# *The consequences of flow-based market coupling: a view from a market party*

**BAEE & CIGRE Policy Workshop**
**Flow-based market coupling: calculation, allocation and economic consequences**

26 April 2012

**Paul Giesbertz, Statkraft**

Statkraft
PURE ENERGY

# A market party's view on Flow Based Market Coupling (FBMC)

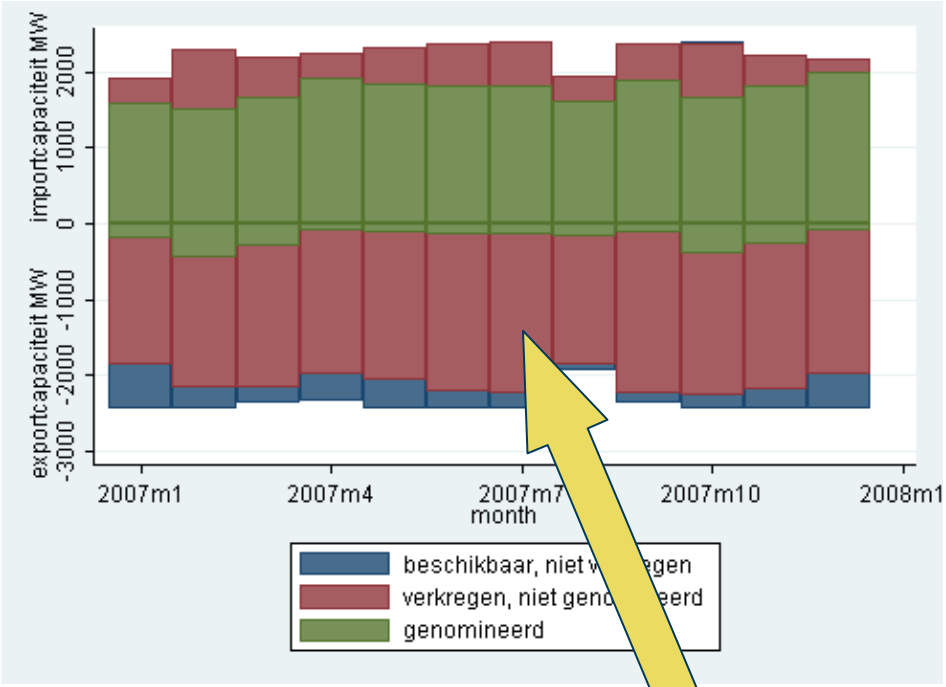
- --> Flow based allocation: some history
- --> FBMC is complex
  - -- maximum bilateral exchanges are non simultaneous values
  - -- Non-intuitive results
  - -- Impact of the Base Case
  - -- Internal lines as critical branches
- --> FBMC is great. But what about CACM?
  - -- ATC calculation, theory & practice
- --> Conclusions

Statkraft

# Usage of interconnectors in 2007

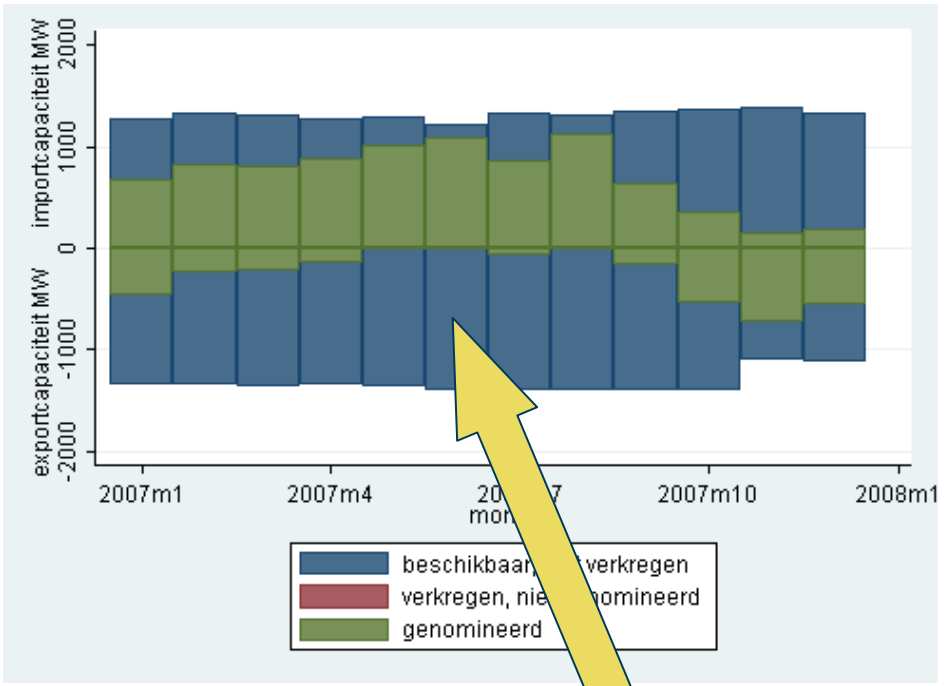
***NL-DE: sub optimal & congested; NL-BE: optimal & non-congested***

## NL – DE (explicit auction)




capacity obtained, but not used

## NL – BE (market coupling)




capacity available, but not needed

Statkraft

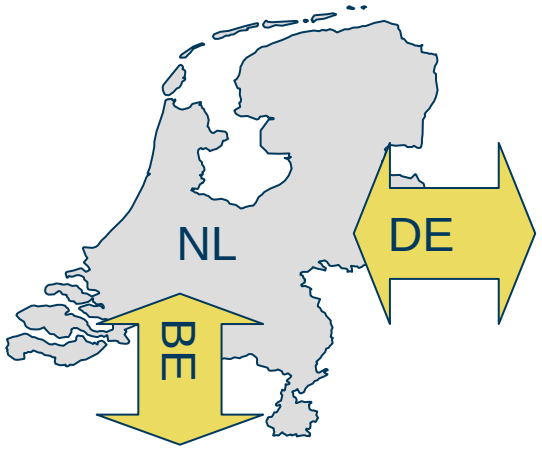


*Illustrations from: NMa Monitor 2007*

## Usage of NL-DE and NL-BE interconnectors

***Flow based approach should provide extra capacity***

--> Case NL day-ahead: NL-DE explicit; DE-BE implicit




--> No optimal usage (sometimes not fully used despite remaining price difference )

