HUMBOLDT-VIADRINA Governance Platform

Summary White Paper: „An electricity market for the energy transition“

Note: This is not an official translation or summary. The HUMBOLDT-VIADRINA Governance Platform translated and summarized it for facilitating the discussions at the Trialog 13 July 2015.

The Federal Ministry for Economic Affairs and Energy (BMWi) has undertaken a broad consultation process regarding the future electricity market. To prepare for this process, it published a **Green Paper** in October 2014. The **consultation process** lasted till March 2015 and resulted in over 700 comments by **various stakeholders**: government authorities, trade unions, research institutions, companies, civil society organizations and individual citizens. The subsequent **White Paper** was published July 3rd 2015. The major outcome of the consultation process was the fundamental decision to **refrain from introducing a capacity market**. However, also further measures were discussed and analyzed.

The White Paper presents **20 measures to prepare the German electricity market for the future** electricity supply with an increasing share of renewable energy sources (RES) and a decreasing share of conventional power plants. The measures to reach the so-called **electricity market 2.0.** are divided into **three modules**. **Module 1** explicates measures that are supposed to strengthen existing market mechanisms. Measures in **Module 2** aim to optimize the electricity supply on national and European level in an efficient and flexible way and **Module 3** encompasses measures for additional safeguards of supply security. A short summary of these measures is given below.

Moreover, the BMWi recognizes the need **for further steps** to realize the energy transition and to achieve its ambitious 2050-goals of reducing greenhouse gas emissions by 80-95%, reducing primary energy consumption by 50% and to increase the RES-share in the electricity consumption by to 80%.

The 20 measures deal with current issues but will not suffice to prepare the electricity market for the longer future. Therefore, the BMWi suggests **six future action fields**, which are summarized in the last part of this paper.

Statements on the White Paper can be submitted until August 24, 2015 to weissbuch-strommarkt@bmwi.bund.de

20 measures for a successful electricity market 2.0 as presented in the White Paper:

Module 1: "Stronger market mechanisms" – these measures aim at strengthening market mechanisms, so that market participants provide sufficient capacities and ensure security of supply. Trust in competitive price formation shall be enhanced.	
Measure 1: **Free Pricing**	Free pricing on the electricity market will be anchored in the **Energy Industry Act** to create a secure legal environment for investors. The **12 electrical neighbours** (see Measure 5) are also committed to allow flexible prices and to refrain from introducing price caps.
Measure 2: **More transparent antitrust controls**	The Bundeskartellamt (German competition authority) will make its **procedures more transparent**. It will clarify in which cases companies are allowed to bid on the wholesale market above their marginal cost (so called mark-ups).
Measure 3: **Stronger incentives for adhering to uphold balancing group commitments**	The system of **balancing groups** and imbalance settlement is the **central synchronization** instrument. Together with balancing capacity, the balancing group and imbalance settlement system ensures that precisely the same amount of electricity is fed into the power grid as is simultaneously drawn from the grid. In particular, it involves the obligations to incorporate all producers (generators) and consumers into balancing groups (balancing group obligation), report balanced schedules on the basis of load and generation forecasts and adhere to them (**obligation to uphold balancing group commitments**) and to charge for any unforeseen imbalances using the imbalance settlement system. This system will be further improved, e.g. on the basis of costs for the provision of balancing capacity.
Measure 4: **Account balancing groups every 15 minutes**	This has previously not been clearly regulated. Now it will be clarified that the **costs for interference from TSO's** in times of extreme lack of capacity have to be borne by the balance responsible party.
Module 2 "Flexible and efficient electricity supply" – these measures optimize the electricity supply on a European and national level. In that way they support a cost-efficient and environmentally friendly usage of capacities.	
Measure 5: **Enriching the electricity market**	The BMWi with its White Paper on the electricity market commits itself to a **liberalized European electricity market**. Together with its "11 electrical neighbours" the BMWi agreed in

with measures of European co-operation	a *Joint Declaration for Regional Cooperation on Security of Electricity Supply (June 2015)* to - **improve cooperation** among neighbouring countries (e.g. adopt network codes); - develop a common understanding and monitoring of generation adequacy; - not to restrict cross-border trade in times of high prices; - allow flexible prices (**no price caps**); - remove barriers to supply and demand flexibility; - market participants, including renewables should react to **market price signals**; - **reinforce grids** - develop demand side response and options from heating and transport sector
Measure 6: **Opening balancing markets to new providers**	The balancing markets should be opened for smaller and more flexible providers of balancing capacity such as RES, flexible consumers and storage. This is to be facilitated via shortening the lead times and reducing the required bid size.
Measure 7: **Develop a target model for state-imposed price components and network charges**	Network charges and state-imposed price components should be remodeled in a way that the **retail price stronger reflects market prices**. The BMWi will start a discussion process on that issue in collaboration with relevant stakeholders. The **final model** should: - Facilitate a fair competition of different options of flexibility; - Provide incentives for onsite generation facilities to react to market price signals; - Link the heating and transport sector with the power sector; - Support an efficient grid expansion and energy efficiency; - Fairly distribute the costs between different consumer groups.
Measure 8: **Adapting special network charges for a more flexible demand**	Currently large consumers get special discounts on network charges for stable consumption. These special network charges discriminate against flexible large consumer and should therefore be geared towards a stronger market orientation. Large industrial consumers should be able to participate on the balancing market.

