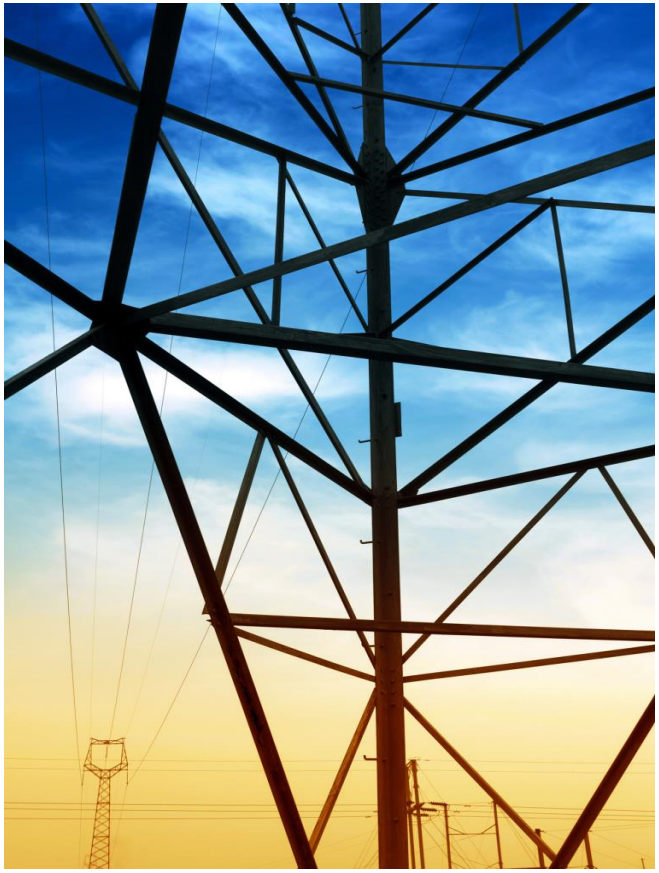

Network Infrastructure in Europe: recent regulatory issues

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Infrastructure development: comparing energy and telecom

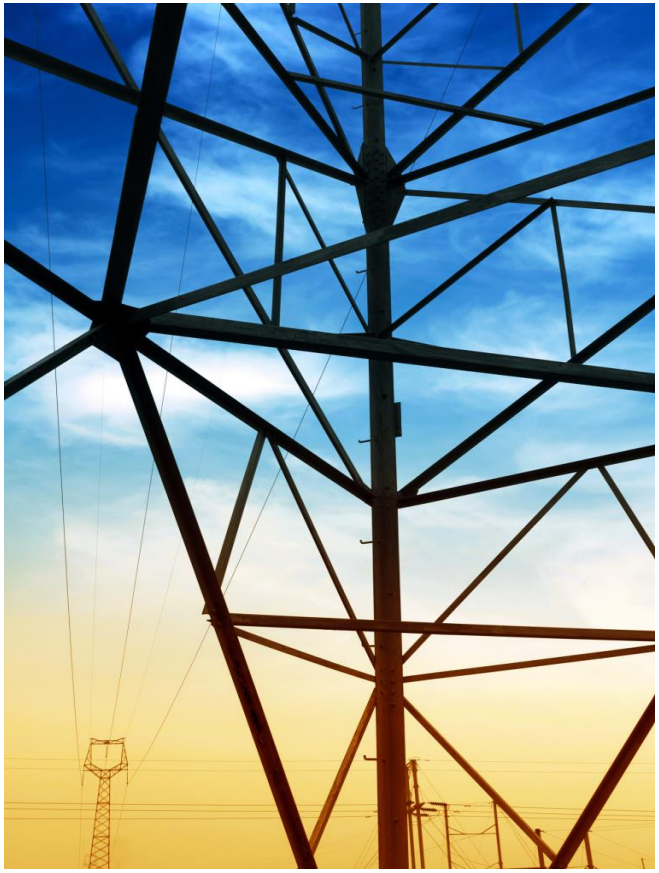
- European infrastructure development in energy and telecoms is at a crossroad
- In Energy (electricity and gas) there is clearly a need of Transeuropean infrastructure development
  - Interconnection to complete the Internal Energy Market, integrate renewables, ensuring security of supply
- In Telecoms there is a need for Transeuropean services harmonization and transparency
  - Roaming charges abolished
  - Innovative services requiring high network capacities at the *national level*

Outline

- Major Issues in electricity and gas infrastructure development
  - Role of European regulators and Transportation System Operators
  - Network in Europe: facts and Figures
  - « Case study »: distributed generation and tariff design

- Major Issues in Telecom infrastructure development
  - Fibre-deployment of broadband access networks “Next Generation Access (Networks)”
  - Incentives for investments at the national level

- Conclusion: comparing two infrastructure development models



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Energy infrastructure

Context

- 2015 is the target year set by the EU Council for the removal of “energy islands”, i.e. for better integrating regions with limited interconnection capacity with the rest of the Union

- The document by the Agency of European Regulators, published at the end of 2014, “Energy: A bridge to 2025” sets the priority for network infrastructure development

- Project tendering to European Transportation System Operators in electricity and gas

Energy: electricity and gas

Context

- European Network of Transportation System Operators in electricity and gas (ENTSO-E and ENTSO-G) oversee the investment process in the European infrastructure.

