EDSO
for smart grids

European (worldwide) development on smart grids

Smart Grids Week,
21 May 2014, Graz

Per-Olof Granström

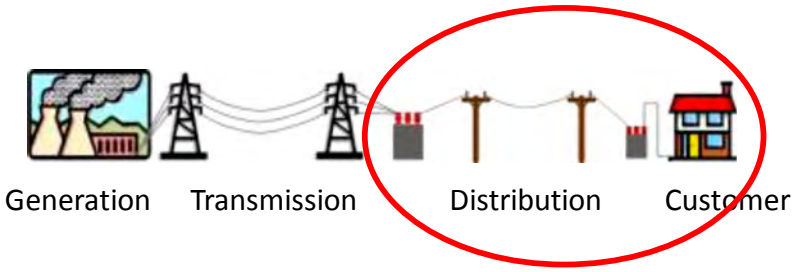
European (worldwide) development on smart grids

- Policies and drivers
- New energy paradigm – flexibility in focus
- Investment needs
- Smart Grid development
- DSOs evolving role
- TSO-DSO cooperation
- "Delivering the power to the consumer"

European Distribution System Operators for Smart Grids

Leading the cooperation for the Electricity networks of the future

Bringing Smart Grids from vision to reality



EDSO for Smart Grids – activity overview

European Electricity Grid Initiative

Smart Grid technology platform

Horizon 2020 roadmap

Smart Grid task force

Smart Grid standardisation

Network Codes

Smart Cities Stakeholder Platform

Florence and London forums

Global Smart Grid Federation

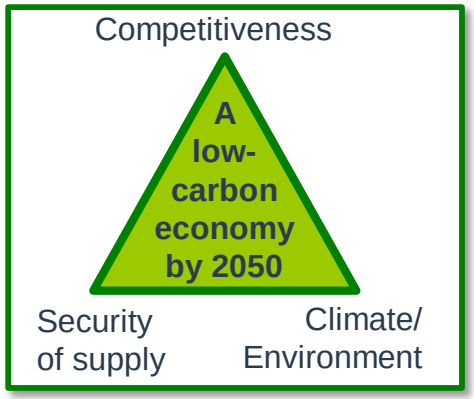
GRID+ EU projects; map, label, KPI, finance

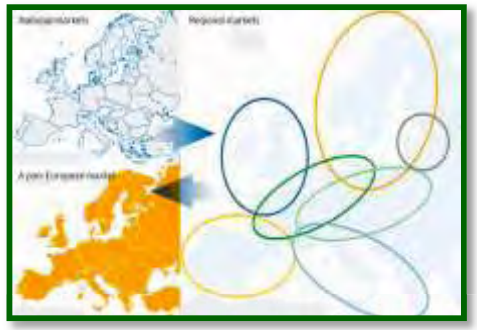
Meter-ON Smart metering knowledge sharing

