Core Theme 1

Core Theme 1

Support Schemes for RES Electricity

Co-funded by the
Intelligent Energy Europe Programme
of the European Union

Table of Contents

Authors:

Natascia Falcucci, Agime Gerbeti, Energy Services Operator (GSE), Italy

André Poschmann, Anne-Maria Ide, Karin Franzen, Robert Sachso Lorentz

Federal Ministry for Economic Affairs and Energy, Germany

CA-RES CONCERTED ACTION RENEWABLE ENERGY SOURCES DIRECTIVE

1 CT1 in a Nutshell

Increasing shares of electricity from renewable energy sources, the need for the cost-efficient integration into electricity networks and markets and a changing landscape of market players and generation structures requires an adjustment of support mechanisms and markets. Many EU Member States and others have already undertaken reforms of the design of their support schemes in recent years. The EU State Aid Guidelines on Environment and Energy (2014-2020) put particular emphasis on market integration of renewable energies, shifting production support to market premiums and tendering. As of 2017, support levels shall in principle be determined by technology-neutral tenders, although exceptions from both tendering and the principle of technology-neutrality apply and a transition period is granted from 2015 to 2016.

Throughout the second phase of the CA-RES, CT1 participants presented and discussed their experiences with the revision of support schemes for RES electricity, and the set up of different tender schemes. Enhancing market integration of renewables and flexibility were seen as key elements to meet the challenges of the changing landscape. Nonetheless, the shift towards tendering poses implementation challenges to Member States, as overall experience with tendering is rather limited and mixed.

Discussions revealed that testing different design options and approaches, and finding a suitable balance between prequalification (material as well as financial) and penalty rules while still allowing for sufficient competition in the tender will be vital for successful implementation.

CT1 also discussed market integration of RES electricity with a particular view to balancing, market premiums and negative prices as increasing flexibility in the overall electricity system with an emphasis on infrastructure challenges and the role of interconnections. CT1 participants not only benefited from expert presentations and discussions within the Core Theme, but also from the vivid exchange with participants of CT4 on Electricity Networks in joint sessions. Participants agreed that flexibility of the overall electricity system is key for the integration of high RES shares and that various different options for flexibility exist. These include flexibilisation of generation, demand side management, enhancement of grid infrastructure and storage options. To integrate high shares of renewables the potential of all options will need to be tapped. It was emphasized that RES already took over important system responsibilities: By shifting from fixed feed-in tariffs to market premium models RES become responsive to market signals which is an important step towards market integration. In market premium systems RES producers carry full balancing responsibilities. This way RES have an incentive to improve weather forecasts and optimize their production according to the demand (e.g. east/west orientation of PV, mix of large and smaller wind turbines, weak wind turbines, flexible use of biomass). Also, the introduction of tender schemes in most Member States enhances market integration and cost control of RES support.

2 In the Spotlight: Tendering for Electricity from Renewable Energy Sources

2.1 The Background: The EU Commission's Guidance and State Aid Guidelines

The EU Commission's guidance for the design of renewables support schemes of 5th November 2013[1] highlighted enhanced market integration of renewables and continuous cost reduction of RES support as main principles of reforming RES support schemes. Best practice examples for different support instruments outlined in the Communication show that there is no "one-size fits all" support instrument.

CT1 looked into different instruments for market integration, including feed-in premiums, quota and tendering schemes. Participants agreed that the introduction of a transparent common methodology on assessing the Levelised Costs of Electricity (LCOE) would be useful. Furthermore, the use of automatic cost degression mechanisms like flexible caps was highlighted during the discussions as a useful aspect of a cost degression. Discussions revealed that the suitability of different instruments depends on the respective technology, energy markets and national energy policy preferences. Member States need flexibility to adjust their support schemes to meet the different characteristics and challenges.

The European Commission guidelines on state aid for environmental protection and energy (EEAG) of 9th April 2014 also include detailed provisions on support for renewables and entail substantial implications for the future design of Member States' support schemes.

General aspects of the EEAG:

- The support for energy from renewable sources can be granted as an investment or during the operation of the plant.
- Market mechanisms such as green certificates are allowed provided that the price is created exclusively by the market.
- The Commission will authorize schemes support for only 10 years which, if maintained, will have to be re-notified. However, the operating aid for food-based biofuels can only be granted until 2020.

Specific aspects on operating aid:

The guidelines underline the importance of market integration and call for the introduction of more competitive elements within support schemes. From 2017 onwards, tendering shall become the principal support instrument for RES electricity and support levels shall be determined by technology-neutral tenders.

1 European Commission guidance for the design of renewables support schemes, SWD(2013) 439 final; COM(2015)80 final; http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2015:80:FIN

From January 1st 2016 on, support to renewable electricity production is to be granted in the form of premiums in new aid schemes and measures. Exceptions apply for small scale installations with an installed capacity of less than 500 kW (or demonstration projects) and for wind installations with an installed capacity of less than 3 MW or three production units.

