

Toward the EU Target Model 2.0: Diagnostic of issues with current electricity markets key research directions

Conference 'ELEMENTS OF A NEW TARGET MODEL FOR EUROPEAN ELECTRICITY MARKETS 'Towards a Sustainable Division of Labour between Regulation and Market Coordination

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Agenda

- Diagnostic of issues with current electricity market design
- Reconciling market design with changing policy objectives and technology cost profile
- Lessons from international experience: toward 'hybrid markets'?
- Applicability to Europe of hybrid markets and long term policy pathways
- Conclusion: short term 'no regret' policy recommendations

Note: the full report on which this presentation s based can be downloaded at the following link:

http://www.fti-intelligencestore.com/Toward-the-Target-Model-2.0





Diagnostic of issues with current market design

Context and motivation - the Energy Union work program

EC's 'Framework strategy for a resilient energy union with a forward-looking climate change policy' published on February 25th. 2015

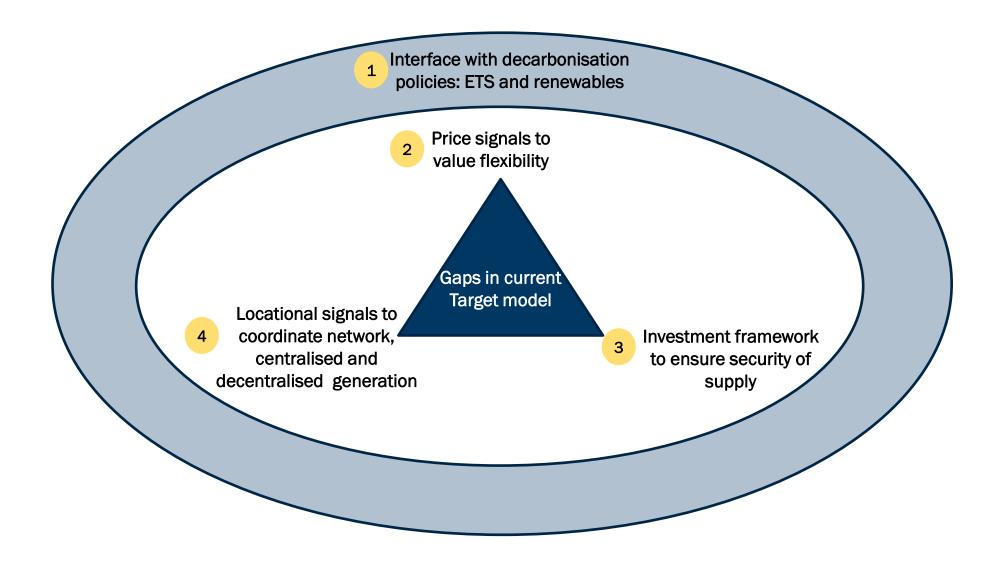


"Action point 5:

Creating a seamless internal energy market that benefits citizens, ensuring security of supply, integrating renewables in the market and remedying the currently uncoordinated development of capacity mechanisms in Member States call for a review of the current market design.

- ■The Commission will propose legislation on security of supply for electricity in 2016.
- ■The Commission will propose a new European electricity market design in 2015, which will be followed by legislative proposals in 2016."

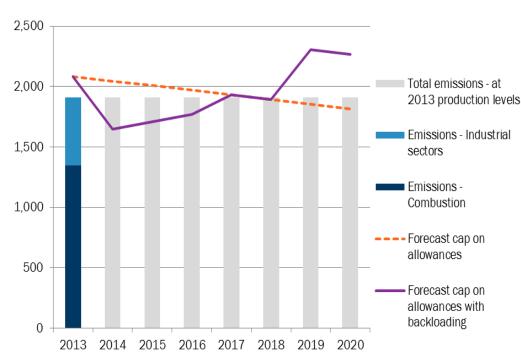
Key issues in current regulatory framework







Emissions and cap in the ETS (million CO2 equivalent)



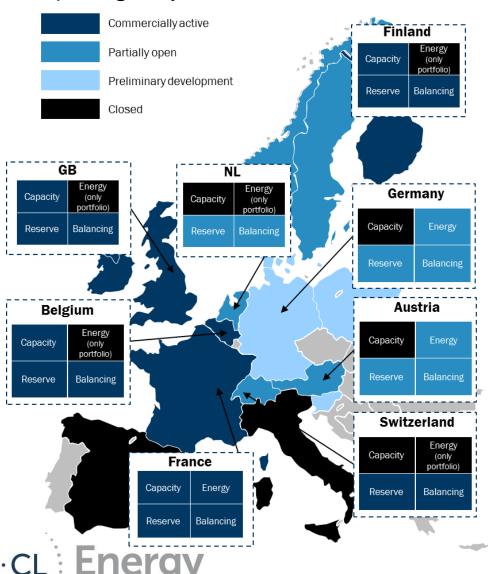
Source: EEA, FTI Consulting calculations (presuming release into the market by 2018)

- Weak prices are not effective to drive carbon emission abatement in the power sector:
 - The ETS has become a "residual market" for carbon abatement and the envisaged MSR reform is insufficient
 - A structural reform of the ETS is needed to provide a credible and bankable carbon price signal in the long term to investors
- Policies to promote RES have come with a number of negative side effects on electricity markets:
 - Without control of volumes and pace of deployment, RES support can lead to stranded assets
 - RES support schemes based on energy introduce distortions in the merit order (e.g. negative prices)
 - There has been so far little progress toward coordination of RES support schemes across countries, which lead to a suboptimal geographic deployment and increased costs for consumers.



