# DIA-CORE POLICY BRIEF

# Options for a sustainable EU renewable energy policy

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**Key Messages**

- ✓ **Effectiveness and economic efficiency are key to ensure that a policy is sustainable.** Effective policies are able to trigger investments in the targeted amount of renewables, while economically efficient policies ensure that this target is met at low costs.
- ✓ **Non-economic design elements need to be considered as well.** With competitive tenders for renewables support becoming a major instrument across the EU, it is important to ensure that there is a level playing field between all tenderers.
- ✓ **Support systems can be designed with varying degrees of exposure to market prices**. A higher exposure to market prices ensures a better market integration but increases investors' risks and therefore their financing costs. To determine the cost-effective level of risk transferred to generators, it is essential to weigh the resulting increase in policy costs against potential benefits.
- ✓ **Looking towards the year 2020, cooperation mechanisms are a key measure to ensure that the EU's renewable energy target is met cost-effectively.** Making use of cooperation mechanisms reduces (i) the required remuneration to trigger deployment, (ii) integration costs and (iii) necessary capital expenditures.
- ✓ **Enhanced coordination of renewable energy support across EU Member States is needed.** At the very least, frequent exchange of data should be ensured in order to avoid undesired production peaks and windfall profits.

Launched in April 2013, DIA-CORE is carried out under the Intelligent Energy Europe programme. Its main objective is to ensure a continuous assessment of the existing policy mechanisms and to establish a fruitful stakeholder dialogue on future policy needs for renewable electricity (RES-E), heating & cooling (RES-H) and transport (RES-T). Thus, DIA-CORE seeks to facilitate convergence in RES support across the EU and to enhance investments, cooperation and coordination.

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# 1 Policy options to increase overall efficiency and effectiveness of renewable energy support

## Improve knowledge on renewable energy generation costs and provide guidance on best practices for calculating and monitoring them

Detailed knowledge of renewable energy generation costs is required when designing renewable support schemes. Support should be moderately above the full costs of generation in order to avoid overcompensation. In the future, auctions may be an effective measure to keep profits at a moderate level, but auctions cannot be the only solution for at least three reasons. First, the outcome of auctions needs to be monitored. In a competitive outcome, support would be close to generation costs. Therefore, governments will still need to assess these costs, even if they do not set the support level anymore. Second, in most auction procedures, there is the possibility to set a price ceiling (or maximum price) for bids, above which no bids are accepted. This helps governments to cap policy costs and reduce the risk of excessive remuneration due to strategic behaviour. Therefore, the assessment of generation costs is needed to allow informed decisions on price ceilings. Third, support for small-scale installations might still be set administratively. Therefore, to further improve the efficiency of renewable energy support payments, a constant monitoring of changes in technology costs and the according adjustment of support levels are crucial. This is particularly relevant for renewable energy technologies with very dynamic cost developments such as solar photovoltaics (PV).

## Consider non-economic design elements to enhance effectiveness of support

Empirical evidence shows that high profit levels alone do not necessarily result in a strong market growth. For a policy to be effective, it is crucial to ensure high policy stability and a sound investment climate. In general, non-economic barriers that hinder the market uptake of promising renewable energy technologies must also be taken into account when designing policies. Their timely mitigation is highly beneficial to enhance the effectiveness and efficiency of a public intervention.

## Technology-specific versus technology-neutral support

Experiences with technology-neutral support schemes have shown that these either lead to considerable windfall profits for low-cost technologies or are unable to trigger the deployment of less mature technologies. Considering the still significant cost differences among renewable energy technologies, it is recommended to grant technology-specific support. This recommendation is backed up by recent developments at national level. Several EU Member States, which were previously granting technology-neutral support, have introduced technology-specific elements in their support mechanisms.

Technology-neutral support can be a cost-effective alternative, provided that the cost-potential curve is flat and that there is a large potential to install renewables. In practise, this means that several technologies have similar generation costs and can be installed in abundant volumes. This is the case in the Norwegian-Swedish quota scheme.

## Improve preparedness of electricity markets for integrating renewables

To facilitate the integration of renewables, several aspects of today's electricity markets need to be improved. An essential element is market coupling and harmonising gate closure times, foremost regarding intraday markets, where the implementation of market coupling is still lagging behind. With a growing share of renewables, the importance of intraday markets is expected to increase, because the forecasting quality of wind and solar power is improving when moving closer to the time of delivery. Moreover, the regimes for defining grid connection cost should, where not already done, be changed to "shallow" regimes implying that project developers are charged for the connection to the nearest grid connection point only. Finally, the liquidity of wholesale markets (day-ahead, intraday and balancing) should be improved to lower barriers for small producers selling on the electricity market.