Measures shall also be put in place to ensure that producers have no incentives to generate electricity in times of negative prices. Member States have highlighted that such a requirement bears major challenges. In particular, a sudden stop of support and curtailment of RES plants in hours of negative prices could endanger system stability. Negative prices can also be beneficial to incentivize flexibility of the overall system (demand side response; reduction of conventional power production). Furthermore, the conformity of such a provision with the principle of priority dispatch as set up in the RES Directive is unclear. Here, it appears that a suitable solution needs to be found with incentives where RES electricity production can react to price signals more strongly but at the same time ensure system stability which complies with the principle of priority dispatch. The interactions between support schemes for renewable electricity and negative prices are further discussed in chapter 3 of this report.

As of 2017, support levels need to be determined by technology-neutral tenders, although exceptions are granted to deviate from both tendering and the principle of technology-neutrality. During a transitional period (2015-2016), Member States are required to test tenders by auctioning at least 5% of the newly installed renewable capacity in order to gain first experiences.

However, the guidelines include exceptions for deviations:

Possible deviations from tendering

- Plants below 1MW or demonstration projects, with the exception of wind energy, with installed capacity up to 6MW or 6 units of production, incentives may be supported without a competitive procedure.
- Member States can derogate from the principle of tendering when they can demonstrate that: only one or a very limited number of projects or sites could be eligible; or a competitive bidding process would lead to higher support levels (for example to avoid strategic bidding); or a competitive bidding process would result in low project realisation rates (avoid underbidding).

Possible deviations from technology neutrality

- Member States can derogate from the principle of technology neutrality in cases where this would lead to suboptimal results, with a particular view to: the longer-term potential of a given new and innovative technology; the need to achieve diversification; network constraints and grid stability; system (integration) costs; the need to avoid distortions on the raw material markets from biomass support

In principle, CT1 participants welcomed the stronger emphasis on market integration of RES electricity and the stepwise enhancement of competitive elements in support schemes. Particularly the shift to tendering as main support instrument implies major challenges of adapting RES support schemes to meet the new EEAG. The transitional testing phase was in general welcomed, although CT1 participants particularly addressed the need for a suitable transition period for projects already existing or initiated before the reference date of January 1, 2017.

2.2 Tendering for Electricity from Renewable Energy Sources

As RES shares increase and technologies mature, market integration and cost control of RES support become even more important. Tendering is one of the possible means to reach these goals. Experiences with tendering schemes applied in EU Member States and beyond showed mixed results. Tenders need to be carefully designed in order to effectively meet the respective countries' policy objectives.

Some participating countries have already gained experience with tender schemes. Other countries experience the implementation of tender schemes for the first time. Taking up this challenge, CT1 focused on main elements and potential advantages or disadvantages of different design options for tender schemes. Some participating countries that have already implemented tender schemes and have encountered several challenges with regard to the design and implementation of these, provided valuable insights and recommendations.

Main design options and elements discussed include the following:

- **Price determination mechanism:** The two main options for the type of auction procedure are pay-as-bid and uniform pricing. In pay-as-bid tenders, the selected bidder receives the offered price, whereas a common price is paid for all bidders in the case of uniform pricing. Often a ceiling price is helpful to avoid exceeding costs.

- **Prequalification requirements & penalties:** Prequalification requirements refer to the eligibility for the initial participation in the tender, and aim to enhance the seriousness and feasibility of the offer. These can be material requirements, such as planning and environmental permits, grid access approval, and land-use or property rights, or financial requirements like liabilities and bid-bonds. Often a combination of material and financial prequalification requirements is useful. They also interlink. Penalties are in most cases applied for non-realisation of a project or delays in the construction or permission phase. These may include e.g. the retention of the financial bid bond, a decrease in support levels, or a suspension from future tenders for a defined period of time.

As an example, NL, DK and FR have already implemented tender schemes with the following design elements:

TABLE 1: Main Design Options of Auctions/Tenders in Selected Participating Countries

	NETHERLANDS	DENMARK	FRANCE
Main feature	Floating premium determination	Location-specific tender for Offshore/Near-shore	Online tender for small-scale PV
Auction procedure	Sequential bidding rounds with predetermined prices	Negotiated procedure	Pay-as bid
Technology-focus	Technology-specific and technology-neutral	Technology-specific for wind offshore	Technology-specific for solar PV
Price ceiling	✓	✗ Offshore ✓ Planned for near-shore	✗
QUALIFICATION REQUIREMENTS			
Prequalification	Environmental licence; water permit (geothermal/heat and cold storage projects); written permission of the owner of the land (if relevant).	Final criteria published as a part of the contract notice	Bidder has to be owner of the building; plus CO_2 assessment and statement on recycling of the installation
Bid bonds	-	The winner has to put in bank guarantees for the potential penalties.	-
Penalties for non-realisation or non-delivery	Penalties are in place for non-realisation of projects within the required period. Penalties only apply to projects that claim over EUR 400 millions.	Penalty rules are clearly stated in tender material	In case of construction delays: duration of support can be reduced by the delay, multiplied by two
Duration of support	5, 12 or 15 years depending on the technology	50,000 full-load hours or 12-14 years	20 years (1580 h/a in France, mainland and 1800 h/a in Corsica and overseas)
Frequency of auctions	Annual auction with new budgets each year	Frequency according to schedule	Regular schedule foreseen (5-6x per year)

