Market4RES

Presentation of main results from the Market4RES project:

A view on the policy recommendations on electricity market design post 2020

Final event

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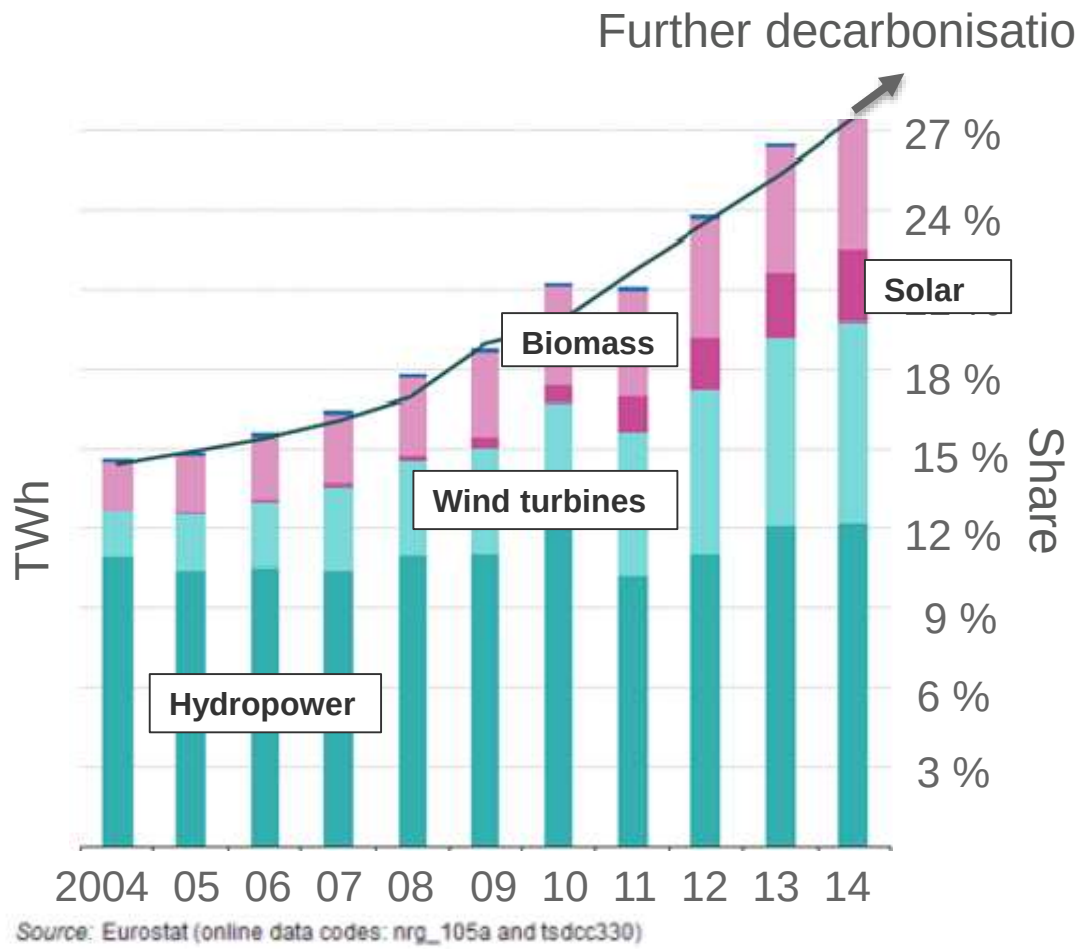
Europe's policy for promoting integration of RES-E technologies has been a success story

- Replacing fossil fuels with renewable energy is important
  - for combating global warming
  - reducing dependency of imported energy.
- RES-E directives 2001 and 2009
  - Targets for RES-E shares
  - Priority dispatch to avoid curtailment
  - Feed-in tariffs in many countries, reducing investor risks

Increasing shares of renewable generation in EU



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Challenges

- Concerns about security of supply
  - Increasing share of production is affected by weather conditions
  - Firm capacity having problems to recover their investment costs due to lower prices
- Considerable financial support is provided to RES generation
- Efficiency of electricity markets
  - Market distortions
  - Level playing field
  - Cross border trade

The Market4RES approach

- Markets fit for RES
- RES fit for market

Market fit for RES at all timeframes

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Markets for electric energy: Keep up the momentum in harmonization!

