

# Rethinking power markets for decarbonisation: Toward the EU Target Model 2.0

*EPRG Spring Seminar in partnership with FTI-CL Energy*

*Toward a Better Energy Policy – Key Issues for the New UK Government and the New European Energy Union*

*Fabien Roques, SVP, Compass Lexecon*

*Cambridge – 5 June 2015*



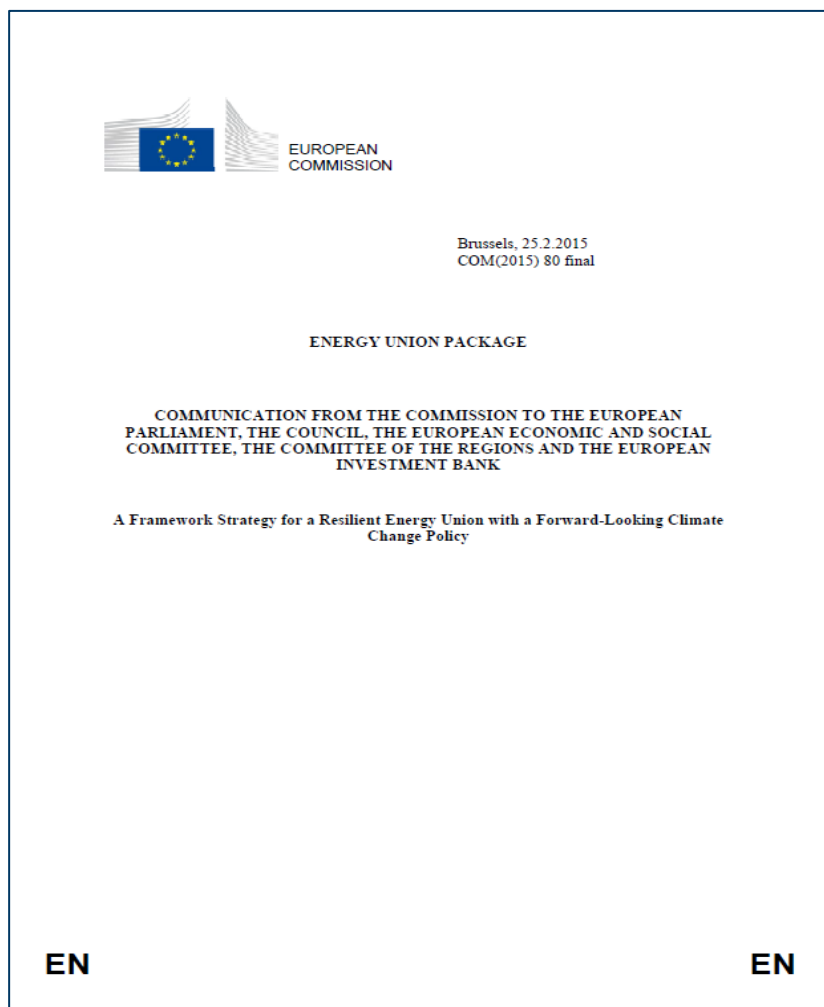
# Agenda

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- Context and motivation – the Energy Union work program
- Why are investment signals muted? Diagnostic of issues with current Target Model
- Lessons from international experience: review of “hybrid markets” with coordination and investment support mechanisms
- Applicability to Europe and policy recommendations
- Conclusions

# 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.”*

# Study approach: three phases

## 1 - Diagnostic: issues with current EU market framework

- Identify issues and gaps with current market design: Why are investment signals muted?
- What is the typical allocation of risks and does it hamper investment?
- Which coordination issues arise in planning and delivering the investment required?

## 2 - Lessons from international case studies

- Review of alternative “hybrid” market designs
- Focus on role of long term contracts, risk sharing and coordination mechanisms
- Latin America: Brazil, Columbia, Chile, etc.
- North America: US, Ontario
- UK EMR