SOURCE: Adapted from Fraunhofer ISI and Ecofys: Design features of support for renewable electricity, 2014.

2.3 Examples of Tender Schemes

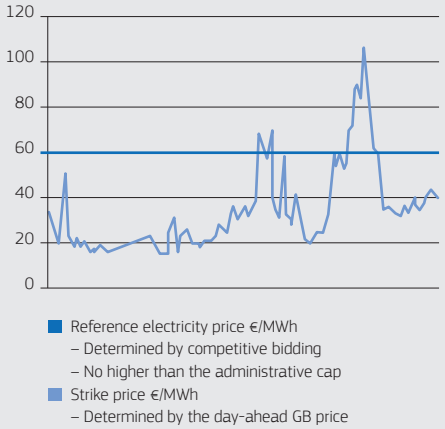
Two tendering schemes that were approved by the EU Commission under the state aid guidelines were discussed among CT1 participants: Contracts for Difference in the UK and the photovoltaic pilot tender in Germany.

Contracts for Difference in the United Kingdom

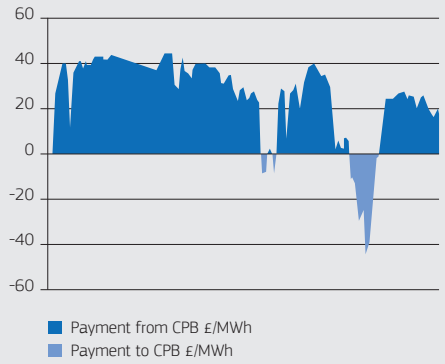
One of the key mechanisms for Electricity Market Reform (EMR) in the UK is the **Contract for Difference (CFD)** for renewable energy. A CFD is a private law contract between a low carbon electricity generator and the Low Carbon Contracts Company (LCCC), a government-owned company. A generator party to a CFD is paid the **difference between the "strike price"** via long-term contracts– a price for electricity reflecting the cost of investing in a particular low carbon technology – **and the "reference price"** – a measure of the average market price for electricity in the UK market via long-term contracts (15 years). The reference electricity price is determined by short-term (daily) or long-term (annually) electricity prices depending on the RES technology. The RES operator either receives the difference if electricity prices are lower than the strike price, or has to pay back the difference to the government in case the electricity price exceeds the strike price. Maximum strike price levels for each technology were defined at the end of 2013 for most RES technologies for the period 2014-2019. In some cases these include a predetermined digression, but in practice contracts are allocated on the basis of competition, so strike prices are likely to be lower than the maximum strike price.

FIGURE 1: Mechanism of the Contracts for Difference

STRIKE PRICE & REFERENCE PRICE



CFD PAYMENTS



SOURCE: Department of Energy & Climate Change, 2014

CFDs are allocated by **sealed bid, pay-as-clear auctions**. Bidders submit the lowest price at which they are able to deliver. The auction ranks all the projects and starts accepting the cheapest bids first (in any delivery year) until the budget is used up. All projects are paid the price of the most expensive project which has been accepted (in its delivery year). Bidders may submit multiple bids with varying delivery years and capacities ("flexible bids"). These may not be earlier or larger than the original application. The auction will assess the lowest strike price of the flexible bid first and then assess other bids if the first was not affordable. Bids submitted will not be shared with DECC and will only be used by National Grid to determine the clearing prices.

Funding for the allocation of CFDs is made available under the **Levy Control Framework (LCF)**. The LCF sets annual limits on the projected costs of all low carbon electricity levy-funded schemes until 2020/21. The annual cap rises to £7.6 billion (in 2011/12 prices) in 2020/21, a level which will enable us to cost-effectively meet our low carbon and renewables ambitions.

The **first allocation round** for Contracts for Difference started in October 2014, and in February 2015 the first CFDs, worth more than £315m per year, were awarded to renewable developers. In March 2015, the first competitively allocated CFDs were signed. These projects could power an equivalent of 1.4 million homes and could reduce UK's CO_2 emissions by 4.2 million tonnes per year. The tendering has led to a reduction in support costs of up to £105m per year compared to support without competition. The CFD will run in parallel with the existing support scheme (the Renewables Obligation) until April 2017 after which all further renewable deployment will be through the Contract for Difference. The UK Government aims to move towards a competitive price discovery process for all technologies and apply technology neutral auctions for all low carbon generation.