## Support diffusion of best practices regarding non-economic framework conditions for deploying renewables

Especially in light of competitive tenders for renewables support becoming a major instrument across EU Member States and discussions about opening up national support schemes, it is crucial to create a level playing field for renewable energy project developers on national as well as on EU level. A distortion of competition can be avoided, if non-economic barriers are also considered and diffusion of best practices in this field is promoted.

The results of a comprehensive stakeholder survey and renewables diffusion analysis in three EU Member States (Germany, UK, and Spain) have emphasised that particularly a stable and reliable policy framework as well as the diffusion of best practices regarding administrative processes and spatial planning for renewables play a major role in this respect.

For example, regional authorities responsible for project authorisation and spatial planning should be further supported through provision of best practice guidelines or harmonised procedural standards on national level. In this context, stakeholders in Germany reported that non-harmonised regulations for spatial planning among the federal states (e.g. the 2015 distance regulation for wind parks in Bavaria) constitute a major barrier for wind energy development in Germany. They emphasised that uniform national standards for spatial planning would be beneficial.

Also stricter time limits for permit approval were mentioned as a suitable measure to improve the predictability of the planning procedures and to reduce risks and costs for the developers. For example, project developers from the UK reported that the permitting procedures ("planning permit") for medium and large scale installations are lengthy, especially due to appeal processes. Stricter procedural timelines as well as a stronger support to the local administration (in terms of budget, staff and know-how) would significantly reduce the risks for renewable energy project developers.

# 2 Policy options to increase the exposure to market prices

## Background

Support systems can be designed with varying degrees of exposure to market prices. Currently, we are observing a trend where most EU Member States are moving away from feed-in tariff systems and are implementing feed-in premium systems instead. In this context, UK's Contract-for-Difference is equivalent to Germany's sliding feed-in premium scheme. In both cases, a certain price is guaranteed, but only for the volumes announced one day ahead of delivery. This means that renewable energy generators are directly responsible for forecast errors, which are typically referred to as balancing obligation.

Further market integration implies to impose more responsibilities on renewable energy generators. Transferring obligations from a central authority to generators is equivalent to a risk transfer and does therefore lead to higher financing costs for renewable energy projects. In that case, a higher level of remuneration would be required to trigger the same amount of deployment and overall policy costs would increase.

To determine the cost-effective level of risk transferred to generators, it is essential to weigh the resulting increase in policy costs against potential benefits. In the case of imposing balancing responsibility on generators, it is expected that the benefits outweigh the costs, because forecast quality would increase. Therefore, the balancing risk is typically considered as a productive risk.

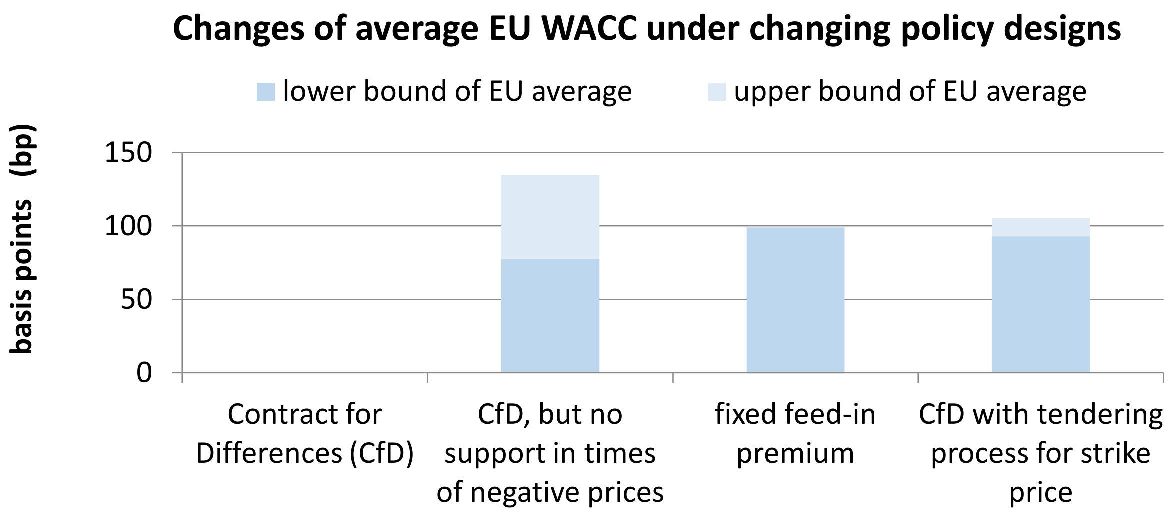
## Financing costs under varying degrees of risk transfer