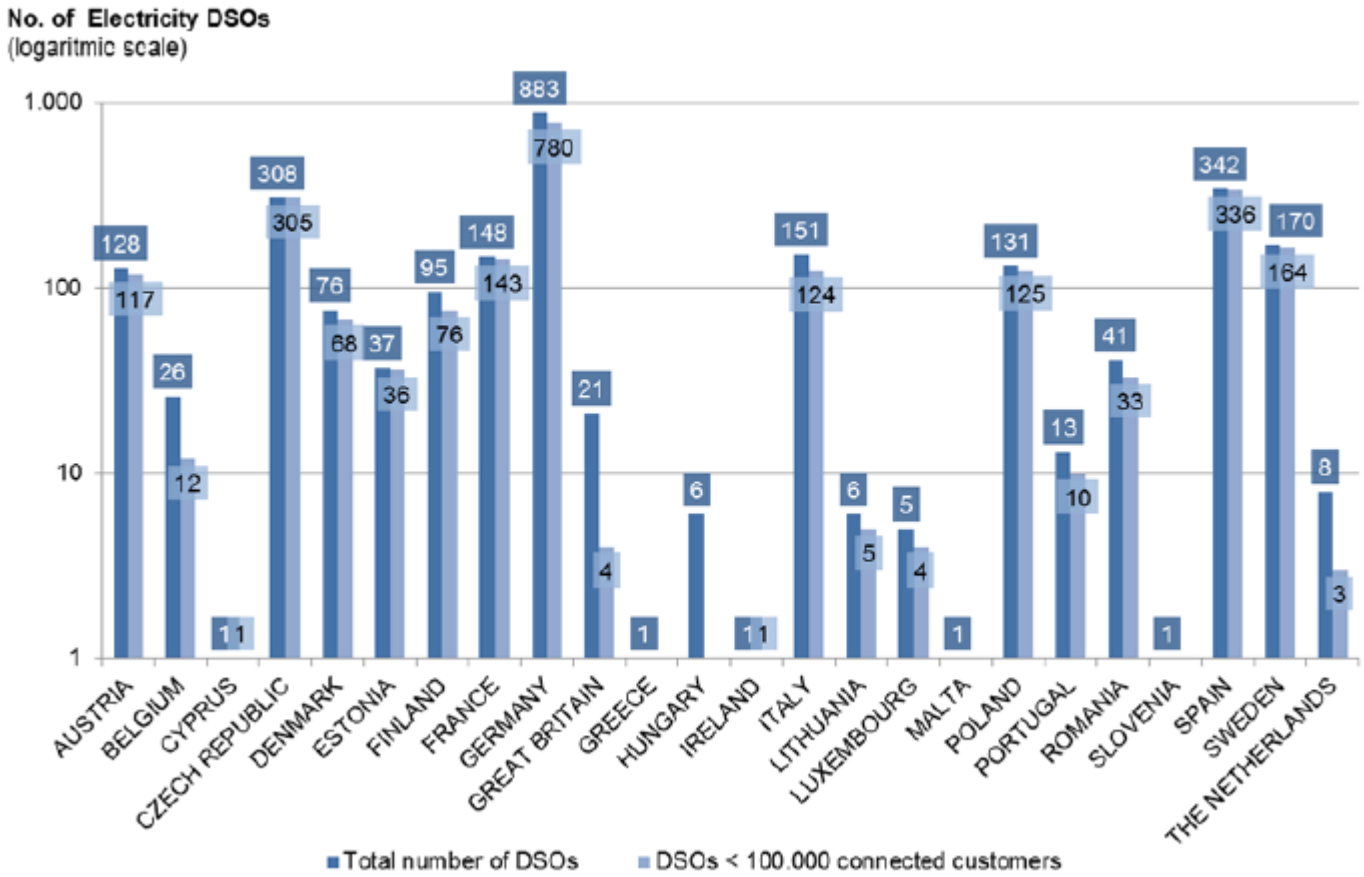
- They were established and given legal mandates by the EU legislation and promote closer cooperation across Europe's TSOs to support the implementation of EU energy policy and achieve Europe's energy & climate policy objectives

European Energy Networks: facts and figures (I)

Transport	TSO	Countries	Lines (Km)	Consumers (millions)	Consumption (2013)	Exchanges	Funding needs up to 2020
ENTSO-E	41	34	307000	532	3307 TWh	390 TWh	150 Billion Euros
ENSTO-G	46	26	247000	117	461 billion m3		70 Billion Euros