evolvDSO The new role of the DSO

REserviceS ancillary service wind, solar PV

EU policy – drivers and investment needs





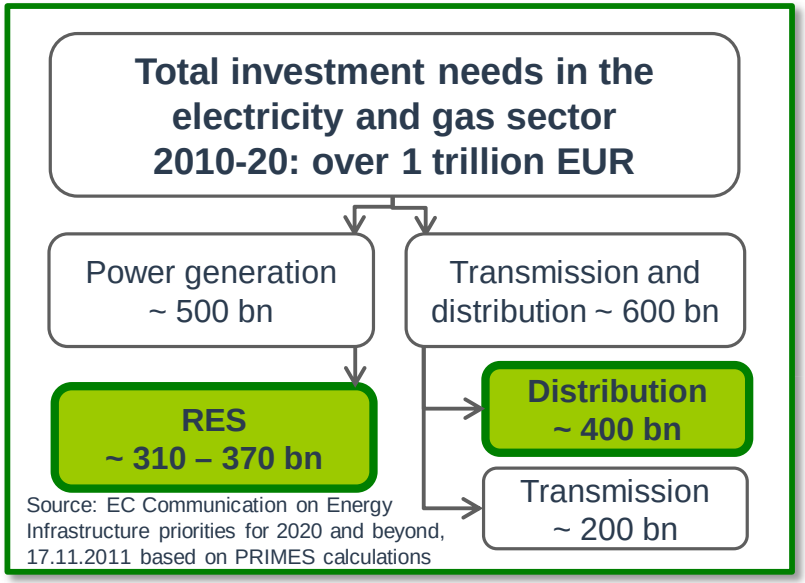
Strong European drivers

- EU 2020, 2030, 2050 objectives
- Market deregulation and integration

European market design is different

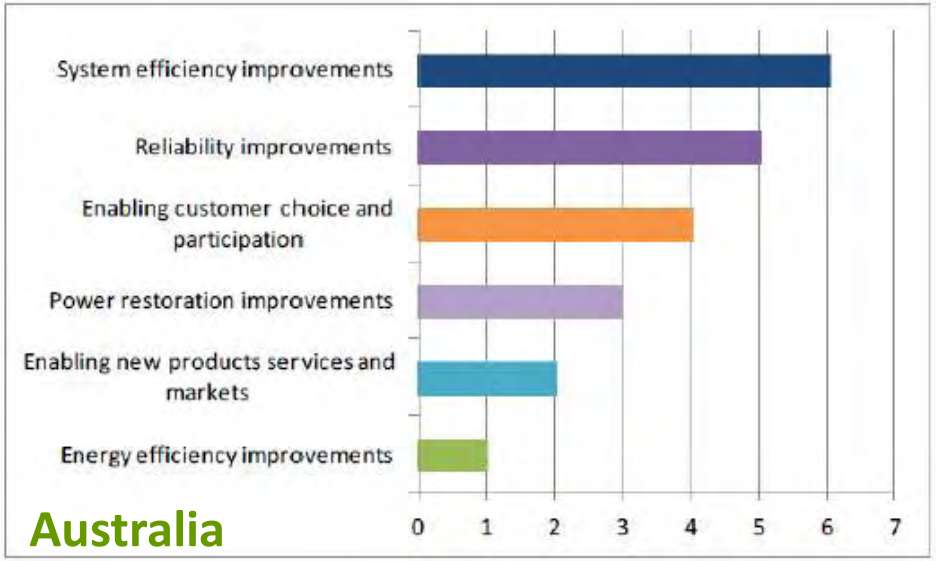
- Retail market competition
- Unbundling Generation/Supply <> Distribution

Huge investment needs



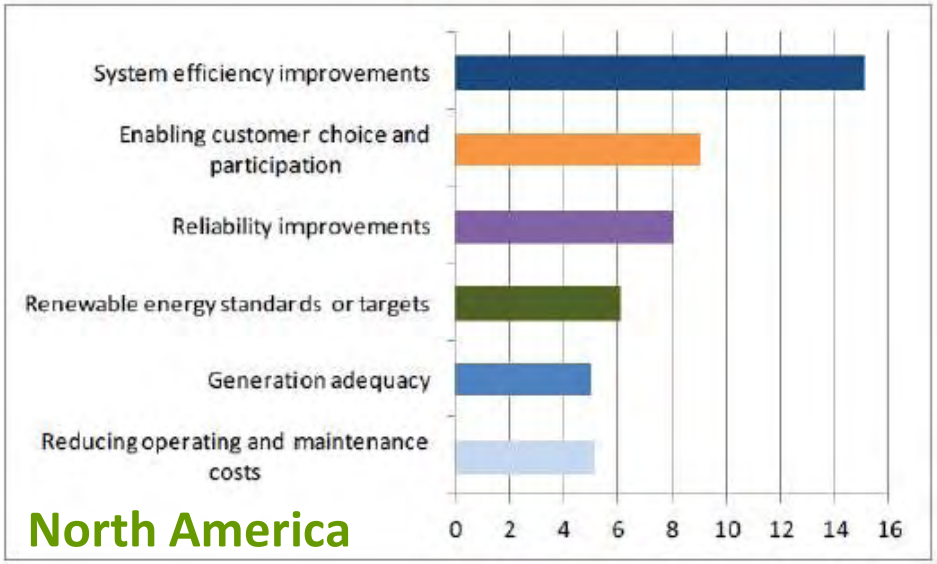
Smart grid technology investment drivers