Measure 9: **Further development of (regional) network charges**	The costs for transmission grids should be **distributed more fairly** among regions. Network charges should be made more transparent and "avoided network charges" for RES and combined heat and power installations commissioned after 2021 should be abolished.
Measure 10: **Introducing a regulatory framework for aggregators of flexible demand**	Up to now large consumers dominate demand-side management. There are no rules and regulations for aggregators of flexible demand from small and medium consumers, although aggregation has unused flexibility potentials. One aim of the regulation is to **enable aggregators** of flexible demand to offer their capacity on balancing markets.
Measure 11: **Supporting the expansion of electric mobility**	E-mobility provides flexibility potentials. The expansion requires and adequate charging infrastructure. Therefore, the **investment framework** for the set-up of charging stations should be improved. The **legal status, rights and obligations of charging station operators** will be specified. Payment systems for charging stations should be simplified and harmonized.
Measure 12: **Enabling back-up power systems to participate in the market**	**Potentials of back-up power systems** to contribute to peak load should be systematically analyzed by the Federal Network Agency and existing barriers for back-up power systems to participate in the market should be eliminated.
Measure 13: **Step by step introduction of smart-meters**	A package on **smart grids** will be presented in summer 2015. Amongst others it deals with issues of data protection and the roll-out regulation for smart meters.
Measure 14: **Limit grid extension demand by curtailing feed-in peaks of RES installation**	It is not economically viable to build a grid that can theoretically transport all the power generated. **Grid planning should therefore consider a cap of 3% of feed-in peaks**. The existing instruments to redispatch-measures and compensation for curtailment proved suitable and will be maintained.
Measure 15: **Evaluate minimum generation**	A certain amount of minimum generation from fossil fuels is necessary **to keep system stability** but it can make the integration of RES more difficult. The Federal Network Agency will issue a report on the required minimum generation on a regular basis which will help to develop recommendation for processes and make them more transparent.

Measure 16: **Integrate combined heat and power generation into the electricity market**	Currently, many environmentally friendly combined heat and power generation plants cannot operate economically. They will get **additional funding** until the market has been redesigned to provide sufficient market prices. Previously the target has been set for at least 25% combined heat and power generation of overall power generation, that target has been reduced to 25% of thermal power generation. Combined heat and power generation plants should react stronger to market price signals. This requires the set-**up of larger heat storage** in order provide a stable heat supply when electricity demand is flexible.
Measure 17: **Creating more transparency about electricity market data**	A **user-friendly online platform** integrating all relevant electricity market data will be set up. The Electricity Market Act will lay the basis for the platform which is modelled according to the good-practice examples of France and Denmark.
Module 3: "Additional safeguards" - these measures are targeted to additionally raise supply security	
Measure 18: **Monitoring supply security**	The current national monitoring report of supply security provided by TSOs has several shortcomings: e.g. it does not reflect **cross-border** balancing effects of renewables feed-in. The planned new monitoring provided by the BMWi will include cross border balancing effects and dynamic adaptation processes of the electricity market. It will also reflect the **probabilistic character of supply security.**
Measure 19: **Introducing a capacity reserve**	As an additional measure to ensure supply security, a capacity reserve will be introduced. The capacity reserve will probably encompass power plants that no longer operate economically on the electricity market. Via a bidding process those power plants that have the lowest stand-by costs will "move" to the capacity reserve. Old lignite coal-fired plants will transitionally moved into the capacity reserve and then decommissioned. The **costs** for providing the capacity reserve will be shared by consumers, the costs for using the capacity reserve will be paid by those producers that did not meet the electricity supply they offered.
Measure 20: **Further developing Grid reserve**	The grid reserve is a different instrument than the capacity reserve. However, it functions according to a similar procedure

	and some power plants from the grid reserve will also be part of the capacity reserve (but will only get compensation once). The grid reserve secures network operations **in case of regional bottlenecks**, the capacity reserve is only used in the unlikely case in which the market is not able to balance demand and supply. It will be extended until 2023 and will be developed depending on further grid expansions that will effect regional supply.

The six action fields for further developing adequate measures to prepare the electricity market 2.0 for the future.