Photovoltaic Pilot Tender in Germany

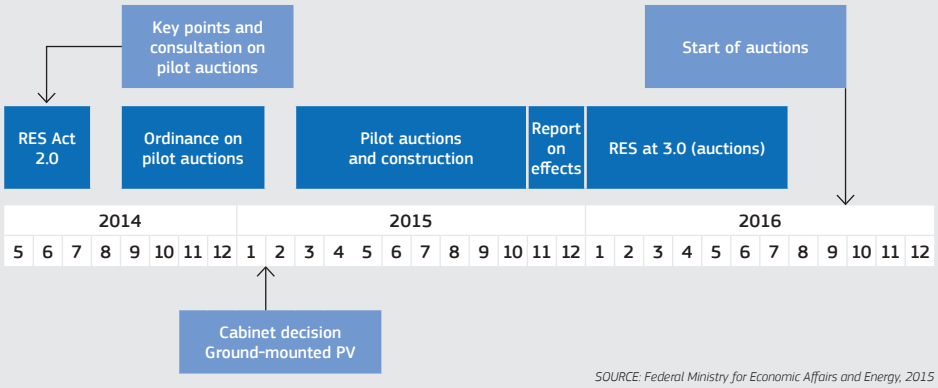
The amendment of the German Renewable Energy Sources Act (EEG) in 2014 has created the preconditions to convert the funding for ground mounted photovoltaic installations from rates prescribed by the administration to rates determined by competition. The revision particularly aims to substantially slow down any further rise in costs, to systematically steer the expansion of renewable energy, and to bring renewable energy more and more to the market.

Therefore an ordinance was adopted in January 2015, permitting a pilot auction to take place for ground-mounted photovoltaic installations, so that initial experience can be gathered with the new promotion instrument. Bids shall be submitted for the sliding market premium based on the "value to be applied". The level of the rate of financial assistance is the sole criterion for the selection of the bid. The main content of the ordinance is as follows:

- A **capacity volume of 400 MW** will be auctioned annually in three bidding rounds with the first bidding round opened in February 2015.
- The Federal Network Agency will act as the contracting public authority.
- The **maximum volume of a project will be restricted to 10 MW** (equates to maximum area of approximately 20 ha) to avoid excessive use of land.
- Bidders are required to submit their bid for a specific project, which must be backed by an approval for a development plan.
- To avoid any abusive bids, **a security of 4 EUR per kW** must be lodged and a fee must be paid at the time when the bid is submitted. If an advanced planning stage is reached, the amount of the security will be reduced by 50 %.
- During the auction, one-time sealed bids are submitted. The rate of financial assistance depends on the individual bid (**pay-as-bid auction**) and after the third bidding round, the procedure will be changed and a **uniform pricing** scheme will be applied (uniform pricing auction). In addition, an ambitious maximum price will be set and published.
- Bidders whose bids have been selected are granted an entitlement to assistance which may not be transferred to another person.
- Bidders are required to submit a **bid bond of 50 EUR per kW** as security for contractual penalties that may become payable in the event of non-completion or delayed completion of projects. The amount of the bid bond will also be reduced by 50 % if an advanced planning stage has been reached.
- Projects are required to **be completed within 24 months** from the date when the contract has been awarded. If a project has not been completed within 24 months, the entitlement to assistance will be withdrawn and the entire security will be retained.
- One part of the pilot auction is **planned to be opened for electricity from foreign suppliers**, taking into account various requirements such as an international agreement, the principle of reciprocity and the physical import of electricity.

The findings from the pilot tender process will be fed into the revision of the Renewable Energy Sources Act in 2016. It is intended to put rules in place for the level of funding for all renewables technologies to normally be set by auction.

RENEWABLE ENERGY SOURCES ACT



SOURCE: Federal Ministry for Economic Affairs and Energy, 2015

Part of this pilot auction will be opened for electricity from foreign suppliers. The EEG 2014 defines three requirements for the opening:

- An international cooperation agreement has to be in place.
- The principle of reciprocity needs to be applied.
- Physical electricity import is needed to show a real impact on the German power system.

For more details please see the CT2 publication.

2.4 Discussion Results

Throughout the discussions it became clear that experiences with tendering schemes are rather limited. Different design elements have different advantages and disadvantages. The suitability of tendering designs depends on an array of factors including the tendered RES technology and the market situation in the respective country and in foreign markets.

One of the main aims of using tendering is to actually reduce overall support costs. The key pre-condition to effectively achieve cost-efficient support levels is sufficient competition among bidders for renewable energy projects. Experience with tendering has shown that the desired reduction of support levels has not always occurred but instead tendering has also resulted in rather high prices. Lack of competition along with collusive behaviour and strategic bidding can be particularly problematic and can become a major drawback of cost-efficient results.