--> Often congested

--> Optimal usage (fully used in case of price difference)

--> Often not congested

--> Idea: shift capacity from BE- to DE-border

--> Can be realised by flow-based allocation

Statkraft

# Flow based allocation: history

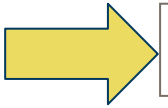
- --> Market participants have asked for flow-based approaches since 10 years
  - -- At that time, explicit flow-based calculation
- --> Flow-based should lead to more efficient usage of transmission infrastructure
  - -- More opportunities for cross-border trading
- --> Market became “concerned”
  - -- after first CWE flow based results in 2008?
    - “less XB capacity because of pre-congested branches in base case”
  - -- explicit flow-based CEE project
- --> CWE flow based project is regaining confidence
  - -- Publication and presentation of feasibility report in 2010
  - -- Plan to use extensive Parallel Run

Statkraft

# A market party's view on Flow Based Market Coupling (FBMC)

--> Flow based allocation: some history

--> FBMC is complex



- maximum bilateral exchanges are non simultaneous values
- Non-intuitive results
- Impact of the Base Case
- Internal lines as critical branches

--> FBMC is great. But what about CACM?

- ATC calculation, theory & practice

--> Conclusions

Statkraft

# FB constraints : maximum bilateral exchanges are non-simultaneous values (1)

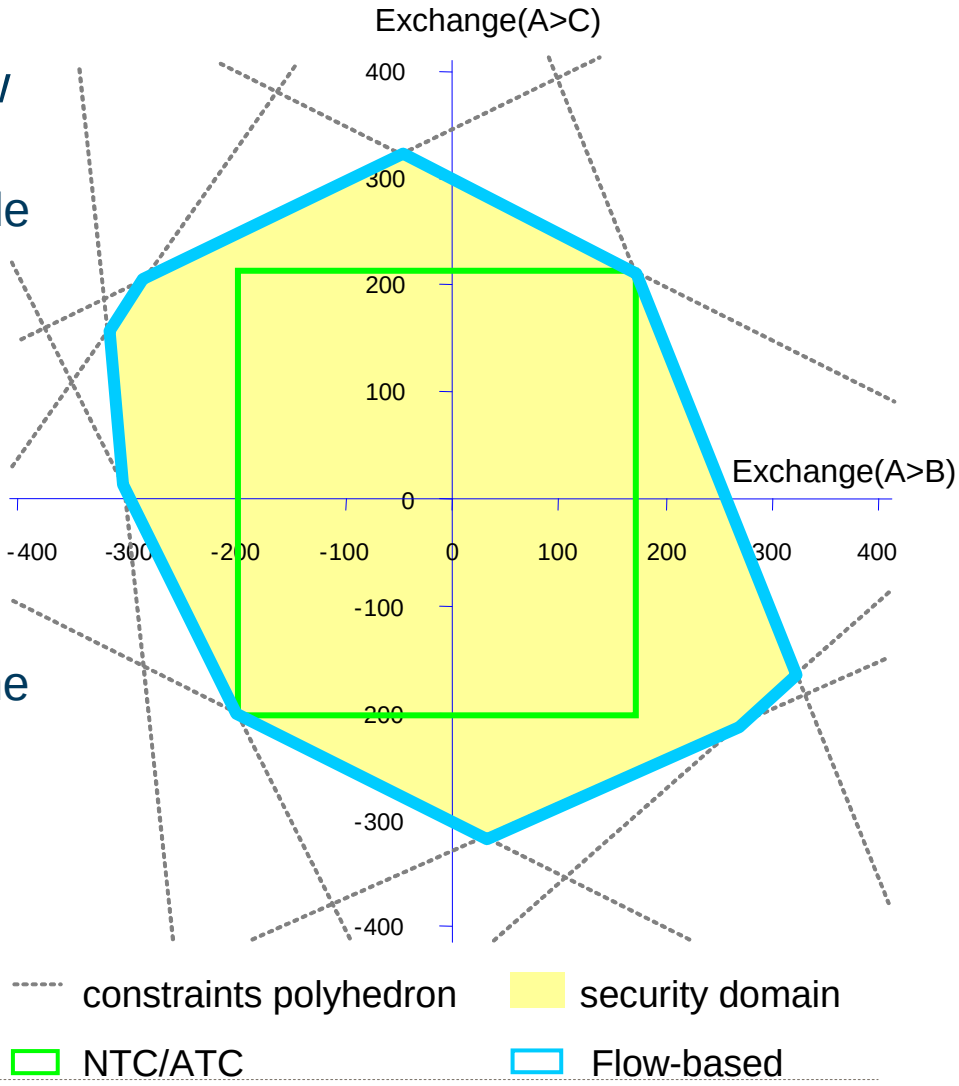
--> NTC/ATC and FB can/will show different values for the maximum bilateral exchanges that are feasible

--> FB

-- Maximum bilateral exchanges feasible in the FB domain are non-simultaneous values

--> NTC/ATC

-- NTCs/ATCs are by definition simultaneous values that limit the bilateral exchanges




Source: CWE flow based project

# FB constraints : max bilateral exchanges are non-simultaneous values (2)

--> This characteristic makes price forecasting more difficult

--> This will to some extent be mitigated by:
- Parallel run
- Utility Tool (as proposed by CWE project)

--> But, price forecasting (market analysis) is not only a day ahead activity, also for
- Forward trading / hedging (e.g. year ahead)
- Investment planning (10-20 years ahead)

--> Full *transparency* of *Common Grid Model* is needed

Statkraft

# A market party's view on Flow Based Market Coupling (FBMC)

--> Flow based allocation: some history

--> FBMC is complex

- maximum bilateral exchanges are non simultaneous values
- Non-intuitive results
- Impact of the Base Case
- Internal lines as critical branches

--> FBMC is great. But what about CACM?

