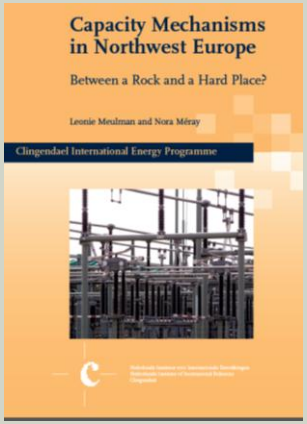
CLINGENDAEL INTERNATIONAL ENERGY PROGRAMME | CIEP

CIEP study on (the need for) possible new power market mechanisms



EU Consultation on Capacity Mechanisms
Brussels 8.03.2013

Rapidly changing power market: new challenges both on the supply as on the demand side…

Supply

- Increasing share of RES (and the uncertainties around it)
- Nuclear phase out (and the uncertainties around it)
- Old plants need to be replaced (also triggered by environmental goals)
- Large scale electricity storage commercially not yet available
- Uncertainty over CO2 prices
- Uncertainty on energy policies.
- Unstable subsidy system for RES.

Demand

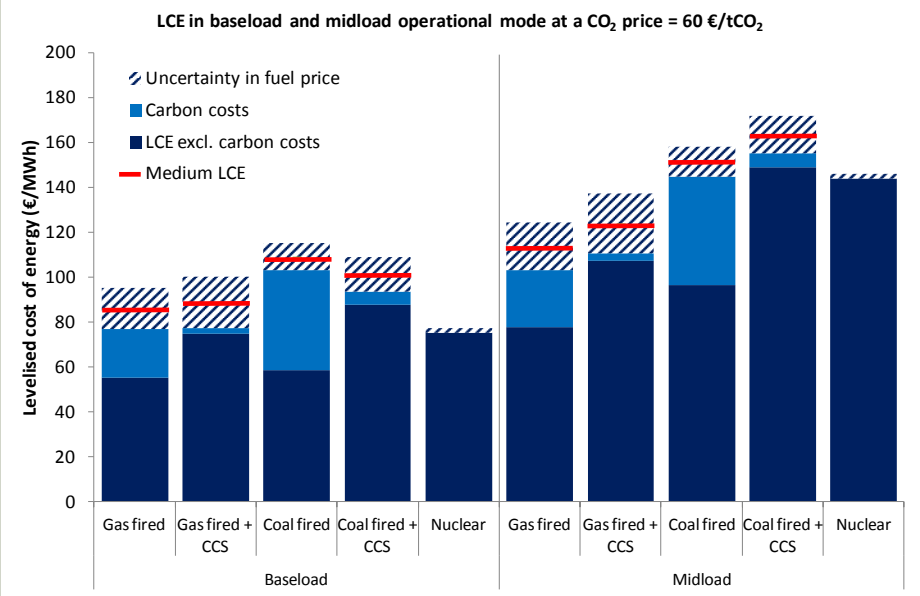
- Demand response not yet available on large scale.

…resulting in more uncertainties for new investments in power generation capacity.

Shift of focus and concern from “energy” to “capacity”

- Wind and solar needs both short term balancing reserve (peak generation capacity) as well as long term back-up capacity.
- There are limited alternatives to long term back-up capacity ➔ mid-load generation capacity needs to stay in the system, however with significantly lower running hours.

Number of running hours influences the economics of power plants considerably



Source: “Wind and Gas: Back-up or back-out, that is the question”, CIEP 2011

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Shift of focus and concern from "energy" to "capacity"