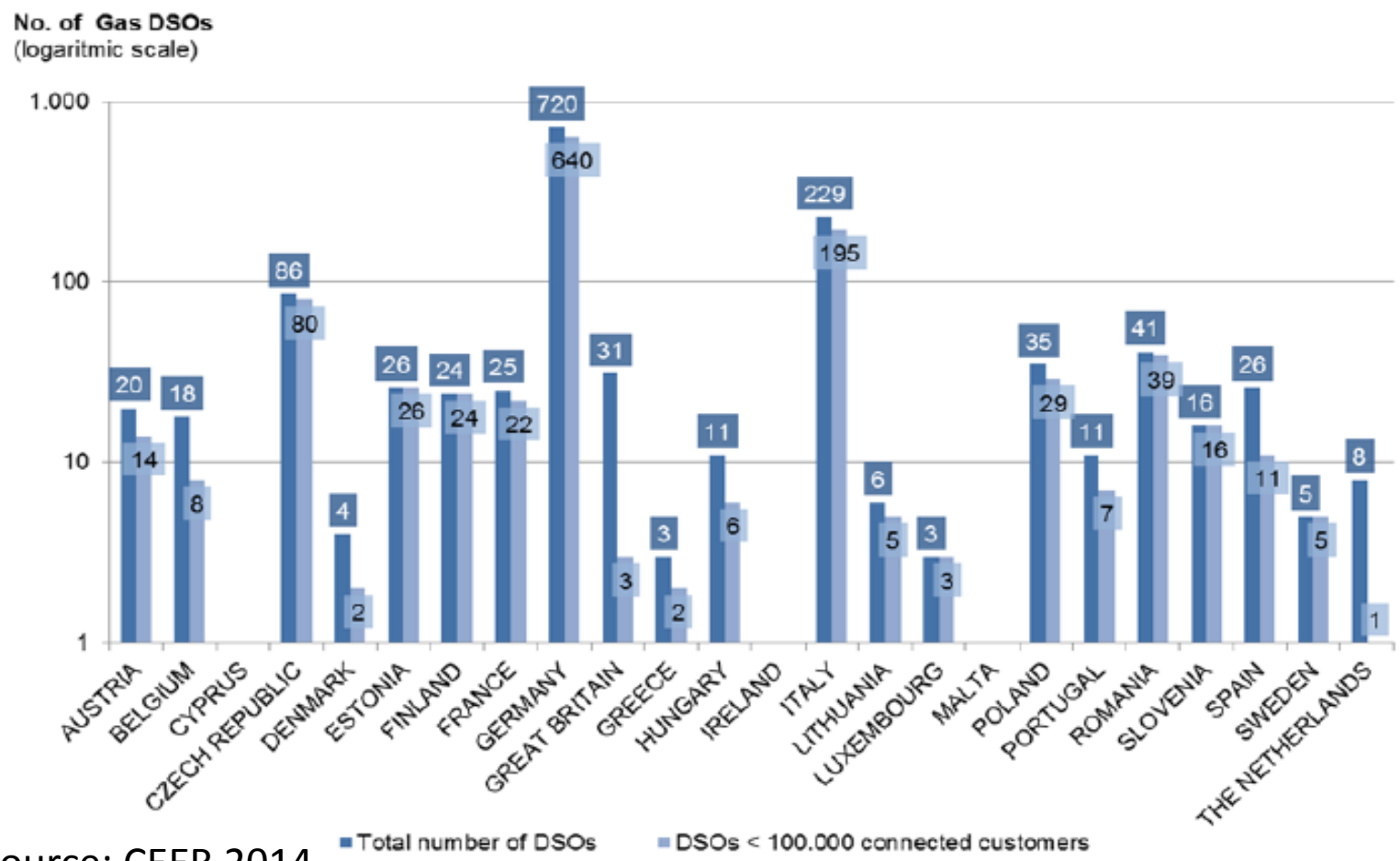
Source: Author's elaboration on ENTSO-E and ENTSO-G

European Energy Networks: facts and figures (II)



Source: CEER 2014

European Energy Networks: facts and figures (III)



Source: CEER 2014

DSO investments

- Regarding electricity and gas distribution, it is much more difficult to have a clear idea of the financing needs, due to the very different governance systems across countries
  - For instance, the European association of Electricity Producers (Eurelectric) estimates 400 million Euros to 2020, given the length of the network (10 millions of km) and the impact of renewables