2 Short term price signals are insufficient to value flexibility

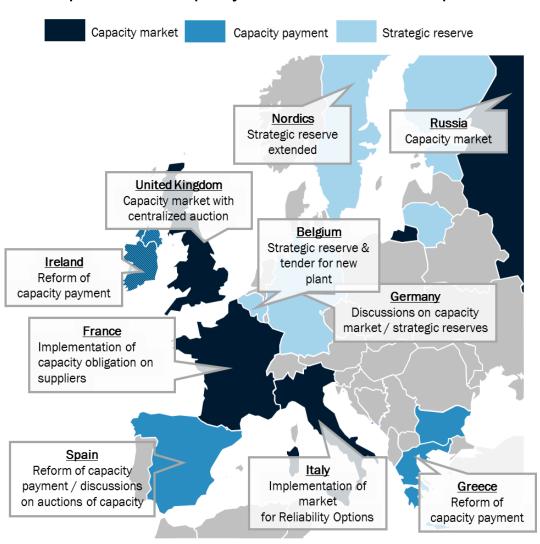
Demand response: most countries do not have an adequate regulatory framework



- ■The development of intermittent renewables reinforces the need to reward operational flexibility as well as dependability on short time frames
- The value of short term operating flexibility is typically captured through intraday and ancillary services
- Current short term price signals do not convey the proper scarcity value of operating flexibility in many countries
- ■EU balancing markets integration is making slow progress, and there are concerns whether it has sufficient ambition
- ■In addition, current market arrangements do not provide for a level playing field – in particular demand response is not widely allowed to participate in balancing markets

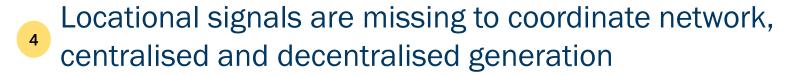
The current market framework does not send adequate long term investment signals

A patchwork of capacity mechanisms across Europe

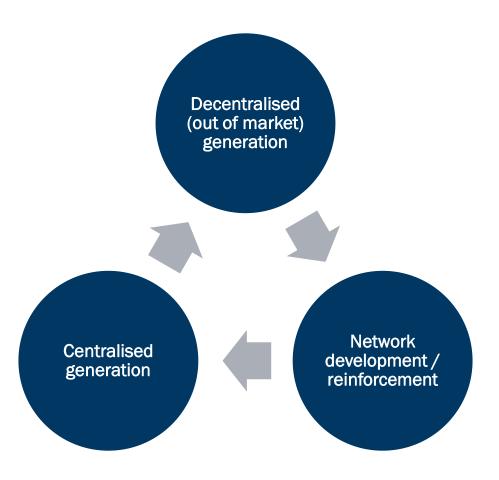


- Concerns are growing that current electricity market arrangements do not provide adequate investment and retirement incentives
- A number of recent national reforms introduced and/or reformed capacity mechanisms to guarantee security of supply
- The debate throughout Europe revolves around the design and harmonization of capacity mechanisms
- Two key differences are whether the mechanism is competitive or regulated, and whether all capacity is covered or only some specific units
- The European Commission is worried that such uncoordinated mechanisms could undermine further integration of European power markets
- One key issue is how to ensure cross border participation and a common approach to security of supply





System optimization: the need to reinvent coordination mechanisms

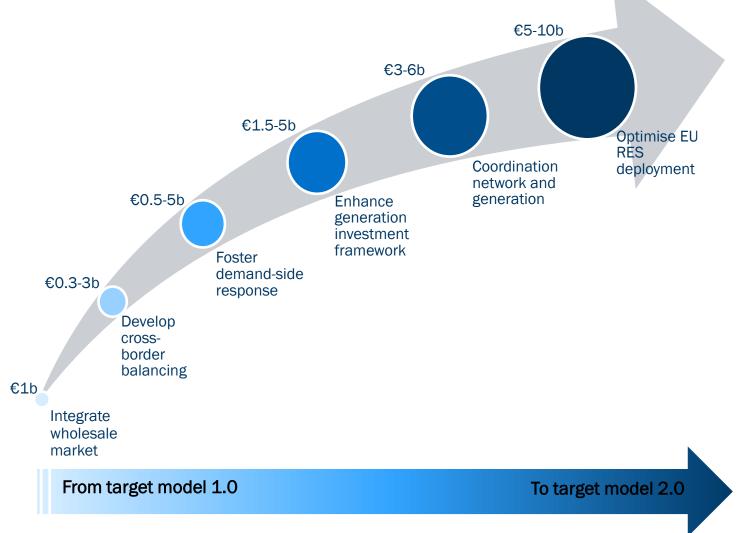


- The fragmentation of the electricity value chain and the development of decentralised generation require new approaches to optimize the electricity system across network, distributed and centralised generation
- There are no locational signals within EU power markets (e.g zonal prices or locational transmission charges), with the exception of the UK and price zones in Italy or the Nordic countries
- This does not allow for economically optimal development of network and generation and will result in higher costs for consumers
- A growing issue is that network investments are primarily driven by RES generation development without much consideration of system optimisation
- According to ENSTO-E 2014 TYNDP, 80% of the proposed network investment in the next decade across Europe address RES integration issues (over €150 billion)



Potential benefits of market reforms focussed on investment largely outweigh gains associated with Target Model 1.0

