bdew

Energie. Wasser. Leben.

BDEW German Association of Energy and Water Industries
Reinhardtstrasse 32
10117 Berlin

Position Paper

Proposals for a fundamental reform of the German Renewable Energy Sources Act

Berlin, 18 September 2013

Contents

1 Summary

With the decisions on the energy transition in June 2011, the German government set, amongst other things, ambitious targets for the expansion of renewable energies (RE). Their share of gross electricity consumption increased from 7% in 2000 to over 25% in the first half of 2013. The foundation for this rapid development was the German Renewable Energy Sources Act (Erneuerbare-Energien-Gesetz, EEG), which has proved to be a successful and proper instrument for start-up support for renewables. After an initial phase, in which the subsidisation primarily aimed at increasing volumes, we are today entering a new phase which requires a fundamental reform of the Renewable Energy Sources Act (EEG). Instead of aiming solely for quantity, a "role reversal" must now be introduced, under which renewables are made to assume increased responsibility for reacting to signals from the marketplace and for contributing to the stability of the system. In the opinion of the BDEW, it is thus of the utmost priority to institute a fundamental and urgent reform of the EEG after the general election in 2013.

The BDEW has constructed proposals, looking at every stage of the value chain, designed to ensure, on the basis of the energy triangle, that the RE expansion targets can be achieved as cost efficiently as possible and without jeopardising the security of supply. Mandatory, retroactive changes to the legal framework for existing plants or for plants for which an investment decision has already been made should be avoided, for regulatory reasons.

At the core of the necessary reform lies the market and system integration of renewable energies. In order to achieve these, the BDEW proposes the following building blocks of a new subsidy model:

- Mandatory direct marketing on the basis of the market premium model for all new RE installations
- Abolishment of the management premium for new RE plants
- Obligation for plants to have remote control function, through the direct marketer, for the purpose of technical-operational system integration.
- Increasing potential of individual renewable energy sources according to technologies used
- Installation of technical equipment for the provision of system services
- Enable a switch to direct marketing for the operators of existing RE plants with the provision of a reduced management premium
- Change from a fixed time-period for the subsidy (EEG: usually 20 years) to a "volume quota"
- Synchronisation of newly constructed renewable energy installations with the expansion of the grid, through
    - Strategic network expansion planning in the area of distribution networks

    - Introduction of market signals for RE installation operators in the installation planning process.
- Reorganization of privilege criteria (e.g. exemption from the EEG levy) to avoid the effects of an "erosion of solidarity".

These instruments can, in principle, be implemented immediately.

However, our target model also requires the determination of subsidy levels in competitive conditions, for example through auctioning, in connection with a defined pathway for the construction of new renewable energy plants. The intention is that renewable energies gradually assume greater market risk through a shift from an ex-post market premium to one which is fixed ex ante. That creates competition and efficiency and increases the added value of the electricity generated by renewable energy plants.

The immediate introduction of obligatory direct marketing ensures effective market integration of renewable energies and initiates the role reversal between renewable and conventional generation, necessary for the implementation of the energy transition. At the same time, auctioning the right to construct new RE installations, in conjunction with a reliable pathway for expansion, enables a high degree of subsidy efficiency to be obtained, whilst ensuring the achievement of RE expansion targets. In the opinion of the BDEW, it is extremely important that the basic framework conditions are set in a manner which allows small and large companies to participate equally in the restructuring of the energy supply.

The instruments and statutory basis for the competitive, ex-ante determination of the market premium (e.g. in the scope of an auction model) have to be developed alongside the implementation of the "immediate measures", to allow the target model to be implemented as soon as possible. In particular, the coordinated planning of RE expansion between Federal and Land authorities and clear criteria are required, on the basis of which an auction model should be designed, to enable the competitive determination of the level of subsidy. An auction model can only be introduced once we have an auction design which has proven to be effective and which increases the cost effectiveness of the energy transition, maintains the diversity of participants, ensures the RE expansion goals can be achieved and which fairly transfers the risks, which have so far been borne by the tax payer, to the investor.

2 Limitations of the EEG and the resulting challenges for a long-term, sustainable model for the achievement of renewable energy expansion targets

The transition process to extensive electricity generation from renewable energies (RE), which has been decided by a political consensus, entails the need for considerable adjustments as the share of RE in total generation increases.

A particular challenge for the supply system as a whole arises from the fact that electricity generation from wind and solar energy is dependent on availability of the source. As their share grows, the remaining electricity generation system and possibly on consumer load and/or exports and imports must be able to respond to an ever increasing extent. The shrinking residual generation (consumer vs. wind/PV feed-in) has to handle both the fluctuations in consumer load as well as in wind/PV feed-in.

In light of the pursued target share of RE in gross electricity consumption (around 25 percent today) of at least 80 percent by 2050 at the latest, a "role reversal" must take place between renewable energies and conventional power plants, as the conventional power plants and consumers can no longer provide the necessary flexibilities on their own. In the course of this exchange of roles, the provision of flexibility and system services will increasingly become the responsibility of RE plants.

In order to ensure - in particular connection with the energy transition - cost-efficient, secure and environmentally friendly energy supply in the future, a market oriented further development of technology, infrastructure and market design is required. In respect of the subsidisation of renewable energies, the following implications can be drawn:

2.1 Security of supply

As a result of subsidies granted independent of demand in the scope of the feed-in tariffs under the EEG, there is currently hardly any incentive for plant operators to plan their feed-in in a demand-oriented manner and to generate a "demanded product". At the same time, the massive expansion of intermittent renewable energies, together with the ever advancing integration of the European internal energy market has led to a situation whereby numerous medium and peak load power stations are no longer profitable because the number of full-load hours - and more importantly the profit margins in the previous midday peaks - has fallen rapidly and will continue to fall. An extensive shut-down of these power stations for commercial reasons can, however, affect the security of supply as the reliable capacity provided by wind and PV plants is not sufficient to make up the capacity shortfall which would possible arise in the case of shut-downs.

Furthermore, it has so far mainly been conventional power stations which have provided the system services necessary for system stability. As intermittent electricity generating plants are inherently unable to provide electricity generation which can be activated according to demand, careful consideration must be given to how, as the share of renewable energies grows, sufficient flexibility and system services can be guaranteed in the future between all market participants together.

This leads to further implications for the future model of subsidising renewable energies:

Requirement 1: Provision of flexibility and system services by renewable energy installations

The model for the expansion of renewable energies must provide for sufficient flexibility and system services to be sustainably available cost-efficiently and at the right time.

Renewable energy plants must also increasingly assume responsibility for the fulfilment of technical minimum requirements and the provision of system services (e.g. frequency and voltage stability). In this context, a distinction should be made between obligatory (non-paid) and voluntary (paid) system services. In the long-term, renewable energy plants will also have to provide the ancillary services, currently provided by conventional plants, such as the provision of reactive power and short-circuit current and on the basis of the same framework conditions. As far as ancillary services are concerned which are organised via a market (e.g. balancing energy), maximum efforts should be made to enable renewable energy plants and storage technologies to participate in this market.

In the view of the BDEW, the market price signal, which comes from overall electricity supply and demand, is the most suitable tool for identification and management of shortages and surpluses in the energy market. In order to incentivise plants which generate electricity from renewable energy sources to feed-in power in a manner appropriate to the system, the market price signal must be passed on to the plant operators (market integration of renewable energies).

2.2 Costs of the energy transition

For the purpose of further expanding the use of renewable energies, the acceptance of private, commercial and industrial consumers, must be secured; this acceptance crucially depends on the associated burdens and how they are distributed. The development of differential costs in the course of the expansion of renewable energies is significant: Whereas the EEG levy was at a level of 2.047 ct/kWh in 2010, it climbed to 5.277 ct/kWh by 2013. In connection with the increased EEG levy, whether the system is fair has been increasingly debated in recent times. In this context, one must examine whether consumers who generate a part of their renewable or conventional electricity themselves but are still dependent on services from the grid (security of electricity supply and possibly, frequency stability) should also bear a fair share of the costs of the energy infrastructure.

The EEG levy is, however, only one element within the overall effects of renewable energy expansion which have to be considered and it is of only limited significance in respect of the costs of the energy transition - a problem which is posed irrespective of the subsidy model chosen. On the one hand, the direct merit-order effect of renewable energies remains ignored, on the other hand, an overall assessment of the costs of the energy transition must also consider the indirect costs of the EEG such as the additional network expansion and the costs of increased flexibility in the energy supply system and the integration of renewable energies into the energy market. In this context and irrespective of the subsidy model, there is the issue of avoiding disproportionately expensive network expansion - in particular in distribution networks - (up to the last kWh).