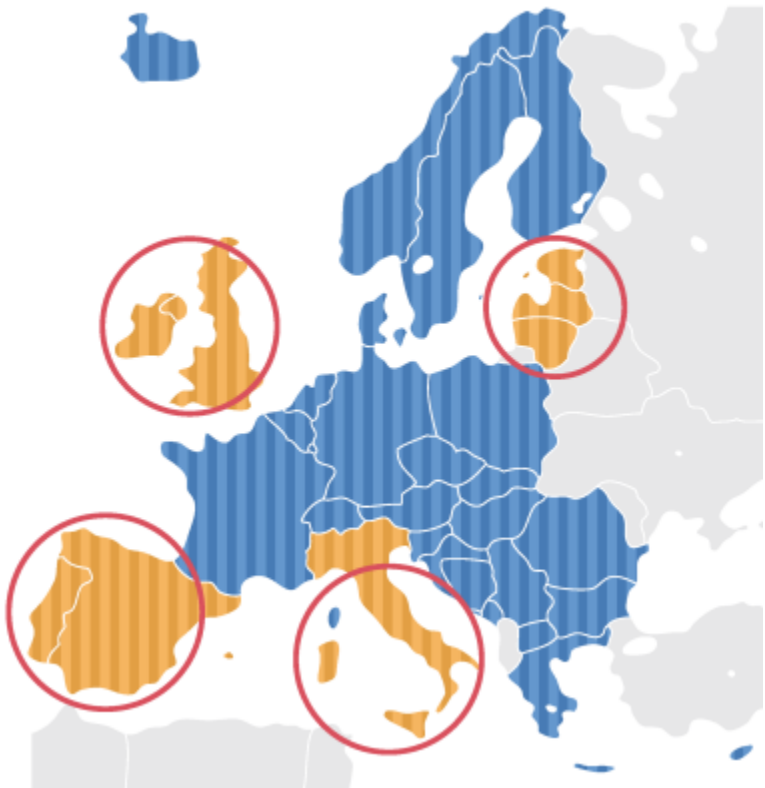
Energy: electricity and gas

- Critical issues about:
  - The 2014 and the 2016 Infrastructure Development Plans/Project of Common Interest (PCI)
  - New methodology for cost benefit analysis, cross-border cost allocation, investment and financing tools
  - Distribution System Operators and Transportation System Operators coordination: the case of distributed generation

TYDP Electricity (I)

- The TYDP is a continuously evolving process that began with the pilot TYDP published in June 2010 ahead of the entry into force of Regulation (EU) 714/2009. The features of the TYNDP 2016 are:
  - The exploration of a longer-run horizon beyond the 10-year scope through to 2030, applied to four contrasting “Visions”
  - New clustering rules to define projects of pan-European significance, focusing on the core investment items
  - A synthetic appraisal of the interconnection target capacities in the different scenarios.
  - Easier and more frequent opportunities for stakeholder participation

TYDP Electricity (II)



- The TYNDP pinpoints about 100 spots on the European grid where bottlenecks exist or may develop in the future
- The most critical area of concern is the stronger market integration to mainland Europe of the four main “electric peninsulas” in Europe.
- Interconnection capacity must double on average throughout Europe

TYDP Gas

- ENTSOG has received submissions for 259 projects from transmission, storage and LNG terminal promoters by the deadline of September 2014.

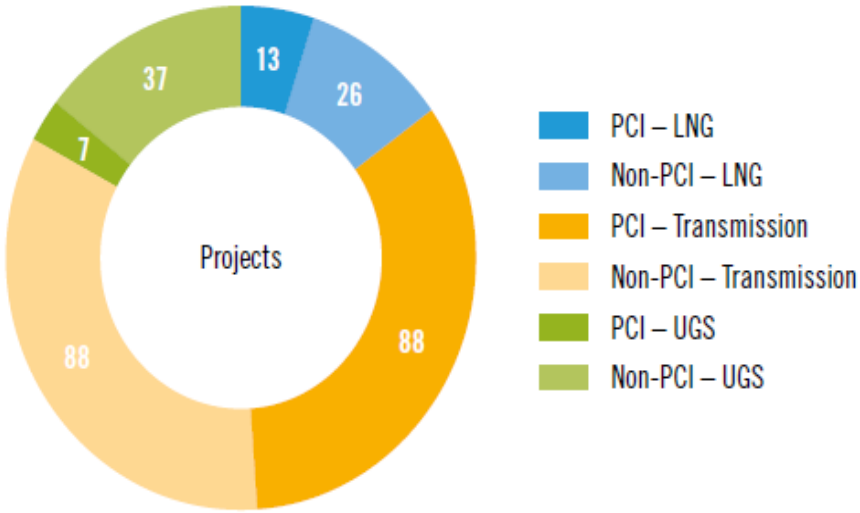


Figure 1: Projects submitted to the TYNDP 2015 (PCI refers to the 2013 approved list)

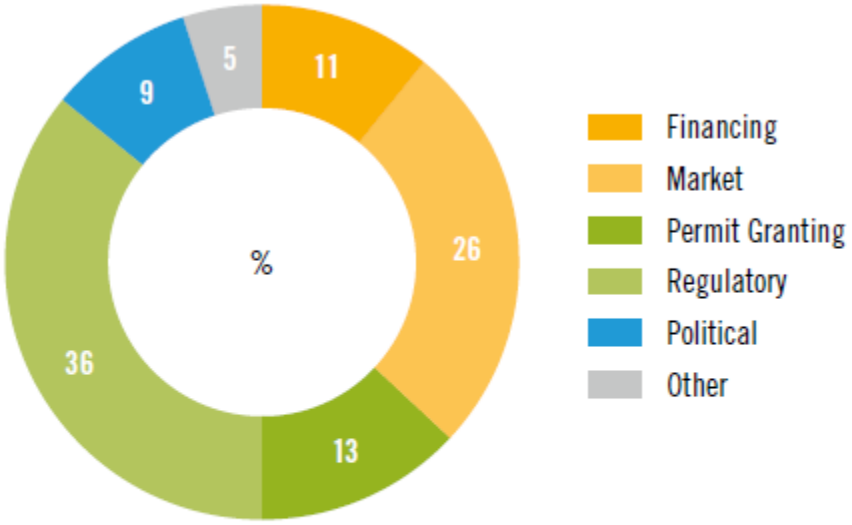
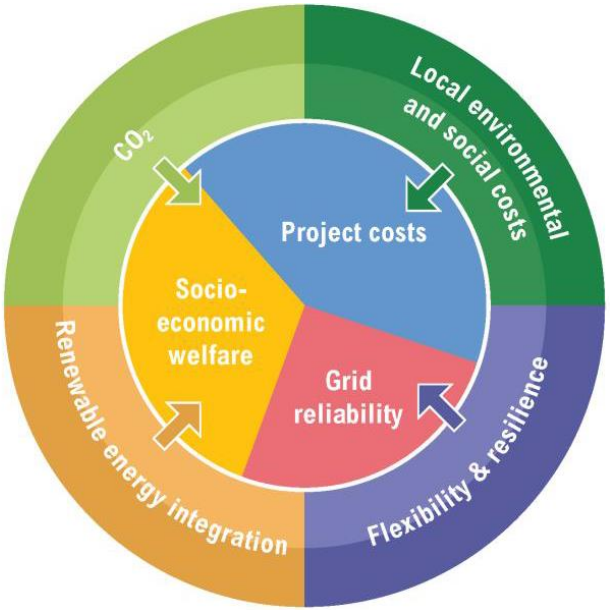


