

## **Response Paper**

### **to the European Commission's public consultation on generation adequacy, capacity mechanisms and the internal market in electricity**

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#### **I. Preliminary remark:**

In June 2012, Dii presented the first part of its long-term strategy “Desert Power 2050”, based on analysis with the Fraunhofer ISI Institute. The analysis demonstrates the benefits of an integrated power system of Europe, the Middle East and North Africa (MENA) in terms of competitiveness, sustainability and security of supply. It compares an optimized European power system to a system connected to the MENA region which is based on more than 90% renewable energy, taking into account that demand has to be met in every hour of the year (i.e. hourly resource adequacy based on real load patterns and several thousand data points for hourly wind speeds and irradiation). In mid 2013, Dii will provide a comprehensive view of the implementation steps towards a renewables-based EUMENA power system in 2050 with the second part of its long-term strategy “Desert Power 2050: Getting Started”. The report includes detailed modeling in ten-year steps, taking into account non-economic barriers of renewable energy diffusion. Based on “Desert Power 2050”, Dii can now contribute to the consultation with key conclusions on generation adequacy, security of supply and the internal market in electricity.

However, the strategy does not analyze market designs and their incentive for investors to build power plants. The executive summary as well as the full Desert Power 2050 report can be downloaded at: <http://www.dii-eumena.com/desert-power-2050.html>.

#### **II. Summary**

“Desert Power 2050” shows first of all that generation adequacy can be ensured in a power system with 90% renewable energy. Second, it demonstrates the benefits of a larger system in terms of security of supply: a larger system offers more options to balance the load and the output of solar and wind power plants. Fewer gas peakers for balancing need to be built and less excess production by renewables, i.e. curtailment, occurs. Moreover, the report shows the benefits of connecting the power systems of Europe and MENA. MENA wind and PV are a natural fit with the EU, since they deliver electricity when it is needed, thus MENA fluctuating renewable energy contributes to generation adequacy in the EU. In addition, CSP with storage facilities in the MENA region will be an economically favorable source of flexible power generation for the EU.

The report's main conclusions are:

- ➔ Generation adequacy can be assured in a power system with 90% renewable energy.
- ➔ An internal, well interconnected and optimized EU electricity market based on renewables is possible and economically beneficial for the EU.

- ➔ There is a need for well-functioning cross-border cooperation between EU member states that takes into account the effects of national electricity systems on neighboring countries.
- ➔ Closer cooperation between the EU and the Southern Mediterranean and interconnection with MENA complement this approach, and lead to significant benefits in terms of security of supply while also adding significant mutually shared economic value.

### **III. Response to selected questions of the consultation paper**

**(3): Do you consider that work on the establishment of cross-border day ahead, intraday and balancing markets will contribute to ensuring security of supply? Within what timeframe do you see this happening?**

- Yes. A highly efficient marketplace matching demand and supply of renewable energy and gas generation across borders is needed. This requires a market mechanism allowing for unlimited cross border exchange in flexible time frames (at least hourly resolution) to secure supply at any point in time. The design of a well functioning EU internal market as well as EUMENA market needs comprehensive further analysis. To ensure that generation adequacy with renewable energy and gas can efficiently be achieved and supply of all consumers in the EU is secured, reconsideration of the existing marketplaces with cross border day ahead and intraday power exchange options balancing out the power demand and offer on at least an hourly basis is required. Support schemes should be compatible with future cross border marketplaces, and need to foster investments in the best possible resources and provide the highest possible level of security for investors in renewable and non renewable generation capacities.
- Whereas the European internal market in electricity should be achieved by 2014, EUMENA integration will take additional time as the market conditions need to change substantially.
- As shown by Dii's strategy "Desert Power 2050", work on the establishment of cross-border day-ahead and intraday power exchange will contribute to ensuring security of supply. The same logic applies to balancing markets. The report demonstrates the benefits of fluctuating wind and solar energy from the MENA region for providing generation adequacy for the EU. The outcome of this modeling is that hourly generation adequacy can be ensured in a system with 90% renewable energy, thereof ~50% wind, 16% CSP and 9% PV. The main conclusions that can be derived from the strategy report are:
  - While generation adequacy can be guaranteed with and without interconnections across the Mediterranean, it is economically favorable to use interconnections. Not only lines across the Mediterranean are needed but also more grids within both Europe and MENA. Grids are the cheapest option to ensure operability of a system with high shares of fluctuating renewable energy. Strong grid build up will be required to complete and optimize the internal market in electricity.
  - CSP with storage from the MENA region will be an economically favorable source of flexible generation for the EU.
  - MENA wind and PV are a natural fit with the EU, since they deliver electricity when it is needed (in summer, when EU wind production is low and during mid day peaks);

