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Good Practices for Grid Connection: European Wind Industry perspective

Iván Pineda – EWEA Research Officer – Grids and Internal Electricity Market

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Presentation outline

- Guiding principles for good connection practices:

- Framework for RES integration
  - RES Directive
  - 3rd Liberalisation Package
- Monitoring RES Directive – Wind Barriers
  - Grid connection procedures
  - Grid connection costs

- Monitoring 3rd Liberalisation Package
  - Network Code Develeopment - Requirements for Generators
  - Market arrangements

Guiding principles for good connection practices

1. RES Directive
   - Legally binding RES targets for 2020
   - Guaranteed access to network, transmission and distribution of electricity produced from RES
   - An appropriate grid infrastructure to be ensured

2. 3rd Liberalisation Package
   - Binding harmonisation rules: Network Codes

These two legislative packages should be the guiding principle for stakeholders when considering any policy options.

Guiding principles for good connection practices

1. RES Directive
   - Legally binding RES targets for 2020
     - National Renewable Action Plans

     - Bulgaria NREAP target for 2020:
     - 1,440 MW of installed wind power capacity or
     - 7.1 % of electricity consumption

     - EWEA target for Bulgaria:
     - 3000-3500 MW, 12.6%-14.7% of electricity consumption

Guiding principles for good connection practices

1. RES Directive
   - Guaranteed access, transmission and distribution of electricity produced from RES
     - Rationale of network arrangements in the RES Directive:

     In the absence of effective competition in the energy market, priority access and dispatch for RES is necessary

Priority grid access should be seen as as compensation to new entrants given there is no functioning internal energy market.

Monitoring the RES Directive implementation

- Development of performance indicators and statistics per country on administrative procedures (Art. 13) and grid access (Art.16)

- Grid connection procedures:
  - Grid connection lead time
  - Grid connection costs
  - Number of authorities/parties involved
  - Grid access transparency

Monitoring the RES Directive implementation

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	Number of TSOs involved	Number of DSOs involved	Number of other parties involved	Grid connection lead time [months]	Grid connection costs [% of overall project costs]	Transparency of the grid connection process [1-5]
Austria	+	-	+	+	-	+
Belgium	0	-	+	+	-	0
Bulgaria	-	-	+	+	-	-
Czech Republic	-	0	+	0	+	0
Denmark	0	-	+	+	+	0
Estonia	-	-	+	-	0	+
Finland	-	-	+	+	+	-
France	-	-	+	+	+	0
Germany	+	+	+	+	-	0
Greece	0	-	+	+	-	-
Hungary	-	-	+	-	-	-
Ireland	0	-	+	-	-	-
Italy	+	+	-	+	+	+
Latvia	-	-	+	+	0	+
Lithuania	-	-	+	-	-	0
Netherlands	+	+	+	+	-	+
Poland	0	-	-	+	+	0
Portugal	0	+	-	-	+	+
Romania	-	-	+	+	+	+
Spain	-	0	-	-	-	-
Sweden	-	-	+	0	+	+
United Kingdom	+	-	+	+	0	+
Offshore EU	0	+	+	+	0	+

Monitoring the RES Directive implementation

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EU average for grid connection lead time:

- Onshore: **25.8** months
- Offshore: **14** months
- Bulgaria: 17.5 months

- Main issue not so much definitive refusals but lack of binding deadlines, delays and lack of transparency

Recommendations:

- Lower the EU average to 6 months
- Set deadlines for grid connection procedures
- Develop the grid infrastructure

Monitoring the RES Directive implementation

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EU average for grid connection costs (as % of total cost):

- Onshore: **5.13%**
- Offshore: **5.43%**
- Bulgaria: 14 %

Recommendations:

- Lower the EU average to 2.5% of the total costs
- System operators to contribute to grid connections costs and adapt it to the project size
- Provide clear definitions and requirements
- Develop a standard grid code across the EU.

Guiding principles for good connection practices

1. RES Directive
   - Guaranteed transmission and distribution of electricity produced from RES

Shallow Vs. Deep charges

- Deep connection charges:
  - Generator pays for equipment + reinforcement
- Shallow connection charges:
  - Generator pays for equipment, TSO pays for reinforcement

Guiding principles for good connection practices

1. RES Directive
   - Guaranteed transmission and distribution of electricity produced from RES

Locational charges

- Charges to generators for transmitting their electricity produced depending on the distance between the area of production and consumption

Wind energy is resource-based, not grid availability-based

Guiding principles for good connection practices

1. RES Directive
   - Guaranteed transmission and distribution of electricity produced from RES

Integration costs

- Calculation is complicated and uncertain (compared to what?)
- "Cost causation" attribution must be across all plants
- Existing market rules often related to alleged integration costs

Balance the system, not individual technologies

Guiding principles for good connection practices

1. RES Directive
   - Guaranteed access, transmission and distribution of electricity produced from RES
     - Rationale of network arrangements in the RES Directive:

- *Recital (63) - Electricity producers who want to exploit the potential of energy from renewable sources in the peripheral regions and regions of low population density, should, whenever feasible, benefit from reasonable connection costs in order to ensure that they are not unfairly **disadvantaged** in comparison to producers situated in more central, more industrialised and more densely populated areas.*

Guiding principles for good connection practices

1. RES Directive
   - Guaranteed access, transmission and distribution of electricity produced from RES
     - Rationale of network arrangements in the RES Directive:

- *Art.16 §7 Member States shall ensure that the charging of transmission and distribution tariffs does not discriminate against electricity from renewable energy sources, including in particular electricity from renewable energy sources produced in peripheral regions such as island regions, and in regions of low population density. (…).*