- CACM guideline
  - Adopted
  - day-ahead, intraday, capacity calculation, …
- Day-ahead markets in 19 countries are connected, 85% of consumption
- Focus should be put on implementing integrated and well-functioning intraday markets
  - PX initiative (XBID) for European trading platform, live 2017?

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Intraday market

- Gate closure should be close to real time operation
  - Allowing VRES to correct for forecast errors
- Continuous trading should be combined with some organized auctions to increase liquidity
- Availability of transmission capacity
  - Flow-based schemes are recommended
  - Consider if some capacity should be reserved for intra-day

Electricity balancing (procurement, activation)

- NC EB
  - Pending
  - It has good intentions with respect to RES !
  - But much is still left open to be specified in the future

- Markets for ancillary services
  - Should be open for RES generation and demand to the extent they can provide it,
  - … and products should be specified with their characteristics in mind
  - Separated procurement of power (MW) and balancing energy (MWh)
  - Separated procurement of upward- and downward reserves
  - Cross border netting of imbalances

Capacity markets

- Market4RES project does not take a position on whether CM are needed or not. This should be revealed by proper system adequacy assessments.
- However, over-investment in capacity due to lack of coordination between different countries should be avoided.
- Design recommendations
  - Financial option with a high strike price
  - Penalty for non-delivery
  - Price/quantity curve to reduce strategic bidding
- Interconnectors should be allowed to participate in CM (statistical availability can be accounted for)

Consumers

- Demand-side flexibility
  - Can contribute to balance RES variability
  - The value of it will increase with higher RES-shares
- Exposing consumers to prices will:
  - Activate some of them
  - Improve efficiency of market
- Needed infrastructure
  - Day-ahead / intraday: Automatic metering
  - Ancillary services: Advanced controls needed; both direct & indirect (DSO) approaches should be allowed

The Market4RES approach

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Diagnosis and views

- Initially, European power markets were not fit for RES
- Still, Europe's policy for promoting integration of RES-E technologies has been a success story
- This is not the time to stop supporting RES
- A shift towards market-based schemes must be accompanied with having making market fit for RES

Ideal features for RES support schemes

- Short term efficiency (operation)
  - Do not interfere with short-term price signal
  - Do not incentivize production when prices are negative
- Long-term efficiency (investments)
  - Use of tenders to select best projects
  - Support based on MWh renewable power produced
- Designed to reduce risk for investors; reducing cost of capital
- Scheme should reflect maturity of: Markets, RES technology

Proposal for RES support scheme

(1) Floating price premium

- Premium on top of average electricity prices
- The premium should be adjusted e.g. each year to reach a target level for total price (thus floating)
- The system is in use in several European countries