Orders of magnitude of the potential gains associated with different types of reforms (EU wide, billion €/year, based on a literature review)

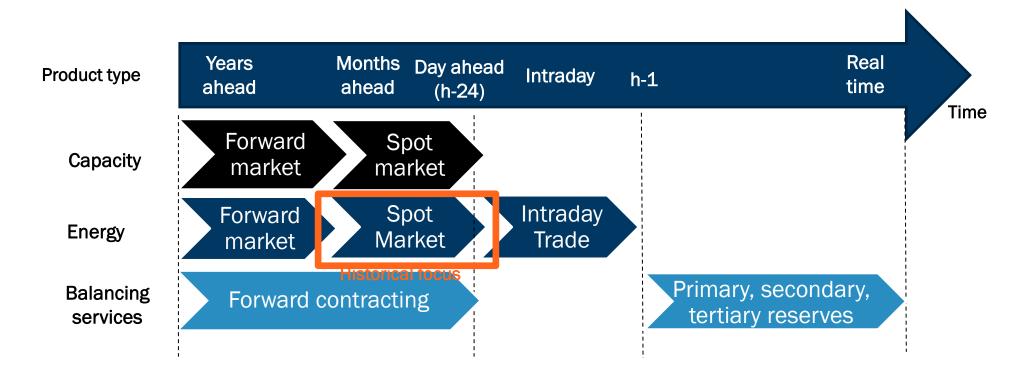






Reconciling market design with changing policy objectives and technology cost profile

Historical approach toward EU market integration focused on short term energy markets



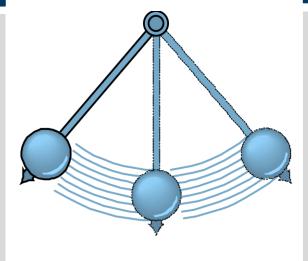
- Market integration started with day ahead markets (e.g. market coupling)
- Current focus of Target Model on short term energy markets with slow progress (e.g. balancing)
- ⇒ Focus needs to turn to capacity / flexibility needs and long term investment signals



Changing policy priorities: which implications for power market design?

Context of the 2010s

- <u>Policy priorities</u>: Security of supply and decarbonization
- <u>Market</u>: Target Model focussed on short term
- <u>Technology</u>: dominance of fixed costs (CAPEX) technologies, growth of decentralised generation
- <u>Networks</u>: Need to upgrade infrastructures
- <u>Financing:</u> distrust in current market framework, high hurdle rates



Context of the 1990s and early 2000s

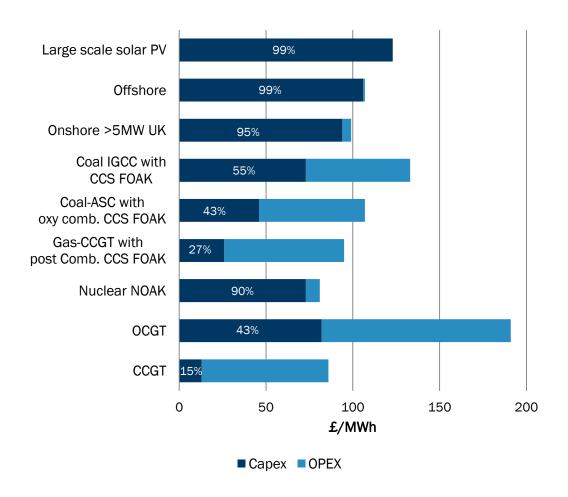
- <u>Policy priority:</u> focus on market integration
- Market: Focus on day ahead competition and integration
- <u>Technology:</u> dominance of variable costs technologies (dash for gas')
- <u>Networks:</u> Optimization of use of pre-existing infrastructures
- <u>Financing:</u> easy access to capital
- Current EU Target Model and the power generation regulatory framework were designed in a different context
- Market design needs to evolve to address longer-term investment incentives and flexibility remuneration issues
 associated with decarbonisation and security of supply objectives





- The industry cost base is moving from 'OPEX' to 'CAPEX': should pricing follow?
- The ongoing reforms contribute to aligning costs and revenues:
 - RES support schemes moving away from production based subsidies (e.g. Spanish reform)
 - Capacity mechanisms for thermal plants
- ⇒ Spot power market prices remain key for operational/dispatch incentives
- ⇒ Investment decisions increasingly based on capacity / flexibility remuneration

Levelised cost estimates for projects starting in 2019, 10% discount rate



Source: Electricity Generation Costs 2013
Department of Energy & Climate Change (UK)



Managing risks associated with power generation

Economic theory suggests that risks should be allocated to those parties best able to manage them – Implications for power investments

Planning and licensing risk

=> Ensure predictable and credible energy policy, streamline planning and licensing procedures

Construction risk

=> To be managed by investor / passed on to EPC contractor

Key risks Operation risk => To be manage

=> To be managed by plant operator

Market risk: price and volume risks

⇒ Design power market that does not rely purely on scarcity pricing to stimulate investment by introducing risk transfer / hedging mechanisms to reduce hurdle rates and costs to consumers

Policy and regulatory risks

⇒ Design market and regulation to minimize scope for policy intervention



generation



Conclusions: Debunking myths about power market design and investment signals

1

The historic market model is well suited for the decarbonization and security of supply challenges

- Current EU Target Model was designed in the early 2000s with different policy priorities and a dominance of variable cost technologies
- New policy priorities to fight climate change whilst maintaining security of supply and a costs structure evolving toward fixed cost technologies call for a rethink
- Reform needs to address long-term investment incentives and flexibility remuneration issues