- ATC calculation, theory & practice

--> Conclusions

Statkraft

# FB market coupling: will result in non-intuitive results (flows from high to low price area)

- --> Blocking non-intuitive flows will reduce "*day ahead* economic surplus"
  - -- But might increase "*total* economic surplus"
- --> No clear view
  - -- Market is used to non-intuitive flows
  - -- Positive that algorithm has a build in "switch"
  - -- Importance of Parallel Run
- --> But UIOSI arrangements (for long term Transmission Rights) need to be clarified
  - -- Negative pay-out not acceptable
  - -- Worrying that Congestion Revenue Distribution Method is still open

Statkraft

# A market party's view on Flow Based Market Coupling (FBMC)

--> Flow based allocation: some history

--> FBMC is complex

- maximum bilateral exchanges are non simultaneous values
- Non-intuitive results
- Impact of the Base Case
- Internal lines as critical branches

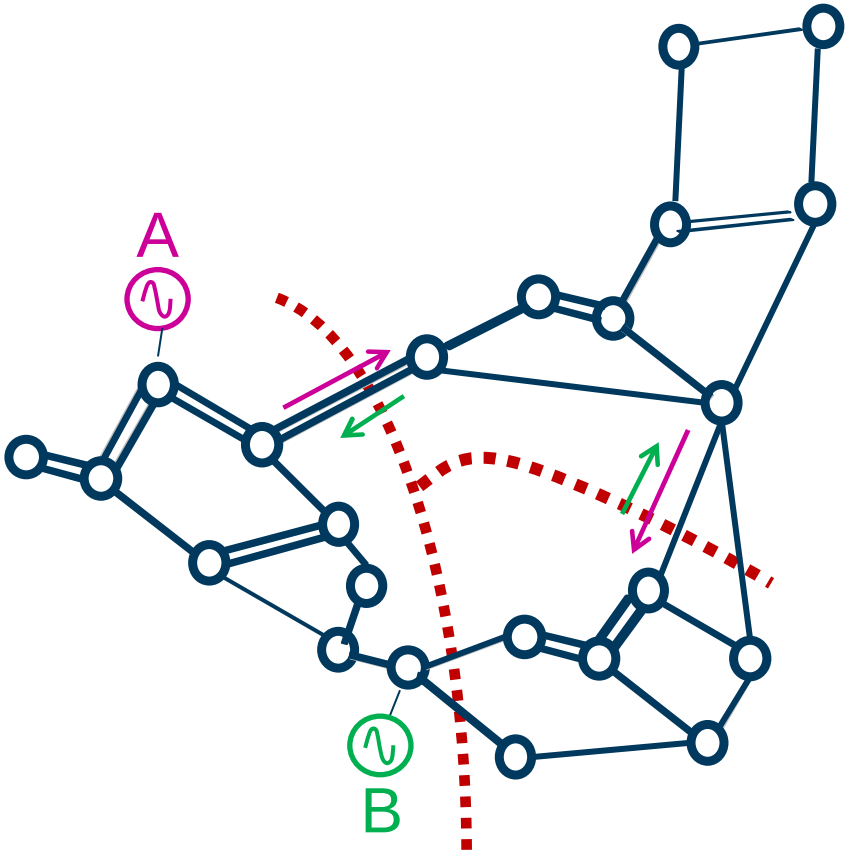
--> FBMC is great. But what about CACM?

- ATC calculation, theory & practice

--> Conclusions

Statkraft

# Impact of Base Case




- --> TSOs construct Base Case
- --> TSOs ask Generators to submit D-2 non-binding schedules, in order to construct accurate Base Case
- --> Selection of power plant A or power plant B in Base Case will determine the Security Domain and therefore influence market prices
- --> Transparency required!

Statkraft

# A market party's view on Flow Based Market Coupling (FBMC)

--> Flow based allocation: some history

--> FBMC is complex

- maximum bilateral exchanges are non simultaneous values
- Non-intuitive results
- Impact of the Base Case
- Internal lines as critical branches

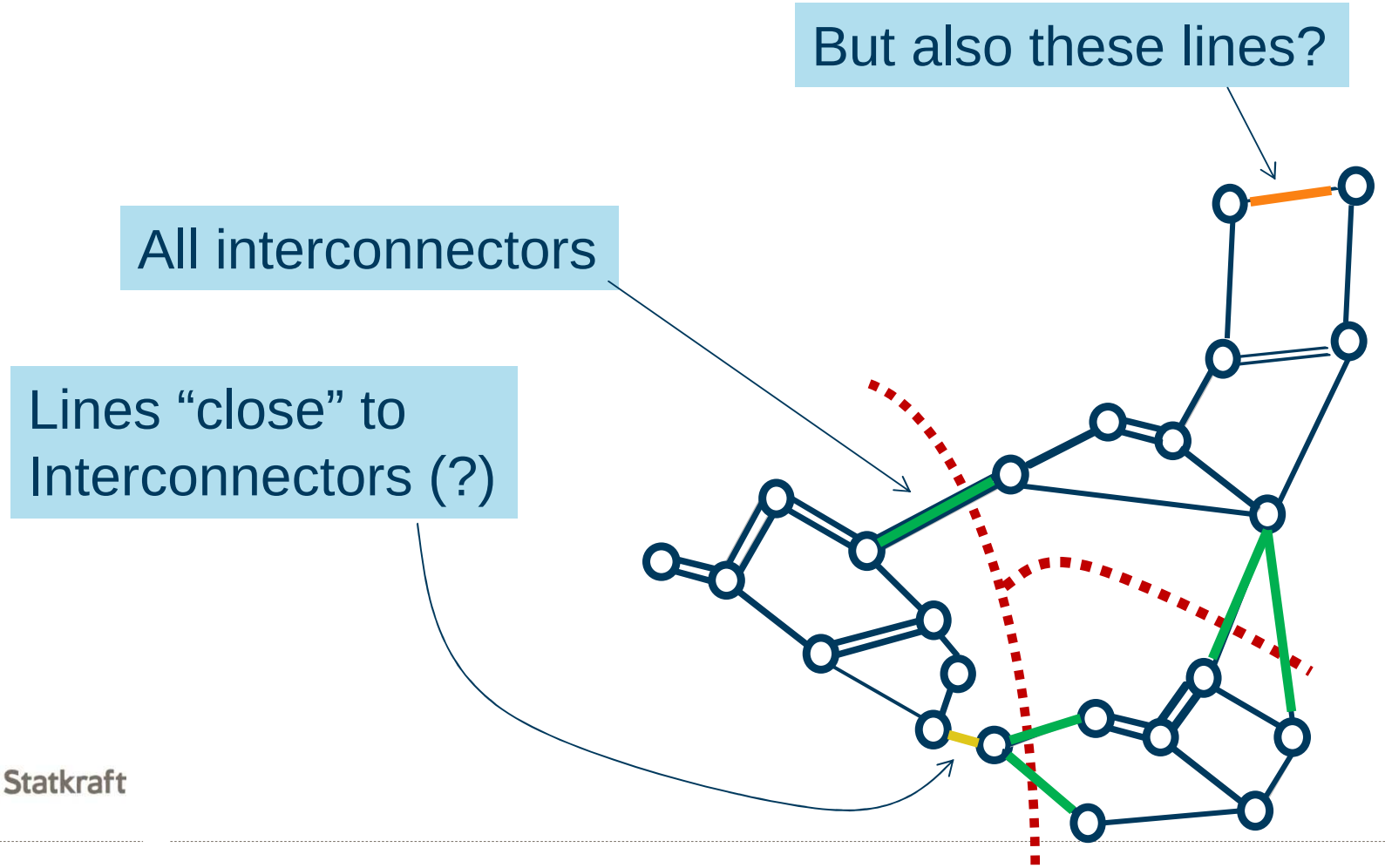
--> FBMC is great. But what about CACM?

