Market RES

# Market design options to be studied within the 2020 horizon

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# Introduction

- Two main aspects of the day-ahead markets are proposed to be the focus of OPTIMATE studies
  - RES support schemes
  - Demand flexibility
- For each of these two study fields, several options consistent with the 2020 horizon are proposed to be studied
- A first list of indicators which will be used for the analysis of the results is presented

# Outline

- Market design options to be studied
  - RES support schemes: from Feed-in-Tariffs to Price Premium schemes
  - Demand flexibility: from no flexibility to load shedding when market prices reach a certain level
- Indicators to assess the impacts of the studied options

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# RES support schemes: from Feed-in-Tariffs to Price Premium schemes

- EC Guidelines on State aid for environmental protection and energy 2014-2020:
  - **Aim:** Better integrating renewables into the internal electricity market through the gadual introduction of market based mechanisms reflecting the increasing maturity of RES technologies
  - **Measures envisaged:**
    - gradual move from Feed-in-Tariffs to Feed-in Premium scheme
    - exposing RES generators to standard balancing responsibilities
    - measures to be put in place in order to ensure that RES producers have no incentive to generate electricity under negative prices.

# RES support schemes: from Feed-in-Tariffs to Price Premium schemes

- Within OPTIMATE, support schemes are parametrized
  - Per country
  - Per type of energy (wind or PV)

- For each, the user can define
  - The percentage of generation sold under price premium (the rest of this generation is considered as sold under feed-in tariff)
  - The wind premium average price (€/MWh)
  - The wind Feed-in tariff average value (€/MWh)

# RES support schemes: from Feed-in-Tariffs to Price Premium schemes

- Features of Feed-in-Tariffs implemented within OPTIMATE
  - Fixed regulated price per MWh fed into the grid (whatever the electricity market price)
  - Priority dispatch granted to subsidized energy
    - → RES production is integrated as a “must-run”
    - → Since within OPTIMATE the whole generation is offered to the day-ahead market, this is modelled as if RES producers submit bids at the minimum authorized price (-3000 €/MWh)

# RES support schemes: from Feed-in-Tariffs to Price Premium schemes

- Features of Price Premium scheme implemented within OPTIMATE
  - RES producers receive the electricity market price and a fixed regulated premium (extra bonus) over the electricity market price for the feed-in of renewable energy
  - No priority dispatch
    - → RES producers have positive income as long as the market price is not more negative than the premium amount
    - → This is modelled as if RES producers submit bids at "minus price premium"

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# From no demand flexibility to load shedding when market prices reach a certain level

- Demand response consists in:
  - **Reducing** the load level of consumers for some time when the price of electricity reaches a **high** enough level
  - And/or **activating** the load level of consumers for some time when the price of electricity reaches a **low** enough level
- Implementation within OPTIMATE:
  - As a default option, demand is considered inelastic
  - Demand can be set to have a flexible part which can be voluntarily shed when market prices reach a certain level
  - No consumption shift is modelled

# Outline

- Market design options to be studied
- Indicators to assess the impacts of the studied options
  - **Common indicators to all studies**
  - Additional indicators to be analyzed to evaluate the impacts of RES SS
  - Additional indicators to be analyzed to evaluate the impacts of demand flexibility

# Common indicators to all studies

| Families of indicators | Detailed indicators | *Purpose* |
|---|---|---|
| **Generation mix** (per country) | Generation from renewable sources | *The impact of market architecture options on the generation mix is the very first point to analyse: a change in the generation mix is indeed the main driver to other indicators, such as market prices, $CO_2$ emissions, etc.* |
| | Generation from nuclear | |
| | Generation from coal | |
| | Generation from gas | |
| | Generation from oil | |



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# Common indicators to all studies

| Families of indicators | Detailed indicators | Purpose |
|---|---|---|
| **Costs and profits, welfare** (per country) | Day-ahead market welfare | *The impacts of market architecture options on variable costs, day-ahead producer surplus and market welfare is key in a context of low profitability of certain power plants and discussion around capacity remuneration mechanisms* |
| | Generation costs | |
| | Producer surplus per type of energy source | |

# Common indicators to all studies

| Families of indicators | Detailed indicators | Purpose |
|---|---|---|
| **Market prices** (per market area) | Average market prices | *The impact of market architecture options on market prices is key to analyse, in line with the EU objectives of competitive energy prices* |
| | Prices first and last centile | |

# Common indicators to all studies

| Families of indicators | Detailed indicators | Purpose |
|---|---|---|
| **Sustainability** (per country) | Share of renewable production covering the domestic consumption | *The objective is to study whether a market design option favours or disfavours the integration of RES and the reduction of $CO_2$ emissions, in line with the EU 2020 objectives* |
| | $CO_2$ emissions | |



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# Common indicators to all studies

| Families of indicators | Detailed indicators | Purpose |
|---|---|---|
| **Cross-border exchanges** (per border) | Amount of cross-border exchanges | *The impacts of market architecture options on cross-border flows, price differentials and congestion revenue are important indicators to evaluate how the complementarity between the national generation parks is exploited* |
| | Average price differentials | |
| | Day-ahead congestion revenue | |

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# Additional indicators to be analyzed to evaluate the impacts of RES SS

| Families of indicators | Detailed indicators | Purpose |
|---|---|---|
| **Generation mix** (per country) | Wind generation | *These figures will allow assessing the impact of changes in support schemes on wind and solar generation in more details* |
| | Solar generation | |
| **Market prices** (per market area) | Occurrence and magnitude of negative prices | *RES support schemes are expected to have an impact on negative prices* |

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# Additional indicators to be analyzed to evaluate the impacts of demand flexibility

| Families of indicators | Detailed indicators | Purpose |
|---|---|---|
| **Generation mix** (per country) | Amount of load shedding | *The magnitude of load shedding will be analysed* |
| **Costs and profits, welfare** (per country) | Day-ahead producers and consumers surplus | *These figures will allow assessing redistributive effects of load flexibility* |
| **Security of supply** | Amount of tertiary reserve power, load curtailment duration | *The impacts of load flexibility on security of supply indicators, which are expected to be positive, will be quantified* |

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# Thank you very much for your attention

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