## 3 - Applicability to Europe – Mapping the transition

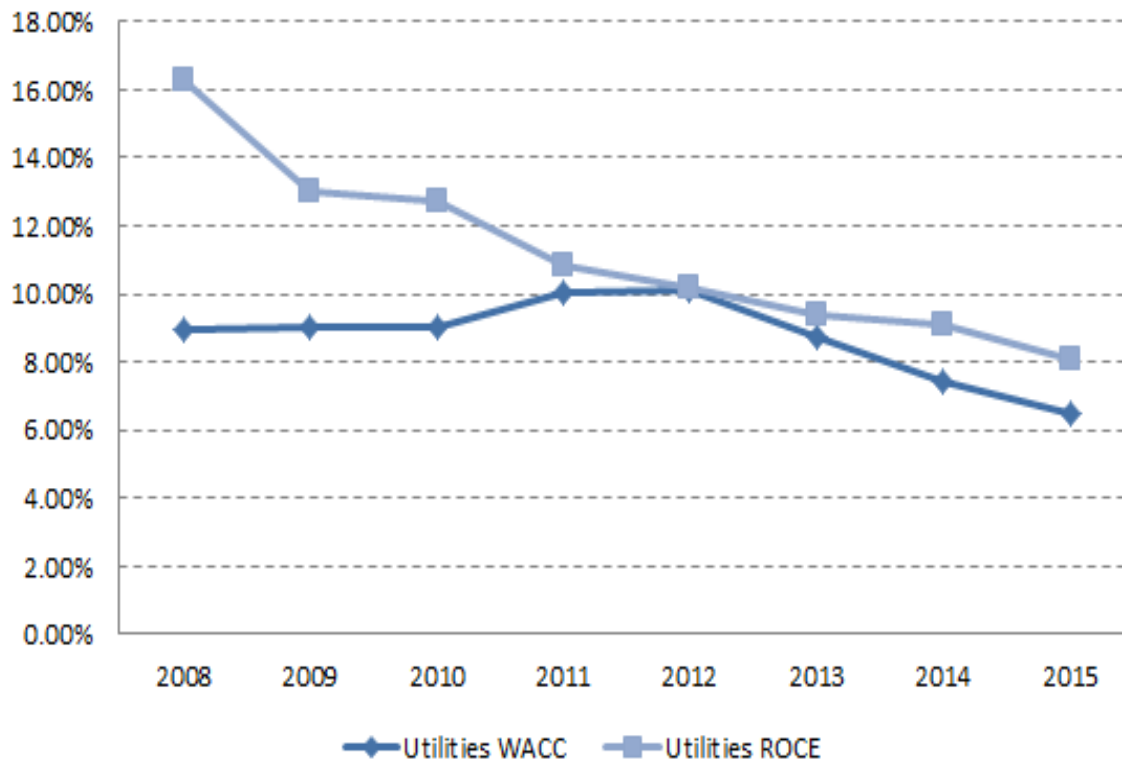
- Identification of issues associated with specific EU context
- Mapping realistic evolution pathways to Target model 2.0
- Policy recommendations
- Public launch event in Brussels on 29<sup>th</sup> June 2015

Sponsored by 6 EU utilities representing about 300 GW of installed generation capacity in Europe

Why are investment signals muted?  
Diagnostic of issues with current Target Model

# The falling profitability of power generation investments in Europe

ROCE and WACC for European utilities, 2008 to 2015



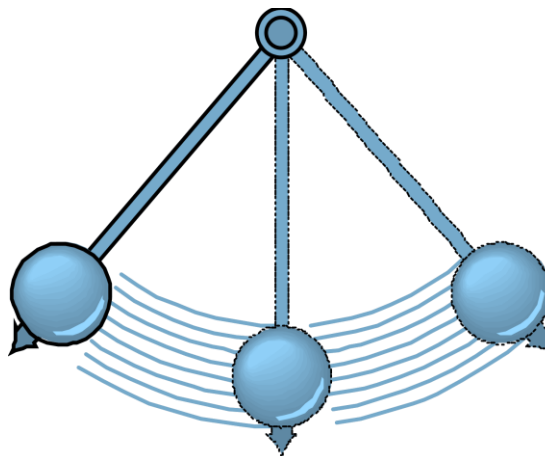
- The profitability of the European sector has fallen in recent years.
- Return on Capital Employed (ROCE) has gotten very close to the Weighted Average cost of Capital (WACC) for the past few years.
- This is in most countries due to a large oversupply induced by RES investments.
- However, this is not just a cyclical trend as the market rebalances, but a structural issue.
- A range of market failures and policy interventions have been identified and documented which contribute to mute investment signals.

Source: Exane data.