Also, non-realisation of winning projects can be a major drawback of tendering schemes. In other words, support cost determined by the tender scheme might be rather low, but in the end projects are not actually being realized. This can result as a consequence of price bids below generation costs (underbidding) if a bidder with only little knowledge or information underbids below cost and thus pushes more realistic bids out of the competition ("Winner's Curse").

Thus, discussions centred on the challenging tasks of ensuring sufficient competition among bidders to actually reach lower support levels, and ensuring the implementation of winning projects, which sometimes appears to entail a trade-off: While penalties and prequalification criteria can help to reach higher rates of implementation, they may result in lower competition leading to higher support levels. Finding a suitable balance between prequalification and penalty rules on the one hand, and allowing for sufficient competition to ensure cost-efficient support levels on the other hand will be vital.

The principle of technology-neutrality for tendering was regarded as being particularly problematic due to differences in LCOE and Member States' preferences favouring the deployment of selected technology. Some Member States have already identified available capacity for different technologies taking into account available land and grid access. Here, the exemptions from technology-neutral tendering will need to give Member States sufficient leeway to meet their needs for the development and deployment of different RES technologies.

CT1 participants also underlined the need to ensure a variety of investors including smaller and local actors to increase the amount of sites for project development and increase local acceptance for projects through local benefits. Tender schemes generally favour the participation of large and experienced players, which might lead to considerable sunk costs for smaller players that are not successful in the tender process. Administrative costs and requirements to prepare and participate in a tender can be a major hurdle for smaller players. Tenders with specific size segments are already applied in several countries and can enhance participation of smaller players. Furthermore, geographical diversification of renewables deployment might be needed, e.g. in order to enable systems integration of high renewables shares.

Overall, CT1 participants stressed that tender schemes differ in their design and require adjustments to the specific needs of the Member States. Participants concluded that tender design choices involve finding the right balance with regard to trade-offs between efficiency and effectiveness of tenders, as well as between short-term efficiency and longer-term dynamic efficiency of tender schemes. Many design choices depend on the specific circumstances like resource availability and the policy objectives of a country: whether to use technology-specific tenders, technology clustering or technology neutrality; which combination of prequalification requirements to use, if any, and other questions. For many countries technology-specific tenders are key to keep system costs down, ensure system and grid system stability and prevent over-subsidization. Participants agreed that these decisions should be taken by the respective country concerned. Some design elements, like the introduction of ceiling prices, rules limiting the tender volume awarded to single bidders, or the necessity to address grid integration concerns – e.g. through mechanisms for geographical diversity of deployment – seemed useful under most discussed circumstances and could possibly serve as more broadly applicable principles. Testing of different approaches and assessing the advantages and disadvantages these options will allow for more experience and conclusions on how to reap the desired results. Further exchange among Member States will help to decide on possible best practices for tendering. Such a joint learning process can inherently also facilitate a stronger coordination of tender designs where appropriate.

3 Further Discussion Topics

3.1 RES Market Integration

The cost-efficient integration of renewable electricity into electricity networks and markets and the move away from generation in large central power plants towards a more de-central production from RES requires an adaptation of current regulations and changes of existing market roles and players. The electricity market needs to adapt and fully integrate all market players, including renewables, flexible demand and energy service providers. CT1 addressed the topic of market integration from different perspectives, such as market premiums, balancing responsibilities, support in hours of negative electricity prices and the role of priority dispatch in times of mandatory direct marketing.

The interaction between renewables support schemes and negative prices was discussed from different angles. The EEAG provides that for new support schemes from January 1st 2016 onwards, measures need to be put in place to ensure that producers have no incentive to generate electricity in times of negative prices. The rationale of this provision prohibiting support in times of negative prices is that when negative prices occur, support shall not increase the existing oversupply.

Recent studies evaluated measures to stop support in times of negative prices, taking the example of the German §24 EEAG. Potential effects of such rules on overall support costs and on the functioning of the electricity wholesale markets were discussed as well. The analysis showed that cutting support in times of negative prices does not save support costs, but is even likely to increase them from a dynamic perspective, i.e. taking into account the need for additional capacity for 2020 target fulfilment. Additional marketing risks resulting from negative prices might lead to welfare losses, and market distortions between intra-day and day-ahead markets may arise. From a scientific point of view it was recommended to abolish rules prohibiting support payments in times of negative prices, as stipulated in §24 EEG.

CT1 participants concluded from vivid discussions on this topic, that support in times of negative prices entails more aspects than the static market value. A sudden stop and curtailment of RES plants in hours of negative prices could endanger system stability; negative prices, on the other hand, can also be beneficial to incentivize flexibility of the overall system (demand side response, reduction of conventional power production).