thus fluctuating renewable energy from the MENA region contributes to generation adequacy.

- MENA demand complements EU demand well, since it is lower in winter than in summer while the opposite is true in the EU. Expanding the electricity market beyond EU borders to MENA would hence even be valuable independent of a transition to a high renewable energy share.
- CCGT and OCGT gas power plants are used to complement renewable energies and ensure sufficient supply at all times. In a connected EUMENA power system, approximately 170 GW of CCGTs are built, which have approximately 4200 full load hours on average. These are complemented by approximately 60 GW of OCGTs, which are less efficient but require lower investments. These OCGTs have only 280 full load hours on average and are the most economic solution to cover peak situations. In the Reference Scenario, a scenario where each region, Europe and MENA, is fully optimized in itself but without cooperation between the two systems, approximately 132 GW of OCGTs are needed which run only approximately 130 hours per year on average. This emphasizes again how important grids are for the energy systems of the future – in general and between the EU and MENA in particular.

**(5): What additional steps could Member States take to support the effectiveness of the internal market in delivering generation adequacy?**

- A key requirement of an integrated EUMENA power system is well-functioning cross-border cooperation between EU Member States. In addition to reinforcing cross-border cooperation within the EU, Member States should apply a more coordinated approach in facilitating cross-border generation and infrastructure projects with third countries. Such an approach could include the use of flexible cooperation mechanisms incorporated in the Renewable Energy Directive and the reinforcement of the implementation of interconnectors between the EU and MENA, with priority for an Algeria/Libya-Tunisia-Italy interconnector.

**(7) Do you consider that there is a need for review of how generation adequacy assessments are carried out in the internal market? In particular, is there a need for more in depth generation adequacy reviews at: a. National level; b. Regional Level; c. European Level?**

- Yes. A system based on renewables and gas needs a barrier free cross-border exchange of electricity at the European level in order to secure supply at any time. The best available resources should be used for renewable energy generation. Considering the different starting positions of EU Member States, a national differentiation of the energy transition paths towards a power system based on 90% renewable energy is required.
- In addition to more in depth generation adequacy reviews at the European level, further analysis of the contribution of third countries to generation adequacy in the internal market in electricity is needed. In particular, the effects of wind and solar energy from the Middle

East and North Africa (MENA) should be analyzed in sufficient detail. “Desert Power 2050” clearly proves that an interconnected power system of the EU and MENA adds economic value as well as security of supply to both MENA and EU and avoids new fossil generation capacity in MENA. EU-level institutions should incentivize cross-border projects in generation and infrastructure within the EU as well as with third countries. Against this background, Dii supports the approach of the European Commission to take concrete steps towards closer energy cooperation with the Southern Mediterranean. These steps include facilitating cooperation mechanisms under the Renewable Energy Directive, promoting an EU-Southern Mediterranean Energy Partnership and a legal framework with the MENA region, as announced in the European Commission’s Communication “Renewable Energy: a major player in the European energy market”. It also includes reinforcing the creation of interconnectors between Algeria-Morocco-Spain-France and Algeria/Libya-Tunisia-Italy, as announced in the Joint Communication “Supporting closer cooperation and regional integration in the Maghreb”.

Dii GmbH was founded as a private industry joint venture in October 2009. Together with its partners from 16 countries and a wide range of stakeholders, Dii enables an industrial scale market for renewable energy in MENA. To this end, Dii is formulating a long-term vision and translating it into country specific assessments, a regulatory framework and concrete reference projects.

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