(2) The total price should be set through a tender

➢ Facilitates reduction of risk & long-term efficiency

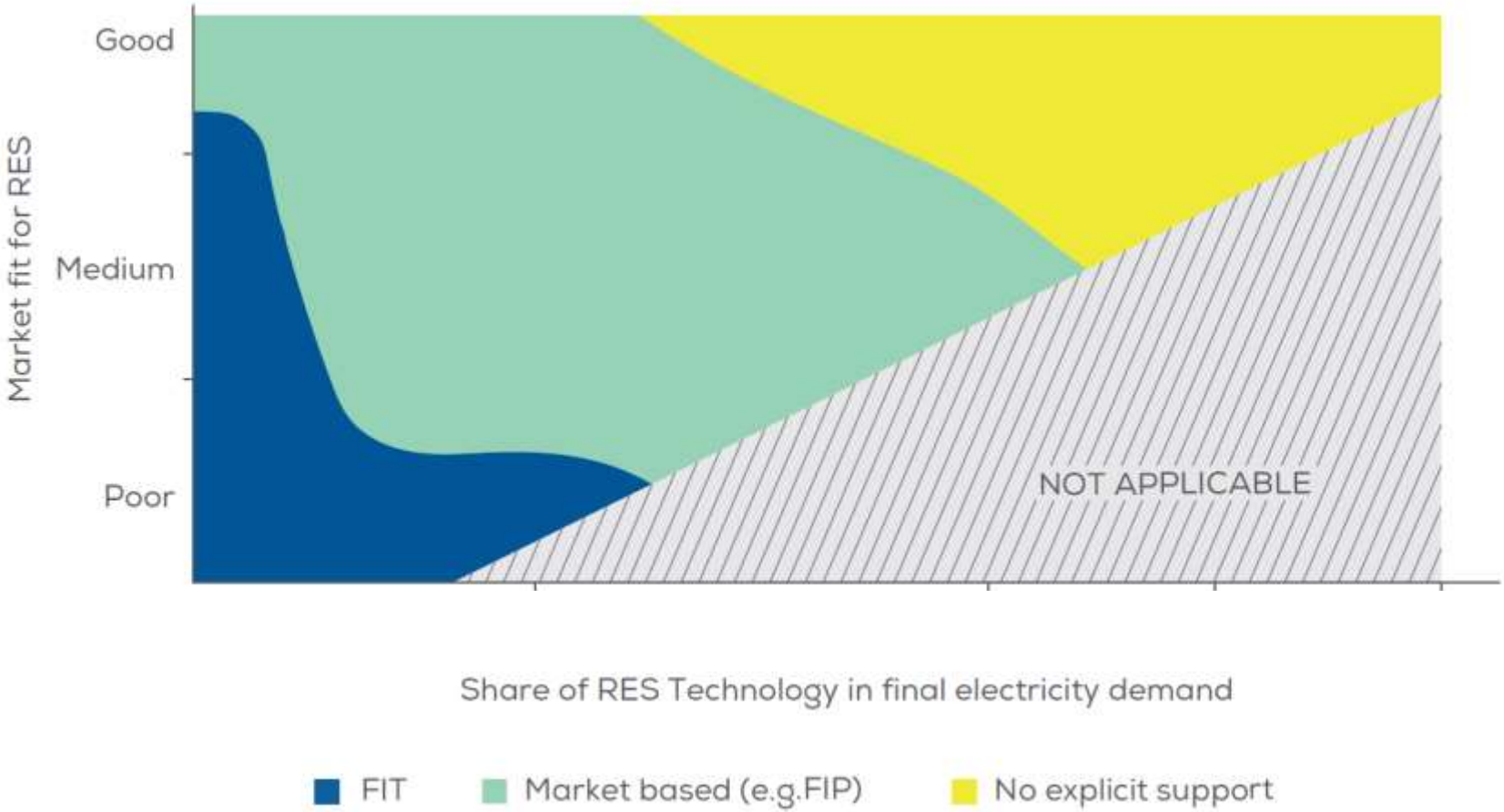
Proposal for RES support scheme

(3) The supported volume

- Wind & solar
  - Per MWh that can be produced
  - Support is not reduced if production is cut voluntary (e.g. due to negative prices day-ahead, or downward regulation)
- Bio-based
  - A predefined number of operating hours

➢ Facilitates short-term efficiency

Conceptual illustration possible evolution of support schemes



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Feed-in tariff, and priority dispatch

- Conceptual illustration: Such instruments should be phased out when markets and technology are sufficiently mature
- At minimum, well-functioning intraday markets must be established

New environmental and energy state aid guideline (2016-2020)

- Aid shall be granted as a premium in addition to the market price
- Beneficiaries are subject to standard balancing responsibilities, unless no liquid intra-day markets exist
- No incentive to generate electricity under negative prices
- Aid shall be granted in a competitive bidding process (with some exemptions)

Co-funded by the Intelligent Energy Europe
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Thank you very much for your attention

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Selected feedback

- Intermittent resources are subject to the so called "cannibalization effect": Support will always be needed
- Complexity of implementation of proposed RES support scheme probably outweigh the benefits of reduced market distortions. Better to build upon already implemented schemes.
- Continuous trading close to real time is the most efficient solution. Difficult to implement: a) intraday auctions (value on transmission capacity) and b) reserve capacity with use-it-or-sell-it close to real time.