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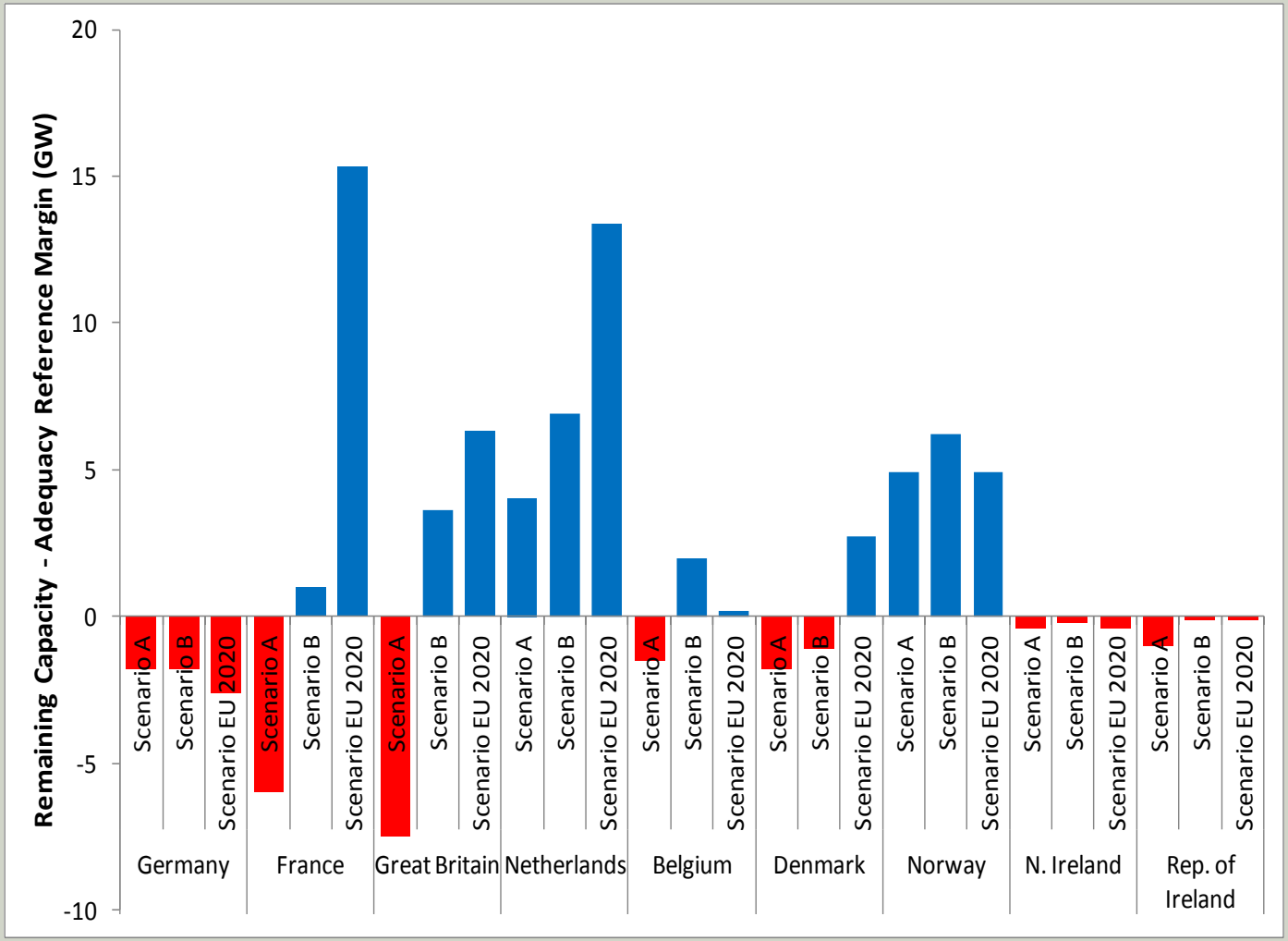
- There are limited alternatives to long term back-up capacity ➔ mid-load generation capacity needs to stay in the system, however with significantly lower running hours.
- **Reduced number of running hours of conventional capacity, results in poorer economics, potentially leading to mothballing/retirement.**
- **Scenarios of future generation adequacy lead to concerns**

Are new market mechanisms necessary for investments in power generation capacity?

Urgency to consider new market mechanisms in the NW European countries differs considerably



Source: CIEP. Data from ENTSO-E

Energy-only market or Capacity mechanism theoretical considerations

- **"Energy-Only" Market Theory**

Prices and price signals provide basis for investments in a well-functioning market

- However: this needs the right market conditions

VERSUS

- **"Capacity Mechanism Theory**

There is always a need for a capacity mechanism to safeguard generation adequacy:

- Fundamental uncertainty (e.g. ST inelastic demand & supply, long lead time investment) - What price level? How many load hours?
- *Risk averseness of* investors
- **Policy and regulatory risk and uncertainty e.g. price capping – RES policies etc**