# Changing policy priorities: which implications for power market design?

## Context of the 2010s

- Policy priorities: Security of supply and decarbonization
- Market: focus should turn to long term investment incentives
- Technology: dominance of fixed costs (CAPEX) technologies, growth of decentralised generation
- Networks: Need for large investments
- Financing: distrust in current market framework, high hurdle rates



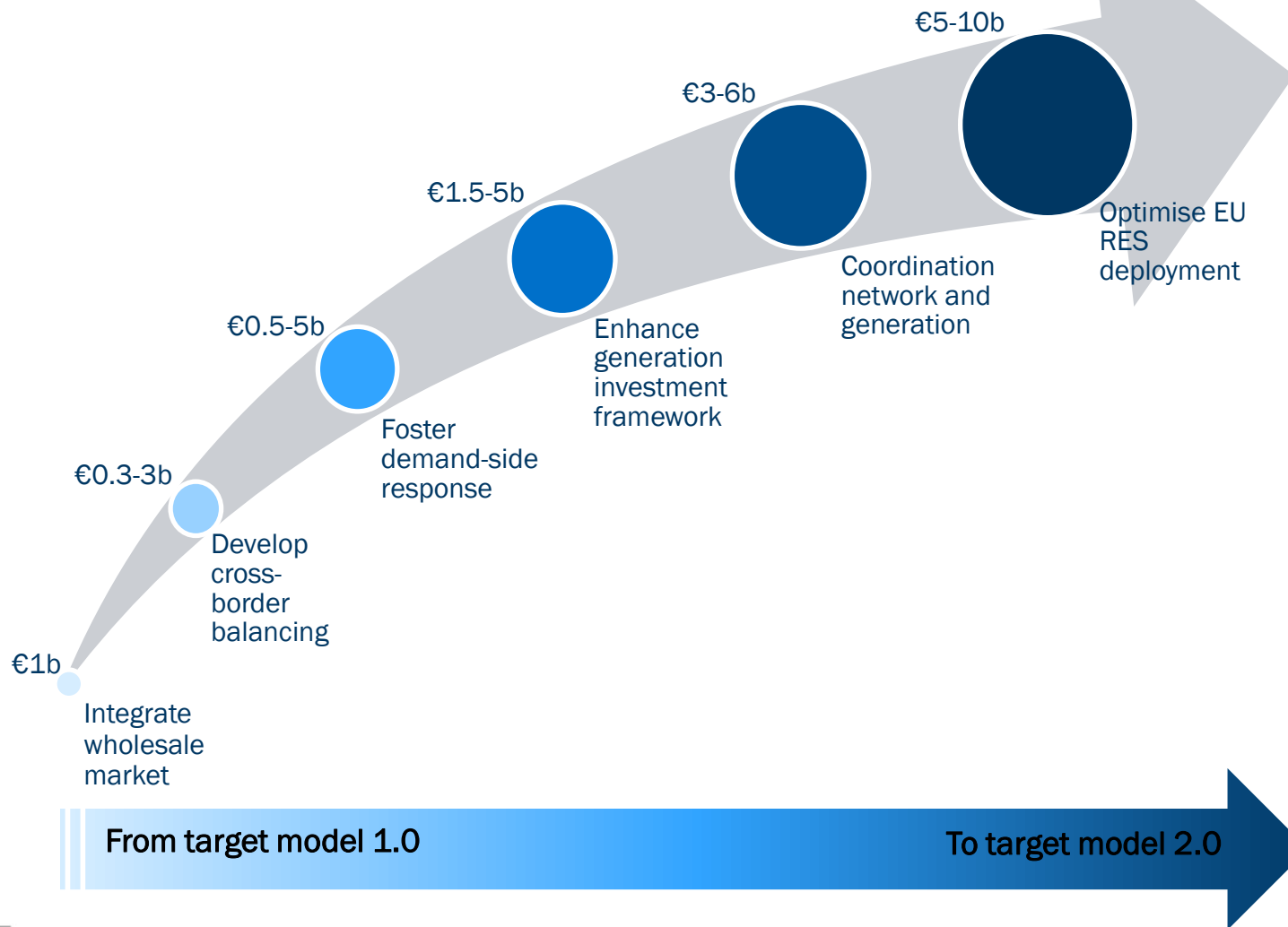
## Context of the 1990s and early 2000s

- Policy priority: focus on market integration
- Market: Focus on day ahead competition and integration
- Technology: dominance of variable costs technologies (dash for gas')
- Networks: Optimization of use of pre-existing infrastructures
- Financing: Easy access to capital

- Current Target Model was designed in a different context ...
- ... and needs to evolve to address long-term investment incentives and flexibility remuneration issues associated with decarbonisation and security of supply objectives