The challenges of the energy transition have to be reflected in an amended regulatory framework. The regulation of network charges today is still geared towards a static energy supply system in which innovation and new technology is not adequately considered. In addition, the regulatory framework does not yet sufficiently reflect the necessary investments and operational expenditure for the construction of modern and intelligent networks. In order to be able to master the enormous challenges for the network infrastructure, the investment conditions in the regulation of incentives have to be further improved. The elimination of the time delay for the instrument of investment measures is a step in the right direction, however it only applies, on a distribution network level, to a portion of the necessary investment.

The possible effects of each of the interventions to be discussed, for the purpose of achieving an efficient use of resources, must be realistically estimated:

- According to forecasts of TSOs, the costs of compensating EEG installations in 2013 will be 18.5 billion euros[1]. It is unlikely to be possible, in light of the protection of legitimate expectations, to reduce this core contribution in the coming years.
- It will only be possible to effectively influence the additional tariff payments for new plants; thus, there is only limited influence which can be exerted on the EEG levy overall.[2]

Notwithstanding that, the following implications arise in relation to the issue of cost efficiency in the energy transition:

Requirement 2: Cost-efficiency of support measures

Support measures should be limited to the extent necessary and shown transparently. As such, market based principles are best able to provide a cost-effective incentive for the expansion of renewable energies and the necessary flexibility for maintaining security of supply.

---

1 http://www.eeg-kwk.net/de/file/Konzept_zur_Berechnung_und_Prognose_der_EEG-Umlage_2013.pdf.

2 An additional construction of onshore wind power of 2.2 GW (as in 2012), leads to additional costs, for an assumed full utilisation of 2,200 hours/year and 9 ct/kWh tariff, of around 250 million euros (around 435 million euros tariff payments minus the estimated 180 million euro marketing revenues). Due to the degression of the tariffs, even for PV and an assumed 7.8 GW at 1,000 hours/year and an average tariff of 15 ct/kWh this would be "only" around 850 million euros (around 1.17 billion euros tariff payments minus an estimated 320 million euro marketing revenues).

Requirement 3: Transparency and equitable distribution of burdens

At the same time it must be clear that the energy transition is a project for society as a whole and the costs must therefore be transparently and fairly distributed, whilst ensuring economic and industrial capacity is maintained.

Hence, the reorganization of privilege criteria (e.g. exemption from the EEG levy) is essential, in the opinion of the BDEW, to avoid the effects of an "erosion of solidarity".

2.3 Investment incentives

The achievement of the expansion targets and the simultaneous maintenance of security of supply require a high willingness to invest. The necessary investment in generating plants requires a particularly high degree of investment security, due to the long depreciation periods, and thus ultimately trust in the existing regulations and laws. Therefore, the BDEW advocates - irrespective of the subsidy system to be developed - a protection of the continuance of the status quo in respect of the tariffs specified in the EEG for the EEG installations which are already operating.

Beyond these very fundamental requirements, the following additional factors have to be considered which must be fulfilled both for the future model for supporting renewable energies and for the future market design:

Requirement 4: Investment security

Investment security means firstly that investors can rely on the statutory framework conditions and secondly that fair profits can be earned in the scope of the market design and the model for supporting renewable energies. A possible over-subsidisation in the past could, due to the guaranteed 20 year feed-in tariffs in the EEG, only be corrected retroactively with great difficulty and at great cost, in particular related to the level of trust in the market. A withdrawal of such statutory commitments would - irrespective of the legal issues involved - give a damaging signal in respect of investment security. As a general rule, retroactive state interventions which affect the profitability of long-term investments should be avoided.

Requirement 5: Volume control / target achievement

Achieving the expansion targets too quickly or missing them can also considerably affect the investment security of other market participants who offer capacity and flexibility in the scope of the energy transition. The same applies to the planning security of other participants, in respect of adjusting to the changes in the system (e.g. power plant and network operators). In light of this, the energy transition needs effective management to ensure the long-term coordination of the various participants and stages in the value chain, as well as the mastering of bottlenecks. So far, suitable, effective instruments have been lacking.

In order to guarantee security of supply, the energy industry must also be prepared for bottlenecks which occur at short-notice. As several stages in the value chain are usually affected in grid-bound systems, a coordinated approach is required. For this purpose, a clear decision-making framework should be created with unambiguously defined roles and instruments. The management for handling problems should have early warning systems and traffic light concepts.

2.4 Synchronisation of distribution network expansion and RE growth

The choice of plant location is currently made independent of the network infrastructure conditions. Thus, it is becoming increasingly common for generating plants to be constructed at locations where bottlenecks already exist. These plants then receive compensation payments when feed-in management measures are (predictably) employed.

The BDEW thus believes that additional potential for cost reductions exists, through strategic network expansion planning on a distribution network level. For instance, the network operator's existing obligation to enable the feed-in of power from renewable energy to include the last kilowatt hour, leads to unnecessary additional costs to the economy as a whole.

Requirement 6: Synchronisation of distribution network expansion and RE growth

The regulation of network expansion must be further developed such that it firstly ensures the necessary distribution network expansion is undertaken and secondly that network operators can have a strategic and cost-effective network expansion planning without jeopardising the investment security of RE plant operators.

Furthermore, a system should be developed which does not impede the choice of a profitable location while also taking the short and medium term network expansion situation at the respective location into account. We should strive for an optimum result for the economy as a whole, by balancing network expansion and RE connection decisions.

2.5 Environmental friendliness and water protection

One key cause of the pollution of ground water with nitrate and pesticides is the agricultural production of maize. Especially in regions which are traditionally strong in and have in recent years been experiencing significant growth in livestock farming, the development of biomass production results in additional ground water pollution. Biomass production serves the cultivation of both feedstuffs and energy crops. The nitrate pollution in bodies of water can, in most cases, be traced to direct and diffuse depositions, in particular from agriculture. A comprehensive nutrient accounting system and its monitoring does not as yet exist.

Requirement 7: Environmental friendliness of the support for renewable energies

The protection of ground water and of the drinking water supply must be fundamentally guaranteed. The EEG regulations should not conflict with that principle. The agricultural cultivation of feedstuff or nutrient crops and the cultivation of energy crops *must strictly fulfill the general and regionally specific requirements of water and fertiliser legislation.*

It is also necessary to eliminate existing deficits in the enforcement of specific legislation, in order to avoid malfunctions in the EEG as well as for the purposes of water protection.

2.6 Integration into the European interconnected system

Germany is not an island, but lies in the centre of the European internal market. The expansion of renewable energies has effects on neighbouring countries connected to Germany via border interconnection points. On the one side, the expansion of renewable energies in Germany increases the overall generating capacity in Germany and reduces the revenues of power stations in neighbouring countries. At the same time, electricity customers abroad can enjoy lower electricity prices which result from the RE subsidies borne by German electricity customers. On the other side, it can be argued that the feed-in tariff of the EEG leads to market distortions or constitutes state aid and thus is in breach of European law. A respective examination of the situation in conjunction with the particular balancing rules as well as the freedom of movement of goods is pending before the Director General for Competition of the EU Commission. This leads to legal uncertainty.

In July 2013, considerations of the Commission on new guidelines for the support of environment and energy projects in Europe were released. The respective catalogue of requirements contains rules for the future support of renewable energies which would be difficult to reconcile with the current practice in Germany. That is true, for example, in respect of the requirement for technology neutral tenders and auctions where member states want to subsidise RE installations.

Requirement 8: Compliance with European law

In particular as regards the realisation of a European internal market for electricity, the subsidy system for renewable energies in Germany must conform to European law. The exchange between member states - for example through the use of flexible cooperation mechanisms - has a relevant inherent potential to reduce costs.

2.7 Administrative cost

Whilst the German Renewable Energy Sources Act in its first version of 1 April 2000 comprised a mere 12 paragraphs and one appendix, its complexity increased through the 2012 EEG amendment to 84 paragraphs and 5 appendices as well as several ordinances. Today, compliance with the EEG leads to enormous administrative workload and associated costs. Over 4,500 tariff categories, bonuses, exemption and interim regulations as well as the use of undefined legal terms complicate the daily processing of the subsidy system by the network operators. The administration costs are borne, through the network charges, by electricity customers.

Requirement 9: Reduction of administrative cost

A future model for the support of renewable energies should limit the administrative workload and the complexity level as far as possible.