Action field 1: Strengthen the internal market for electricity

The "**European target model for electricity**" provides the path for further developing the European electricity market cooperation.
Main elements are:

- **Coupling** of national electricity markets in **Day-Ahead-Markets**
- Functioning **Intra-Day Market**
- Framework for long-term **transmission rights**
- Common methods for the **calculation of capacities**
- Common **network codes** for all market participants (top down)
- **Regional initiatives** such as the Pentalateral Forum as catalyst for the electricity market integration and consideration of local differences (bottom up)

Action field 2: Reduce support need for RES through optimized overall system

The **amendment of the Renewable Energy Source Act in 2014** obliges operators of new installations to directly market the electricity they generate. In contrast to a fixed feed-in tariff, operators of RES have now the incentive to **react to fluctuating market prices**. Furthermore, installations commissioned after 2016 will not receive financial support if prices are negative on the spot market EPEX for at least 6 consecutive hours. This may affect the expansion of RES and should therefore be reviewed in the frame of the electricity market act.

Further political framework condition influence the required payment for RES:

- **Auctions** as another option as support scheme for RES to reduce costs?
- A functioning **Emission Trading Scheme (ETS**) could help make RES more attractive as it would render fossil power generation more expensive.
- A **flexible European electricity system** increases profit options for wind and sun:
    - Through flexible consumers
    - Through flexible conventional operators
    - Through reduction of must-run capacities

- Through a better integrated grid between European countries that can balance fluctuating demand
- The higher the profits of RES on the market, the lower the market premium of RES according to the Renewable Energy Sources Act > this means a cost reduction which consumers pay through the levy of the Renewable Energy Sources Act

Action field 3: Conventional power plants and RES installations operate complementary in the future electricity supply

- Conventional power plants will be important in the future to secure electricity supply: over 50 percent of the power generation in Germany is delivered by conventional power plants (lignite and hard-coal 43%, natural gas 10% and nuclear energy 16% of gross electricity production in 2014).
- With an increasing share of RES in the power production, the share of conventional sources will decrease. However, conventional power plants will play an important role for the integration of RES into the electricity market as they supplement and balance the fluctuating generation of RES.
- It is important to **define the new role and business model of conventional power plants**. They will shift to be a flexible partner for RES. The new business model to react flexibly to power generation and demand is more challenging than the old one of supplying constant energy. However, after overcapacities have been reduced, new options for additional incomes may open up.
- We need efficient and flexible conventional power plants that can react quickly to RES fluctuation and demand. The Federal Ministry supports research and innovations in the field of conventional power plants to increase their efficiency in its COORETEC initiative.

Action field 4: Using electricity for heat, mobility & industry through Power-to-X

- Coupling the different energy sectors has great and innovative potentials for RES in terms of **flexibility and efficiency**: **Power-to-Heat, Power-to-Mobility, Power-to-Industry**
- In the heating, transport and industry sector three times more energy than in the electricity sector is currently consumed.
- New applications will enter the market as new consumers and should be used on the bases of the market situation and prices: e.g. batteries and heat pump storages should be charged when sun and wind generate much electricity and demand is low.
- Power-to-X has great potential for demand side management as well as for reducing dependencies on oil and gas

Action field 5: Find ways to stronger connect energy efficiency and electricity market design

- Energy efficiency is becoming more and more important for the electricity market. An efficient

use of electricity in classical electricity uses decreases the need for new grids and wind- and PV installations, conventional power plants and storage. New applications such as heat pumps and e-mobility increase energy efficiency in the heating and transport sector.

- **Whereas electricity consumption decreases in classical electricity uses, it increases in new applications such as e-mobility and heat pumps.** However, they improve the efficiency in the entire system. Heat pumps and electrical motors can use RES electricity and replace oil and gas. In this way they **reduce CO_2-emissions** and increase the share of RES in the transport and heating sector.
- Finally, energy efficiency and flexibility should be considered together. The relation of energy efficiency and flexibility in the electricity market depends on the ratio between electricity demand and the generation of wind and solar electricity.

Action field 6: Match market and grid

- Energy transition changes the demands on markets and grids: on the one hand, market participants react more flexible to the fluctuating supply from wind and solar electricity.
- On the other, wind and solar electricity present **new challenges to the grid**:
    - producers increasingly feed electricity into lower voltage grids.
    - in times of high feed in of solar and wind power and low electricity prices, new consumers/ applications such as heat pumps and electrical vehicles may raise their consumption and thereby stress the grids.
    - At the same time less and less conventional power plants are available and new providers need to ensure stability of the grids.
- **Grid expansion is central**. A functioning electricity market needs strong grids.
- **Network operators need to take on new tasks** and coordinate them:
    - Electricity is increasingly fed from distribution grids into higher voltage grid
    - As a result, distribution grid operators need to actively manage their network. Their role will be more complex and more responsible in the future. The framework condition may have to be adapted and specified (e.g. intelligent measuring systems, stronger cooperation between electricity traders, distribution grid and transmission grid operators).
- In the current market design there is **number of grid and market instruments that should be better coordinated**. Besides spot and balancing markets there are re-dispatch and feed in management measures as well as a network reserve. In lower voltage grid, network operators will increasingly use storage and other flexibilities options. In principle, the fewer instruments and products pursue the same target, the lower the cost.
- In the future, instruments for grid stability should be better coordinated to existing market products. Flexibility services need to be transparently defined and harmonized where possible.