# EU Target Model insufficient as potential gains from investment coordination larger than those of current approach

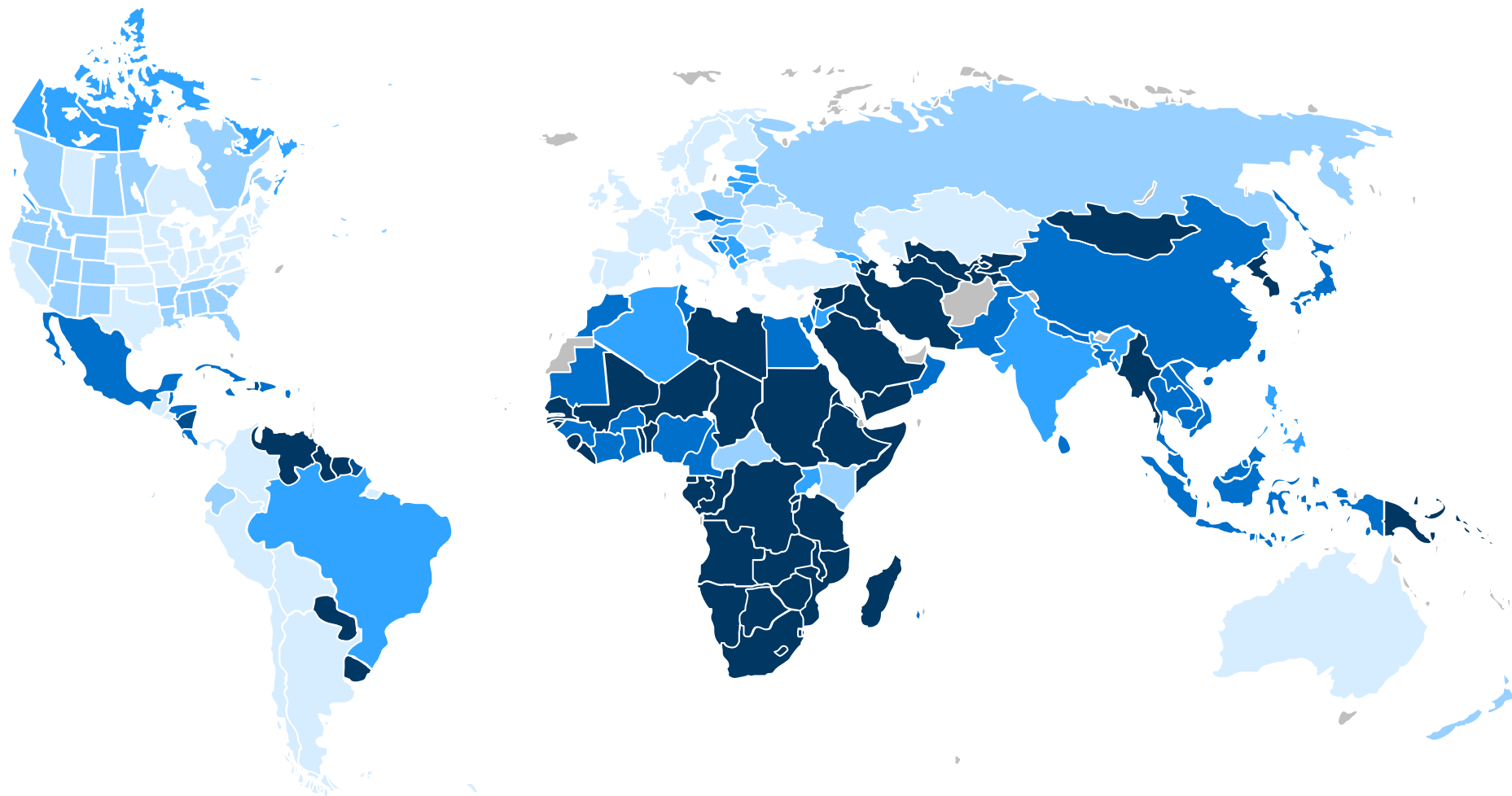
Orders of magnitude of the potential gains associated with different types of reforms  
(EU wide, billion €/year, based on a literature review)





Lessons from international experience:  
review of “hybrid markets” with coordination and  
investment support mechanisms