Figure 2: Investment barriers identified by promoters

CBA principles

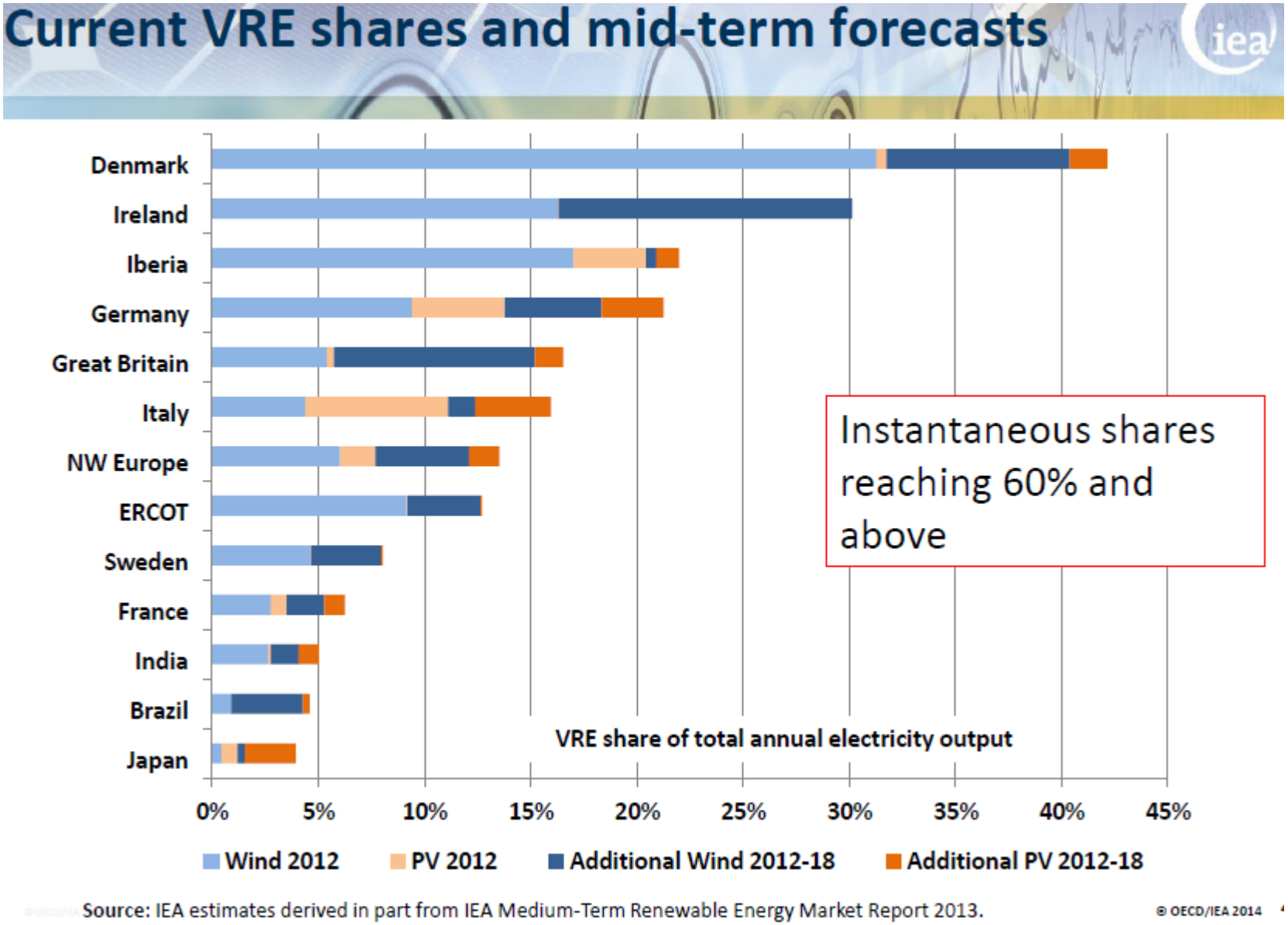
- In 2013, the European Regulation on guidelines for the implementation of European energy infrastructure priorities (EU) No 347/2013 entered into force,
  - The regulation requires for project approval a numerical quantification of every projects, with refined definitions for security of supply, RES integration, socio-economic welfare, resilience, flexibility and robustness, and social and environmental indicators (practical guidelines approved on February 2015)