2.8 All requirements of the fundamental reform of the EEG at a glance

In respect of the framework conditions for the further expansion of renewable energies, the BDEW has formulated the following requirements on the basis of experience up until now and in light of long-term objectives:

1. The provision of flexibility and ancillary services must, in the course of the "role reversal" between electricity generation from renewable energies and from conventional energy sources, increasingly become the responsibility of renewable energy plants.
2. The support instruments must be effective and cost-effective. As such, market based mechanisms are best able to provide a cost-effective incentive for the expansion of renewable energies and the necessary flexibility for guaranteeing security of supply.
3. The economic burdens resulting from the subsidisation of renewable energy must be declared as transparently as possible and distributed as fairly as possible.
4. The energy transition requires a great willingness to invest, the basis of which must primarily be a reliable statutory framework. Furthermore, the achievement of the RE expansion targets requires a subsidy system or a market design which enables reasonable profits to be earned.
5. The targets decided upon for the expansion of renewable energies should neither be greatly undershot nor overrun as a result of the future model for their promotion. This requires an effective instrument for controlling the amount of new RE construction.
6. The expansion of renewable energy must be synchronised with the expansion of the distribution network in order to avoid unnecessary burdens on the economy as a whole.
7. The EEG should be a guarantee for an environmentally friendly expansion and a sustainable energy supply.
8. A system of subsidies for renewable energies in Germany must comply with European law and be compatible with the further development of the EU internal energy market. The exchange between member states - for example through the use of flexible cooperation mechanisms on the basis of the Renewable Energy Directive - contains a relevant potential for cost reductions.
9. Putting the EEG into practice requires an enormous administrative workload on the part of the network operators and is consequently associated with high costs. The aim should be to reduce this expenditure in the future.

3 Components of a subsidy model for the expansion of RE in Germany which is adequate for the energy industry

3.1 Further development of direct marketing

It is the BDEW view that the success of the energy transition depends on renewable energies assuming some system responsibility. This assumption initially refers to a technical system responsibility, which makes it necessary for renewable energy power generation plants to have the possibility, in competition with other market participants, to provide system services of equivalent technical quality. This includes an obligation to equip RE plants with technical components for, amongst other things, output regulation and remote control as well as for the production of reactive power and short-circuit current.

A second element is the market integration of renewable energies. A stronger focus on market and system requirements increases the value of electricity from renewable energy installations and creates a new basis for a development of renewable energies which is system-compatible as well as politically and socially desirable. The degree of competitive orientation is thus one of the most central questions in respect of a long-term model for the promotion of renewable energies.

After intensive debate and under consideration of all arguments discussed, the BDEW calls for the continuation and further development of the market premium model with financing/support for new plants via a premium on the exchange price. Setting parameters for the market premium model is crucial both for the further expansion of renewable energies and the associated financing costs as well as for the system integration of electricity from renewable energy sources.

In order to ensure a broad market integration of renewable energies and to secure the associated advantages, the BDEW is in favour of mandatory direct marketing via the market premium model. In this way, the management premium, which was difficult to determine in any case, can be dispensed with because the marketing costs would already be taken into account in the scope of the profitability assessment of the plant operator. However, one must consider that costs are incurred for the marketing and the abolishment of the management premium without an adjustment of the remuneration levels would constitute a cut in support.

For the purposes of further competitive integration, long-term price estimates must also be considered, in the scope of the investment decision of the business person or entity. The BDEW thus advocates, in its target model, the employment of a market premium which is fixed ex ante. However, there are also good reasons to implement the above mentioned target model for the promotion of electricity generation from renewable energies step by step. In light of the structural changes to the energy supply associated with the energy transition, risks arise which make an immediate switch to an ex-ante fixing of the market premium seem difficult.

Therefore, the BDEW recommends the implementation of the target model in two stages:

1. In the first stage, the BDEW recommends temporarily maintaining the ex-post determination of the market premium.
2. In the second stage, a model should be implemented as swiftly as possible which provides for the competitive determination of a fixed market premium, which increases the cost-effectiveness of the energy transition and which preserves the diversity of participants, secures the achievement of the RE expansion targets and which transfers the risks, which have until now been socialised, fairly to the investor.

3.1.1 Volume quotas

A further, central element for the further development of the market premium model is the replacement of the fixed time period with a volume quota relevant to the subsidy. A correctly configured volume quota for the “energy output subsidised would mean plant operators, in situations of negative electricity prices, would be faced with the decision of whether to exercise the premium immediately (reduced by the negative electricity price) or to "save" the premium for a later feed-in of electricity. In this way, an incentive is created for the plant operator not to feed-in electricity in times of negative market prices. A further advantage of the volume quota is that the subsidy for each generating plant is fixed in advance. Only the time period, over which the subsidy is paid out, would vary according to the quality of the location. Thus, a location based over-subsidisation, as has been the case for particularly productive locations, is considerably reduced.

3.1.2 Introduction of auction mechanisms

With a view to enhancing cost effectiveness, the BDEW believes that the level of the premium should in future be determined under competition conditions. Auction mechanisms, which would appear to be most suitable in the case at hand, also have the advantage that the volumes which are put out to tender can follow an expansion path and the achievement of the target can be guaranteed if the path is correctly defined. On this basis, the necessary expansion of the infrastructure (e.g. network, gas turbines and storage) can be planned accordingly in advance and can respond quickly to the planned additional feed-in capacity.

In view of the issues associated with the auction instrument (see point 4.1.3) and the resulting requirement of an intelligent design, the BDEW recommends the configuration and introduction of an auction for the competitive determination of the level of the subsidy be discussed carefully - but without delay - and then implemented in the course of a second stage of the implementation of the target model.

3.1.3 Obligatory remote control functionality of plants

In order to integrate generation plants into the system, it is crucial that they can be regulated by the network operator and that they can be remote controlled by the marketer. Otherwise a response to price signals is not possible. The direct marketing of electricity from renewable energies can only release its full effect if the direct marketer both has up-to-date knowledge of the current feed-in situation and can control the generation plant directly. This is the only way they are able to fulfill their balancing group responsibilities.

In the view of the BDEW, therefore, support granted within the market premium model should be bound to the requirement that the actual feed-in situation can be precisely controlled. Considering the high number of generation plants, which are currently involved in direct marketing, an interim rule needs to be found which enables these RE installations to retrofit the necessary equipment.

3.2 Synchronisation of new constructions of renewable energy installations with the expansion of the distribution grid

The BDEW believes that there is considerable potential for optimisation in respect of the interaction between electricity network and electricity generation from renewable energies. The BDEW therefore recommends the implementation of the following instruments:

3.2.1 Market signals for RE plants

The choice of plant location is currently made irrespective of the network infrastructure conditions. Thus, it is becoming increasingly common for generating plants to be constructed at locations where bottlenecks already exist in the distribution network. These plants then receive compensation payments when feed-in management measures are (predictably) employed. Thus, a system should be developed which does not impede the choice of a profitable location but which also takes the short and medium term network expansion situation at the respective location into account.

A corresponding solution could be found in the amendment of compensation claims (Sec. 12 EEG) in cases of feed-in management measures (Sec. 11 EEG):

1. Plant operators receive, in the case of feed-in management measures - at least usually - 100 percent compensation.
2. Network operators can pass on the compensation payments due, to the extent that the feed-in management measures were required. For feed-in management measures due to network bottlenecks which need to be expanded, Sec. 12 (2) EEG shall continue to apply: Compensation payments may only be passed on if the measures were necessary and the network operator was not responsible for them.
3. If a plant operator constructs a plant for the generation of electricity from renewable energies in a bottleneck area, the network operator will notify the plant operator of this upon receipt of the respective network connection request. If the bottleneck only arises as a result of the newly planned installation, the notification must include details, in particular, of the amount by which network capacity is exceeded.
   "Network bottleneck" describes the situation whereby the technical, nameplate capacity of the network is not sufficient for the constant and simultaneous acceptance and delivery of all electrical capacities connected to the network or the section of the network of the access network operator, regardless of short-term restrictions due to measures as per Sec. 11 EnWG (maintenance, repairs, expansion). A bottleneck exists, in particular, as soon as a feed-in management measure as per Sec. 11 EEG occurs for the first time, due to a bottleneck in the distribution network.
4. If the plant operator decides to construct the generation plant anyway, he then waives, for a period of two years, any right to compensation payments for feed-in management measures due to bottlenecks in the network of the access network operator. Feed-in management measures due to bottlenecks in the upstream network still qualify for compensation. Insofar as these plants have technical facilities as per Sec. 6 (1) No. 1 EEG, their output will be reduced before that of renewable energy plants and CHP Act plants which were connected before them. Since a priority output reduction

requires a separate control possibility, the reduction of output of smaller PV installations (>30 kW) is effected according to the German Federal Network Agency's guidelines on EEG feed-in management.