Price sensitivities of energy-only markets
the "missing-money" problem

In an energy-only market:

- Electricity prices could (and should) "rock the sky" in case of scarce generation capacity
- This "scarcity price" is needed to support the economics of investments, but…
- Overhang of regulatory risk
  - Regulatory concern about market power
  - More price volatility with RES
  - Creating higher risk of price capping

Leading to

- "Missing money" problem (can be aggravated by further expansion of RES).
- Unattractive investment climate

Growing uncertainties could further delay new investments

- The "missing money" problem aggravated by increasing share of RES is serious, and growing
- Rapid transition toward a more RES based power generation mix has moved policy goalposts and leaves little (insufficient) response time for the market.

and

- Current discussions about the introduction of capacity mechanisms leaves the market holding back ⇨ ….self-fulfilling..?

(Source: Dice, Frontier, Cramton/Ockenfels, Eurelectric)

In an energy-only market the investment climate can be improved

Possible steps to improve investment climate in an energy-only market.

- No price caps
- Allow long term contracts
- Increase flexibility of demand side
- Reduce regulatory and political uncertainty
- "Connection"

and for NW Europe

- Harmonisation
- Interconnection

Would these steps be on time and sufficient to stimulate adequate new investments in power generation capacity?

(Source: Dice, Frontier, Cramton/Ockenfels, Eurelectric)

Which capacity mechanism? – Qualitative criteria

- **Enough reliable capacity?**
  - ❖ Right kind?
- **Stabilisation of generators revenues**
  - ❖Sufficient? Lead times? Contract durations?
  - ❖Scope for regulatory change?
- **Supply side efficiency**
  - ❖How many parameters determined through market forces? Complicated?
  - ❖ Inclusion of both existing and new capacity?
  - ❖ Inclusion of "external" sources?
- **Curbing use of market power in spot market & capacity market:**
  - ❖Witholding capacity
  - ❖Coordinated behaviour
  - ❖Limit price spikes
- **Availability**
  - ❖Incentive to maximise output?
  - ❖(How to) include (relatively unpredictable) RES-E?
- **Implementation costs**
  - ❖Fundamental change of design?
  - ❖Simple mechanism to administer?
  - ❖Difficult to exit?
- **Entry barriers?**
- **Demand side participation + storage**
  - ❖ In which market?
- **Locational element**
- **International dimension**
- **Etc…**

(Source: DECC, De Vries, Frontier, Eurelectric, etc)

Models for Capacity Mechanisms

Main criteria

- Targeted or Market-wide
- Quantity or price-based
- Central or decentral procurement

Market-wide * *

Targeted

Capacity Market
Volume set centrally

Capacity Payment * *
Price set centrally

Strategic Reserve
Central *

Capacity Obligation
decentral

Capacity Auction
Central *

Reliability Option
auction or obligation *

* Could be both central or decentral

* Conceptual range from all plants, existing and new, as well as non-generating options, e.g. DSR, storage, and interconnection capacity to selective

* Price is set centrally (fixed or declining)

Which capacity mechanism? – Strengths & Weaknesses

(Source: DECC, De Vries, Frontier, Eurelectric, etc)

	Strengths	Weaknesses
Capacity payment Spain	▪Compatible with decentral/bilateral electricity market ▪Simple for regulators ▪Stable, direct payment	▪Payment not market-based: over/underinvestment ▪Efficiency: payment only for new plants? ▪Administrative incentive for generators to be available at peak
Strategic reserve Sweden & Finland	▪Compatible with decentral/bilateral electricity market ▪Only focussed on limited part capacity (peak) ▪Electricity price still main driver of investment	▪No direct investment incentive ▪Determining implicit price cap: inefficiencies if too high or too low ▪Back-up variable RES: called too often. ▪Determine size reserve: "slippery slope" ▪Market power: procurement process & electricity markets
Capacity obligation Suggested: France	▪Decentral: reduces regulatory intervention ▪Simple for regulator ▪No direct intervention in spot market	▪Decentral: generally less liquid & transparent price formation ▪Possibly lack forward requirements ▪If secondary trading not possible, customer switching issue ▪Administrative incentive for generators to be available at peak + verifying complex
Capacity auctions Suggested in France & UK	▪Central auction: generally more liquid & transparent price formation than decentral ▪No direct intervention in spot market	▪Implemented in US in central pool system, complex design ▪Price cap (=penalty non compliance): non-market based (efficiency, regulatory risk) ▪Volatile prices auction: if no downward-sloping demand curve & not very forward looking (but resp. arbitrariness & sufficiently forward-looking?)
Reliability option Preferred authorities in Germany & UK	▪Central auction: generally more liquid & transparent price formation ▪ Considered best incentives for generators to be available during shortages ▪Strike price: less volatile prices	▪Complex design, original design: mandatory pool systems. ▪Limited practical experience (Columbia) ▪Determination strike price level key ▪Exercise market power in capacity market