Energy: electricity and gas

- Critical issues about:
  - Innovative services provision: the case of distributed generation

The context: Renewables penetration



Electricity: Distributed generation

- Integration of VRE and distributed generation are one of the drivers of DSO “transformation”

- According to the ACER-CEER “Bridge to 2025” vision, DSO must remain network facilitators, while being able to manage new tasks (congestion, counterflows, ancillary service management)

Electricity: Distributed generation

- The heterogeneity of DSO governance and tariffs across European countries, renewable integration share and support schemes do not ease a coherent transformation

Examples of connection and grid access for DG

Country	Connection method			Use of system charges		Connection to the grid		Use of grid	
	deep	shallowish	shallow	Yes	No	Priority	Non-discriminatory	Priority	Non-discriminatory
Germany			X		X	X		X	
Denmark			X		X		X	X	
Sweden	X			X			X		X

Source: Anaya, K. L., & Pollitt, M. G. (2015). Integrating Distributed Generation: Regulation and Trends in three leading countries. *Energy Policy*.

Who pays for DG connection?

- According to the Anaya and Pollitt (2015), there are a lot of socialisation of connection costs, especially in Germany and Denmark
  - the shallow approach is the connection methodology and the grid operator or DSO is obligated to reinforce the network and transfer the related costs to demand customers, with an increase of electricity cost for consumers

- In terms of subsidies, again Denmark and Germany are the ones with the most sophisticated methodologies.
  - However, this sophistication remains in the subsidies and it is not evident in the business model for the connection of more DG in a cost and efficient way.

Tariffs and DG: different regimes

Overview of DG distribution tariffs in different countries (2011).

	DG share (% of total gross energy production)	Any DG charge in place?	DG charge options	Net metering applied	Proposals in the pipeline
Germany	19.9%	No	Remuneration for avoided charges at higher voltage levels	No	–
Spain	21.2%	Yes	Flat tariff (0.5 €/MWh)	No	Convenience fee
UK	6.9%	Yes	CDCM applied	No	–
Portugal	21.7%	Yes	Only for DG on HV and MV	No (ongoing discussion)	Net injections remuneration
Italy	16.1%	No	Only conventional loss factors applied to DG energy	Yes	DUoS charges for prosumers
Norway	0.3%	Yes	DG coverage of gerenration-specific network assets	No	–
Sweden	10.7%	Yes	Tariff for units > 1500 kW only	No	–
Arizona	0.4%	No	Fees only for industrial customers	Yes	Bill credit
Texas	8.3%	No	–	Yes	VOST

Source: Picciariello, A., Reneses, J., Frias, P., & Söder, L. (2015) *Electric Power Systems Research*, *119*, 370-376.

Tariff design

- Transparent and cost-reflective network tariffs facilitate appropriate network investments
- Regulation drives cost reductions, but must also take innovation into account (e.g. *more ICT – less copper)*

Open questions

- Complexity issues for retail competition: ToU pricing can be used to reflect the value of energy consumed at different times more accurately: ToU dependency for only energy prices or also for distribution tariffs?

- How to recover DSOs costs with energy-based tariffs in a world with a different balance in distributed energy (*prosumers, net metering, energy efficiency)?*

DG and tariffs: tackling open questions

- General tariff structure
  - Fixed charge (€/period)
  - Volumetric charge (€/kWh/period)
  - Capacity charge (€/kW/period)

- New costs arising from DG integration
  - Initial network investments
  - Changes in operation and maintenance costs
  - Changes in the long term network planning

- ***Main DG related challenges***

  - DG exemption from distribution tariffs
  - Load- tailored schemes applied to DG (e.g. combination of net metering and volumetric tariffs)

Tariffs and DG: towards new tariff principles?

- Depending on the DG penetration and concentration levels, network characteristics and dynamics of the distribution networks, the type of network management and DG generation technology/profile.