5. The feed-in capacity of PV installations up to 30 kW will generally be limited to 70 percent of the installed capacity. For PV installations over 30 kW, Sec. 6 EEG continues to apply. Current studies show that a cap on PV installations of 70 percent output, leads to a fall in revenue for the installation operator of no more than two to three percent. On balance, therefore, a significant saving potential in terms of network investment requirement can be ascertained. The alternatives contained in the current statutory regulation (fixed restriction of feed-in capacity or installation of the technical facilities) are not constructive. For installations up to 30 kW of installed power, the fixed restriction should be stipulated as 70 percent of peak capacity. The technically simplest way is usually to curtail the active power via the inverter.
6. Generation plants with an installed capacity greater than 100 kW will still have to be equipped with technical facilities as per Sec. 6 (1) EEG. Where such plants have been located in a network bottleneck area, the technical facilities must enable a direct control and regulation of the generation plant.

3.2.2 Strategic network expansion planning instead of network expansion obligations for acceptance up to the final kilowatt hour

The BDEW thus believes that an additional potential for cost reductions exists, through strategic network expansion planning on a distribution network level. Thus, the network operator's existing obligation to enable the feed-in of power from renewable energy to include the final kilowatt hour, leads to unnecessary additional costs to the economy as a whole. Current studies conclude that harvesting the final kilowatt hour is inefficient from the perspective of the economy as a whole as the additional costs incurred for the network expansion, far outweigh the value of the final kilowatt hour generated. A limitation of active power in the case of onshore wind to, for instance, 80 percent of the installed capacity leads, according to a dena study, to a loss of energy volume of around two percent but saves over 15 percent in network expansion investment. A restriction of active power in the case of PV installations to 70 percent of the nameplate capacity leads to a loss in energy volume of two to three percent.[3] In the opinion of the BDEW, however, it would be counterproductive, in light of the desired installation design - in particular in the case of wind power installations - to permanently reduce the active power fed-in.

The BDEW thus proposes a further development of the network expansion obligation which firstly guarantees the necessary network expansion is undertaken and secondly enables the network operator to pursue a strategic and cost-efficient network expansion plan, without jeopardising the investment security of the installation operator:

---

[3] Jan van Appen (Fraunhofer Institute for Wind Energy and Energy System Technology (IWES)), Martin Braun (University of Stuttgart, Institute of Power Transmission and High Voltage Technology (IEH)), Bastian Zinßer (University of Stuttgart, Institute for Photovoltaics (IPV)), Dirk Stellbogen (Centre for Solar Energy and Hydrogen Research (ZSW)): Power output limitation in the case of PV installations - adjustment of the modelling methods and comparison of different locations, 2012.

1. Network operators are entitled to restrict the output of renewable energy installations and CHP plants when network bottlenecks are imminent. The network area of a network operator is considered sufficiently dimensioned if 97 percent of the possible annual feed-in volume can be accepted.
2. The plant operator receives, as per the new regulation, compensation payments in cases of feed-in management measures (see point 3.2.1 above)
3. The network operator can pass on the compensation payments made in accordance with the new regulation on compensation payments in cases of feed-in management measures (see point 3.2.1 above).
4. The percentage share of the annually restricted volume will be ascertained by 31 May of the following year on the basis of the EEG annual account (attestation).
5. If the restricted electricity volume (lost volume) exceeds three percent of the feed-in volume (including the lost volume) in the network area in any given calendar year, the network operator is obligated to undertake immediate network expansion measures. The network bottlenecks requiring expansion identified in this way must be declared by the network operator as per the notification and publication duties in the EEG.

3.3 Use of technology-specific potential

3.3.1 Technological differentiation and technological neutrality

In view of the often demanded technological neutrality of the future support of renewable energies, the BDEW calls for a temporary maintenance of a certain degree of technological differentiation in the scope of the coming EEG amendment, in order to reflect the different stages of development and learning curves of the various different technologies.

On the other side, the consolidation or removal of individual subsidy categories (e.g. size categories, bonuses for bio-energy, see point 2.3.1) should be undertaken, also with a view to the reduction of bureaucracy associated with the EEG.

The BDEW thus supports the preservation of a balanced energy mix in the area of renewable energies, not least in light of the different technical potential of the individual generation technologies and the associated possibilities for system integration.

3.3.2 Installation of technical equipment for the provision of ancillary services

Overall, the technological optimisation of EEG installations must be a central component of the future EEG. In this context, market integration is fundamentally the most suitable instrument. The effect of the market price signal on the installation operator will incentivise it to optimise the value of the electricity it generates.

At the same time, the necessary role reversal in the course of the energy transition must be initiated at an early stage, also in view of the ancillary services. To this end, it is firstly necessary for plants for the generation of energy from renewable energy sources to have the possibility, in competition with other market participants, to provide ancillary services of equivalent technical quality. Secondly, this includes an obligation to equip RE plants with technical components for, amongst other things, output regulation and remote control as well as for the production of reactive power and short-circuit current.

3.3.3 Biogas: Restructuring the support for electricity from biogas plants

Renewable energies must increasingly assume system responsibility. The generation of electricity from biomethane has a special significance, due to it not being dependent on the availability of the source. In connection with the promotion of biomass in the EEG, its considerable significance - in comparison to the fluctuating renewables - as a "dispatchable energy source" must be taken into account. In this context, it is constructive to distinguish between the generation of electricity from raw biogas and that from biomethane feed-in. In the context of the future support for biomass, the value to the energy industry of the storability of processed biogas through the use of the existing infrastructure (natural gas network) should be considered, as well as the associated possibility of generating electricity to match demand as well as the multiple potential uses of biogas at the interface of heating and electricity utilisation. In this way, biogas can help to achieve the heating related RE targets.

The BDEW thus supports the German government in its efforts to increase the feed-in of biomethane into the natural gas network to 6 billion cubic metres per year by 2020 and to 10 billion by 2030. In the opinion of the BDEW, the potential from residual material and renewable raw material is basically sufficient.

A simplification of the regulatory framework conditions is urgently required, however, in order to raise the potential of electricity generated from biogas to improve flexibility. The BDEW recommends two measures which firstly reduce the complexity of the tariff structure for new generation plants and secondly are designed to enable the trade of biomethane which has been upgraded to natural gas quality.

3.3.3.1 Optimisation of the tariff structure

Part of the necessary subsidisation of biogas and biomethane should aim to incentivise generation of electricity in line with demand. The market premium model, in conjunction with the imposition of volume quotas (see section 4.3), sets the correct course for a demand-oriented generation of electricity from biogas plants. In a similar way, a possible capacity market will offer additional revenue potential. This increased flexibility depends, however, on the possibility of using a gas storage facility, which enables the interim storage of biogas produced in fermentation plants. For biomethane, the existing natural gas infrastructure could be used. In light of this, the BDEW believes that the focus of future subsidies in the area of biomethane should be on gas upgrading in connection with the further development of direct marketing. A bonus should be paid only for gas upgrading, as this is technically more complex and system relieving in comparison to direct electricity generation.

The BDEW thus recommends reducing the tariff structure for future biogas plants to comprise two tariff classes and one bonus.

1. Raw material tariff classes:
    a. Regenerating raw materials, farm fertiliser and residual plant matter.

b. Other residual substances (gradation according to power class of the cogeneration plant, 60% heating use obligation - applicable for on-site plants and biomethane plants)
2. Gas upgrading bonus.

3.3.3.2 Increasing flexibility of biomethane trade

Increasing the flexibility of electricity generation from biomethane necessarily requires the tradability of the product.

With the EEG 2012, a new tariff structure for the generation of electricity from biomass was introduced. To further include residual and waste material, the exclusivity principle was lifted for the use of renewable raw materials in comparison to the EEG 2009. The new remuneration structure is based, in the case of biogas and biomethane, on the respective energy relevant proportion of the substrate used for the gas production, according to the reference values prescribed by the German Biomass Ordinance.

The objective of lifting the exclusivity principle is to enable the formation of tradable products based on biogas/biomethane for the demand oriented generation of electricity and heat as well as the improved development of the potential of residual material which has so far partly been unusable. However, the legislator adopted a restriction in the explanatory memorandum on the legislative text of the EEG 2012, which cannot be directly deduced from the text of the law. This states:

„A division, in the accounting process, of the different materials used into the individual biogas part volumes generated for electricity production in the electricity generating units is not permitted (p. 100, German Bundestag Printed Paper 17/6071)."

This explanation can be interpreted as meaning the total volume of biomethane, prior to electricity generation, cannot be split up into part volumes such that biomethane of different compositions can be supplied to different customers. According to the explanation, the biomethane must always correspond to the individual blend from the respective fermenter-gas processor combination in which it was produced. A division of the natural gas volume into the individual tariff elements can only be undertaken once the gas has been used for electricity generation.