Asia



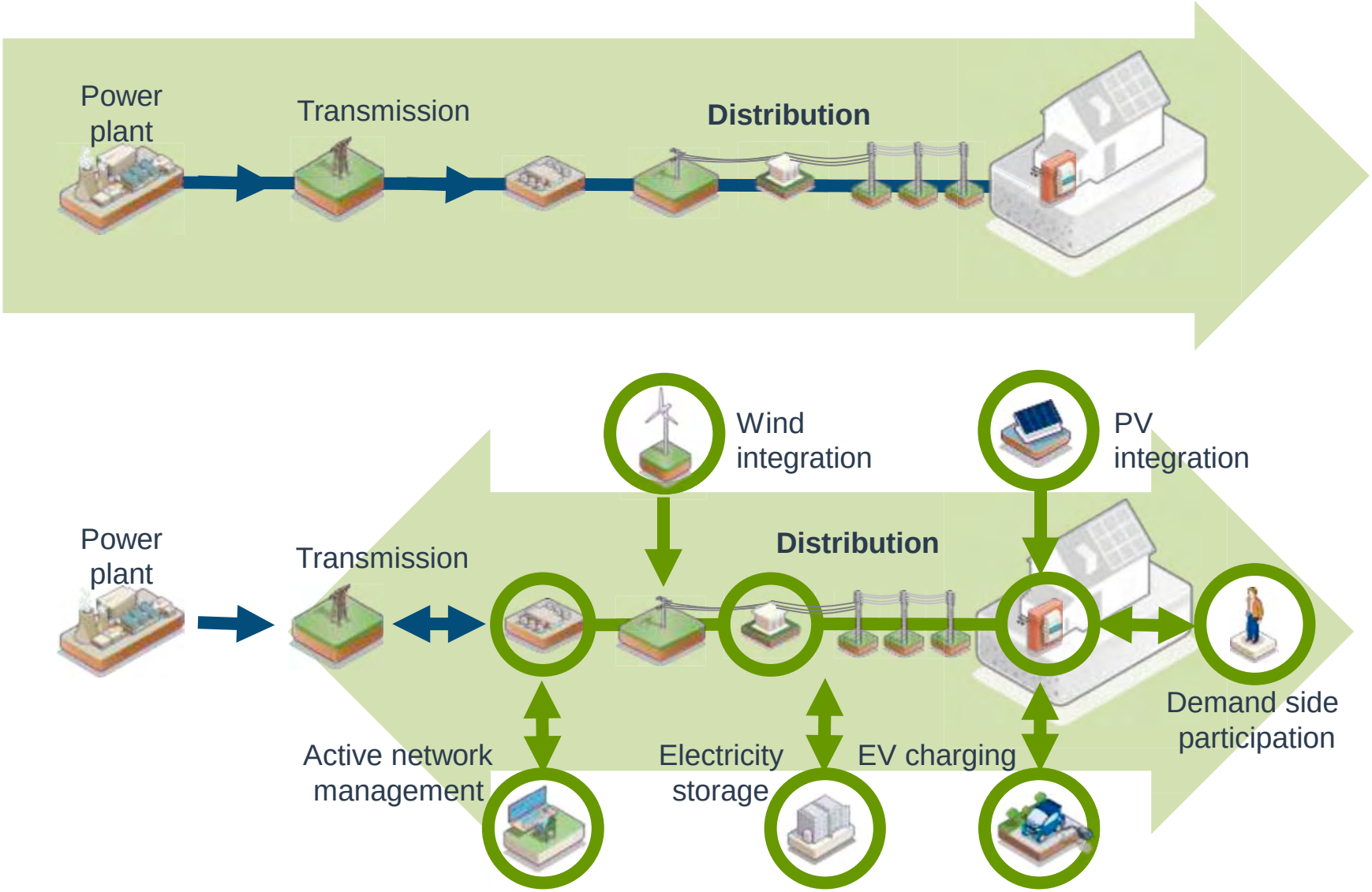
Australia

Europe

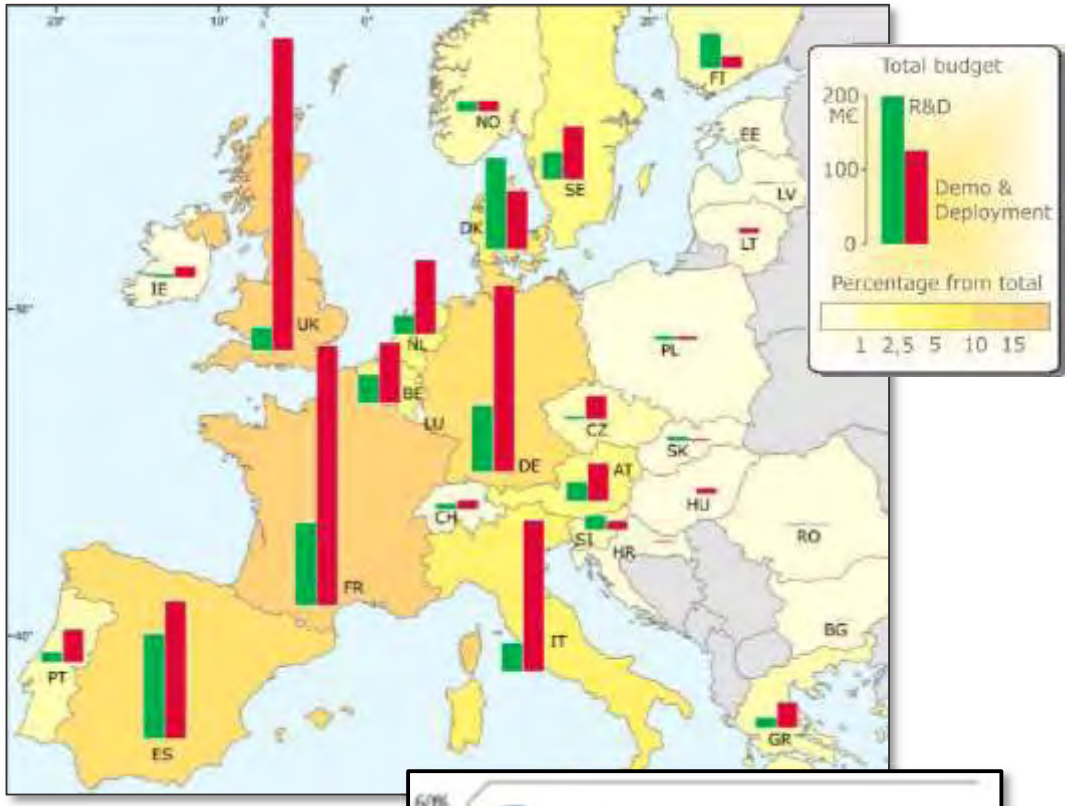


North America

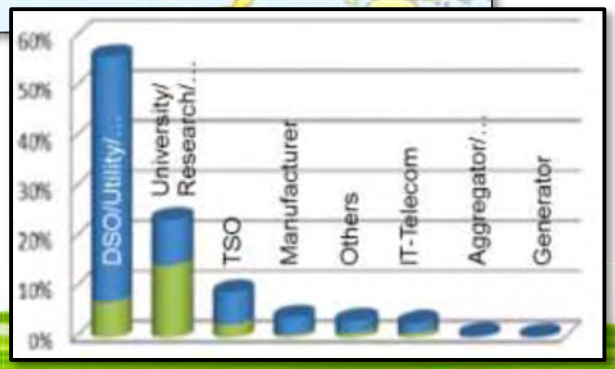
New energy paradigm …



Innovation – European smart grid projects



