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HOW ADVERSE CROSS-BORDER EFFECTS OF CAPACITY MECHANISMS CAN BE MITIGATED

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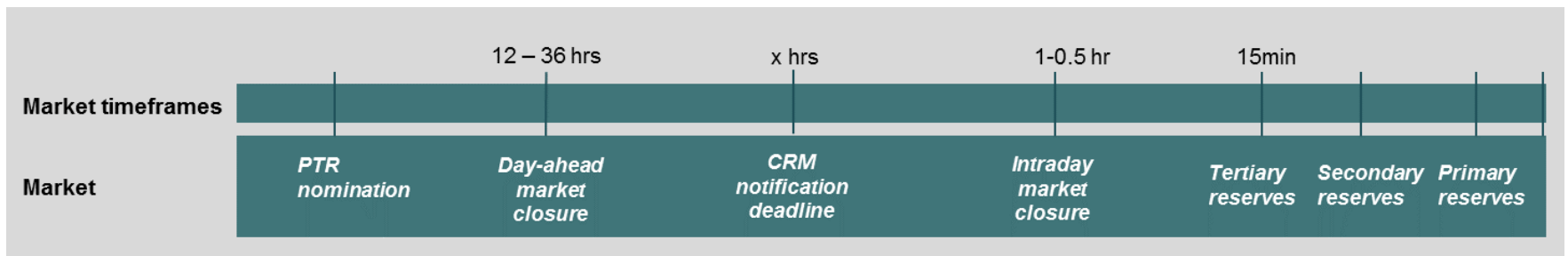
THE PROBLEM

- Individual capacity mechanisms (CRM) distort investment incentives in interconnected markets
 - By causing over-capacity in the CRM market
 - By *reducing the value of trade*, and inherently, the value of interconnectors
- Adverse effects increase when
 - Markets are more integrated
 - Prices are less correlated
 - Stress events are less correlated
- Commission, ACER: The value of trade and interconnected capacity (ICC) should be included:
 - Indirectly by including interconnector capacity in capacity adequacy assessments
 - Directly by facilitating cross-border participation

- On-going discussion
- Frontier: Straw man proposal
- T-CG: Wooden man proposal

PURPOSE AND DESIGN OF CAPACITY MECHANISMS

- Up-front payment to ensure capacity adequacy *during stress events*
- For authorities: Payment reducing the probability of rationing in stress events
- For generators: Revenue reducing uncertainty of profitability of investments
 - Compensates (perceived) “missing money” from the energy only market
 - Obligation: Availability (bid) or delivery (generation/flow)?
 - Domestic capacity: Availability = delivery
 - Penalty: If obligation is not fulfilled during stress events
- Interconnected capacity should be remunerated on equal terms with domestic capacity
 - Equal contribution yields equal payment, obligation and penalty
 - Delivery requires both available interconnector capacity and generation (surplus) in the interconnected market



MODELS FOR INCLUSION OF X-BORDER CAPACITY

Interconnector model

- IC owner bids into CRM
- (Own) *delivery* obligation:
Penalty related to flow
 - Penalized on equal terms with domestic capacity
- (Own) *availability* obligation:
Penalty not related to flow
 - Not penalized on equal terms with domestic capacity
 - Domestic capacity:
Availability = delivery, if grid access
 - IC: Availability ≠ delivery, depends on market solution
- Obligation should be delivery
 - No doubt about contribution
- *Can provide efficient solution*
 - IC risk management options

Generator model

- XB generators bid into CRM, buys access right to IC capacity (e.g. PTRs)
 - Part of CRM value accrues to IC owners
- Full delivery obligation: May pervert dispatch in non-CRM market
 - Availability of long-term PTRs, Use-it-or-lose-it?
- (Own) availability obligation:
Not responsible for flows or availability of IC
 - Not penalized on equal terms with domestic capacity
- *Difficult to see how individual generators can manage the risk properly*

Combined model

- Generators bid into CRM
- Simultaneous IC capacity auction
 - Scarcity rent accrues to IC capacity: Allocates capacity payment to IC owner
- (Own) availability obligation:
Penalty related to bids
 - Does not pervert dispatch in non-CRM market
- No obligation on IC owner
- Generators can only participate in one CRM at the time
 - Perverted long-term incentives

MODELS FOR INCLUSION OF X-BORDER CAPACITY

Interconnector model

- IC owner bids into CRM
- (Own) delivery obligation: Penalty related to flow
 - Penalized on equal terms with domestic capacity
- (Own) availability obligation: Penalty related to availability
 - Penalized on equal terms with domestic capacity
- **Main weakness: Conflicting role of TSOs**
- Availability ≠ delivery, depends on market solution
- IC: Availability ≠ delivery, depends on market solution
- Obligation should be delivery
 - No doubt about contribution
- *Can provide efficient solution*
 - IC risk management options