2

The issue is not the market but the policy interventions which undermine price signals

- Policy interventions are an intrinsic feature of electricity markets given the specificity of electricity
- A good market design is one that recognizes policy objectives and pre-emptively limits scope for policy intervention

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The electricity industry is capital intensive but does not differ from other industries for which investments are not an issue

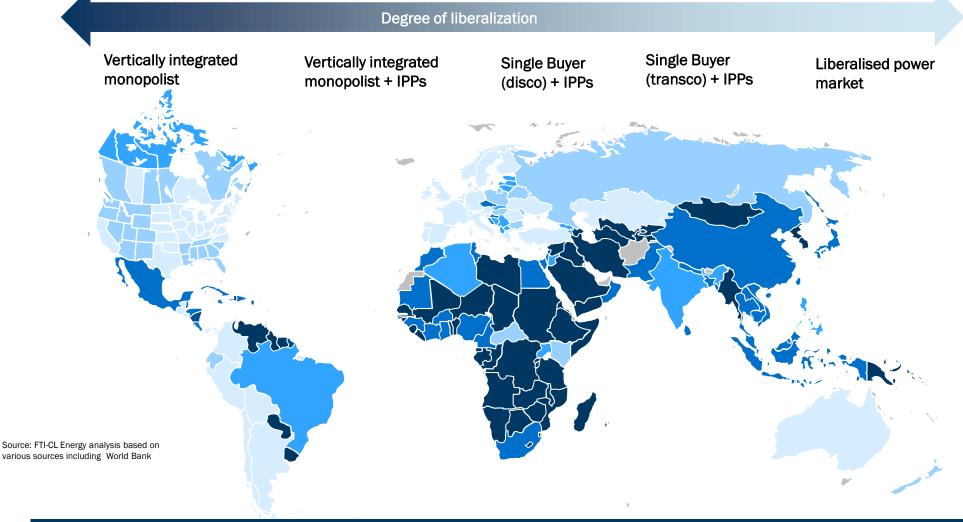
- Other capital intensive industries either offer much greater returns (e.g. oil industry), or much lower risks (infrastructure regulation)
- Historical model of merchant generation investment relied on balance sheet financing of large utilities or project financing backed by PPAs
- Risk transfer / hedging mechanisms are needed to provide some financial security and reduce financing costs





Lessons from international experience: toward "hybrid markets"

Global mapping of electricity industry regulatory arrangements

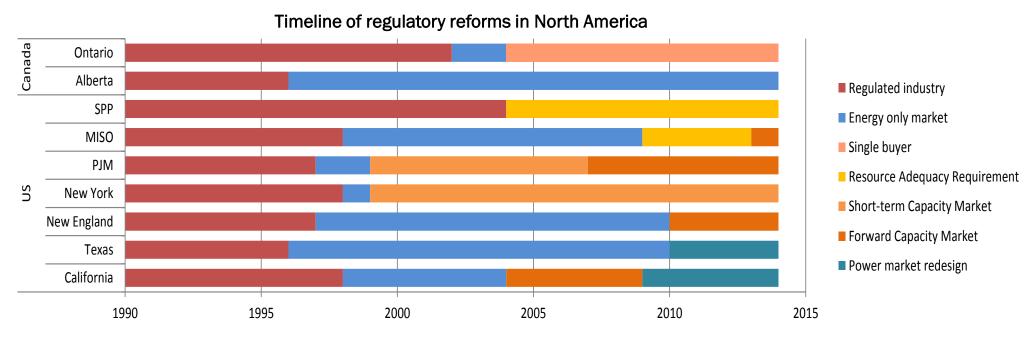


- Most markets feature some form of pubic intervention in either security of supply, determination of the generation mix, and/or the development of transmission networks
- We focus on a selection of hybrid markets with investment coordination and risk sharing mechanisms



North America: Evolution toward hybrid markets

- After the initial wave of deregulation and the start of the power markets in mid-90s, a number of major revisions of the market design have been implemented with different approaches across the states:
 - Some of the revisions were pro-market (e.g. nodal prices in California and Texas)
 - Others were administrative interventions to support capacity (short-term and long-term capacity markets and resource adequacy requirements) or short term scarcity pricing (Texas)



- Many states of the US and Canada have converted into a range of hybrid markets arrangements with some state intervention, often to support investment and/or influence the generation mix
- There is no standardised approach and a range of approaches exist since the failure of the 'Standard Market Design' initiative from the FERC





North America – Lessons from the various experiences with liberalisation

- The liberalisation process is stalled across North America, and a wide variety of industry structures coexist
 - FERC's attempt in 2002 to introduce a 'Standard Market Design' failed
 - Some states have gone through a number of pro-market reforms (e.g. nodal prices in California and Texas)
 - Others have seen administrative interventions to support capacity (short-term and long-term capacity markets and resource adequacy requirements such as PJM)
 - or even re-regulation (such as the reintroduction of a single buyer in Ontario)
- A range of frameworks exists for generation investment and resource adequacy, examples being:
 - Ontario: Administrative contracts for capacity procured a single buyer
 - PJM: Capacity markets clearing the capacity and setting capacity price based on the capacity requirement
 - Texas: Energy Only, relying primarily on the price signals from the energy and ancillary services markets
- No optimal solution seems yet to have been found among other North American regulatory frameworks to stimulate efficient investment
 - Some regulatory intervention seems necessary to induce efficient investment in Energy-Only market (e.g. scarcity pricing mechanism as in Texas)
 - Single buyer approach ensures capacity in the ground, but may create excessive risk for customers, especially in face of considerable need for investment and planning uncertainties (e.g. Ontario)
 - Provided that capacity markets are well designed, they induce material capacity. However, capacity markets are
 most efficient in inducing "low-cost" resources rather than new plant capacity (e.g. PJM)