# Global mapping of electricity industry regulatory arrangements



Vertically integrated monopolist

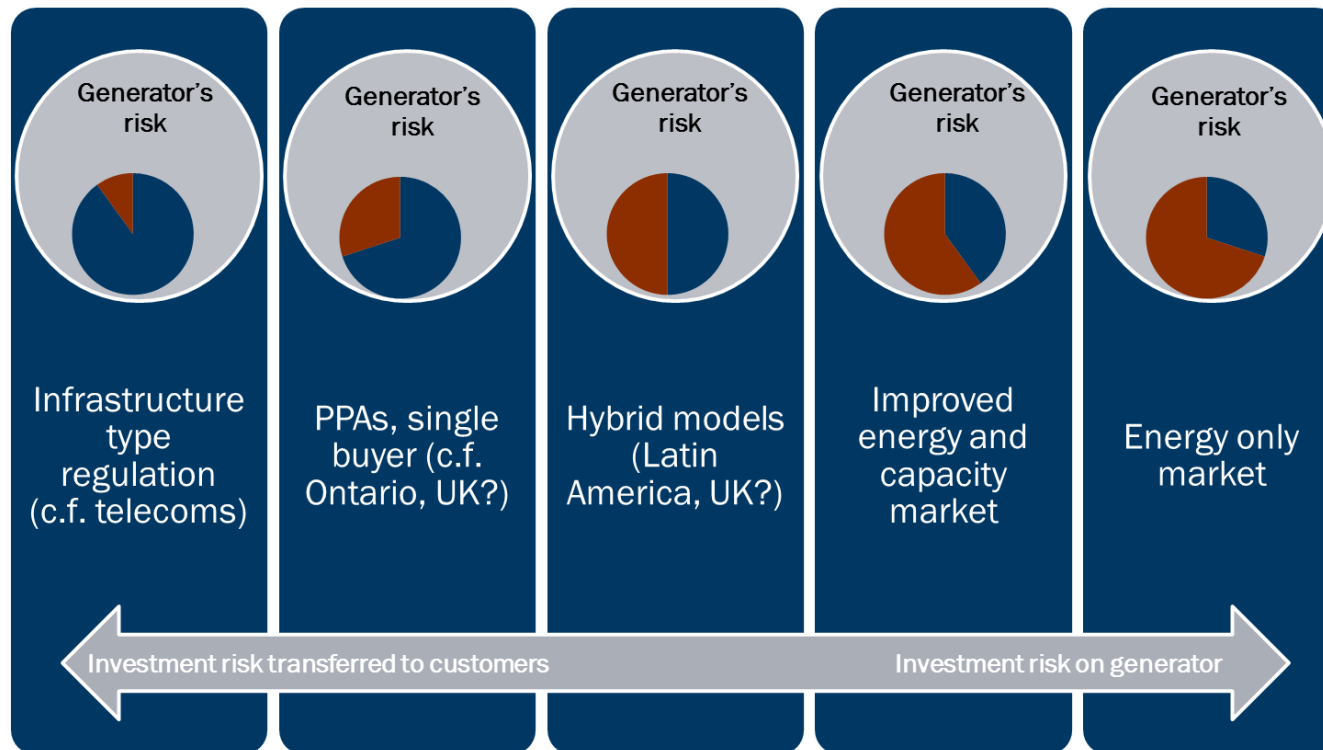
Vertically integrated monopolist + IPPs

Single Buyer as a national genco, disco or disco, or a combined notional genco-transco or transco-disco + IPPs

Many discos and gencos, including IPPs, transco as a Single Buyer with Third-Party access