Source: JRC/European Commission 2014



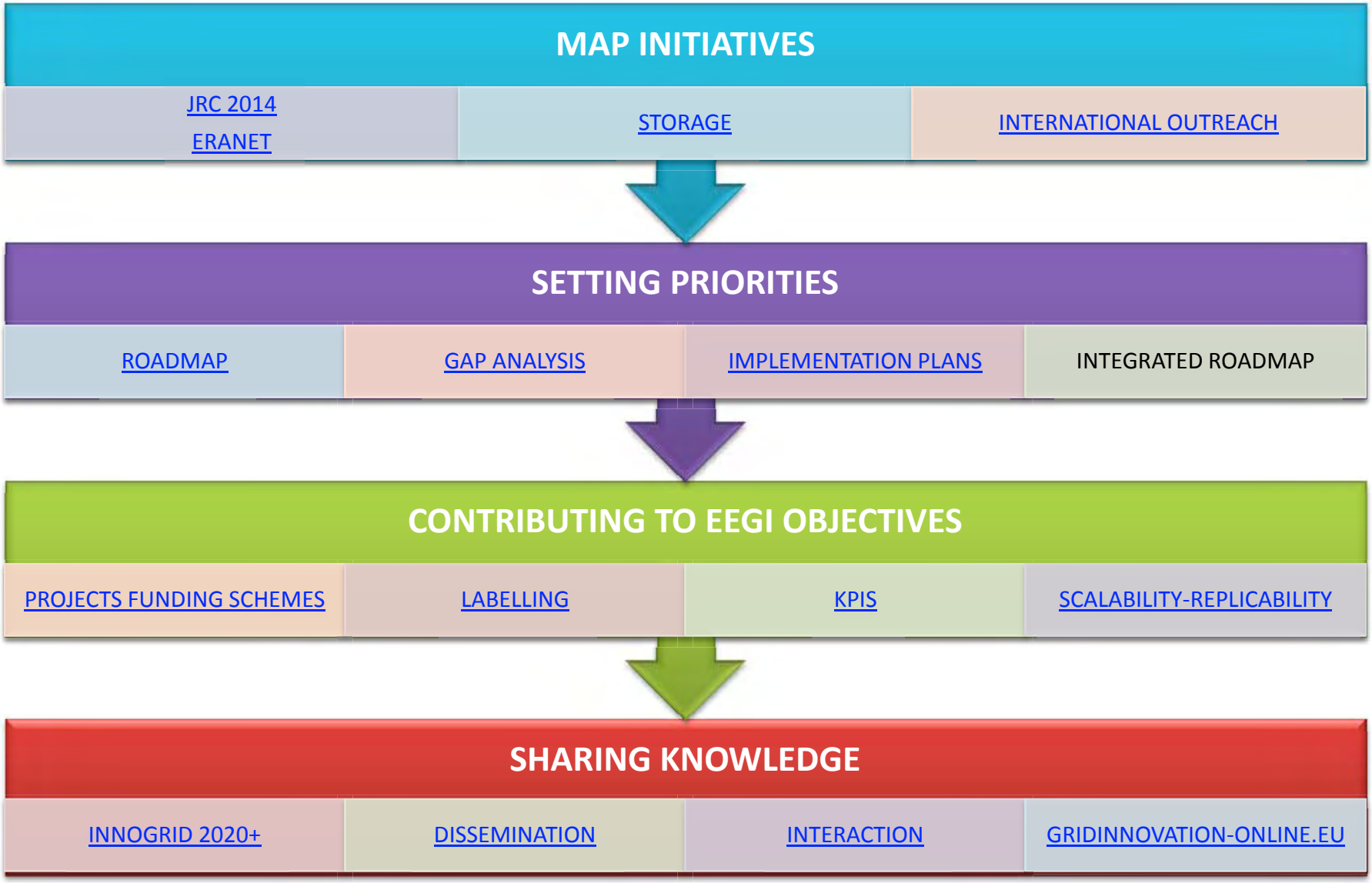
European Electricity Grid Initiative

- Industrial RD&D initiative, 2 Bn EUR
- Accelerate innovation
- Transmission and distribution
- 9 year roadmap and implementation plans