<u>Latin America</u> – The two waves of market reforms

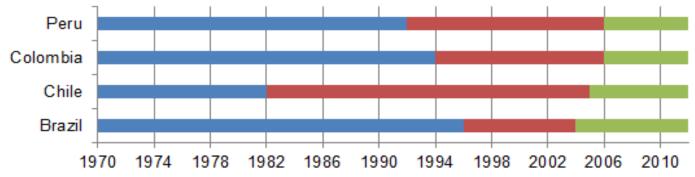
1st wave of market restructuring

- Early 1980s: vertically integrated monopolies.
- From 1982 onward: partial liberalization with centralized cost-based dispatch; prices for small consumers remain regulated.
- Policy discontent in the early 2000s:
 - Dissatisfaction with price regulation;
 - Volatile spot prices failed to stimulate timely investment; rotating blackouts in some countries;
 - No stable long-term generation revenues for project-finance of new capacity.

2nd wave of market restructuring

- Early 2000s: introduction of hybrid markets with long term contracts (LTCs) to support and coordinate investment. Rationale included:
 - Coordinating investment through a competitive process (auctions);
 - De-linking of investment from volatile spot prices;
 - Reducing risks for new comers and facilitating project financing through LTCs;
 - Allowing enough time to develop capacity through forward auctions reflecting anticipated need.

Timeline of regulatory reforms in selcted countries of Latin America



- Vertically-integrated monopoly remunerated under cost-of service
- Restructuring: liberalisation and marginalism (first wave)
- Long-term electricity auctions (second wave)



21

<u>Latin America</u> – Comparison of market and auction arrangements across countries

Country	Brazil	Chile	Peru	Colombia
Degree of centralisation	Joint auctions by distribution companies centrally organised.	Disco(s) organise and manage their auctions, possibility of joint auctions.	Disco(s) organise and manage their auctions, possibility of joint auctions.	reliability cinging dan
Buyers	Regulated users.	Regulated users.	Regulated users, but free consumers can be included.	All consumers.
Sellers	Separate auctions for existing and new capacity	Existing and new capacity in the same auction.	Existing and new capacity in the same auction	
Load forecast responsibility	Disco(s) inform on load forecasts in each centralised auction to supply regulated market.	Disco(s) are responsible.	Disco(s) are responsible.	Regulator and planner provide demand, auction bridges the total system gap.
Delivery date	Existing: few months - 1 year New: 2-5 years	2-5 years	3 years	3 to 7 years.
Auction process	2-phase hybrid auction.	Sealed-bid combinatorial auction with pay-as-bid rule.		Descending clock auction.
Energy policy decisions	Specific auctions for technologies and special projects.	All technologies compete together.	Separate auctions for renewables.	All technologies compete together.
How often are auctions organised	Regular auctions to contract new capacity, government can organise additional auctions whenever needed.	Disco(s) decide.	Disco(s) decide.	At planner\s discretion, whenever there is a foreseen gap between future demand and supply.



<u>Latin America</u> – Lessons from 'hybrid' markets

- Latin American power sectors have evolved in the past decade toward various forms of 'hybrid models' combining a role for the spot market and for long term contracts (LTCs) in order to separate :
 - Short term system optimization (dispatch) based on spot market prices
 - Long term investment decision largely driven by auctioning of LTCs
- In practice, there are significant differences in implementation across countries:
 - Brazil: centralized scheme with a single auction to contract distribution company's needs
 - Chile / Peru: decentralised scheme where distribution company auctions their demand
 - Colombia: auctions whenever demand not covered by capacity
- Whilst auctions for LTCs attracted significant interest of investors, the jury is still out in terms of the effectiveness of the auction mechanisms to attract least cost green-field generation and price it efficiently; key issues include:
 - The type product to be auctioned energy, capacity or some hybrid product
 - How far in advance of delivery to run the auction, how much volume to auction and how frequently
 - The auction design: how to efficiently allocate and clear prices
- Of particular importance is the definition of roles and responsibilities for planning (load forecast), contracting and running the auctions:
 - Whether the procurement process needs to be centralised
 - Who should be the counterparty
 - Incentives to minimize costs, risk of policy interference and regulatory capture





Applicability to Europe of 'hybrid markets' and long term policy pathways

Lessons from international case studies: Applicability to Europe of 'competition in two steps'

Investment planning (years ahead)

Operations planning (days / hours ahead)

Competition "for" the market

- Tendering of long term capacity contracts
- Can be technology neutral or specific
- Puts competitive pressure where it matters: CAPEX
- Can be used to stimulate new entrants and development of competitive market
- Ensures coordinated system development

Competition "in" the market

- Well integrated and liquid forward, day ahead and intraday markets
- Optimizes short term dispatch and minimizes costs for consumers
- Level playing field with balancing obligation
- No distortions as subsidies not based on production

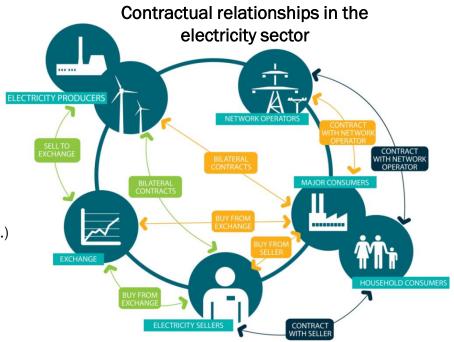
Alternatives to implement two step competition based on long term contracts:

- Mandate an independent organization to define the type of contracts and to procure them through a centralized auction (e.g. capacity auction, CFDs, etc.), or
- Implement a decentralized process with contracting obligations on suppliers (e.g. capacity obligation, renewables obligation, etc.)