- ATC calculation, theory & practice

--> Conclusions

Statkraft

# Which lines will be labeled as *“monitored lines”* or *“critical branches”*?




Statkraft

# An internal line being labeled as a critical branch: What does it mean?

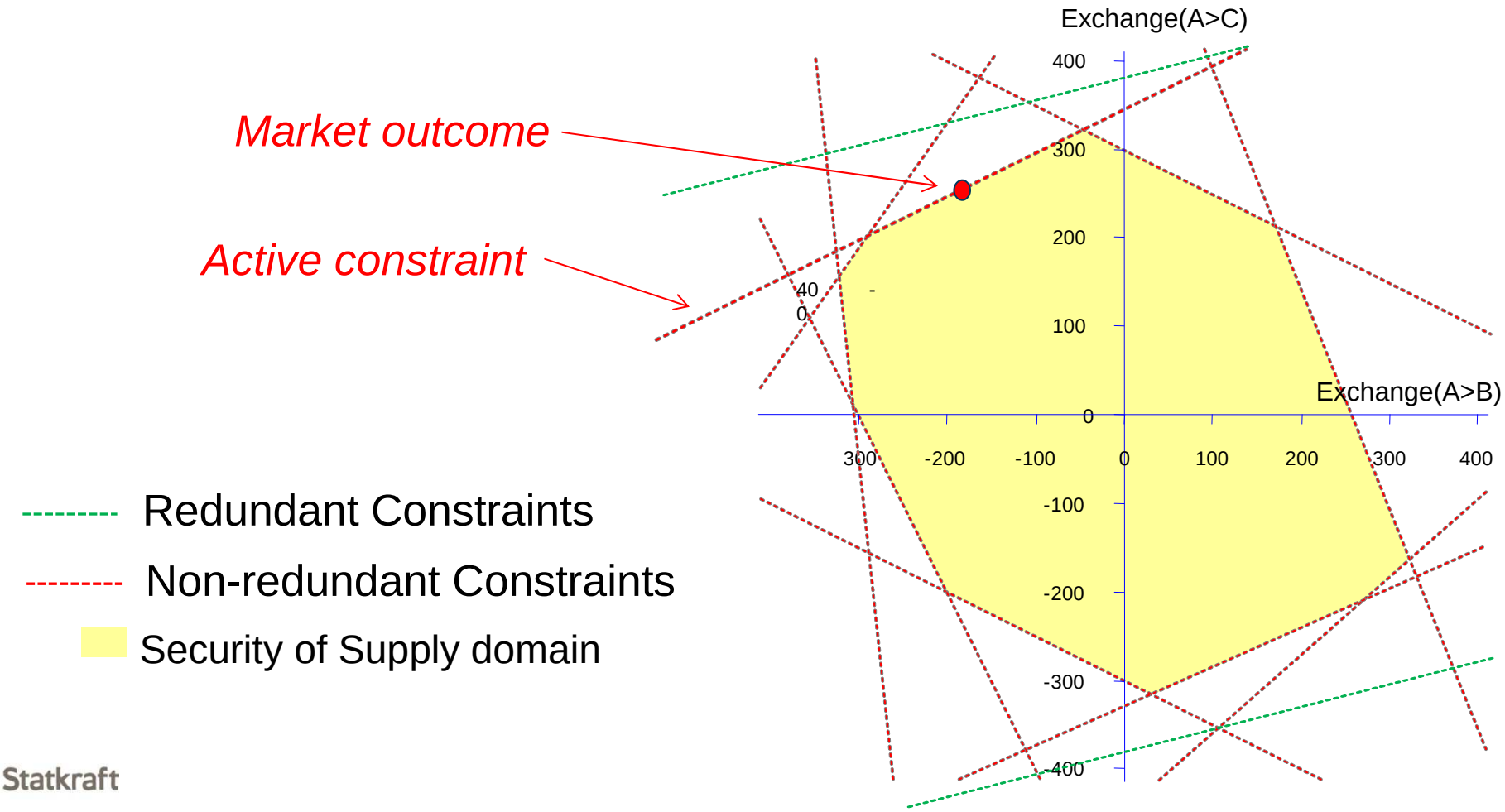
--> It means that the market coupling process will produce results (export/import values for countries A, B and C) that avoid congestions on that branch

--> If an internal branch becomes an active *) critical branch, then the congestion will be managed by restricting international trade, whereas ***other measures (redispatch or countertrade) will be ignored*** as a CM method.

*) A critical branch (in an hour) may or may not be limiting the security domain. If it does, it relates to a non-redundant constraint. If the market outcome is such that a non-redundant constraint becomes restrictive than the related branch can be called an active critical branch.

Statkraft

# The Security of Supply domain: redundant and passive constraints



# May internal lines being labeled as a critical branches?

--> Managing an internal congestion by limiting xb-trade, is that allowed?

--> Is this compliant with the SvK case (Case number: COMP No 39351) and EU Regulation 718 (CM guidelines)?