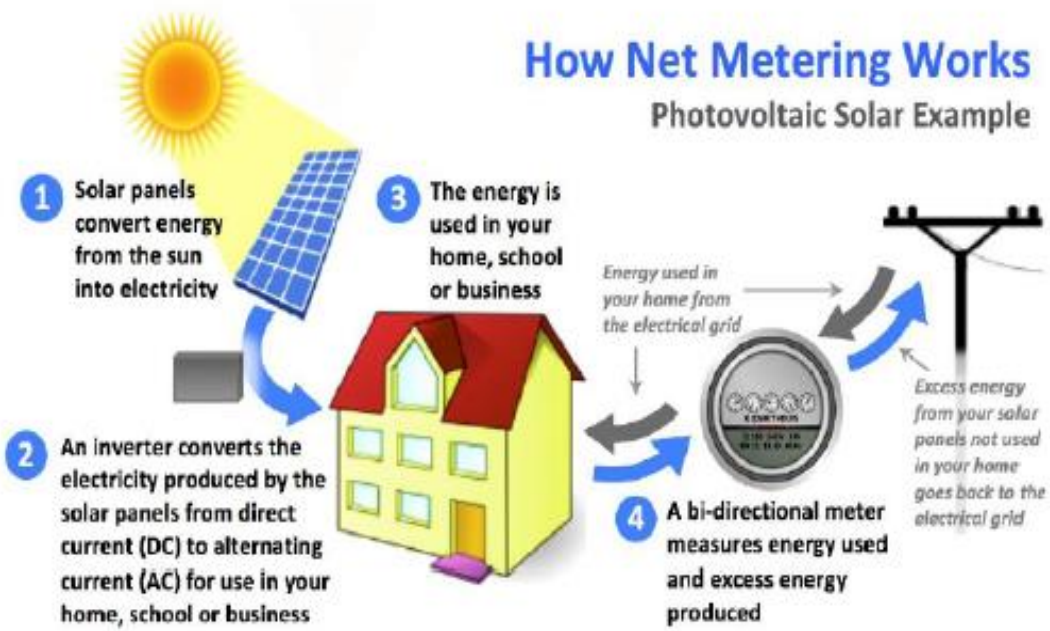
- An increasingly urgent question is: who is going to pay for those additional DG-driven costs/benefits?

- One of the risks that exists is the cross-subsidization of some consumers, especially with increasing DG penetration

- Several case studies/simulations show that
  - on one hand, when net metering is adopted and volumetric tariffs utilized, cross subsidization of customers with self generation by the customers without it is likely to arise;
  - on the other hand, separate volumetric tariffs to be applied to producers and consumers allocated network costs on a cost-causality basis and, in this way, neutralize such risk for cross subsidization.

Tariff design: net metering

- Regulatory involvement comes from the development of **Net Metering** for prosumers: a program that allows customers who generate their own electricity to be only charged for the net demand withdrawn from the grid and to feed their excess back into the grid in return for financial or electricity credits



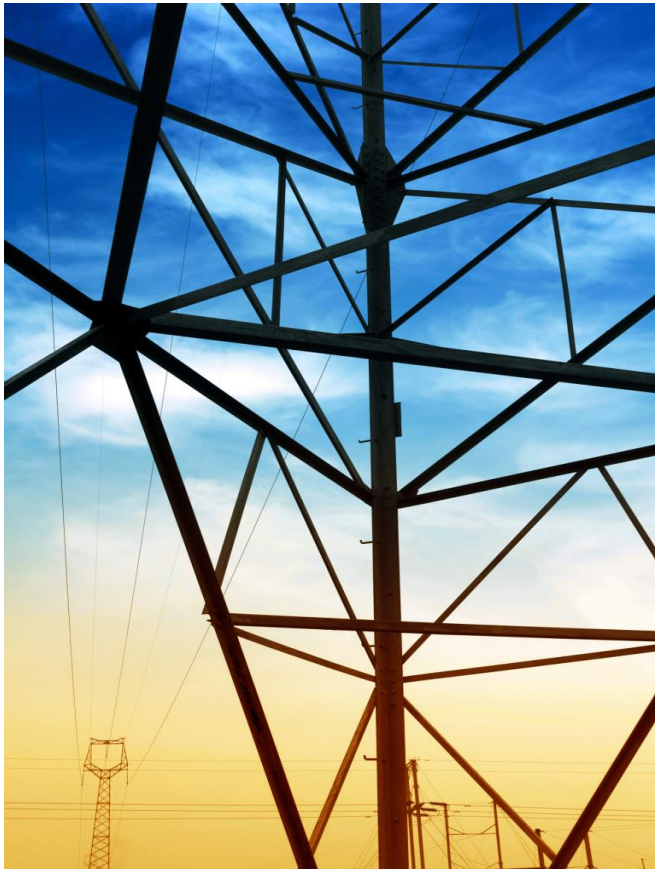
Source: SBC Energy Institute (2015)

- If the distribution tariffs is uniforms it hides an **implicit subsidy** from non-enrolled consumers to enrolled consumers

Conclusions

- The landscape of network developement and tariffs in Europe presents different trends:
  - A faster integration of network investment planning at the transeuropean level, in the context of the creation of the European Energy market
  - An increasing integration of renewables

- Still, regulatory challenges for harmonized tariff design remain, as the case of DG has shown



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European telecom infrastructure: context

- Broadband targets to 2020:
  - Basic broadband for all citizens by 2013: target met - satellite broadband is available to raise the coverage to 100% in every Member State.
  - Coverage: Next Generation Networks (NGN), 30 Mbps or more for all by 2020;
  - Uptake: 50% of households having 100 Mbps subscriptions or higher.
  - The European Commission's policy framework to achieve these targets encourages both private and public investment in fast and ultra-fast networks.