With regards to the conformity of such a provision with the principle of priority dispatch under the RES Directive, it appears that a solution for incentives needs to be found where RES electricity production can react to price signals more strongly but that at the same time ensures system stability complying with priority dispatch.

Most Member States agreed that negative prices can be a driver for flexibility options, at least in a transitional phase to a higher market integration of RES. They also agreed that the discussed aspects regarding financial and market questions would merit a reconsideration of the current EEAG provisions on the issue.

Discussions on the priority rules set out in Article 16(2) of the RES Directive addressed three concepts that are all related to grid issues:

- Guaranteed transmission and distribution, which is related to maintaining and strengthening reliable infrastructure
- Priority or guaranteed access, which requires the physical connection to the grid
- Priority dispatch as priority with regard to grid management in times of grid or system constraints.

Looking in particular at the recitals of the Directive, participants agreed that priority dispatch as understood in the Directive does not relate to market functioning, i.e. it does not require any interference with the merit order on wholesale markets.

Discussions on the economic implications of these concepts revealed that some form of purchase obligation would be in contradiction with direct marketing and that priority rules with regard to grid management remain beneficial to the efficiency of the transition towards a system with higher shares of RES. It was argued that such priority rules will help to mitigate some critical system challenges by creating incentives for considering RES to provide more ancillary services or for reducing inelastic must-run capacities. It was also discussed that compensation in case of grid related curtailment was essential because the risk of local grid bottlenecks cannot be influenced by generators. Assigning this risk to them would be inefficient, so it should rather be borne by the system operators that have the possibility to manage them cost-efficiently. Participants agreed that putting the risk of local grid bottlenecks on RES installations would - under most circumstances - be an inefficient solution.

3.2 Increasing System Flexibility and Adapting the Market Design

In joint sessions with CT4 on Electricity Networks, CT1 addressed approaches to increase flexibility of the overall electricity system.

Participants agreed that flexibility of the overall electricity system is key for the integration of high RES shares and that various different options for flexibility exist. These include flexibilisation of generation, demand side management, enhancement of grid infrastructure and storage options. To integrate high shares of renewables the potential of all options will need to be tapped.

It was emphasized that RES already took over important responsibilities in some areas: By shifting from fixed feed-in tariffs to market premium models RES become responsive to market signals which is an important step towards market integration. In market premium systems RES producers already carry full balancing responsibilities. This way RES have an incentive to improve weather forecasts and optimize their production according to the demand (e.g. east/west orientation of PV, mix of large and smaller wind turbines, weak wind turbines, flexible use of biomass). Also, the introduction of

tender schemes in most Member States enhances market integration and cost control of RES support. A holistic approach was perceived as very important for using the potential of all flexibility options. In general, the grid needs to become more intelligent, enabling multidirectional flows of electricity and the balancing of fluctuations in demand.

The role of interconnections was discussed against the background of the 10% electricity interconnection target set out in the Commission Communication of 25 February 2015 (COM (2015) 82), and their importance for the creation of an internal market, energy security and the decarbonizing of the energy mix was highlighted. As regards the challenges for the electricity grid, increasing shares of renewable electricity generation will require TSOs to adapt to this development to ensure that renewables' fluctuations are managed efficiently while continuing to ensure the safe and sustainable operation of the electricity system. Electricity interconnection levels will be further increased by the implementation of Projects of Common Interest (PCI) and in parallel regional cooperation shall be strengthened.

On 25 February 2015, the Commission published a Communication on "A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy" [2]. The new electricity market design should ensure that energy markets can support the transition towards a low-carbon energy system at minimum costs. A new market framework will be developed that is suitable for an interconnected EU-wide electricity market providing clear price signals for new investments and facilitating the further development of renewables, to promote regional cooperation and coordination of energy policies, to enable cooperation in the development of renewables including through support schemes, to safeguard an appropriate governance and regulatory framework and to ensure security of electricity supply on a European level.

The European Commission held a public consultation on its Communication on a New Energy Market design from July to October 2015. More than 300 comments, reflecting the variety of stakeholder views, were provided under 5 headings, namely Electricity Market Adaptation, Generation Adequacy, Retail Market, Governance, and Regional Cooperation. The majority of stakeholders expressed positive views on the importance of scarcity pricing for future market design, the need to speed up the development of integrated short-term (balancing and intraday) markets, the full market integration of renewables, an "energy-only market", the need for a harmonized method for generation adequacy assessment and a stronger regional cooperation of TSOs. Differing views were revealed on retail and governance issues.