The H2020 integrated roadmap

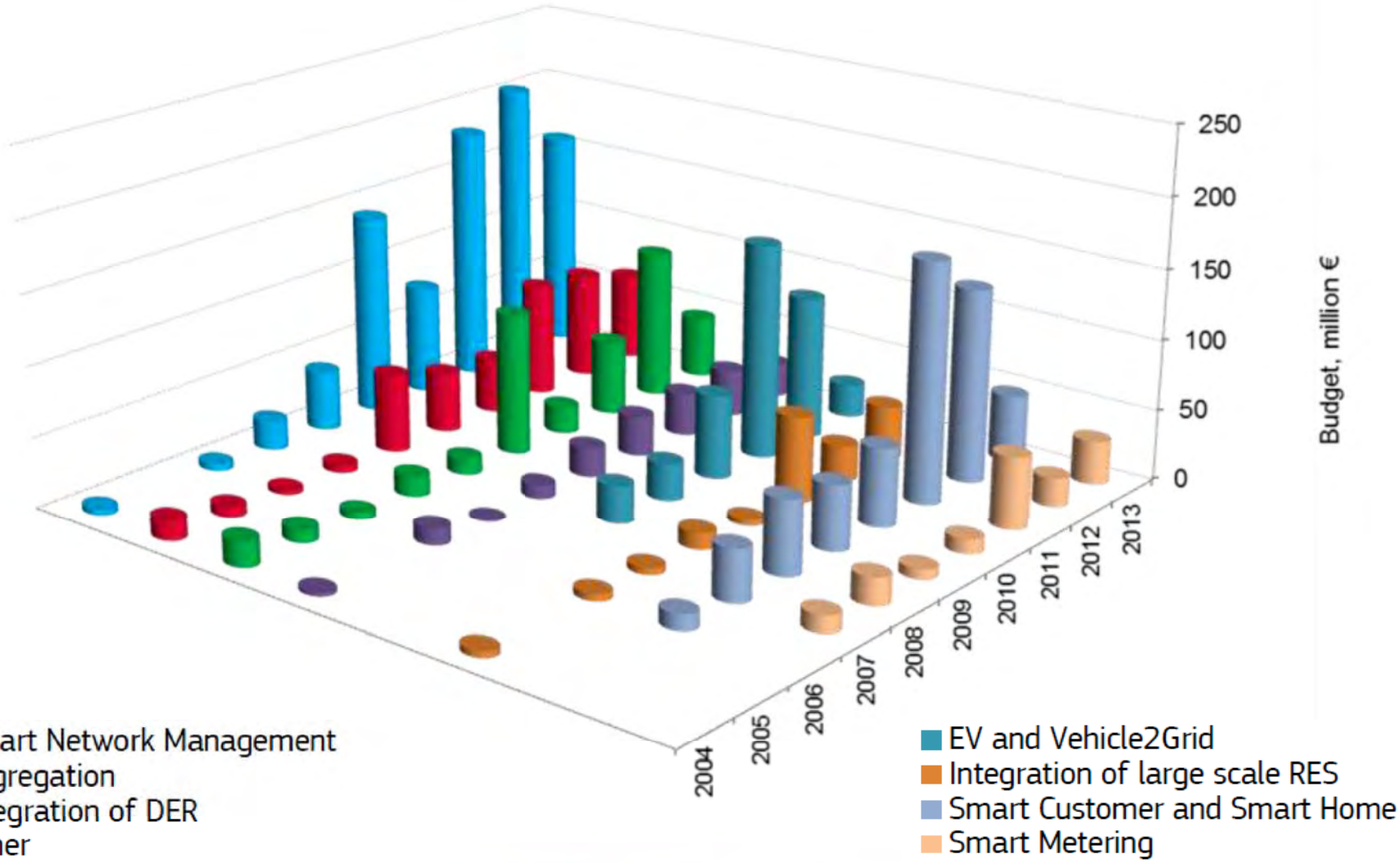
- Basis for EU/ national investment in energy research and innovation
- Basis for calls 2016-2020
- System/market/grid integration: Demand Response, Storage, Networks of infrastructures (Electricity, gas, heat)

THE GEOGRAPHY OF GRID+



European smart grid projects – application, year, budget

Source: JRC Inventory – provisional data



REserviceS Project - example

- Ancillary services from renewables can increase hosting capacity for distributed energy resources, reduce grid losses and increase power quality

- Example - Preliminary result: using ancillary services from solar PV on a rural LV network - total cost reduction potential of up to 50% compared to traditional grid reinforcement (increase of connected PV capacity by 15% per year)

Evolving role of the DSO

The DSO should

- Be **incentivised to invest in smart solutions**, beyond physical grid reinforcements
- Be able to **actively manage its grid**
  - Tools to monitor its grid on all voltage levels
  - Access data on all grid users
  - Have the right to use flexibility services from grid users
  - Decide on actions from third-parties that can impact DSO grid stability
- Be a **neutral market facilitator**, managing/storing metering data
  - Provide non-discriminatory access to metering data (consenting)
  - Have the right to monitor (possibly influence) the charging patterns of EVs
  - Have the right to own/manage public EV charging (if the regulator permits)
- **Be 100 percent legally and functionally unbundled** (the 3rd energy package)

Evolving role of the DSO – flexibility

- Sharp increase in distributed renewables, reinforcements, extensions, heat pumps, EVs and new appliances – increased need for flexibility

Flexibility – change in injection/consumption patterns in reaction to signal	**System flexibility services –** "services delivered by a market party, procured by a DSO to maximise the security of supply and quality of service in the most efficient way"	**Voltage control and congestion management**

- Distribution networks, incorporating new risk margins and uncertainty – enhanced observability, controllability and interactions with market stakeholders
- Benefits for DSOs, consumers (all grid users) and society
  - Optimised network capacity investments
  - Reduced technical losses, curtailment of distributed generation and outage times
  - Increased distributed hosting capacity