Long-term contracts in EU electricity markets – DG Competition approach

- The electricity value chain involves a range of <u>voluntary</u> bilateral contracts between different parties:
 - Supply contracts btw. producers and suppliers / consumers
 - Capacity / transmission contracts
- In addition, a range of <u>regulatory/policy driven</u> long term contracts can be found in EU power markets:
 - Legacy pre-liberalisation power purchasing contracts (PPAs)
 - Contracts to support investment in clean technologies (FIT, FIP, CFDs, etc.)
 - Contracts to ensure security of supply (capacity markets)
 - Regulatory contracts to support market entry (NOME, VPPs, etc.)



■The EC address long-term contracts through its typical competition policy approach:

- 1. Article 101 of the Treaty on the Functioning of the European Union (TFEU) prohibits both horizontal and vertical agreements between market operators which restrict competition.
- 2. Article 107 of the TFEU ensures that aid granted by a Member State or through State resources does not distort competition and trade within the EU by favouring certain companies or the production of certain goods.
- ⇒Recent UK State Aid cases demonstrate pragmatic effect based approach of DG competition
- ⇒State Aid inquiries for Hinckley point 35 years CfD and UK capacity market 15 years contract for new plants demonstrate scope for growing role of long term contracts when beneficial



Long term vision – key uncertainties and trade offs

Risks and uncertainties

Technology

- How fast will RES costs decrease?
- Will storage become a commercial technology?
- Emergence of new technologies?

Socio-economic

- Economic growth and evolution of demand?
- Demand-side response and prosumers' attitude?
- Development of self-generation driven by retail prices? (interaction retail / wholesale markets)

Market

- Evolution of international fossil fuel (oil, gas, coal) prices?
- Risk of over procurement of capacity for security of supply?
- Energy, capacity & reserve prices enough to make RES competitive despite effect on energy prices and low capacity factor?

Policy

- Willingness of politicians to control generation mix beyond CO2 and security of supply?
- Hierarchy of energy policy objectives and acceptability of costs?

Key drivers

Pathway 1: competitive RES/storage technologies

- RES/storage costs have dropped significantly
- High CO2 price drives strong electricity prices
- External costs of decentralised / intermittent generation reflected in retail prices
- RES/storage profitable and competitive with other technologies
- Policy makers no longer need, and wish, to intervene in markets beyond ETS / CRMs

Pathway 2: sustained need for intervention in RES

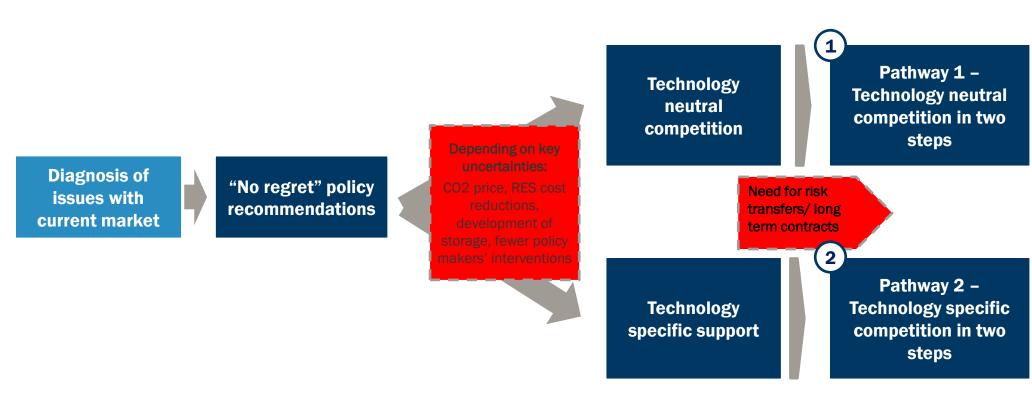
- RES/storage costs have decreased, but are still above conventional technologies
- CO2 price insufficient to support power prices as thermal plants are rarely marginal
- Some RES technologies are not yet competitive
- Policy makers still wish to control generation mix







Policy recommendations: short term "no regret" actions and long term policy pathways





Conclusions: Debunking myths about "hybrid" power markets with coordination and risk transfer mechanisms

Regulation and planning are the enemies of an efficient competitive power market

- All electricity markets are hybrids with some form of public intervention in either security of supply, determination of the generation mix, and/or transmission development
- The issue is which combination of market and regulation is most efficient, and how to design regulations that complement market forces

Return to a planning process with someone deciding what to build would lead to large inefficiencies

- The planning process can be decentralized to avoid bias toward 'system gold plating'
- Independence of regulatory agency is paramount as well as incentives for system cost minimization
- Asymmetry of information points towards the use of information revealing mechanisms such as auctions