For the biogas industry, this interpretation of the prohibition on separate balance sheet accounting, represents a serious impediment to trade. The prohibition on accounting division impedes the trade with biogas/biomethane as the possible products:

- become too complex and thus incomprehensible for the customer (not salable);
- are not comparable with one another, because an infinite variety develops (not tradable);
- are only definable/quantifiable in the following year and are thus burdened with a very high economic risk (the biomethane quality sold during the year is only determined retrospectively which in turn influences the level of subsidy and the price of the already sold gas);

- are burdened with high administrative costs at each individual trading stage (increased costs).

This leads to the restriction that biogas plants are only operated with raw materials from a single tariff class. In this way, some generation plants come into being which purely operate using waste material. A collection of the residual and waste materials in the area and cofermentation is currently practically excluded from the market under the current regulations - through the inevitable formation of plant specific products whose value is only ascertainable at the end of a year. Consequently, a high potential within residual and waste materials cannot be exploited.

Therefore, the possibility of separate accounting is a requirement for trading with products - a tool for the ability of participants to trade. The BDEW recommends permitting separate treatment for accounting purposes. In order to avoid the lock-in effect, the tariff structure of the EEG should be regularly checked in relation to biogas plants and then modified according to the current framework conditions.

3.3.3.3 Water protection

In order to avoid further water pollution with nitrate from agricultural sources, agricultural legislation should be amended. The agricultural cultivation of feedstuff and food crops and the cultivation of energy crops must strictly fulfill the general and regionally specific requirements of water and fertiliser legislation. It is also necessary to eliminate existing deficits in the enforcement of the relevant law, in order to avoid malfunctions in the EEG as well as for the purposes of water protection. The abolishment of the liquid manure bonus, adopted in the 2012 EEG amendment and the promotion of a broad raw material spectrum (including a necessary limitation for particular energy crops such as maize) are steps in the right direction. The protection of ground water and of the drinking water supply must be fundamentally guaranteed.

3.3.4 Onshore wind: Ending of partial over-subsidisation

Onshore wind energy has made large technological advances in recent years. The outcome of these advances enabled by, amongst other things, market integration and the associated effect of the market price signal, are wind power plants, which can generate more consistent electricity even at much lower wind speeds, using large rotors in conjunction with smaller generators,.

In addition, the fulfilment of the German Ordinance on Ancillary Services by Wind Energy Plants (SDLWindV) has become "state of the art", hence, in the opinion of the BDEW, the ancillary services bonus (SDL bonus) can be abolished.

Currently, the support for onshore wind energy is too high at many locations, in particular in the north of Germany, as, amongst other things, the technological further development of the plants has led to a significant reduction in electricity generation costs. However, there is not a need for remedy at all wind locations: the promotion of locations with low to normal wind speeds is still reasonable, for instance. The BDEW considers this an indication that the effect of the reference yield model for the gradation of support for wind power installations is not unfolding to the desired extent. The BDEW thus refers to the already mentioned possibility of the imposition of a volume quota on the subsidised electricity volumes, which would also serve effectively to reduce the "over-subsidisation" of good locations.

3.3.5 Achievement of targets through stabilisation of the subsidy framework for offshore wind energy

Due to current delays in network connection and in the clarification of liability issues, commencement of construction and investment decisions have been postponed for numerous projects. Furthermore, the discussion surrounding the brake on electricity prices ("Strompreisbremse") has led to further uncertainty amongst investors. As a result, the originally expected expansion of offshore wind farms (10 GW by 2020) will be delayed - as will, therefore, the associated cost reduction effects.

A further consequence is that the optional acceleration model, as per the EEG 2012, can only be utilised by plants which commence operation by 31 December 2017. At the same time, a degression of seven per cent per year begins from 1 January 2018. The offshore projects which have been delayed due to external factors are now in danger of no longer being able to use the acceleration model and will also receive a lower EEG tariff. This leads to considerable uncertainty on the part of the investors, who planned their projects on the basis of the current framework conditions and have already invested eight-figure sums. In the worst case scenario, some of the delayed projects will not be realised meaning that approved network connections will be built but not used; due to the current regulations, these will still have to be paid for by electricity customers.

The BDEW calls for a constant and efficient expansion of offshore wind energy. In this context, the network connection capacity created must be used effectively and efficiently. For this purpose, the BDEW believes that the existing acceleration model could be stretched on a cost-neutral basis and also applied over an extended period. Furthermore, instruments should be created which incentivise as secure and swift an expansion of offshore wind farms as possible in order to minimise the "vacancy rate" of network connections. An early definition of the tariffs would contribute to this, for example at the same time as the binding allocation of access capacity by the German Federal Network Agency.

3.3.6 Photovoltaics: Flexibility of surface area of photovoltaic power plants

As far as PV installations are concerned, a fundamental distinction must be drawn between roof-mounted installations and free-standing solar power plants. Whilst roof-mounted installations usually, on account of the size, do not include any communication or regulation technology, the control possibilities for free-standing solar power plants can be better compared to those of conventional power plants (ability to control the plant, remote monitoring in real time, measurement of solar radiation, precise forecasting).

It is conceivable that, in future, free-standing solar power plants could (just like other generation technologies) - with the addition of storage capacity - include rotating masses through electronic inverters for the purpose of frequency and system stabilisation.

Also in respect of the economic benefit of existing differences between small, roof-mounted installations and free-standing solar power plants. Firstly, effects of scale in electricity generation apply, so that free-standing solar power plants require lower subsidies compared to relatively small, roof-mounted installations whilst not being dependent on the hidden subsidy of own use of electricity. Secondly, there is the possibility here - similarly to wind power installations - both for public participation models which enable every citizen to participate even if they do not have the required roof area and for investment possibilities for energy providers who can invest in larger projects with higher capital expenditure.

Against the background of improved dispatchability of free-standing solar power plants, an allocation of free-standing solar power plants beyond the currently stipulated area restrictions could be constructive. Therefore the BDEW calls for the introduction of exceptions which can be regulated on site by the municipality involved, in respect of the existing restrictions (conversion area, size restrictions etc.), provided the respective free-standing solar power plant technically fulfills a network supporting function at the network connection point and thus network expansion measures and the associated costs can be avoided.

3.3.7 Photovoltaics: Removal of the unnecessary, own consumption incentives, contained in the EEG

In the last few years, the proportion of plants with own-use has increased greatly and is currently at 80% of installed new photovoltaic (PV) plants. The operator and „self-user" thus profits in several respects. Firstly, through its own-consumption, the operator saves the equivalent portion of the EEG levy as well as the network costs which would normally apply to the volume generated. With the use of the self-generated electricity, the operator thus profits, in comparison to the feed-in tariff, excessively and weakens solidarity within the system as the own-use of the electricity means that the final consumer volume which can be subject to the levy, onto which the EEG costs are passed, shrinks further. This applies similarly in respect of the network charges.

The consumption of self-generated electricity also places a burden on the distribution network. The strongly fluctuating electricity generation from PV, in conjunction with the similarly fluctuating own demand of the households, leads to a situation whereby in almost any given hour, the distribution networks are being called upon, either because excess production must be carried away or, in the case of a lack of own generation, because the demand has to be balanced.

It should be noted that the users of own generation are also reliant on services and capacity from the network for the security of the electricity supply and for frequency stability.

Sooner or later, a self-perpetuating cycle is created which leads to a growing incentive, via the increase in electricity usage costs, for further own consumption which in turn leads to a further reduction in levyable end consumer volumes.

Therefore, as a basic principle, the BDEW believes that the energy industry exception criteria - and this does not only apply to the EEG - in respect of own-use and the marketing of electricity from a connectivity perspective, must be critically examined.

3.3.8 Hydropower: Use of the potential of hydropower plants

In the view of the BDEW, electricity generation from hydropower is extremely significant in the scope of the energy transition because it enables demand-oriented electricity generation from renewable energy sources and can provide technology dependent ancillary services.

The BDEW thus welcomes the intention of the legislator, as expressed in the EEG, to incentivise the modernisation but also the new construction of hydropower plants whilst taking into account ecological factors. The problem in this context, however, is that the current design of Sec. 23 EEG does not enable the objectives to be realised. Existing hydroelectric power plants, but also the few new construction projects which are currently in the approval process, are especially affected by the demand for the implementation of the EU Water Framework Directive without this being compensated through the EEG levy.

The BDEW fully supports the objectives of the EU Water Framework Directive. If, however, the requirements of ecological modernisation as per Sec. 23 (2) EEG remain the basis for the tariff payments, this should be increased through an ecological bonus which compensates for the costs incurred by the hydropower plant operators.

3.4 Temporary arrangements and treatment of existing plants

The presented measures should only apply, for reasons of protecting legitimate expectations, to new generation plants. Under certain circumstances, some rules could also apply to existing plants if their operators agree to them.