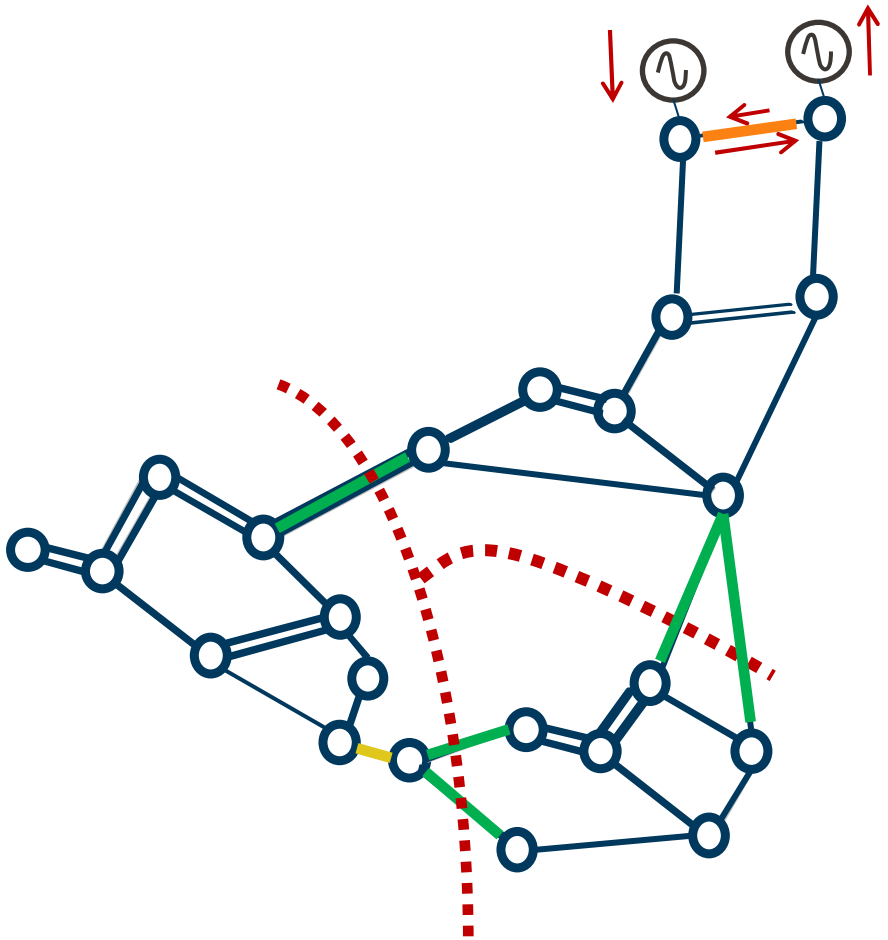
--> Interesting question, but let's skip the *legal* discussion today and focus on *efficiency*

Statkraft

# Redispatch is an alternative CM method

--> Redispatch (or countertrade) is an alternative Congestion Management method

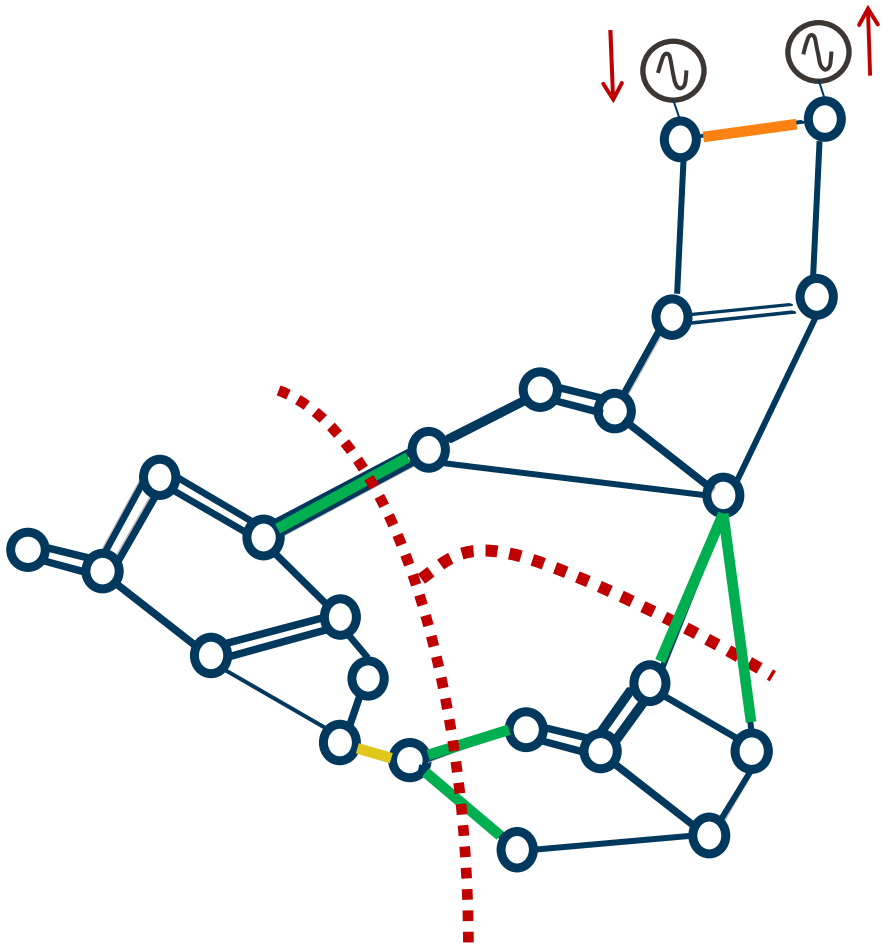
--> TSOs might favor the critical branch approach (no CM costs, more congestion revenues)



Statkraft

# How can internal lines being labeled as a critical branches? (1)

- --> It is obvious that labeling internal lines as critical branches (as a Congestion Management method) can be efficient, if
  - -- the branch is located close to the border
  - -- there are no redispatch possibilities
- --> but it can also be suboptimal, if
  - -- e.g. if the branch is a remote branch more at the periphery)
  - -- the security domain will be strongly reduced.
  - -- the export/import values will be pushed to extreme values
  - -- redispatching will be more efficient



Statkraft

# How can internal lines being labeled as a critical branches? (2)

--> If a TSO wants to label an internal line as “critical branch”, then the TSO has to ex ante justify that such a CM method is more efficient than redispatch/countertrade

