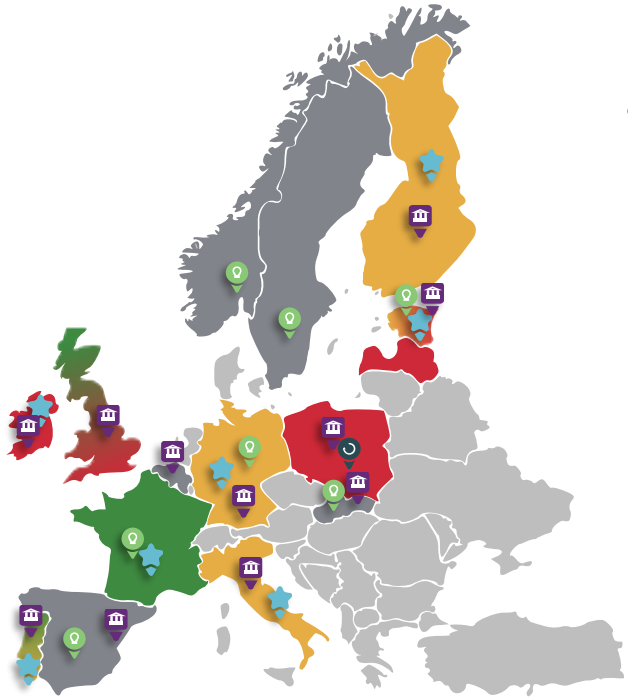
edp innogy HELEN

Enel Distribuzione elektrilevi

Technology providers, consultants

SIEMENS ENERCON EURACTIV zabala innovation consulting

enoco PÖYRY CYBERNETICA



Generation, retail and aggregator

EDF UPSIDE

Research instituties, universities

Imperial College London INESCTEC

Fraunhofer KATHOLIEKE UNIVERSITEIT LEUVEN

UNIKASSEL VERSITÄT RSE

Demonstrators

Real time simulator

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Project Advisory

FINGRID

elia
Powering a world in progress

REN
Redes Energéticas Nacionais

nationalgrid

Terna

Rte Le réseau de transport d'électricité

ČEPS, a.s.

TenneT
Taking power further

Wind EUROPE

AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

ERCOT

eurelectric
ELECTRICITY FOR EUROPE

entsoe
Reliable Sustainable Connected

EDSO
for smart grids

USEF

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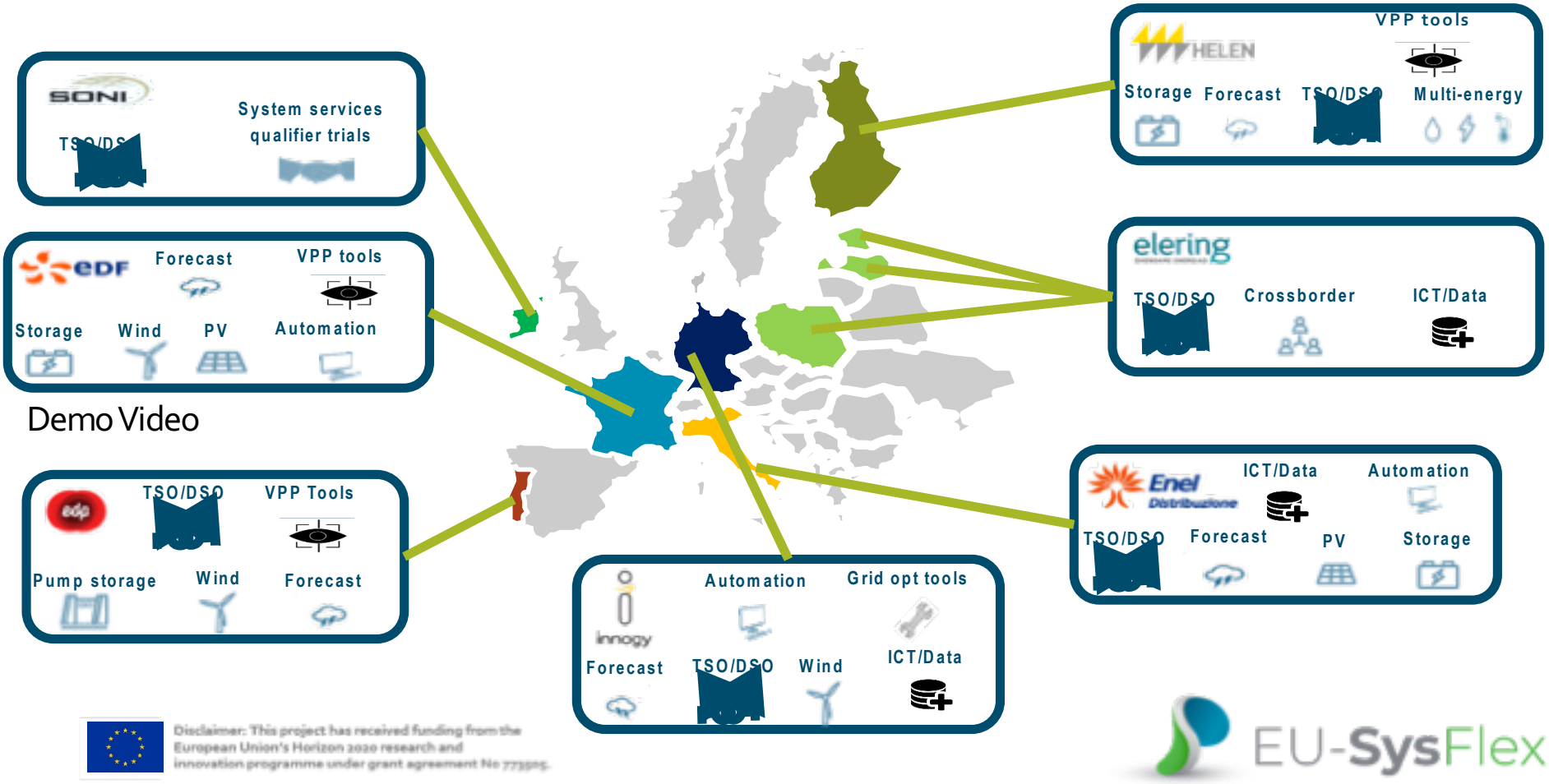
Demonstration Projects