3.4.1 Direct marketing

In view of the existing plants, a switch to direct marketing whilst preserving a reduced management premium should be made possible. The granting of this management premium - although it will be abolished and not replaced for new plants - is necessary because the calculation of the tariff for existing plants did not as yet include marketing costs. These marketing costs will only become an integral part of the tariff following the switch to obligatory direct marketing. Hence, it seems fair to grant generation plants which came online prior to the next EEG amendment and which now make the switch to direct marketing a premium in the amount of the expected marketing costs (which would otherwise be due in the scope of the marketing by the transmission system operator). Quantification of this management premium must be undertaken on the basis of the expected learning curve in respect of the application of the market premium.

3.4.2 Volume quotas

It is also conceivable that the volume quota system could in future also apply to existing installations. In this context, however, a calculation must be made at the time of the switch, as to how much of the "volume quota" still applies. This could be undertaken on the basis of the volume of electricity already generated and the subsidy period already elapsed. Transferring existing plants in this way would eliminate the incentive to feed-in power in hours where negative electricity prices apply and thus contribute to dampening negative electricity prices.

4 Aspects for the further development of direct marketing

The "market integration" of renewable energies does not exclude the financial support for renewable energies up to the time of achieving full competitive capacity. Rather, it should be seen as a process in which investment in and electricity production from renewable energies will increasingly be exposed to competitive incentives, namely market price signals, in order to incentivise the plant operators to act in accordance with the system with the aim of guaranteeing a secure supply of electricity as cost effectively as possible with/or in spite of an increasing proportion of electricity from renewable energies. To this end, the market price must have a controlling effect.

Example: In the feed-in tariff system of the EEG prior to 2012, market price signals only affected very few renewable energy plants, namely those which used the direct marketing option in Sec. 17 EEG 2009. The introduction of the market premium model initially created, on a voluntary basis, a further possibility for direct marketing, with the difference between feed-in tariff and average market value of the electricity being balanced out with the market premium. In this way, the short-term market price signals are already having an effect on plants for the generation of electricity from renewable energy.

In the scope of the further market integration of renewables, they have to assume a greater degree of system responsibility. This includes balancing group responsibility and the provision of ancillary services. Market integration interpreted in this way is not the same thing as an abolishment of subsidies for renewable energies. Market integration does not call the renewable energy expansion targets into question rather it is an essential requirement for achieving a reliable electricity supply with a high proportion of renewables.

In this context, market integration should be differentiated from competitiveness. If one wanted to achieve a high proportion of renewable energies in electricity generation without subsidies, the electricity from these generation plants would have to attain a sufficiently high market value. This requires, firstly, a considerable reduction in costs for the generation of electricity from renewables, which is occurring at various speeds depending on the technology involved. Secondly, European CO_2 trading can contribute to the competitiveness of renewables if structural measures reduce the current excess supply on the European CO_2 market.

The central parameters for the adjustment of the market premium for renewable energies will be discussed below.

4.1 Determination of the subsidy level

The level of the subsidy (both in the case of an investment cost contribution per kW and in the case of a kWh based subsidy) can either be set in the scope of an administrative process (e.g. as in the existing EEG, on the basis of a monitoring report or a flexible cap) or determined in the scope of an auction. How the subsidy level is determined is a key factor influencing the efficiency of the subsidy and it thus indirectly controls the construction of new generation capacity.

4.1.1 Administrative determination (EEG, except PV)

In this procedure, the level of the subsidy is set by the legislator on the basis of a monitoring report. The procedure allows the EEG tariff rates to be adjusted according to the cycle of legislative amendments in order to correct any undesirable developments - such as an overheating or cooling of the process of expansion of renewable energies.

The disadvantage of this model is that the state regulator must possess a comprehensive knowledge on the development of costs (variable ex-post premium) or the cost and price developments (ex-ante premium).

4.1.2 Flexible cap (Photovoltaics within the EEG)

A variation on the legislative determination of tariff rates introduces a dynamic element through the implementation of a flexible cap which replaces legislative corrections of tariff rates with a legislatively prescribed automatic process. The cap is used to control the degression of the tariff rates in the current EEG in the area of photovoltaics.

Whilst setting the amount of the subsidy to control new construction of renewable energy plants in the scope of legislative amendments is only possible at a comparably high cost, the "flexible cap" instrument allows the new construction to find its own level without any additional legislative process if the degression formula at least approximates the development of costs. However, the control effect achieved in the scope of an auction process (see 4.1.3 below) is considerably more precise because tenders for the desired new construction can be called for in a technology specific manner.

It currently appears that the flexible cap which applies to PV in 2013, could be having the desired controlling effect. Independently of that, however, there are doubts as to whether the introduction of a flexible cap for other technologies would be constructive in view of the long planning times. For example, a flexible cap for electricity generation from wind power plants - and also free-standing solar power plants - can lead to a situation whereby investors could not anticipate, at the time of investment, how the right to applicable tariff would develop up until the time the generation plant commenced operation.

In light of the considerations above, the BDEW advises against an extension of the flexible cap system to other technologies and recommends an examination of the tariff system for free-standing solar power plants.

4.1.3 Competitive determination of the level of subsidy by way of an auction

As far as the subsidy efficiency is concerned, the auction process can, if correctly designed, ensure the the greatest possible degree of competition between the bidders. At the same time, an effective volume control is provided through the specific additional capacity put out to tender. In light of this, one can assume that the auction process is fundamentally suited to achieving, in addition to a defined volume control, cost effectiveness in the subsidisation of renewable energies.

On the other side, experiences in other countries have shown that auction processes do not necessarily lead to the desired outcome - as with all other control mechanisms or subsidy designs - and entail risks:

1. If the market participants assume - knowingly or unknowingly - too much risk, the bid prices will fall due to a reduction in profits. However, the danger of the project failing due to insufficient precautionary measures in the auction design increases.
2. Auction procedures could lead to energy supply companies being favoured who are in a position to manage the respective risks. This could result in an unintentional restriction of the number of participants.
3. Depending on the organisation of the auction, generation plants in inefficient locations could be incentivised, especially if auction designs are chosen which are divided into too small sections and geographically differentiated.

The BDEW believes that auctions, if intelligently designed in terms of important parameters such as participant pool, prequalification and investment obligations, can overcome the risks described and lead to the desired outcome.

When implementing this type of mechanism in Germany, one must take care to ensure that plant construction is not incentivised at inefficient locations and that an auction design is selected which provides for sufficient competition. In light of the opportunity to use auctions to determine the level of subsidy competitively and efficiently, as well as to control the additional construction, the BDEW recommends developing design options for auction procedures in a balanced, inter-sector dialogue with the help of scientific expertise and commencing implementation without delay.

4.2 Time of determination of subsidy levels and granularity of the kilowatt hour based support for renewable energies

In the medium to long term, renewable energies will require a secondary revenue stream in addition to revenues from the electricity market. Such an additional financing stream can be determined ex ante as a premium in the market premium model or calculated ex post as the difference between a previously determined revenue and an average market value (as per market premium 2012).

For the purposes of further competitive integration of renewables, long-term price estimates must also be considered, in the scope of the investment decision. In its target model, the BDEW thus advocates the introduction of a market premium which is fixed ex ante, through which plant operators have to bear the long-term revenue risk for the volume of electricity they produce. At the same time, there are concerns within the BDEW against a premature switch to an ex-ante determination.

4.2.1 Arguments for the fixed market premium

Proponents of a market premium fixed ex ante, argue that, in the area of renewable energies, the market risk is currently greatly limited as the feed-in tariff is fixed on the basis of a full-cost analysis. According to the proponents, plant operators do not assume any long-term market risks in the market premium model either. The claim is that in this model with the variable market premium as the difference between the average market price in the respective month and the full-cost calculation described, the end consumers bear the long-term market price risk.

However, this price risk cannot be borne by the public forever, rather it must, in the medium to long-term, be transferred to the plant operators - the investors and recipients of the profits.

Fundamentally, competitive behaviour should also include forecasting long-term market proceeds prior to construction of a generation plant. Thus, according to the proponents of this system, a complete market integration of renewable energies requires that renewable energy plant operators - like the operators of conventional power plants - assume the entire market price risk for the volume of electricity they generate. This point would be reached when the plant operators receive a fixed market premium in addition to their market revenues.

A further advantage of the ex ante model, according to its supporters, is that the subsidised volume in the scope of volume quotas would be more predictable.