Which capacity mechanism?- Some key messages:

- **No one-size-fits-all mechanism: relative importance of a specific performance indicator often explains differences between study results.**

- **In case of market power concerns: this can be curbed in spot market by a strike price. However, there could also be market-power abuse potential in the procurement process of capacity.**
  - With again the risk of regulatory intervention

- **Capacity mechanisms are geared to reliable sources: hard for fluctuating renewable sources to participate (in the future without RES incentive schemes) in the capacity market.**

- **The longer the lead times and contract durations in capacity mechanisms: beneficial for investor confidence and improving level playing field existing plants and new investments**.
  - However, this implies longer-term market forecasting, possibly resulting into more projection errors

- **Limited learning from experience with mechanisms**
  - Market conditions in each market are very specific and unique
  - None have been in existence long enough to draw firm conclusions
  - None have been introduced to deal with the impact of large amounts of wind and solar capacity
- **Desk studies offer different conclusions and not always totally unbiased**.

Developments in some NW European countries

UK **New Energy Bill**	No immediate threat but: ▪closure 1/5 existing capacity ▪more intermittent (wind) & inflexible (nuclear) generation	Capacity Market: ▪competitive central auction ▪capacity agreements: deliver or face penalties ▪includes existing providers and new providers, & demand side ▪in the delivery year, providers will be paid for their capacity ▪need & timing of 1st capacity auction decided by Ministers	▪Completed design 03/2013 ▪First auction: administered by NG: in 2014 if needed for capacity in 2015/16 ▪Main issue: interaction energy & capacity payments (CfD?)
Germany **On going discussion ?**	Challenge is increasing: ▪"missing money " +RES ▪Electricity price insufficient for OCGTs to recoup cost & some cases for CCGTs	Capacity market (option model) ▪Central auctioning ▪Regional angle: market splitting with capacity auction (hence regional differentiated prices) Implementation: prior to 2020	▪Consultation on study's findings, possible conclusions still pending?
France **Ongoing discussion?**	Main Reasons: ▪Shortage >2015 ▪Increased LT peak electricity demand due to a.o heating ▪also RES	NOME law: Capacity obligation ▪Current proposal: ▪Obligation for suppliers: capacity certificates ▪ Bilateral exchanges of certificates? ▪Ex post peak check TSO ▪Emergency mechanism: call for tenders	
Belgium **Ongoing discussion ?**	• Low investment appetite partly due to haziness in nuclear phase-out plans • Too little flexible capacity for regulating power • installed capacity shortage for cold periods	Plan from State Secretary Wathelet: • Strategic Reserve consisting of older, not-in-the-money plants • Guaranteed return for new built CCGT based on auction results • Creating clarity by fixed dates for nuclear phase-out	

Implementation risks

- **Single projection of future requirement is always wrong..**
- **Central agencies likely to err on the side of caution- overcapacity – higher costs**
- **Most studies argue that it is very difficult for a power plant/DSR in country A to participate in the capacity market/mechanism of Country B.**
  - **permanently reserve cross-border transmission lines**
- **If only domestic sources allowed: possible overcapacity and reduced cross-border trade and efficiency - higher costs**
- **Implementation processes could be complex with much potential for unexpected (regulatory) problems**
- **Regulatory imperfections (and political uncertainties) of current system should be addressed before introducing new market mechanisms which bring their own imperfections**

EU dimension: Significant effect?