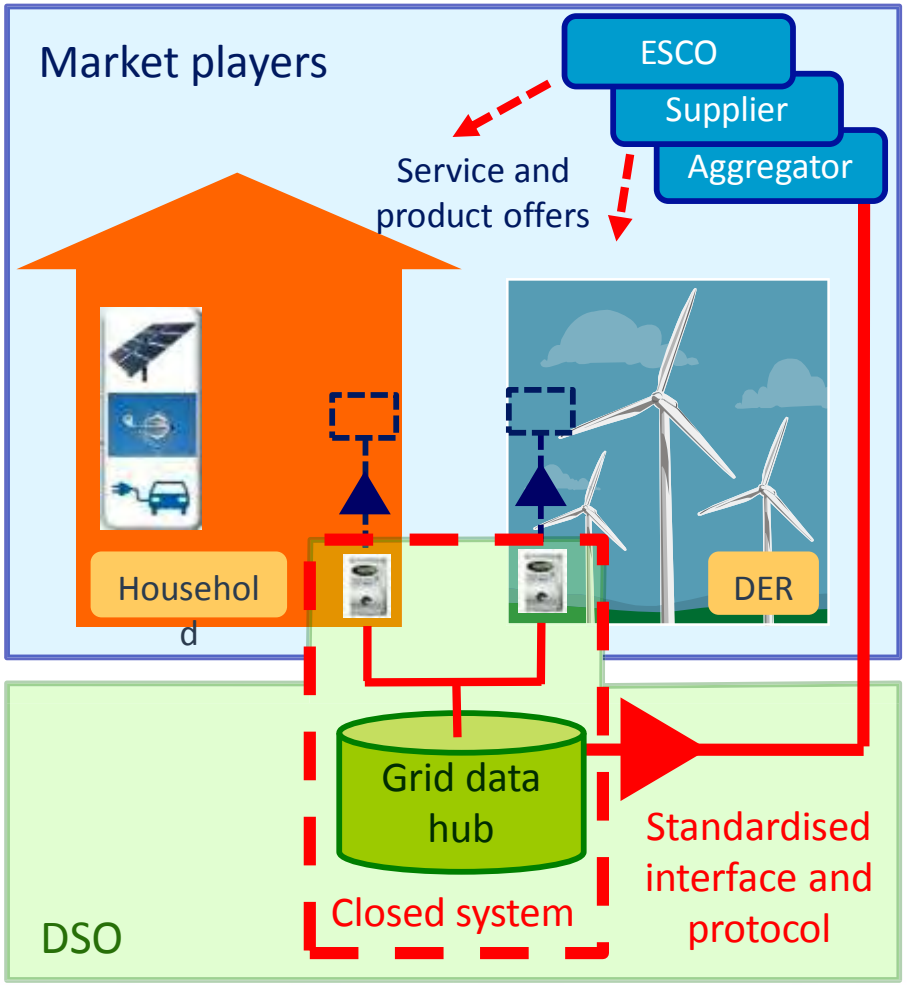
Different types of flexibility

Party	Activity	Business model based on	Will procure	Flexibility use	Final aim
Commercial Party (supplier, aggregator, balance responsible party)	Buy and sell electricity (MWh) in a market	Price set by market rules	Portfolio Optimisation	System-wide	Profit maximisation
Regulated party Transmission System Operator,	Channel electricity between generators and consumers	Regulatory mechanism to cover costs	System Flexibility Service	System-wide	Grid planning and operational efficiency maximisation
Regulated party (**Distribution System Operator**)	Channel electricity between generators and consumers	Regulatory mechanism to cover costs	**System Flexibility Service**	Local, regional or national	Grid planning and operational efficiency maximisation

Evolving role of the DSO – flexibility

Market design	• Using system flexibility services from DER and demand to solve grid constraints • Safety measures to avoid "gaming" by market players • Clear price signals (indicating real demand for flexibility) needed • Market for local flexibility not to jeopardise national balances
Regulation	• Allow DSOs to procure system flexibility services in all timescales – in addition to traditional grid reinforcement – CAPEX to OPEX
TSO-DSO	• Extensive cooperation and clear boundaries TSO-DSO
Data exchange	• Communication standards – DSOs-flexibility providers, DSO-TSO
Consumer engagement	• Incentives, technologies, revision of grid tariffs: time-dependent, site-dependent components/incentive based demand response
Distributed Generation	• Mechanism incentivising DER to adapt power output based on network use

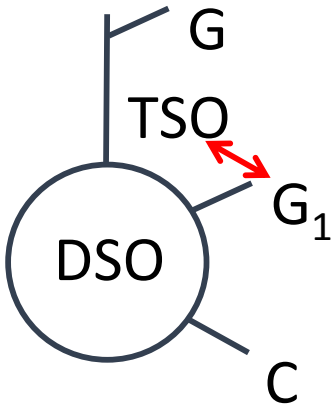
Evolving role of the DSO – data management