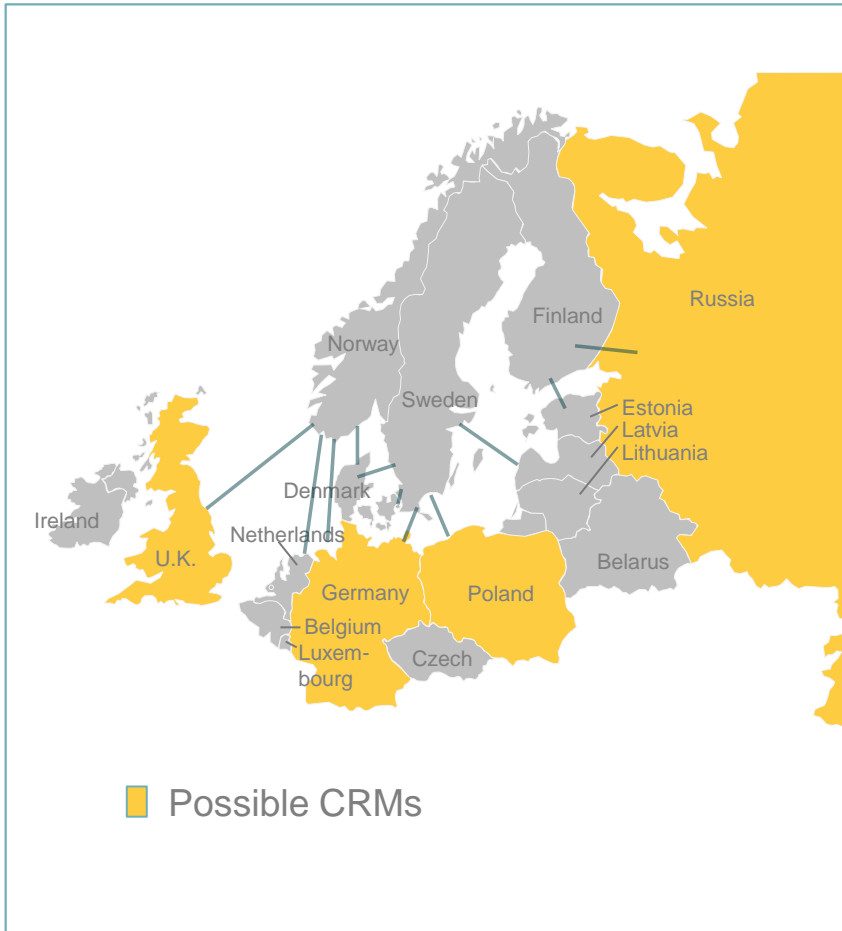
Generator model

- Generators bid into CRM, buys PTRs or similar access right to IC capacity
 - Part of CRM value accrues to IC capacity
- **Main weakness: Incentives of non-CRM generation**
- (Own) availability obligation: Not responsible for flows or availability of IC
 - Not penalized on equal terms with domestic capacity
- *Difficult to see how individual generators can manage the risk properly*

Combined model

- Generators bid into CRM
- Simultaneous IC capacity auction
 - Scarcity rent accrues to IC capacity
- **Main weakness: Limited responsibility and participation**
- No obligation to deliver
- Generators can only participate in one CRM at the time
 - Perverted long-term incentives

THE NORDIC PERSPECTIVE



- Ample capacity in the Nordic – small probability of system stress events
- NO-SE-SF: low correlation with neighbouring markets (prices, SSE)
- High value of trade and IC
- Nordic ICC contributes to capacity adequacy in several markets
- As more ICs are built, generation capacity may be more scarce
 - Should incentivize new investments if profitable from overall perspective
- Ability to deliver depends on the interconnected Nordic area
- ICs compete for capacity in the market: Common CRM options market?

CONCLUSIONS

- Main concern: Restore long-term investment incentives for interconnectors and distribution of investments between markets
- Criteria for efficient participation:
 - CRM market: De-rated ICC capacity should be as reliable as domestic generation and DSR
 - Non-CRM market: Capacity payments should be allocated to the scarce resources according to their contribution to capacity adequacy (IC and generation/DSR)
- IC models more likely to provide efficient solution
 - Can draw on all available resources across the Nordics
 - If necessary, may incentivize new investments across the Nordics via CRM options
 - Possible split TSO incentives need to be addressed
 - Other possibilities to restore incentives may be investigated further



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ECONOMIC EFFICIENCY CRITERIA

- **Benchmark: Efficient (optimal) energy only market**
 - Energy only market: Interconnector investments if economical
 - Based on (long-term) hourly price differences between markets
 - Both merchant and TSO owned ICs
 - Contributes to security of supply in the interconnected markets
 - Enhances economic efficiency in the interconnected markets
 - Trade affects prices and investment incentives in both markets – rewards contribution of resources in the common market
- **Participation of interconnected capacity should strive to restore (optimal) investment incentives across markets**
 - Between capacity in the CRM market, interconnectors and capacity in non-CRM market
 - Interconnector capacity needed in order to deliver
 - Generation capacity (and/or demand response) needed in order to provide flows
- **Criteria for long-term efficiency**
 - Both IC capacity and non-CRM capacity may be scarce: Both should be remunerated by the mechanism accordingly
 - Cross-border capacity should be remunerated on equal terms with domestic capacity

REMEDIES FOR SPLIT TSO INCENTIVES?

- TSOs as system operators have multiple roles
 - Market facilitator
 - Capacity adequacy assessment
 - Organizer of capacity auction
 - Setting IC ATC values
 - Investors in interconnectors
- Would participation in CRM and CRM options obscure neutrality?
- Possible mitigation of adverse incentives
 - Dual role in CRM Separate CRM operation and TSO operation
 - Dual role in balancing markets: Organize ICs in separate regulated companies
 - Strategic setting of ATC values: Organize ICs in separate regulated companies, determine ATC values via independent calculations by involved TSOs (or common FBMC algorithm)
 - Risk sharing: Organize ICs as separate regulated companies