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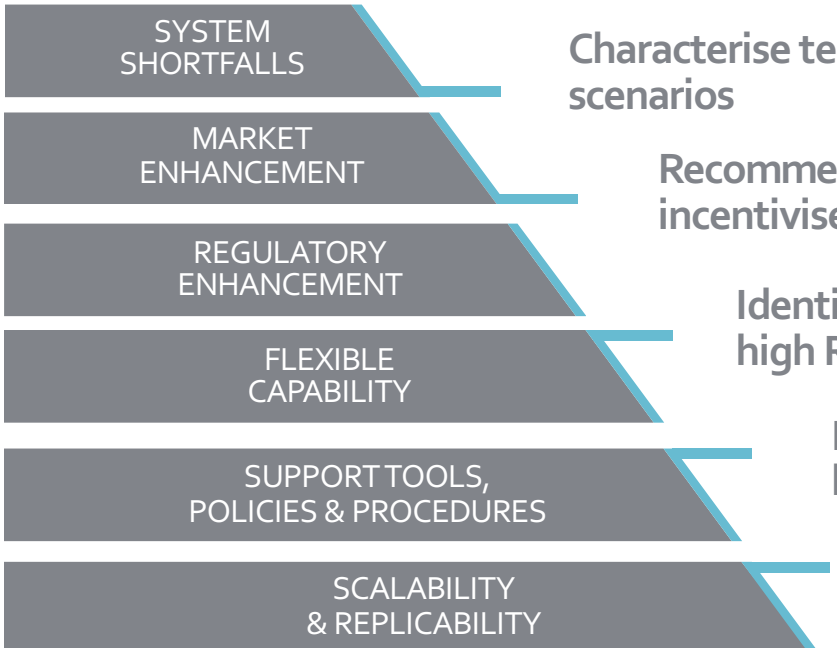
Project Dimensions



Characterise technical shortfalls of EU system for 50% RES 2030 scenarios

Recommend market and regulatory augmentation to incentivise the right flexibility and system services

Identify flexible capability of technology to facilitate a high RES environment

Provide system operation tools to support high levels of renewable integration

Ensure scalability and replicability on a pan European basis

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1st Technical Deliverable – State of the art literature review

- **Review covering**: 28 RES integration studies, projects and grid codes
  - Focus on European power systems with inputs from US and Australia
- **Initial conclusions**
  - Several technical scarcities showing technical issues of high levels of non-synchronous renewable generation and need for system flexibility
- **Scarcities identified**
  - **Lack of frequency control** – Inertia, Operating Reserves, Ramping Capability
  - **Lack of voltage control** – Steady-state & Dynamic Control, Short Circuit Power
  - **Rotor angle instability** – Small-signal Stability, Large-disturbance Stability
  - **Network congestion** – Hosting Capacity, RES Curtailment, Capacity Allocation
  - **Need for improved system restoration** – Black-start Capability, Network Configuration, Load Restoration
  - **Degradation of system adequacy** – Variable RES Uncertainty, System Interdependencies

Final report submitted at the end of April 2018

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EU-SysFlex : Europe at the forefront of power system transformation to meet world-leading RES objectives

A pan-European vision respecting the needs of different regions and meeting society expectations : mitigating climate change, addressing security of supply and assuring competitive electricity prices

Lay the foundations of an European electricity market that values all different sources of flexibility, from generation to flexible consumers, fostering an efficient use of resources

Enable TSOs and DSOs, via the development of tools and processes, to realise the transition to flexibility provided by resources spread across Europe and at all levels of the system

Improve EU companies competitiveness and support job creation by ensuring a high degree of replicability and scalability of the solutions and exploring their potential extension to new markets

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THANK YOU!

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