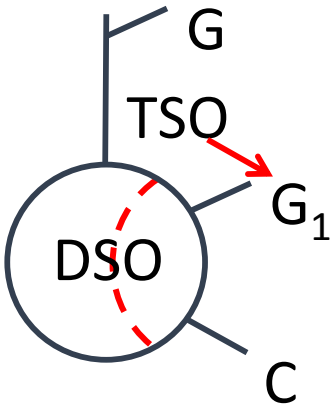
DSO

- Access to DSO grid users' data
- Well-positioned to manage data exchanges between customers and market players
- A regulated entity with no commercial interest in the data
- Making sure consumers remain the sole owners of their data
- Neutral and non-discriminating towards market parties that are offering, for example, demand response and energy efficiency services

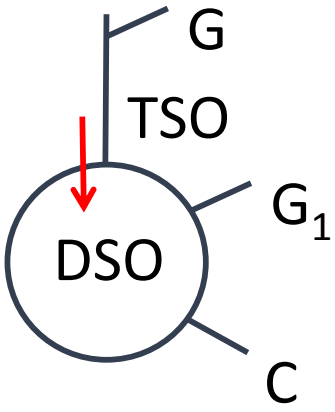
Network codes – hurdles for smart grid and retail market development



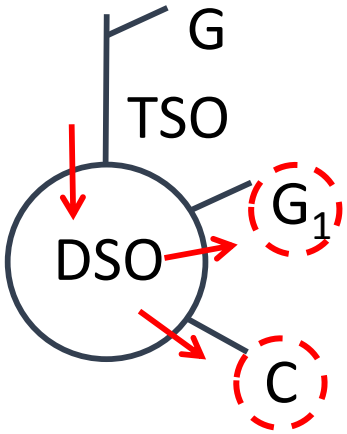
Direct communication link between the TSO and the distribution network users (OS)



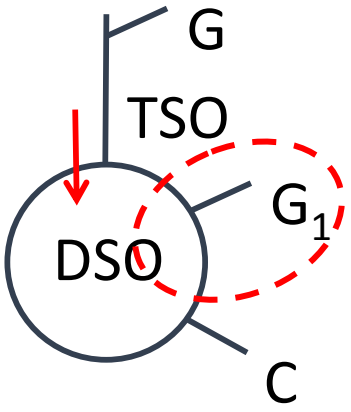
TSO can require action in direct contact with the distribution network user, without asking the DSO (OS)



Requirements/limi ts for voltage and/or reactive power flow at the TSO-DSO connection points (DCC, OS)

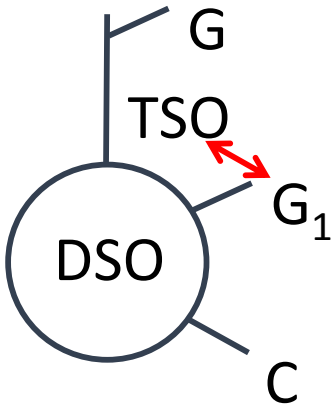


Prescribes how the DSO should test compliance of distribution network users (RfG, DCC)



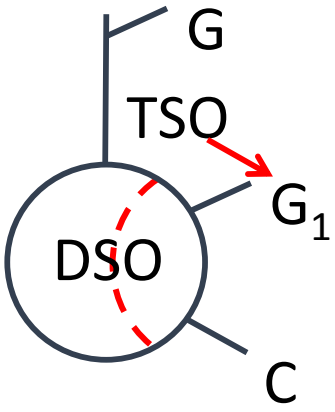
New requirements for generators, LFSM, instructing not to disconnect (RfG)

Network codes – hurdles for smart grid and retail market development



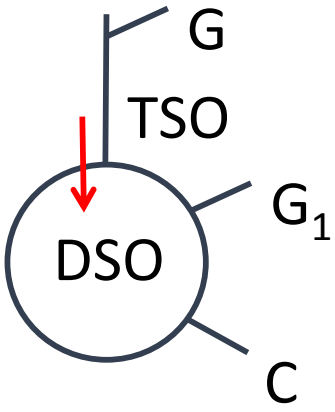
Direct communication link between the TSO and the distribution network users (OS)

Unclear responsibilities!



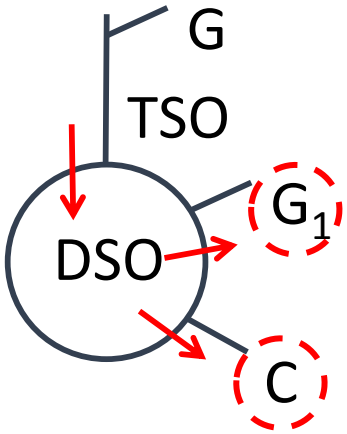
TSO can require action in direct contact with the distribution network user, without asking the DSO (OS)

Unclear legal responsibilities, risking network security!



Requirements/limits for voltage and/or reactive power flow at the TSO-DSO connection points (DCC, OS)

Unnecessary additional costs for customers and society!