Guiding principles for good connection practices

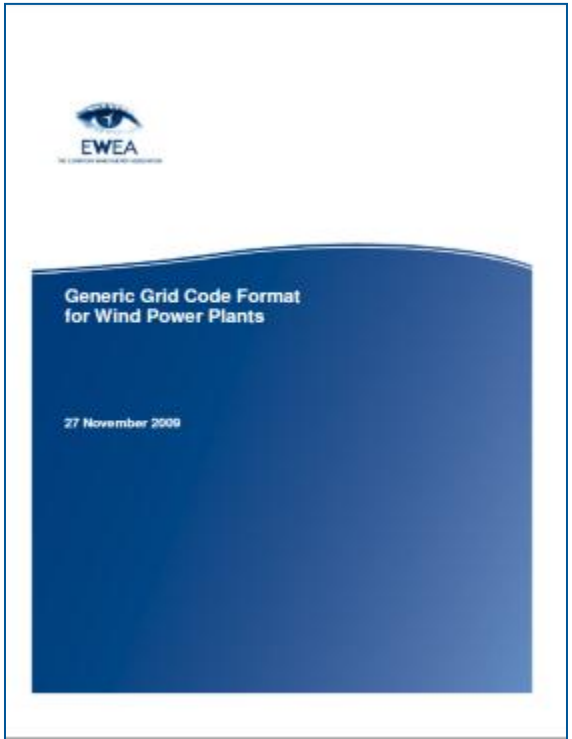
1. RES Directive
   - An appropriate grid infrastructure should be ensured

- ENTSO-E 10 Year Development plan - TYDP
  - First Pan-European grid plan

- National grid development plans

Monitoring 3rd Liberalisation Package

2. 3rd Liberalisation Package
   - Binding harmonisation rules: Network Codes
- ENTSO-E Network Code Development
  - Connection Requirements for Generators (RfG NC)



- EWEA submitted 60 comments + redrafted requirements on FRT and reactive power
- 33% fully accepted
- 17% partially taken into account
- 50% not accepted
- Generic Grid Code Format proposed

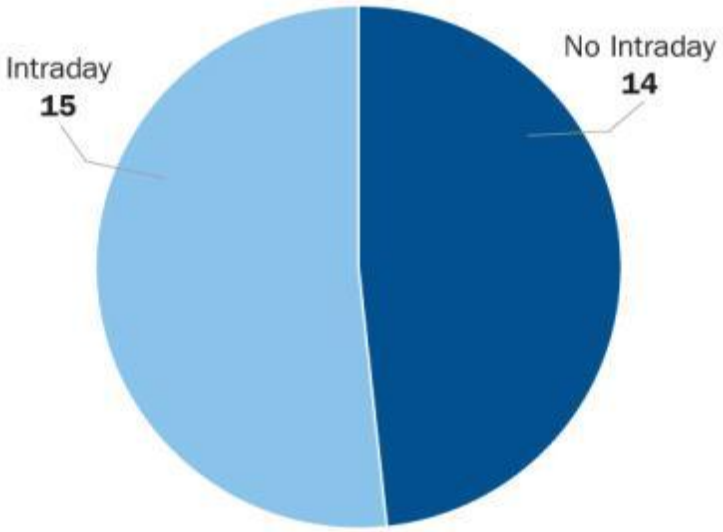
Network Code recommendations

- Clearly formulated – No room for (mis)interpretation
- Done close cooperation with stakeholders
- Requirements justification included
- Harmonisation perspective – local NCs to be consistent to ENTSO-E RfG
- Maintenance plan included
- Only minimum connection requirements
- Consider market-based approaches for ancillary services for a cost effective wind energy integration

Monitoring 3rd Liberalisation Package

2. 3rd Liberalisation Package
   - Binding harmonisation rules: Network Codes
- ENTSO-E Network Code Development
  - Capacity Allocation and Congestion Management (CACM) NC – Submitted to ACER, 2012
  - Electricity Balancing (EB) NC - Planned for 2013

- Market arrangements for transmission capacity calculation and allocation intraday and balancing markets



A good example to follow…

- Ireland –State-owned TSO: Eirgrid
- 40% of wind energy by 2020
  - All Island Grid Studies – A single electricity market and grid for Republic of Ireland and Northern Ireland
  - Grid 25 – Grid Infrastructure Upgrade plan for accommodating variable RES (€4 billion investment by 2025)
  - DS3 program: "Delivering a Secure Sustainable Electricity System – Operational tools and new products in the market for RES

Conclusions

- Good practices for wind connection shall be based on 2 guiding principles:
  - RES Directive
  - 3rd Liberalisation package
- Rationale of RES support is (grid access, priority of dispatch, etc) should be seen in the context of lack of a functioning market
- Monitoring:
  - Lead time to grid connection
  - Connection costs (as % of total costs)
  - Grid development – ENTSO-E TYDP and local TSO plans
  - Network Code development:
    - Harmonisation and ancillary services
  - Market arrangements - Intraday and balancing markets are needed!

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A similar example as Bulgaria

- FERC Order 64
  - Notice Of Proposed Rulemaking (NOPR) - November 2010
  - Over 130 responses received
  - Final Rule Order (Order 764) issued in 2012
- Move from hourly transmission schedules to 15 minute or faster schedules ✓
- Wind plants to provide data to system operator for a centralised forecast ✓
- Added a new Tariff 10 option for regulation service to manage variability – BUT! only if the first two requirements have been satisfied. ✗

Thank you

ivan.pineda@ewea.org

EWEA
80 RUE D'ARLON
B-1040 BRUSSELS

T: +32 2 213 1811
F: +32 2 213 1890
E: ewea@ewea.org

www.ewea.org