Long term contracts (LTCs) are incompatible with competitive electricity markets

- 80% of generation investment in Europe in the past five years has been supported by some form of LTCs (FITs, FIP, CFDs)
- LTCs represent a structural part of well functioning power markets as a device to allocate and transfer risks efficiently to parties best able to handle them
- LTCs provide financial security and reduce hurdle rates for RES investment

Long term contracts undermine competition

- Long term contracts have both pro- and anti-competitive effects
- EU competition authorities recognize both effects and need for cost benefit analysis
- For instance, tenders for long term contracts can reduce barriers to entry and drive competition 'for investment'





Conclusion: short term 'no regret' policy recommendations

Policy recommendations: the no-regret actions

Strengthen CO2 price & phase out distortive output-based renewables subsidies

2

Re-prioritize and fast track the implementation of the target model 1.0

3

Define a common framework for security of supply and long term generation investment

4

Improve coordination of network, centralised and decentralised generation

- Reform the ETS to introduce a rising and credible carbon price floor (and price ceiling)
 trajectory and address carbon leakage issues
- Transition RES support mechanisms toward investment incentives to limit impact on market
- Allocate RES subsidies through tenders to minimise costs and control volumes with predefined roadmap for gradual subsidy phase out
- Set out more ambitious goals for balancing markets to foster harmonisation and integration, improve price signals (marginal price and single settlement) and remunerate better flexibility
- Establish a sound framework for demand-side response participation
- Improve EU governance framework to foster and speed up integration by strengthening the role of ACER and ENTSO-E and encouraging regional approaches
- Implement regional resource adequacy assessment with a common methodology
- Develop legislative and operational frameworks to manage coincidental stress events
- Introduce regional market wide and technology neutral capacity markets as a first step toward competition 'for' the market via coordinated tenders for new investment
- Foster risk sharing mechanisms such as long-term contracts to reduce financing costs and support investment
- Implement regional system coordination groups and provide TSOs with stronger incentives to optimize system planning across borders (e.g. through shared ownership)
- Reinvent system optimization by introducing coordination mechanisms between decentralized generation, conventional generation and network development
- Introduce locational signals by refining bidding zones and/or implementing geographically differentiated connection charges and capacity-based network tariffs





Issues in need of further research

Articulation of short term system operation and long term investment signals

- Resilience of SRMC based pricing with deep penetration of variable renewables
- ■Desirability of separate approach to remunerate existing / new capacity?

Risk sharing/hedging mechanisms and contract design:

- Product definition: financial hedge or physical product (energy, clean energy, capacity?)
- ■Need for regulated approach: obligation to contract for part / all of consumption?
- ■Compatibility with retail competition: contract follows load approach?
- ■Counterparty: state or group of suppliers?

Governance and coordination of investments:

- ■Centralised (auctions) / decentralised (obligations) approaches
- ■Mandate and incentives of independent authority / TSO ? in charge of system planning / procurement

Auction design:

- ■Market power, collusion incentives
- ■Information revealing properties
- ■Multi attribute auctions to value in the same auction electricity with different attributes (green, firm, etc.)





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Annex:

Details of the 'no regret' policy recommendations



Define a consistent interface between decarbonisation policies and power markets

Objective	Proposed measures		
Reform the EU Emission Trading System to rebuild trust and credibility	 Define an indicative credible minimum long term carbon price floor trajectory - possibly coupled with a price cap Implement a supply adjustment mechanism through e.g. a reformed MSR to maintain the CO₂ price above the predefine price floor trajectory Consider implementation of long term carbon 'contracts for difference' with EIB/some countries as a counterparty demonstrate long term commitment to the rising carbon price floor trajectory 		
Redesign RES support schemes to avoid distortions and foster market integration	 Impose balance responsibility on RES operators Generalise FiP schemes with no premium when prices are below variable costs, in order to improve RES exposure to mark signals as a first step; Move eventually towards investment-based support schemes Allocate support through tendering procedures so control RES deployment pace and reduce costs Introduce volume caps and automatic support reduction for distributed RES (small scale PV) to control volumes Monitor the impact of decentralised and self-generation 		
Strengthen EU coordination in decarbonisation and RES deployment	 Coordinate national approaches to support carbon prices beyond the ETS As a first step, implement a peer reviewing process of national transition plans at regional and EU-level; then developed coordinated regional energy transition plans specifying targeted volumes of different clean technologies with a detailed impact assessment Redesign cooperation mechanisms to remove the perceived barriers to their implementation; Provide incentives of countries to collaborate by establishing a framework to share costs and benefits Work toward common approaches for RES support mechanisms on a regional basis Define a governance framework for the EC to ensure that the 2030 RES targets are met, and a backstop mechanism (e.g., 'last resort' auction run by the EC) providing incentives to countries to reach their national targets 		
Ensure sustainability of RES support and decarbonisation costs	 Define a coordinated approach to channelling some of the proceeds from national ETS revenues to investment in pow sector infrastructure and R&D in clean technologies Assess cumulative anticipated RES support costs depending on the evolution of fossil fuel prices and evolution of RES cos as part of the 2030 national RES deployment plans and define a maximum RES support budget Scale up and coordinate R&D and innovation policies for clean technologies through a reform of the European Strateg Energy Technology plan; take into account R&D expenditures in the 2030 RES targets through a single RES support budg by country for both R&D and/or deployment Address carbon leakage issues by reviewing current exemptions criteria and/or cost containment approaches; implemed dynamic allocation of free allowances based on actual production; explore targeted border tax adjustments Enforce State Aid guidelines to create level playing field for RES support costs exemptions for industrial users 		