--> This requires transparency on critical branches

--> No conflict with security / terrorism issues (critical infrastructure), as:

- A “critical branch” is not necessary a critical infrastructure
  - it just means that flow-based allocation is a more efficient CM method than redispatch
  - Therefore better to speak about ***“monitored lines”***
- Information on congested lines, anyhow has to be published, e.g. for network development plans

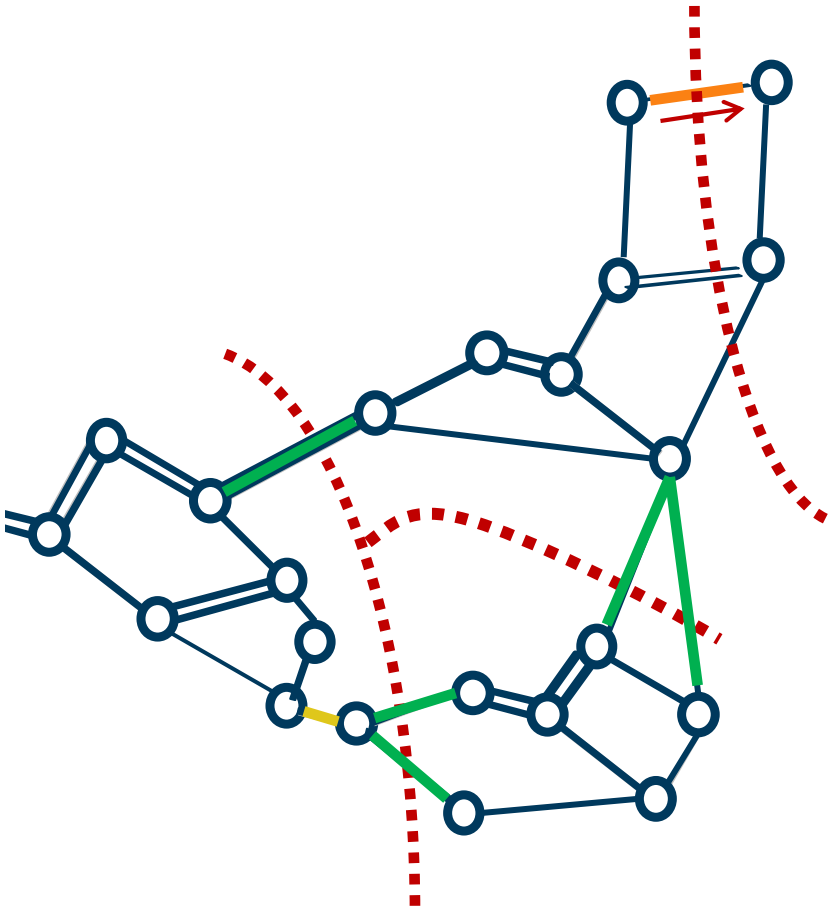
Statkraft

# What means “ex ante justification”?

- --> Pro-active (not on request)
- --> Fully transparent (not only for NRAs)
- --> Balance between detailed and pragmatic
  - -- Not on a day-to-day basis
  - -- Suggestion: yearly and when a new element is labeled as critical branch
- --> It is possible that at a certain moment redispatch is more efficient, whereas at other moments flow-based allocation is more efficient
  - -- In such cases, TSOs must be allowed to make some choices
- --> Planned ***external parallel run allows for valuable insights*** in the “day ahead economic surplus loss” of labeling an internal line as critical branch

Statkraft

# Are smaller bidding zones a solution?



- --> Not necessarily and anyhow no solution for “tomorrow”
- --> 4 TSOs (PL, CZ, SK, HU) have called for splitting of DE/AT bidding zone to manage *problem of unplanned power flows*
- --> A truly EU common approach for capacity calculation and congestion management should solve issue of “unplanned flows”
- --> Smaller bidding zones have detrimental impact on liquidity and competition (also retail)
  - -- These impacts must be assessed as well
  - -- Theoretical gains of nodal pricing are limited *)
- --> Another delimitation not excluded
  - -- National borders are not necessarily bidding zone borders
  - -- Borders where structural congestions (resulting in suboptimal redispatch) are apparent
  - -- Larger zones should also be considered