Power market of gencos, discos and large users, transco and ISO

# Most power markets are hybrids with some form of public intervention

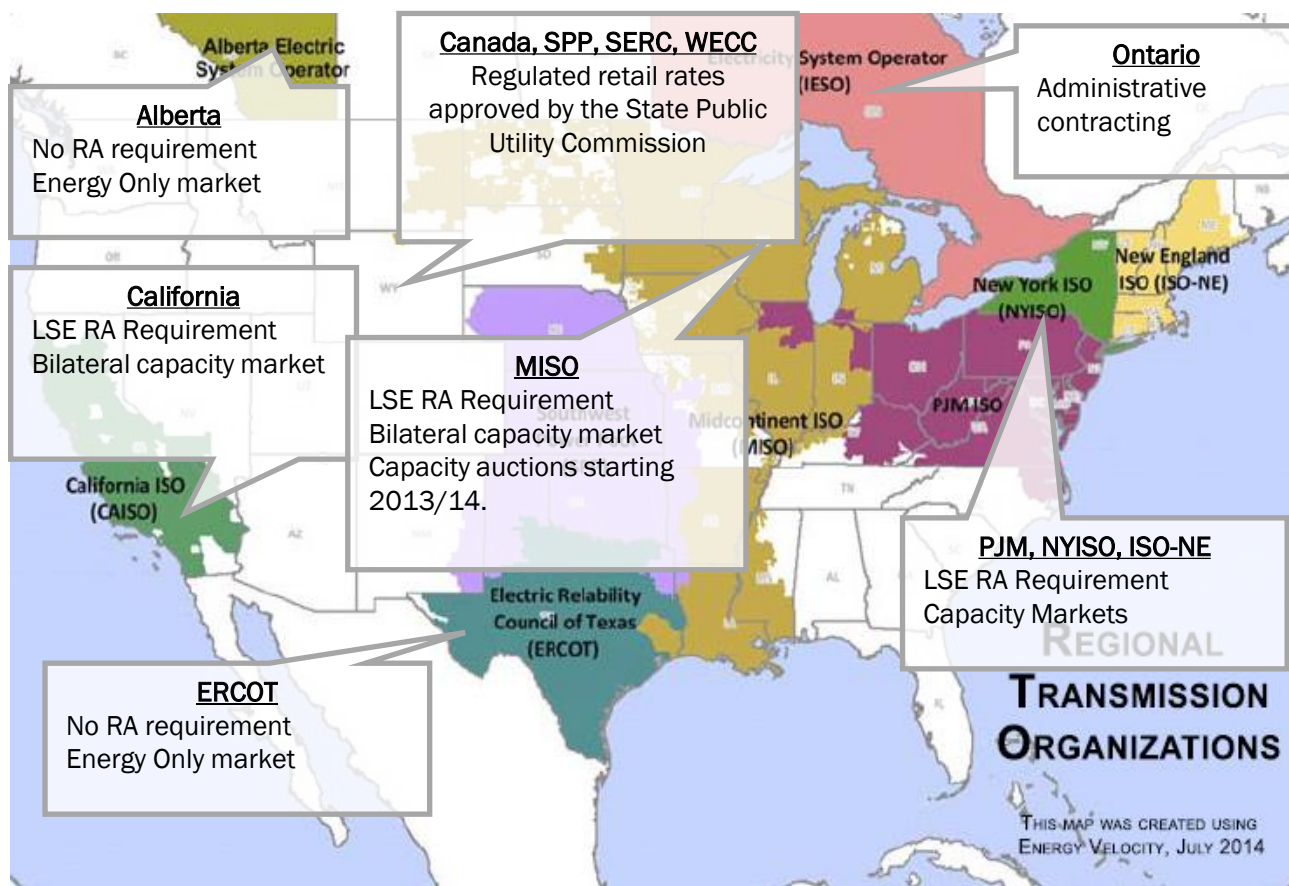


- Hybrid markets comprise some form of public intervention in either security of supply, determination of the generation mix, and/or the development of transmission networks
- We focus on in depth case studies of Latin America, the US, and the UK to identify the types of hybrid mechanisms which focus on:
  - Coordination of investment for transmission, merchant generation and policy driven clean technologies
  - Risk sharing mechanisms such as long term contracts

# North America: Five main investment frameworks

North America features five main market frameworks implying a different degree of risk sharing between generators and consumers

<b>Regulated Utilities</b>	<ul style="list-style-type: none"> <li>▪ SPP</li> <li>▪ BC Hydro</li> <li>▪ WECC</li> <li>▪ SERC</li> </ul>
<b>Administrative Contracting</b>	<ul style="list-style-type: none"> <li>▪ Ontario</li> </ul>
<b>LSE Resource Adequacy Requirement</b>	<ul style="list-style-type: none"> <li>▪ California</li> <li>▪ MISO</li> <li>▪ SPP</li> </ul>
<b>Capacity Markets</b>	<ul style="list-style-type: none"> <li>▪ PJM</li> <li>▪ NYISO</li> <li>▪ ISO-NE</li> </ul>
<b>Energy Only Markets</b>	<ul style="list-style-type: none"> <li>▪ Texas</li> <li>▪ Alberta</li> </ul>



Source: Based on Brattle 2013, Capacity Markets – Lessons Learned



## North America – Lessons from the various experiences with liberalisation

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- **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)
  
- **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)