4.2.2 Arguments for a variable market premium

Proponents of the variable market premium point to the structural changes in the energy supply which accompany the energy transition and the associated regulatory risks which, in their opinion, would make the ex-ante fixing of the market premium difficult:

1. Thus, today there is still no pathway for the addition of new plants for the expansion of renewable energies which is in any way reliable. Knowledge of generating capacities in the market and their feed-in behaviour is, however, of great significance when forecasting market prices.
2. Furthermore, the current discussions about a new market design which will possibly need to be implemented, lead to new uncertainties which impair the calculation of an ex ante market premium. In this context, the introduction of a capacity market, for example, could reduce the market revenues on the energy only market.
3. The future of emissions certificate trading is also unclear, whereby emissions trading, if designed accordingly, could also influence the formation of the price. An investor would have to anticipate whether and to what extent a politically motivated squeeze on the availability of certificates could occur.

These - and other - regulatory risks also apply similarly to conventional electricity generation plants, however this at least does not contradict the notion of competitive equality and thus it supports an ex ante fixed market premium. On the other side, however, the assumption of risk is not for their own sake. The assumption of risk is, in a market economy never an end in itself but a consequence of competition which can generate efficiency gains. As the expansion target in the area of renewable energies is set by politics, an assumption of price risks does not automatically lead to improved efficiency. Unlike on other markets, the demand is determined in advance. Thus, the objective is to achieve this demand as cost-effectively as possible.

Proponents of a variable market premium also argue that a market premium fixed ex ante, would not lead to a situation whereby the general public does not bear any risk.
In the case of the variable premium, consumers would always pay the full costs via the procurement costs as well as the amount of the variable premium. For them, the only uncertainty is about the composition of these full costs. The financing levy (EEG levy) serves to compensate the difference between electricity market proceeds and the full costs.
In the case of the fixed premium, however, the amount of the financing levy is fixed, however the overall costs to the public as a whole are not. As an expected value, the total costs for the public (levy plus procurement costs) are higher. This is because an investor would have to price in the aforementioned unknowns, completely independently of whether these risks become reality. Consequently, one should expect risk premiums which would be reflected in, amongst other things, higher interest rates - and thus in higher expected costs for the end consumer. If, however, one maintained the variable market premium, these risks could only be passed on to the end consumer via the EEG levy if they become reality. If market prices exceed expectations, the variable rate would have a cost-reduction effect. As a result, the premium which was determined on an ex ante basis would create considerable risks for end customer prices as the hedge between the EEG levy and market prices then ceases to exist.

Furthermore, a premium which is determined ex ante does not produce any efficiency gains which a variable premium would not also produce. The short term (Dispatch) incentives are the same for a variable premium as they are for a fixed premium - it is the level of the premium alone which decides the level above which negative feed-in prices would not be accepted. In both cases, plant operators would always feed-in electricity even at negative market prices until the amount of the market premium - regardless of whether the premium was determined ex ante or ex post - was exhausted. In both cases an efficient dispatch of power could be ensured by combining the premium with the imposition of an appropriately designed volume quota.

4.3 Determination of the subsidy system

An assessment must be made as to whether the current fixed time period of the subsidy, in light of the requirements mentioned in section 1, sends the right signals and whether the achievement of these aims would not be better supported by alternative options for the subsidisation. The following instruments are conceivable:

1. Time limit for the subsidy on a kWh basis (current);
2. Investment cost subsidy per kW;
3. Imposition of a volume quota for the subsidy per kWh.

4.3.1 Intended effect: Avoidance of feed-in at negative prices

In the current system of fixing a kilowatt hour based subsidy for a particular duration, the plant operator is solely incentivised to feed-in as many kilowatt hours of power as possible during the subsidy period. Where this takes place within the scope of direct marketing and where the operator thus receives a market premium, the operator will only have an interest in avoiding feeding-in power if the negative market price completely cancels out the market premium. Hence, the market premium is only able to counteract extreme negative prices.

If the disbursement of the subsidy as an investment cost subsidy or through the setting of a subsidised electricity volume (imposition of a volume quota) the maximum amount a generation plant could receive would be clear from the outset, provided the plant produces, overall, more than the subsidised quota. In these cases, a plant operator can rely on the fact that he can also claim the subsidy to which he is entitled at a later time. If the operator feeds-in power at a level below his marginal cost, he would have to forego a portion of the subsidy to which he is entitled. This gives plant operators an incentive, the same as all other plant operators on the electricity market, only to feed-in power at market prices above their marginal cost level. Unlike with a pro-rata payment of an investment cost subsidy, the determination of an overall volume quota with no time limit would, however, weaken this effect by the loss in net present value of the subsidy claimed later. In this case, the additional determination of a low annual quota in addition to the determination of an overall quota could act as a remedy as it would mean that the plant operator could assume that he would not lose the subsidy to which he is "entitled". Consequently, the loss in net present value is limited to the current year and is thus negligible.

A further possibility is the introduction of a provision which stipulates that there can be no subsidy claimed for electricity which is fed-in at times of negative market prices. However, this provision could lead to considerable administrative costs as it requires the time logs of every generation plant to be checked by the relevant network operator responsible for the accounting.

4.3.2 Possible effect: Reduction in the over-subsidisation of extremely good locations

In the existing regime, every generation plant receives its technology specific, and sometimes also size-specific, subsidy. The differences between locations, which can, especially in respect of fluctuating energy sources, be significant, are not taken into account. This leads to a situation whereby the same plant at a better location not only produces more electricity and thus earns greater revenues from its marketing than one in a worse location, but its increased production is - despite similar investment costs - also subsidised. In the case of wind power plants, this effect is partly countered by the reference yield model. However, the cost of construction of wind power plants at locations where less than 82.5 percent of the reference yield is earned, is no longer covered by the reference yield model (because the maximum subsidy duration of 20 years is reached first). In the same way, an over-subsidisation of extremely good locations (more than 150 percent of the reference yield) cannot be avoided.

One advantage of the volume quota system and the investment cost subsidy could be that the over-subsidisation of extremely good locations is reduced. Through the imposition of volume quotas or an investment cost subsidy, how much subsidy a generation plant will receive could be determined in advance. The incentives of an extremely good location would still be preserved as the greater volume of electricity generated at such a location, whilst no longer subsidised, could be marketed. In contrast, a volume quota (with an overall quota) or an investment cost subsidy would allow generation plants to be constructed at weaker locations even if the return on capital might exceed the 20 year level or the electricity production for the return on investment becomes protracted and the invest has to accept a loss in net present value.

4.3.3 Alternative designs and effects

Whether, to what extent and, where applicable, with what side effects the possible positive effects described above could be realised, depends primarily on the parameters set for the alternatives.

4.3.3.1 Pro-rata disbursed investment subsidy

In this case, it is assumed that an investment subsidy is granted pro-rata (e.g. monthly) and for a limited time.

Effects:

- Total subsidy volume is fixed
- Subsidy volume per year is fixed
- Over subsidisation of extremely good locations is reduced
- Location advantages are preserved through their additional production of electricity
- Plant operators are given the incentive not to feed-in electricity during hours where the market price is less than their marginal cost
- Net present value losses no longer occur as the expected annual subsidy is already set in advance
- Processing an investment subsidy is simple
- Long-term revenue risks are transferred to the plant operator
- The investment subsidy is not compatible with the market premium model; it would replace it

4.3.3.2 Total quota would have no time limit; no annual quota

For each kW installed, the volume of electricity eligible for subsidy is determined - in combination with the market premium model. There is no time limit on the term of the subsidy.

Effects:

- Total subsidy volume is fixed
- Annual subsidy remains open
- Over subsidisation of extremely good locations is reduced; the advantage of good locations is in the net present value benefits of being able to claim the subsidy sooner as well as the increased revenues from the additional production of electricity
- Plant operators are given the incentive not to feed-in electricity during hours where the market price is less than their marginal cost. However, in such cases the loss of

net present value applies. This can lead to generation plants accepting market prices below their marginal costs at the beginning of the subsidisation period
- The imposition of volume quotas is compatible with the market premium model

4.3.3.3 Total overall quota without a time limit and with a low annual quota

For each kW installed, the volume of electricity which can be subsidised is set according to the technology involved - and in the scope of the market premium model. There is no time limit on the duration of the subsidy. Furthermore, a low annual quota is set which is achieved by almost all generating plants.

