

Delivery of secondary control (aFRR) by wind farms

Users' Group

10th of December 2015



aFRR- Wind project: technical pilot project

Involved parties



Owner wind farm
of Estinnes



Manufacturer
wind farm



BRP
R2 contract



TSO

Scope of pilot project

- Check technical capability of wind farms to provide downward aFRR (R2)
- Perform a two month period test where wind farms participate in downward secondary control (aFRR-) at Elia

Wind farm of Estinnes

- Direct driven (variable speed) synchronous generator / full convertor
- 10 x ENERCON E-126: 7,5 MW
- 1 x ENERCON E-126: 6 MW



Ancillary services in Belgium: context (1)

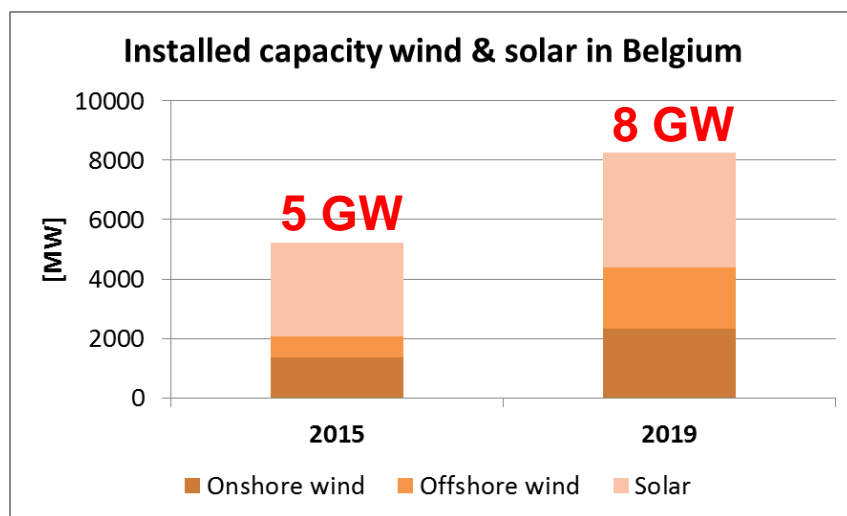
Keeping the balance between generation and offtake



Large scale integration of intermittent renewables represents a balancing challenge...

... intermittent renewables can be flexible and should be part of the solution

With increasing volumes of renewables in the grid

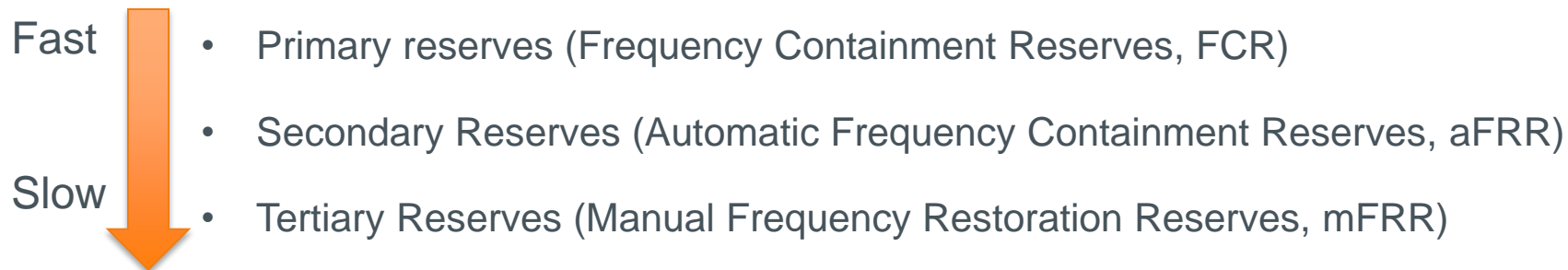


BE peak load:
13 – 14 GW

High share of non-flexible baseload

Ancillary services in Belgium: context (2)

TSO contracts reserve capacity for balancing its control area



In Belgium the contracting of aFRR capacity (spinning reserves) often leads **to start-up of gas units, that are out of the money**, in particular with high share of nuclear, to **deliver the service** to the TSO

- Situation leads to high “must run”-costs

Hence diversification of aFRR resources should be considered:

- Biomass, cogeneration, demand side,...
- **Renewables: wind, solar**

Ancillary services in Belgium: aFRR product

P_{ref} power profile (defined by producer)



For a windfarm the P_{ref} is not known
Active Available Power (AAP)
mechanism:

- Calculation of the P_{ref} on the basis of power infeed, pitching of the blades, wind speed, ...
- AAP quality is key: AAP is starting point for regulation

Elia aFRR set point (ΔP) power profile



+



Wind farms are highly flexible and can follow a set point ΔP



Required power output profile of the unit

Bidding gate closure time & product resolution

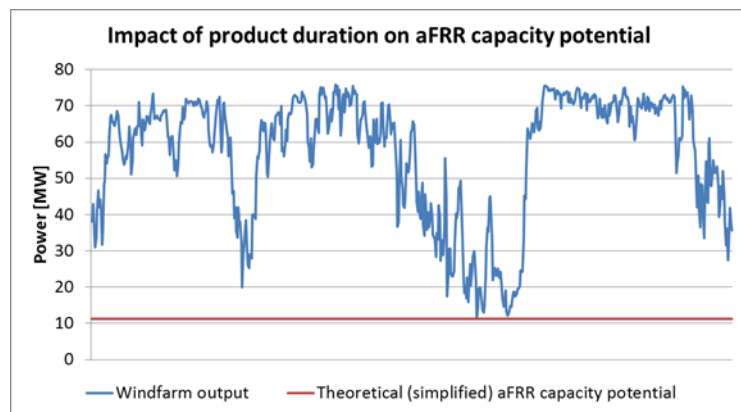
Today in Belgium:

- Monthly procurement of aFRR capacity
- Product resolution: peak and long off-peak (incl. WE)
- GCT for aFRR energy bids: day-1 at 15h00

Further investigations:

- Procurement lead time: as short as possible (e.g. DA)
- Product duration: as short as possible (e.g. daily)
- Product resolution: as high as possible (4 or 8 hours)
- High reliability of D-1 nominations: up to 99% reliable nominations for single windfarm

Weekly wind farm production



Potential of produced energy that could be offered as downward capacity (if perfect forecasting and no minimum power)

	Product duration / product resolution	Peak & long-off-peak	8h blocks	4h blocks
Onshore wind farm	Month	0%	1%	1%
	Week	4%	5%	8%
	Day	34%	50%	65%
BE aggregated offshore production	Month	1%	1%	1%
	Week	6%	7%	11%
	Day	47%	65%	78%

Technical pilot project: general conclusions

- Wind farms are highly flexible and can provide ancillaries to the grid
- AAP method very promising to ensure efficient delivery of aFRR capacity by windfarms
- Pilot project identifies both technical and market aspects that need to be investigated and analysed further in detail for provision of aFRR- capacity by windfarms
 - How to handle loss of green certificates in case of downward curtailment?
 - transition to shorter procurement lead time and product duration
 - shorter product resolution
 - reliability of R2 nominations
 - Accuracy of the AAP profile: improvements for AAP calculation,...

Thanks for your attention!

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Link to study: <http://www.elia.be/nl/users-group/ad-hoc-werkgroep-balancing/studies-publicaties/R2-wind%20study>

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