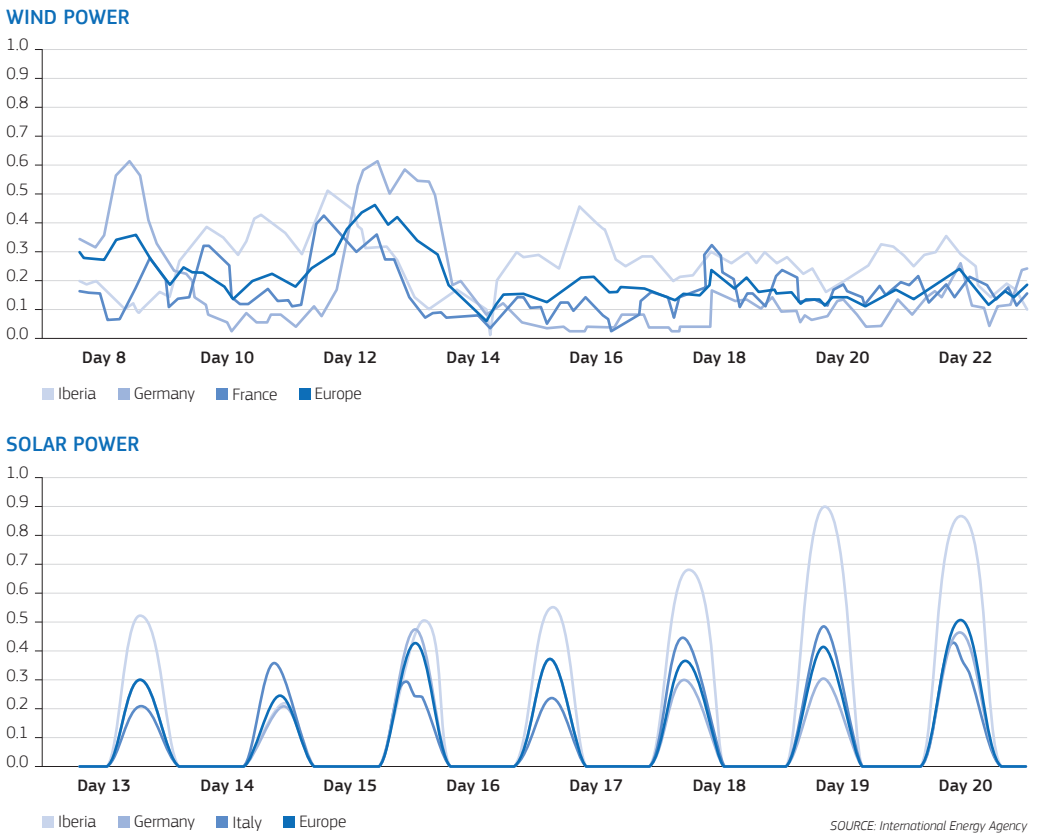
CT1 participants expressed interest in introducing, where it does not already operate, a regulatory framework that favours variability of generation and demand through a wider participation in the balancing market.

Participating countries further underlined the relevance of a diversified deployment of RES across Europe, which bring about positive effects on market integration and balancing needs. A diversified approach with a larger area of RES deployment lowers balancing costs of intermittent RES production, as fluctuations vary across geographical regions and can be balanced among each other. An aggregation of wind and solar power generation on a European level can, for instance, strongly reduce the variability of electricity production that each of these sources entails.

2 European Commission's Communication on A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy, COM(2015)80 final; http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2015:80:FIN

FIGURE 2: Aggregation of Wind and Solar PV Generation on European Level Reduces Variability

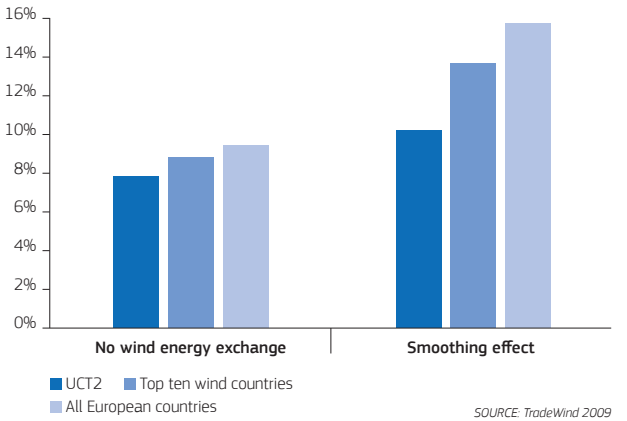
Based on wind power and solar PV generation data from April (top) and March (bottom) 2011



SOURCE: International Energy Agency

FIGURE 3: Regional Diversification Increases Credit Capacity

Relative Capacity Credit, percentage of installed capacity



SOURCE: TradeWind 2009

This also implies advantages in terms of generation adequacy, as a stronger geographical expansion of RES deployment can enhance the credit capacity of electricity generation mixes throughout Europe.

4 Main Findings and Achievements

Enhanced RES Market Integration is the right way forward

The work of CT1 on support schemes for RES electricity contributed to a better understanding of the main challenges of the energy market reform and the shift towards market-based support instruments. The EU State Aid Guidelines on Environment and Energy (2014-2020) put particular emphasis on market integration of renewable energies, shifting production support to market premiums and tendering.