Effects:

- Total subsidy volume is fixed. The maximum annual subsidy level is set via the annual quota. In this way, a swift exhaustion of the entire quota and thus a higher (brought forward) burden on the EEG account can be avoided
- Through the setting of a low annual quota, weather related fluctuations in electricity generation are no longer felt as an additional burden on the EEG levy
- At very bad locations, the total quota will be used more slowly which, in these - rare - cases, will lead firstly to an extension of the time period of the subsidy and secondly to a reduced burden on the EEG account
- An over subsidisation of extremely good locations is reduced
- Plant operators are given the incentive not to feed-in electricity during hours where the market price is less than their marginal cost. In this way, the low annual quota ensures that no loss of net present value occurs. Generation plants thus have the market based incentive, once the price falls to the level of their marginal cost, to decide against feeding-in electricity
- It should be noted that a low annual quota is the equivalent of a cut in the subsidy, even in connection with an overall quota, so would require an adjustment of the tariff rates. The incentive to forego the feed-in of electricity in times where market prices are below marginal costs, also leads to a situation whereby RE plants with positive marginal costs are in operation for far fewer full load hours. With a low annual quota, one would have to convert the target subsidy to the amount of the quota, whereby the rate per subsidised kWh would increase from present levels
- A net present value advantage, achieved through claiming the subsidy faster, is prevented by setting a low annual quota
- Location advantages can only be utilised in the form of increased revenues from increased production of electricity
- The imposition of volume quotas is compatible with the market premium model

4.3.3.4 Annual quota and time limit

A further alternative would be to implement a time limited, annual volume quota in conjunction with the market premium model. Due to the control effect (discounting effect) it is assumed that in this case also, the quota would be set so low that almost every plant could achieve it.

- The maximum annual subsidy level is set via the annual quota
- As the subsidy has a time limit, the total subsidised volume is fixed
- In this way, a swift exhaustion of the entire quota and thus a higher (brought forward) burden on the EEG account can be avoided
- Through the setting of a low annual quota, weather related fluctuations in electricity generation are no longer felt as an additional burden on the EEG levy
- At very bad locations, the annual quota will not be exhausted, resulting in a reduced burden on the EEG account. In these - rare - cases, plant operators will not be able (due to the imposition of a time limit) to claim the entire level of subsidy which would otherwise be due to them if they achieved their annual quota
- Over subsidisation of extremely good locations is reduced; A net present value advantage, achieved through claiming the subsidy more quickly, is prevented by setting a low annual quota
- It should be noted that a low annual quota with a time limit is the equivalent of a cut in the subsidy, even in connection with an overall quota, so would require an adjustment of the tariff rates. The incentive to forego the feed-in of electricity in times where market prices are below marginal costs, also leads to a situation whereby RE plants with positive marginal costs are in operation for far fewer full load hours. With a low annual quota, one would have to convert the target subsidy to the amount of the quota, whereby the rate per subsidised kWh would increase from present levels
- Location advantages can only be utilised in the form of increased revenues from increased production of electricity
- Plant operators are given the incentive not to feed-in electricity during hours where the market price is less than their marginal cost. In this way, the low annual quota ensures that no loss of net present value occurs. Generation plants thus have the market based incentive, once the price falls to the level of their marginal cost, to decide against feeding-in electricity
- The imposition of volume quotas is compatible with any design of market premium model

4.3.3.5 Further questions in relation to the imposition of volume quotas

a) Following conversion to a system of volume quotas, will a reference yield model for (onshore) wind power plants still be necessary?

The reference yield model for onshore wind power plants aims to balance out differences between good and bad locations and to avoid over subsidisation whilst ensuring a constructive regional distribution of wind power plants. In practice, however, over subsidisation has occurred despite an established reference yield model.

The volume quota model can fundamentally reduce the location based "over subsidisation" as the subsidised electricity volume is limited independent of location. At the same time, location advantages are preserved as more electricity will be produced at high yield locations which - whilst not subsidised - will, in turn, generate market revenues.

The proposed volume quota model has the same effect as an investment subsidy which is granted independent of any market revenues. It is conceivable that, on the basis of very good locations, in conjunction with appropriate plant design, market revenues can be earned which would lead to a significant increase in profits.

Provided it is politically so desired, this effect can be countered through a gradation of the volume quota or through a gradation of the level of subsidy similar to a reference yield model. The BDEW believes, however, that care should be taken to ensure that location differences are not levelled out or else the incentive to construct plants at productive locations would be lost.

A reference yield model becomes surplus to requirements if an auction model is introduced, provided the design of the auction model ensures cost effectiveness.

b) How will the level of subsidy be calculated in the volume quota system?

If the market premium is fixed in advanced and determined through the auction process, the level of subsidy must not be calculated as this is specifically fixed - independently of the actual market price level.

If, however, a variable determination of the market premium is used, the question arises as to how the variable market premium will be calculated in the scope of the imposition of a volume quota. The following variations would be possible:

- Calculation of the difference between the energy source and plant specific market value of the kWh which are actually fed-in and the fictitious tariff entitlement
- Determination of the difference between the energy source specific, average monthly market values in the months in which electricity is fed-in and the fictitious tariff entitlement
- Calculation of the difference between the energy source specific average annual market value and the fictitious tariff entitlement.

The view of the BDEW is that the first two variations would lead to increased processing costs in the accounting process and possibly to cherry picking on the part of the plant operators - at least in cases when plant operators feed-in and can choose only to claim the subsidy in hours where the lowest market price applies. This would counteract the control effect in respect of the avoidance of electricity feed-in during times of negative market prices.

The BDEW thus recommends calculating the variable market premium as the difference between the weighted yearly average of the energy source specific market value, determined ex post, and the fictitious tariff entitlement on the other side. In order to ensure a constant financing flow, the payment of monthly instalments in conjunction with a final year-end payment (with rolling correction if necessary) seems to be constructive. In this context, the method for calculating the instalment payments should be defined on the grounds of providing legal certainty.

c) How will the volume quota be determined / fixed?

For this purpose, the total quota and the monetary level of the subsidy should be considered together. The smaller the volume of electricity subsidised, the higher the subsidy per kWh must be.

One must ensure, in order to guarantee an efficient dispatch, that the annual volume quota is kept low to avoid the feed-in of electricity at market prices below marginal costs. However, the relationship between the annual quota and the total overall quota must be taken into account as it is that which sets the anticipated duration of the subsidy.

4.3.3.6 Conclusion: Design options

An examination of the effects described above clearly reveals the similarities between the effects of investment subsidies and volume quotas. For both basic alternatives, the feed-in of electricity at prices which are below marginal cost are avoided through market incentives. It should be noted that this desired effect is weakened, in the event of a total quota without a (low) annual quota, by the discounting effect. In light of this, we will assume a (low) annual quota in the following.

Investment subsidies and volume quotas (low annual quota) are similar in many of their effects:

- They both avoid, in the same way, the over-subsidisation of extremely good locations without destroying fair competitive location advantages (additional production of non-subsidised electricity)
- In both cases, the annual cost to the EEG account is no longer affected by weather related fluctuations (wind/sun) and can thus be more precisely forecast
- In both cases, plant operators are given market based incentives to stop feeding-in electricity during hours with negative market prices. In the case of investment subsidies, the plant operator bears - in a similar manner to a situation with a market premium which is defined ex ante - the long-term revenue risk whilst the imposition of a volume quota can fundamentally be combined with a variable market premium

In view of the considerations in point 4.2, the BDEW thus recommends the implementation of an annual volume quota for the subsidisable electricity volume in conjunction with the market premium model.

This type of (low) annual quota for the subsidisable electricity volume could either be subject to a time limit or volume restriction through the imposition of a total quota for subsidisable electricity. Whilst a time limit has the advantage of clearly defining the end of the subsidy, a total quota in conjunction with a low annual quota could increase investment security and reduce over subsidisation of extremely good locations.

In addition, the BDEW advocates the introduction of a volume quota for subsidisable electricity production with a low annual quota, whereby the end of the subsidy period should be defined as when the previously set total quota has been achieved.

4.4 Technological differentiation versus technological neutrality of the subsidy

Scientific analysis has shown that the technological neutrality of the subsidisation of renewable energies supports efficiency enhancing competition between subsidised, renewable energy sources and this represents an important driver of cost savings. Hence, where subsidies are applied in a technology neutral manner, it would be expected that the most cost-effective technology - currently onshore wind - would always be grown. This could have two possible consequences:

1. If tariff rates appropriate for this most cost-effective technology were applied, generation technologies which today are still expensive but have great potential for the future (e.g. offshore wind, biogas etc.) would not be further developed under the EEG.
2. The higher the degree of technological neutrality, the more likely there would be an over subsidisation of the most cost-efficient option with the probably consequence that these would continue to be expanded in a one-sided manner, as long as effects such as location scarcity do not apply.

In both cases, a renewable energy plant fleet would ultimately be created which is not able to assume real system responsibility.

For this reason, the BDEW calls for the maintenance of technology specific subsidy levels and requirements - the existing potential for the reduction of subsidy categories must, however, fundamentally be increased.

Contact person:

Dr. Maren Hille
Telephone: +49 30 300199-1300
maren.hille@bdew.de

Stefan Thimm
Telephone: +49 30 300199-1310
stefan.thimm@bdew.de