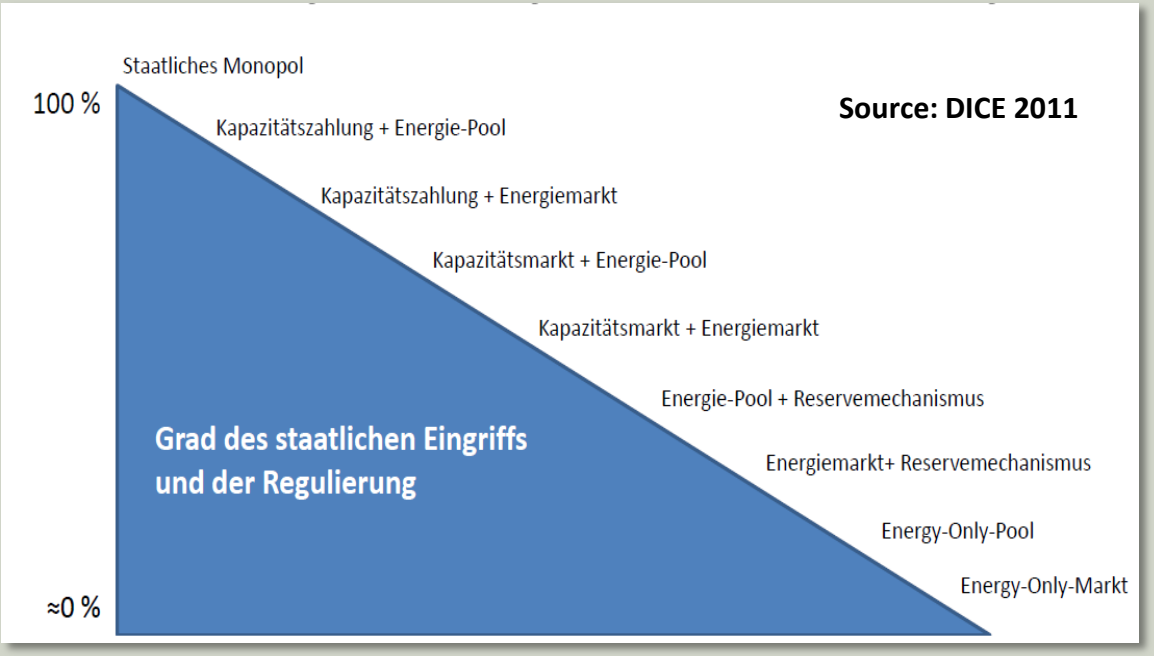
- **Different capacity solutions reflect national requirements and policy making towards secure national energy markets**
- **Different mechanisms across EU complicate internal market rules and ambitions**
- **Any capacity mechanism leads to (further) erosion of principles of liberalised markets,** with Strategic Reserve having the mildest impact
- **Different capacity mechanisms (or countries with and without) could result into inefficient investment incentives**
  - Impact on congestion?
- **Distributional concerns:**
  - National consumers could end up paying for the resource adequacy in other countries.
  - Reliability option best way to cope. However firm contracts required. Otherwise: difficult to enforce.
- **Impact on (the mechanism of) market coupling/ bidding?**
- **European approach feasible?**

Discussion

- What are the chances of energy-only markets and prospects
- NW Europe aggregate of capacity and interconnection: how realistic?
- Strength and weaknesses of mechanisms
- Containment and spill-over
- Impact on Internal Market
- Status and necessity

Key issue: Extent of regulatory intervention

- Regulators: to what extend do they believe market participants will invest sufficiently (in the right kind of capacity).
- Companies: to what extend do they believe regulators will not intervene?



EU dimension: Where from here???

- **The genie seems out of the bottle...but**
- **No need to rush into new measures:**
  - Economic slowdown
  - Aggregate of NW Europe should suffice (given sufficient interconnection)
  - Consider existing instruments (i.e. art 7 Directive)
  - Finalise implementation 3rd package
  - Consider developing CB-balancing mechanisms
- **ST concern basically about coal/gas competition……**
- **Articulate the EU –role:**
  - Assess the CB-basis
  - State aid issues
  - The PSO-issue (necessary, proportional, transitory)

Linking "2014/15 with the post 2020 policy….

- **Develop/use long term view of European energy market design & system**
- **Assess the issue on a CB-basis**
- **Study internal market implications of various mechanisms**
- **Consider regional approaches**

Thank you for your attention

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