# Latin America – The two waves of market reforms

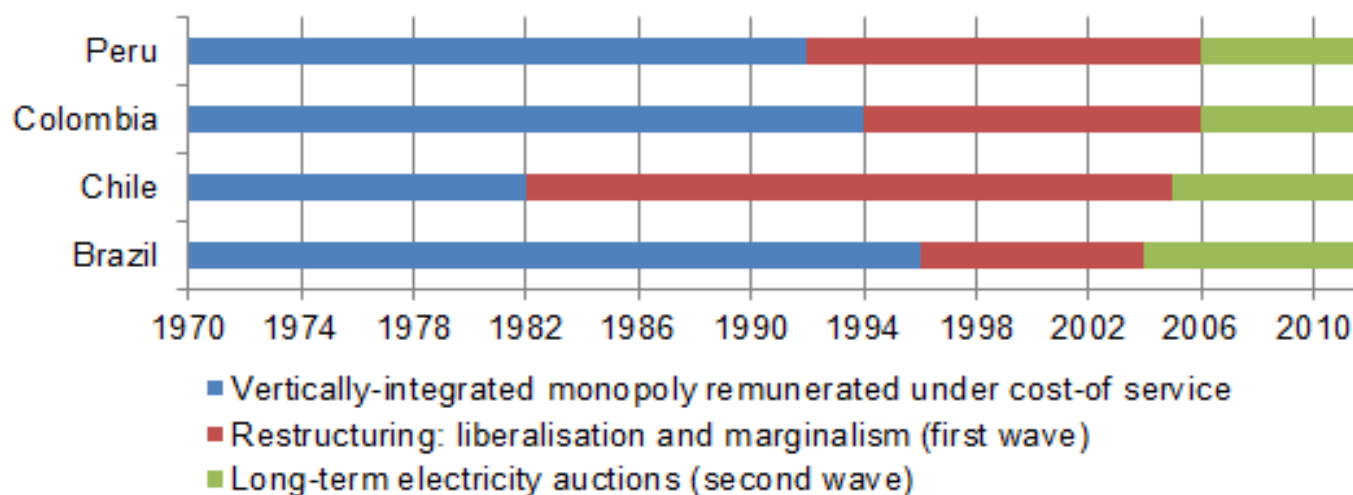
## 1<sup>st</sup> wave of market restructuring

- 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.

## 2<sup>nd</sup> 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



# Latin America – Comparison of market and auction arrangements across countries

Country	Brazil	Chile	Peru	Colombia
<b>Degree of centralisation</b>	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.	Joint auction to ensure reliability, closing gap between supply and demand organised by the Regulator
<b>Buyers</b>	Regulated users.	Regulated users.	Regulated users, but free consumers can be included.	All consumers.
<b>Sellers</b>	Separate auctions for existing and new capacity	Existing and new capacity in the same auction.	Existing and new capacity in the same auction	Existing and new capacity in the same auction.
<b>Load forecast responsibility</b>	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.
<b>Delivery date</b>	Existing: few months - 1 year New: 2-5 years	2-5 years	3 years	3 to 7 years.
<b>Auction process</b>	2-phase hybrid auction.	Sealed-bid combinatorial auction with pay-as-bid rule.		Descending clock auction.
<b>Energy policy decisions</b>	Specific auctions for technologies and special projects.	All technologies compete together.	Separate auctions for renewables.	All technologies compete together.
<b>How often are auctions organised</b>	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.

Source: Adapted from « Regulating Generation Investment in Latin America: Future Challenges », Rodrigo Moreno, Luiz. Barroso, Hugh Rudnick, Bruno Flach, Bernardo Bezerra, and Sebastian Mocarquer, IAEE Forum, Second quarter 2011.



# Latin America – Lessons from ‘hybrid’ markets

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- **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



Lessons from international experience:  
Applicability to Europe and policy recommendations

# 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 :

1. 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
2. Implement a decentralized process with contracting obligations on suppliers (e.g. capacity obligation, renewables obligation, etc.)