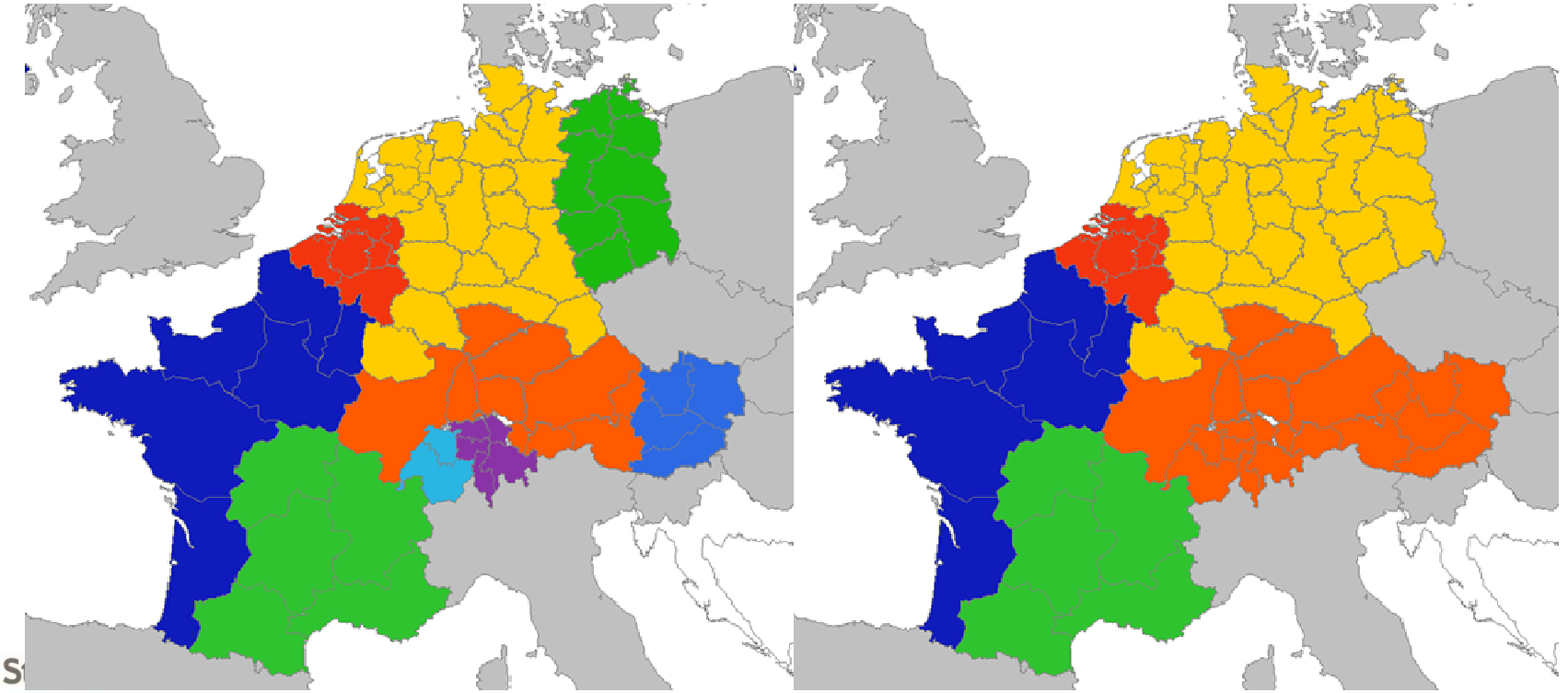
Statkraft



*) See: “FROM NODAL TO ZONAL PRICING - A bottom up approach to the second best”, Barbara Burstedde

# Final Zonal Delimitations 2020
# 9 (left) and 5 (right) zones

- Heuristic gives 5 as the optimal number of clusters
- Structural changes such as line extensions require redefinition of zones



Source: “FROM NODAL TO ZONAL PRICING - A bottom up approach to the second best”, Barbara Burstedde

# A market party's view on Flow Based Market Coupling (FBMC)

--> Flow based allocation: some history

--> FBMC is complex

- maximum bilateral exchanges are non simultaneous values
- Non-intuitive results
- Impact of the Base Case
- Internal lines as critical branches

--> FBMC is great. But what about CACM?

- ATC calculation, theory & practice

--> Conclusions

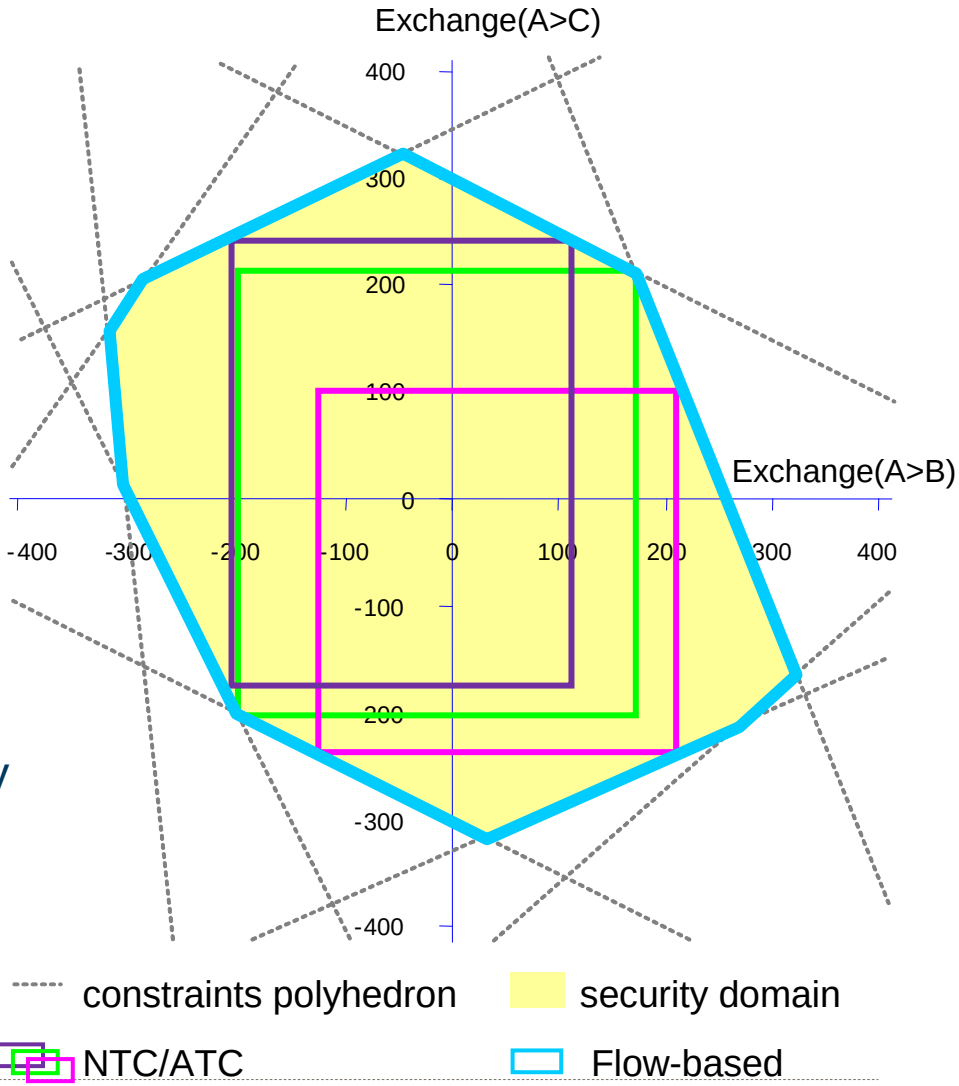
Statkraft

# ATC & FB constraints – theory

--> Security domain is obtained by taking into account all the relevant physical constraints of the grid

- Given the security domain, NTC/ATC constraints and the corresponding NTC/ATC domain are a choice made by the TSO