Improve short term price signals to value flexibility

Objective	Proposed measures	
Adapt governance to strengthen cross border integration	 Give ENTSO-E and ACER a mandate to respectively propose and approve regional/EU rules Adapt the ACER decision making process, so that the Board of Regulators can vote rules approvals at multi-country or EU-levels Adapt and/or clarify the role of DSOs, TSOs and PXs in the future market design and functioning, e.g. drawing the line between regulated and competitive activities and enforcing independence or setting a more adapted governance framework for PXs 	
	 Provide incentives for TSOs (through e.g. shared ownership and eventually regional TSOs) to improve cross border operation and capacity calculation, accelerate market developments and integration, develop networks, etc. 	
Improve flexibility valuation	 Improve balancing markets (cf. infra) and intraday markets Allow DSR participation in all market segments: share good practices and then draft guidelines on DSR participation Promote more cost-reflective and time-varying prices for end consumers, leveraging the benefits from smart meters' deployment 	
Shift emphasis toward balancing market design and integration	 Standardise effectively balancing markets (processes, products and pricing) to facilitate integration Implement market-based procurement of reserves to improve value for flexible assets Reduce costs through the sharing of reserves between TSOs to optimise reserve sizing across TSO control areas Improve price signals (to reflect scarcity and flexibility value) through the introduction of marginal pricing and single price imbalance settlement 	
Improve Target Model 1.0	 Foster more harmonisation in market design to facilitate cross-border trading and limit distortions: intraday, forward capacity allocation, dispatch regimes (including suppressing priority dispatch for RES) Improve capacity calculation to make better use of existing infrastructures, e.g. through flow-based capacity allocation or use of re-dispatching Adapt bidding zones to improve capacity calculation and dispatch efficiency while considering liquidity and market power impacts 	



3 Develop a Target Model for generation investment

Objective	Proposed measures
Improve price signals to reflect scarcity	 Ensure cost reflectiveness in imbalance settlement through balancing market reform (cf. measures for improving short term price signals)
	Harmonise price cap and floor methodologies, based on a robust economic study
	Promote time-varying prices for consumers to have cost reflective tariffs
	 Value curtailment of consumers based on a consistent approach across the EU (value of lost load) and allocate corresponding costs to relevant responsible stakeholders in consistency with other mechanisms
	 Improve and harmonise the system adequacy outlook methodology and coordinate adequacy forecasts at regional and European levels
Dovolon a regional recourse	 Include the assessment of flexibility needs in system adequacy outlook at national, regional and European level
Develop a regional resource adequacy assessment	 Establish a process to define forward capacity needs and targets on a coordinated basis, including an evaluation of the statistical contribution and de-rating of interconnections
	Define standard capacity products' design to correspond to common regional issues
	Agree on the principle to introduce a mechanism to remunerate capacity
Implement regional market-	Draft EU guidelines on the implementation of mechanisms to ensure adequacy, including the main features of the
based mechanism to ensure adequacy	target model and a process for progressive integration of mechanisms: market-based, volume-based and market- wide mechanisms should be favoured
	 Develop cross-border participation between capacity mechanisms and gradually integrate them towards regional mechanisms
	Define a framework for contracting obligations to follows customers changing suppliers
Foster long-term contracts and other risk-sharing arrangements	 Foster long-term contracts for RES support mechanisms and possibly capacity mechanisms to facilitate financing and reduce hurdle rates
	 Streamline DG Competition's approach by defining guidelines on long term risk sharing arrangements supporting investment in generation, identifying rationale for interventions based on typical market failures and defining a framework for cost/benefit analysis taking into account reduced financing costs





Reinvent coordination to optimize system development 4 across network, decentralised and centralised generation

Objective	Proposed measures		
Improve coordination in network investment and operation	 Reinforce TSO cooperation through regional investment plans and regional operations coordination centres Implement efficient cross-border cost allocation for network investments Provide stronger coordination incentives for TSOs through e.g. shared ownership and eventually regional TSOs 		
Integrate better renewables in networks	 Remove priority dispatch and access, and ensure equal treatment for all sources of generation Allow market-based/compensated curtailment for all sources of generation including RES Introduce mechanisms to coordinate and optimize local RES development and reinforcements in distribution and transmission networks (inspired by the US CREZ or Irish Gate System) 		
Introduce locational signals, including for RES	 Introduce in a consistent way some of the following measures: Review bidding zones, based on economic and physical grounds, taking into account market impacts Implement zonal capacity remuneration with zones in capacity markets in consistency with structural congestion appearing during tight supply periods Consider locational signals in network charges in consistency with previous locational signals Introduce a harmonised approach on how to differentiate charges location-wise 		
Adapt TSO / DSO regulation to the challenge of the future power system	 Draft guidelines on network charges and regulation, in particular so that network charges give locational signals and foster efficiency and right cost allocation, without distorting market functioning and cross-border trade Define a harmonised approach at the EU/regional-level to define costs/shares to be paid by generators in network charges Provide incentives for TSOs to improve operation and capacity calculation, to accelerate market developments and integration, to develop networks, etc. Define an improved regulatory regime adapted to the new roles and challenges for DSOs and precise the relative roles of and responsibilities of TSOs and DSOs 		





The study was a highly interactive process which involved a range of stakeholders

The study involved consultation of a range of stakeholders over the past 6 months...



... and was sponsored by 6 large utilities representing about 300 GW of installed generation capacity in Europe, including:















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