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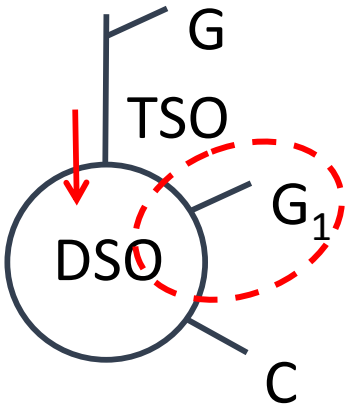
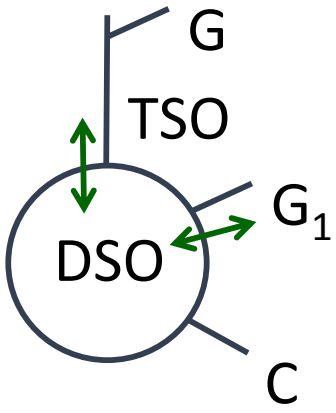


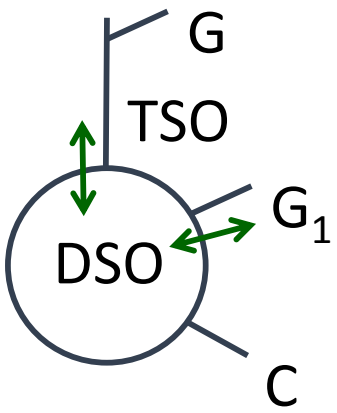
New requirements for generators, LFSM, instructing not to disconnect (RfG)

Risk of safety, damages to appliances, etc.!

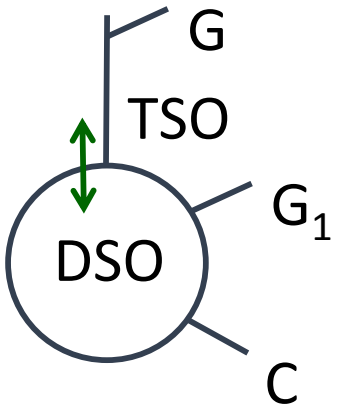
Network codes – hurdles for smart grid and retail market development



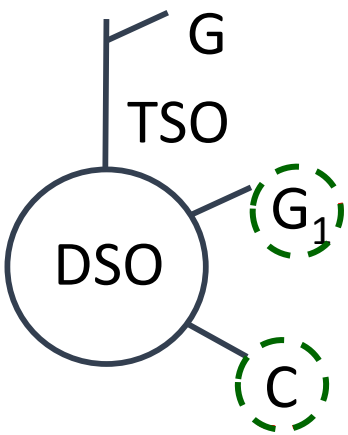
Data and communication should be handled by the system operator of the network it is connected to



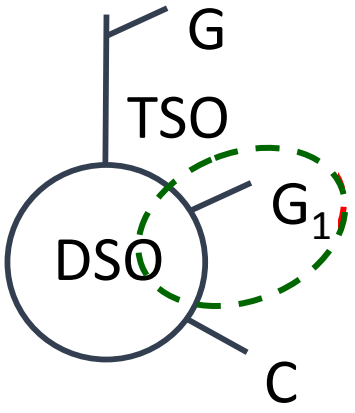
A grid user should only receive signals from the system operator of the network it is connected to



The TSO and DSO should jointly define voltage/reactive power flow limits at their connection points



Network codes should instead include requirements for grid user compliance defined in standards elaborated by CEN-CENELEC



The network code should not preclude technical solutions


INTELLIGENT ENERGI
SmartGridGB
For an intelligent future
Japan Smart Community Alliance
SmartGrid CANADA
sgi
smartgridireland
switch2smartgrid
Elder
SMART GRIDS FLANDERS
EDSO
SMARTGRIDS
GRIDWISE ALLIANCE
KSGA
Korea Smart Grid Association
ITRI
Industrial Technology Research Institute
ISEA
The Israeli Smart Energy Association
सत्यमेव जयते
GSGF
Global Smart Grid Federation

Global Smart Grid Federation

- Collaboration – foster research and support implementation on smart grid technologies
- International exchange of ideas and best practices
- Cooperation between public and private sectors

- Cooperation: Clean Energy Ministerial – International Smart Grid Action Network, ISGAN – Global Green Growth Forum – International Energy Agency

- Working groups: Connecting distributed generation, Interfaces of grid users, Interoperability and standards

- ISGAN and GSGF – ISGAN Award of Excellence – showcasing leadership and innovation in smart grid projects around the world (consumer engagement and empowerment) – Entergy New Orleans' "SmartView" AMI pilot

Development of smart grids

- Strong EU policy drivers – new paradigm – local impact
- Huge needs for investments – flexibility

- Testing new solutions – large-scale demonstrations – RD&D/ innovation funding
- Involving regulators early
- Incentives to invest in smart grids, allowing new solutions
- A level playing field for market players – DSO as the neutral market facilitator – flexibility, data management, TSO-DSO cooperation and boundaries
- Standards for EU-wide/global interoperability – privacy and cyber/system security
- Authorities' support for smart grids/metering roll-outs
- Bringing the consumer on-board

New solutions

Investments

Role of the DSO

Interoperability

Data

The consumer

Cost-efficiently reaching the European objectives

"Delivering the power to the consumer"

- Bringing renewable energy to the consumers
- Empowering consumers through smart metering – knowledge and the power to make smart choices
- Ensuring the security of grid and consumption data – the DSO, a neutral and regulated market facilitator
- Flexibility - optimising the investment in new grids
- Bringing the consumer on-board

The CEER and BEUC 2020 vision for Europe's Energy Customers 2012-2013

… whilst securing energy supply and network stability

Thank you for listening!

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