CT1 participants concluded that stronger market integration and the stepwise increase of competitive elements are needed to ensure that RES electricity can react to market signals. The suitability of applicable instruments, such as feed-in premiums, quota or tendering schemes, depends on the respective technology, energy markets and national energy policy preferences. A transparent common methodology on assessing the Levelised Costs of Electricity (LCOE) and automatic cost degression mechanisms like flexible caps can be useful tools to reduce costs. From an economic point of view, priority rules with regard to grid management were seen to remain beneficial to the efficient transition towards a system with higher shares of RES. These can help mitigate system challenges by creating incentives for considering RES to provide more ancillary services or for reducing inelastic must-run capacities.

Tendering can enhance cost-effectiveness of support schemes – but careful design is vital

Participants agreed that tendering can enhance competition and cost-effectiveness of support for renewable energy, but experience is still limited. Discussions and interventions in CT1 showed that tender schemes differ in design and require an adjustment to the specific requirements of the respective country. Finding a suitable tender design which ensures sufficient competition and project realization were identified as particular challenges. Different price setting mechanisms are being tested across Europe. Setting a ceiling price for tender bids is useful for cost control. Prequalification criteria (material as well as financial) can help to ensure timely project realisation. Nevertheless, they need to be carefully designed in order to allow for sufficient competitive bids. Participants also concluded that tender design choices are about finding the right balance with regard to trade-offs between efficiency and effectiveness of tenders as well as between short-term efficiency and longer-term dynamic efficiency of a scheme. Overall, CT1 participants stressed the need for more testing of tender schemes to reap the desired results and to decide on best practices for tendering.

Technology-specific tender are implemented and necessary in most Member States

Member States have different preferences for certain RES technologies. Taking into account available land, system and grid requirements some Member State have identified a deployment path for certain technologies. As LCOEs of RES technologies differ technology-specific support is needed. Accordingly, the principle of technology neutrality for tendering as set out in the EEAG was underlined to be problematic. Exemptions from technology-neutral tendering will need to give Member States sufficient leeway to meet their needs for the development and deployment of different RES technologies.

When restraining RES support in times of negative prices, dynamic market values and flexibility signals should be taken into account

With regards to support in times of negative prices, CT1 participants concluded that this discussion entails more aspects than the static market value. Most participating countries agreed that negative prices can be a driver for flexibility options, at least in a transitional phase to a higher market integration of RES. They also agreed that the discussed aspects regarding financial and market questions would merit a reconsideration of the current EEAG provisions on the issue.

Flexibility of the overall electricity system is key for the integration of high RES shares.

There is a variety of different flexibility options. These include flexibilisation of generation, demand side management, enhancement of grid infrastructure as well as storage. These options will all need to be tapped in a holistic approach to integrate high shares of renewables. In general, the grid needs to become more intelligent, enabling multidirectional flows of electricity and the balancing of fluctuations in demand.

The proposed new energy market design affects the implementation of the Renewable Energy Sources Directive as the EU moves towards 2020. The required revision of support schemes for RES electricity and the stronger market integration have to be based on a profound understanding of the potential options at hand and the challenges these might entail. Throughout the Core Theme discussions, CT1 participants could benefit from the exchange of experiences with different support mechanisms for RES electricity, which will be of utmost importance to meet the challenges of a changing energy market.

5 Abbreviations

Participating countries are referred to according to their two-letter country codes as defined by ISO 3166-1 alpha-2 standard (AT – Austria, BE – Belgium, etc.).

Abbreviation	Meaning
CA-RES	Concerted Action on the Renewable Energy Sources Directive
CA-RES I	First phase of the Concerted Action on the Renewable Energy Sources Directive
CA-RES II	Second phase of the Concerted Action on the Renewable Energy Sources Directive
CFD	Contracts for Difference
CO_2	Carbon Dioxide
CT	Core Theme
EEAG	European Commission guidelines on state aid for environmental protection and energy
EEG	German Renewable Energy Sources Act
EU	European Union
LCCC	Low Carbon Contracts Company
LCOE	Levelised Costs of Electricity
PV	Photovoltaic
RES	Renewable Energy Sources

This is a public CA-RES report

For more information please send an email to:
Leonardo.Barreto-Gomez@energyagency.at,
Cornelia.Schenk@energyagency.at,
Shruti.Athavale@energyagency.at

The Concerted Action to support the implementation of the RES Directive 2009/28/EC (CA-RES) was launched with the participation of the responsible authorities from 30 EU countries and supported by Intelligent Energy Europe (IEE) in July 2010 to provide a structured and confidential dialogue on how to address the cost-effective implementation of the RES Directive 2009/28/EC.

For further information please visit **www.ca-res.eu**