# In the long term, two alternative pathways: Technology neutral or not?

## Pathway 1: competitive RES/storage technologies

## Pathway 2: sustained need for intervention in RES

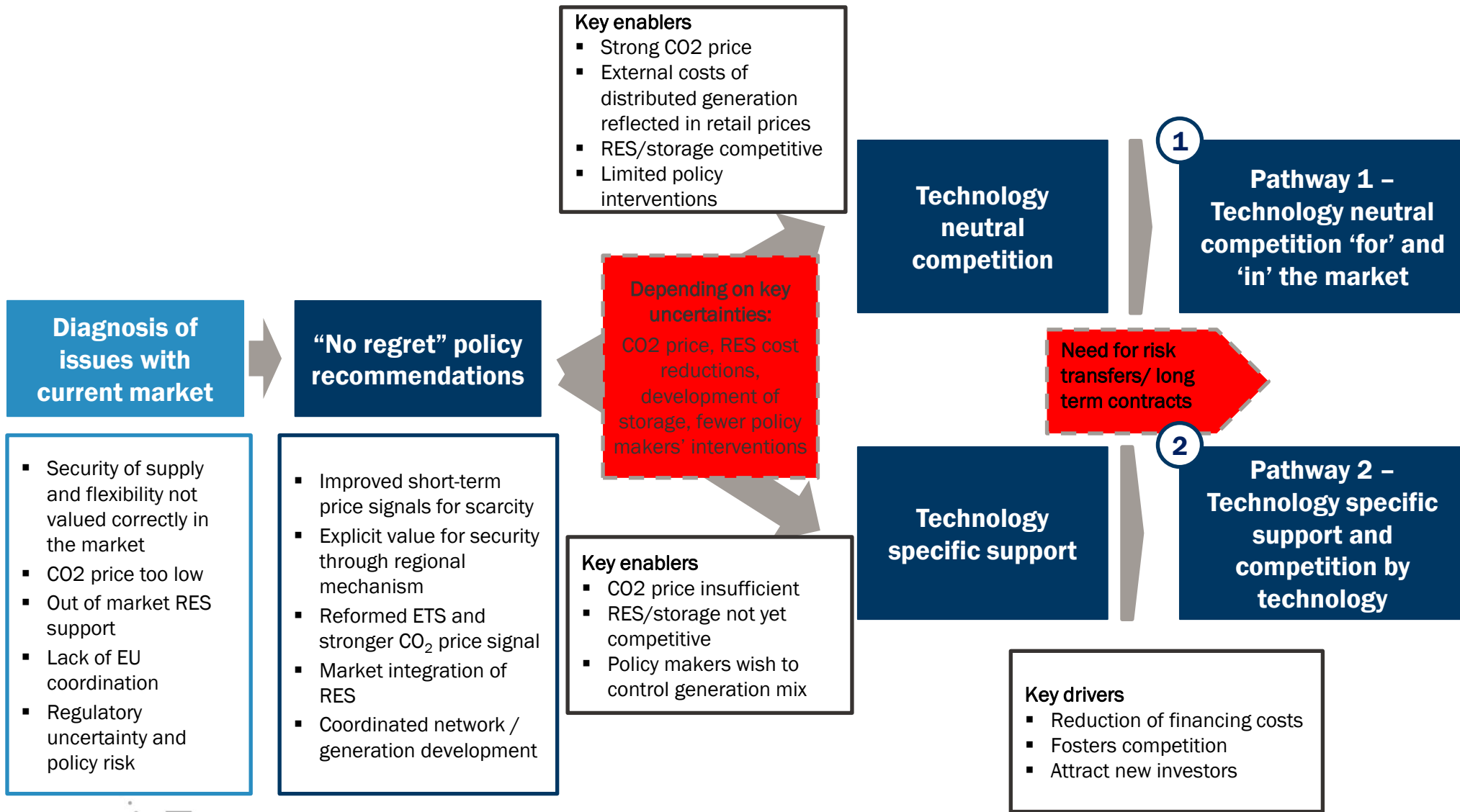
### 1 Pathway 1: competition 'for' and 'in' a technology-neutral market

- Market design structured around capacity, energy and reserve / balancing market segments
- All technologies, including RES, storage or DSR participate on a level playing field on the basis of their technical capabilities to meet system needs
- Competitive tender and market processes determine the efficient volumes of the different technologies, respecting criteria related to security of supply and decarbonisation, and following locational signals
- Investments supported by lower financing costs thanks to long-term contracts that facilitate risk sharing between parties

### 2 Pathway 2: competition 'for' and 'in' the market with technology-specific coordination

- Regional long-term planning to determine the resource mix and/or more complex and detailed criteria (such as shares of specific RES technologies by country)
- Coordination with network development ensured within the long-term planning process on regional basis
- Tenders – possibly through a single coordinated procedure – allocate long-term capacity contracts for each technology depending on the location
- Alternatively, obligations could be defined for suppliers to meet the different criteria (capacity margins, RES shares...) through contracts

# Policy recommendations: short term “No regret” actions and long term policy pathways





## Conclusions

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- Energy Union work program suggests that the European Commission will take a fresh look at electricity market design and issues with the current Target Model (TM)
- Current TM focus on short term market integration is insufficient as change in context and policy objectives suggest need to provide better investment and coordination signals
- Review of experience in Latin American countries with ‘hybrid markets’ comprising some explicit coordination and investment support mechanisms provides some useful lessons for Europe but demonstrates complexity of designing efficient interface between short term market operations and long term investment planning
- In the long term, key uncertainty is whether a level playing field for all generation technologies is eventually possible or whether technology support will be permanently needed
- In the meantime, ‘low regret’ policy actions include:
  - Define a consistent interface between decarbonisation policies and power markets
  - Improve short term price signals to value flexibility
  - Develop a Target Model for generation investment
  - Reinvent coordination to optimize system development across network, decentralised and centralised generation



Thank you for your attention

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**Fabien Roques**  
**Senior Vice President**  
**FTI - COMPASS LEXECON**

[froques@compasslexecon.com](mailto:froques@compasslexecon.com)

**+33 1 53 05 36 29 direct**  
**+33 7 88 37 15 01 mobile**

## Annex: details of the ‘no-regret’ actions

1

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

- 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

2

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

- 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

3

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

- 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

4

Improve coordination of network, centralised and decentralised generation

- 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