- The FB domain is the security domain itself




Source: CWE flow based project

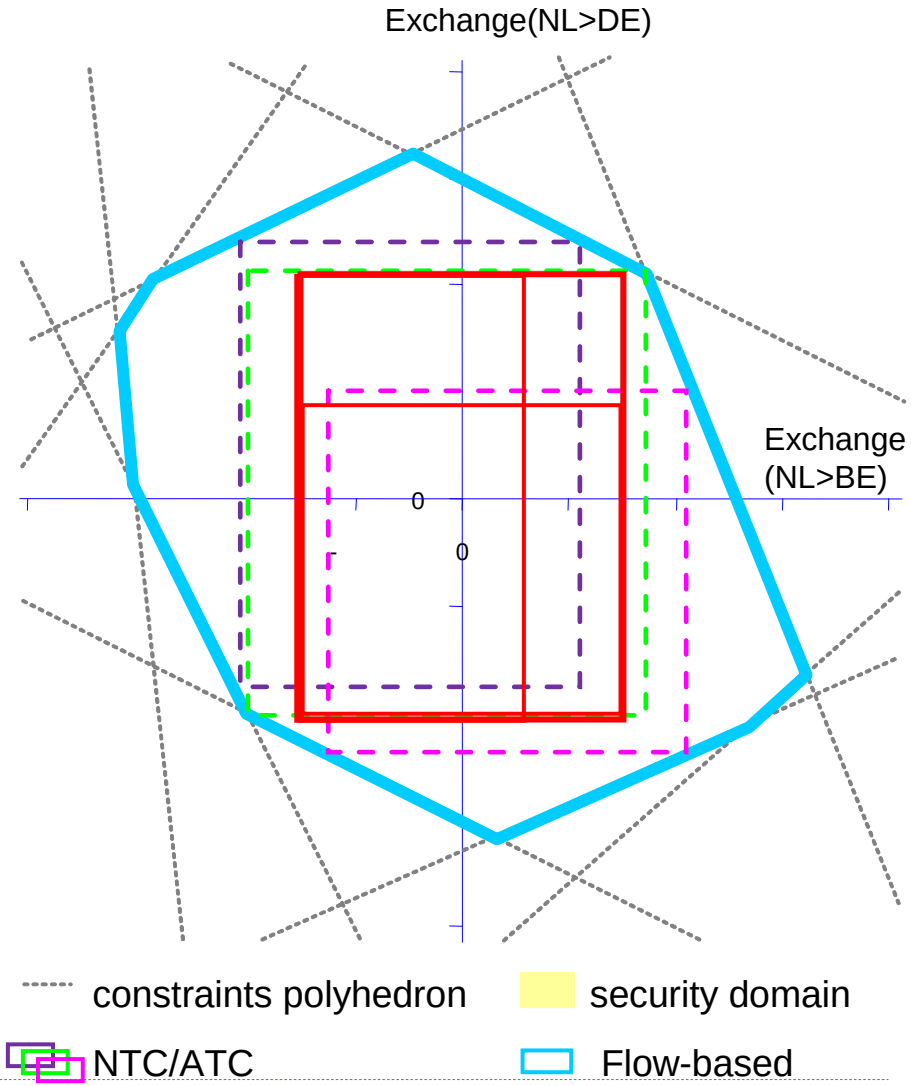
# ATC constraints – Dutch practice?

--> One max total import (export) value for NL allocated over two borders (NL-DE and NL-BE) with fixed allocation factors; 2500 MW NL-DE and 1400 MW NL-BE [1])

--> Equal value (3800 MW) for import as well as for export (?)

--> Result of calculation or "discussion between TSOs"? [2])

--> Will this old practice remain (as back up for flow based)?




Statkraft



[1]) Monitor Groothandelsmarkten 2010
[2]) www.tennet.org

# NL-BE border (from CREG Studie dec. 2011: *'de relatie tussen de fysische en commerciële interconnectiecapaciteit op de Belgische elektriciteitsgrenzen'.*

| | Franse grens | | Nederlandse grens | |
|---|---|---|---|---|
| | export | import | export | import |
| gemiddelde | 1.093 | 2.582 | 1.334 | 1.341 |
| winter | 1.187 | 3.065 | 1.358 | 1.339 |
| zomer | 1.004 | 2.184 | 1.309 | 1.345 |
| verschil winter-zomer | 183 | 880 | 49 | -6 |
| %verschil | 17% | 34% | 4% | 0% |

Tabel 3 : gemiddelde commerciële capaciteit op de interconnecties op Belgische grenzen (bron: Elia + eigen berekeningen)

"…Echter, er is nauwelijks variatie te zien in de capaciteit met de Nederlandse grens. Zoals eerder gezegd, is dit te verklaren door het feit dat de interconnectiecapaciteit met Nederland bepaald wordt door de Nederlandse Grid Code. Die wettelijke limiet zorgt ervoor dat zelfs de seizoensvariaties, die kunnen oplopen tot 12%, niet te zien zijn in de hoeveelheid commerciële interconnectiecapaciteit die ter beschikking gesteld wordt."

Statkraft

# A market party's view on Flow Based Market Coupling (FBMC)

--> Flow based allocation: some history

--> FBMC is complex

- maximum bilateral exchanges are non simultaneous values
- Non-intuitive results
- Impact of the Base Case
- Internal lines as critical branches

--> FBMC is great. But what about CACM?

- ATC calculation, theory & practice

--> Conclusions

Statkraft

# Conclusion: Complexity requires Transparency

- --> We need more “parallel” results, e.g. on:
  - --> Extreme cold period February 2012 (30 Jan - 19 Feb)
  - --> Economic surplus impact of internal critical branches
  - --> Sensitivity of Base Case assumptions
- --> More transparency
  - --> Full CGM and Base Case
  - --> Justification of critical branches
  - --> Regulatory approval process
  - --> Implementation Plan
    - --> Relation CWE flow based and NWE/PCR projects
  - --> Governance issues:
    - --> algorithm development, fall-back procedures, quality control, incidents & liability

Statkraft

# Conclusion: CACM is the main issue

- --> Capacity Calculation and Congestion Management remains the black box
- --> Do not jump into the conclusion that a new delimitation of bidding zones is required
  - --> Such a change needs time
  - --> In the mean time: black box must be opened
- --> A single EU and transparent approach is needed
- --> draft CACM Code is too vague/general

Statkraft

# For discussion

We need to focus more on efficient cooperation by TSOs, especially on capacity calculation and efficient congestion management and less on (flow based) market coupling

Statkraft

PURE ENERGY

# Thank you!


Paul Giesbertz

Phone +31 20 795 7874

paul.giesbertz@statkraft.com

Statkraft Markets B.V.

Gustav Mahlerplein 100

NL – 1082 AM Amsterdam