Policy and Regulatory instruments

- The Commission has recently released the Investment Plan for Europe, a package of measures to unlock public and private investments in the real economy of at least EUR 315 billion over the next three years (2015-2017).

- The main pillar of the Investment Plan for Europe will be a new European Fund for Strategic Investments (EFSI), to be set up within the European Investment Bank. Member States will have the opportunity to contribute to the Fund directly or through their National Promotional Banks. The EFSI is earmarked to finance high speed broadband roll-out and other digital networks in 2014-2020 including rural areas.

Next Generation Access Services

Context

- Fibre-deployment of broadband access networks (“Next Generation Access (Networks)” – NGA(N)) have become a major issue for sector-specific regulators, competition authorities, national and local governments, as well as for investing firms.

- Operators of copper- and coax-based (“first generation”) broadband networks have to speed up their networks to fulfill needs for high-bandwidth demanding services and are confronted with an increasing capacity demand of mobile operators who are subject to an explosion of mobile broadband services (“apps”).

Incentive for investments

- Incentives for efficient investment
  - **EU relies on market forces and Member States measures** but still foresees a set of ex ante access regulations to foster NGA investment.
  - Switzerland, which is not part of the EU, actively promotes NGA deployment on the basis of co-investment models
  - With respect to emerging NGA infrastructure the EU framework currently foresees the most comprehensive and intense access obligations in intercontinental comparison.

Telecoms: two issues

- Discussion of 2 controversial questions:
  1. The emerging NGA infrastructure should be subject to access regulations , or “softer” regulations or deregulatory approaches (e.g., regulatory holidays, non-discrimination obligations, retail-minus pricing) should be granted?

  2. How existing broadband regulations, in particular the level of the access charges, impact migration incentives to NGAN ?

Answer 1: Regulatory Options

- Less restrictive access regulation improves social welfare and induces more NGA investment compared to more restrictive regulatory regimes like cost-based access regulation.
  - the permission of risk-sharing and cooperation models, regionally differentiated access charges or temporary regulatory holidays in conjunction with voluntary access provision are such instruments

Answer 2: co-investment

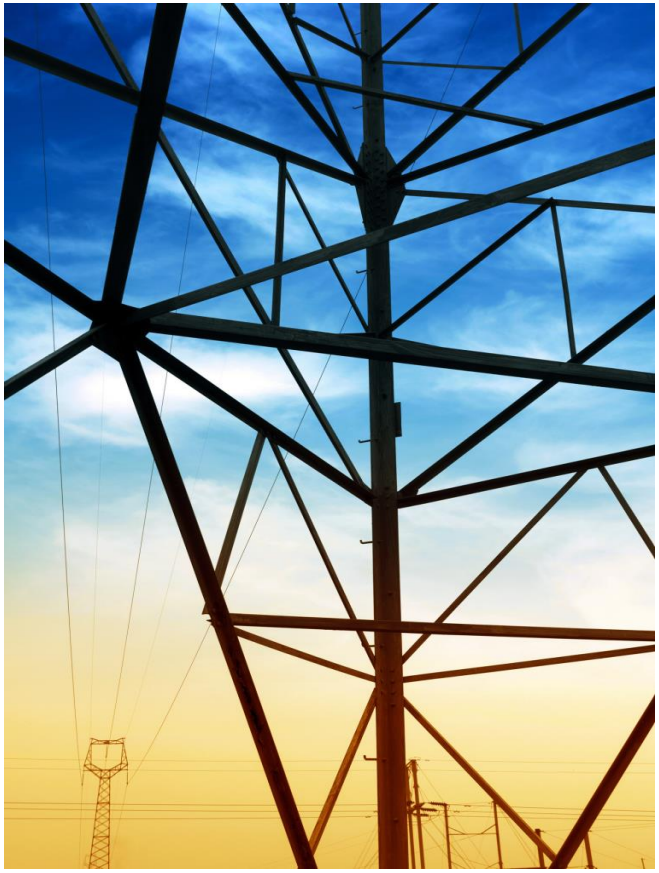
- The gain from co-investment models is the avoidance of unnecessary duplication costs provided that product differentiation is sufficiently high
  - The drawback, from a welfare perspective, is that upstream cooperation may lead to downstream collusion.
  - The natural reaction by the regulator would be to enforce access for non-co-investing parties, but this would reduce the incentive for NGA investment

Anwser 3: subsidies

- Provided strong enough externalities or spill-over effects exist, public subsidies are justified to cover white areas where private network deployment is not profitable even in case of a monopoly and where there is no danger to crowd-out private investment.

- Although access regulations typically include white areas at least formally, they appear to be practically ineffective in those regions in terms of inducing NGA investment

- Hence, ***public subsidies represent a relevant and complementary alternative*** which might, but not necessarily should be accompanied by further third party access obligations.



Concluding remarks

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Concluding remarks

- Compared to the existing development model for energy infrastructure investment, the telecom model relies on private incentives and a limited role for public subsidies
- This might be appropriate given the more competitive structure of the sector
- Possibly, this could represent a long-term scenario for the energy markets, where the role of a strict regulatory procedure is still crucial