



North Western Europe Day Ahead Price Coupling Project

Recap PCR Algorithm

14 June, London





Summary at a glance

1. Input

- a) Network data (capacities, ramping limits, losses, etc.)
- b) Order book data (aggregated curves, additional supported products)

2. Calculation

- a) Objective function: welfare maximization
- b) Limited by constraints (requirements), and time!

3. Output

- a) Net export positions and flows/nominations
- b) Clearing prices, aggregated accepted quantities and acceptance status for additional products



The (size of the) problem to be solved

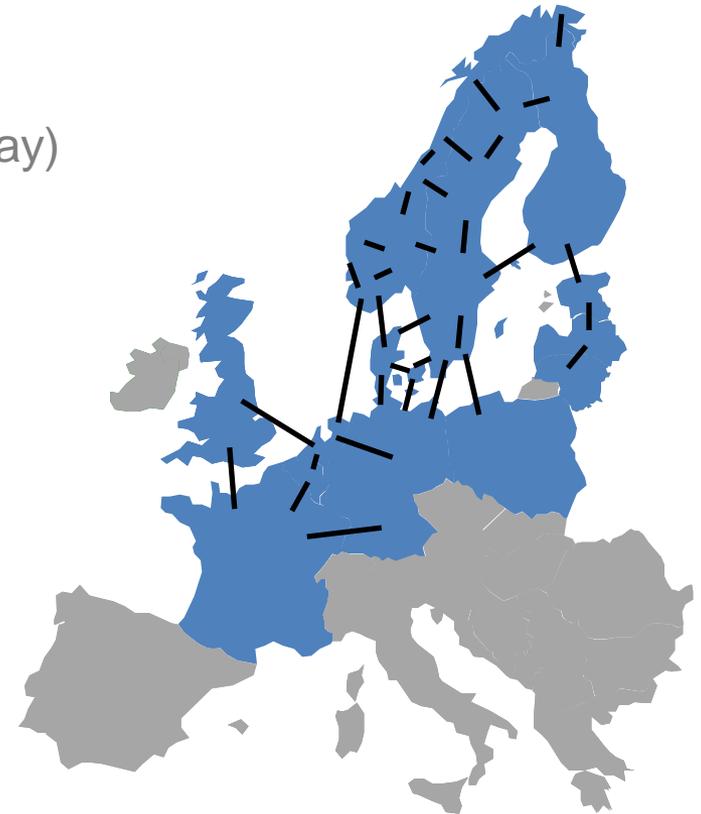
Historical 2012 NWE data as used for simulations

27 bidding areas

- a) Average of 6.2 TW submitted quantity (per day)
- b) 1,800 block orders (per day)

38 lines (interconnectors)

- a) Ramping limit for 8 lines (Nordic)
- b) Losses for 3 lines (IFA, BritNed and Baltic)
- c) Tariff for BritNed (first part of 2012)





Network requirements (implemented)

1. Lines

- a) Capacity
- b) Ramping limit (and cumulative ramping limit)
- c) Losses
- d) Tariffs

2. Areas

- a) Hourly ramping limit
- b) Daily ramping limitation using hourly thresholds (and reserve)

3. Network

- a) ATC
- b) Flow based (including combination ATC/flow based)



Price - network properties (ATC)

- 1. No congestion revenue if available capacity not scarce**
This includes lines with losses
- 2. Positive revenue if available capacity is limiting the flow**
i.e. if line is congested
- 3. Potential negative revenue if**
 - A line has negative capacity
 - The flow is limited by a (cumulative) ramping limit



Market requirements

1. Limit orders

- Acceptance only depends on hourly clearing price, can be curtailed
- Aggregated curves can be both stepwise and piecewise linear

2. Block orders (normal/profiled, linked and flexible)

- a) Quantity for multiple periods
 - b) Fill-or-kill condition
 - c) Acceptance based on weighted average price
- Additional/special conditions for linked and flexible block orders

3. Prices

- a) Negative minimum price
- b) Measures for non-harmonized extreme prices
- c) Deterministic rules for price indeterminacy (mid-point)