A survey was conducted to assess the impact of varying degrees of risk transfer on financing costs. As base case, a sliding feed-in premium scheme was assumed, where the remuneration level (strike price of Contract-for-Difference, CfD) is set administratively.

Respondents indicated that the weighted average costs of capital (WACC) would increase by 80 to 140 base points compared to the base case when additional risks are transferred to generators (see Figure 1).

More specifically, the impact of the following modifications to the base case was surveyed:

- Case 1: no support in times of negative market prices
- Case 2: fixed feed-in premium
- Case 3: tendering process for strike price




- *Figure 1: Indicative changes of the average EU WACC under different policy designs for wind on-shore projects, June - Sept. 2015*

The results of the survey show that moving away from the base policy case always leads to higher WACC – especially in case 1, where no support is granted in times of negative market prices. This is because the frequency of negative prices in the future is rather uncertain and difficult to forecast. As a result, revenue streams become more uncertain and therefore financing costs increase. Furthermore, renewable generation which is curtailed during negative prices needs to be replaced by new installations, if there is a target. This replacement leads to higher support costs. Benefits to the overall power system are ambiguous. On the one hand, some argue that the market price gives an undistorted dispatch signal, if no support is granted to renewables in times of negative market prices. On the other hand, the incentive to invest in flexible generation and demand is is higher in times of negative prices. Therefore, it is currently controversial whether net benefits exist to outweigh the increase in financing costs.

In the other two cases, the increase in financing costs is not as strong as in case 1 but still significant, i.e. around 100 base points.

In case 2, a fixed feed-in premium would be granted instead of a sliding premium. For generators, this means that in case of falling power market prices they would be unable to recover their full costs. This risk is typically not considered a productive risk, because generators are exposed to the risk of falling fossil fuel and carbon allowance prices, which are beyond their control. Moreover, overcompensation cannot be excluded either.

In case 3, a tender would be set up to determine the strike price of the CfD. The expectation is that in a competitive bidding process policy costs would be lower than when the strike price is set administratively. However, this also depends on the specific design of the auction mechanism. Like with other aspects of support systems, design and oversight have a major impact on its efficiency and effectiveness.

# 3 Policy options to increase benefits from deploying renewables

## Costs and benefits of deploying renewables

Looking towards the year 2020, cooperation mechanisms are a key measure to ensure that the EU's renewable energy target is met cost-effectively. Making use of cooperation mechanisms reduces (i) the required remuneration to trigger deployment, (ii) integration costs and (iii) necessary capital expenditures (see Welisch et al. 2015a).

Different degrees of cooperation between EU Member States – from meeting the target domestically to an efficient and effective target fulfilment at EU level – provide different magnitudes of efficiency gains. Concretely, system-related benefits in terms of avoided fossil fuels increase when making use of cooperation mechanisms. Moreover, overall support costs decrease under a strong cooperation scenario as would capital expenditures.

Looking towards the year 2030, a key prerequisite to ensure increased deployment of renewables and reaching the overall target of 27%, is to establish a clear and binding policy framework for renewables post 2020. Agreeing on a clear effort sharing mechanism across EU Member States is crucial in that respect.

The agreed target of 27% renewables appears feasible to achieve without strong efforts to be taken at EU and at national level. However, a clear and guiding framework and removing currently prevailing non-economic barriers are key to keep the cost burden low and to balance costs with accompanying benefits. More than 27% by 2030 appears feasible and comes with additional benefits but requires, in turn, additional efforts to be taken.

## Market value of renewables and the merit-order effect

To achieve the deployment of mature renewable technologies with lower support or under a phase-out of dedicated incentives in the longer term, these technologies must be able to sufficiently recover their full costs in power markets. Renewables with variable generation costs close to zero, like solar PV and wind energy, have a price-reducing effect. As a result, their market value is lower than the reference electricity price (see Sensfuß et al., 2008).

Results from the historical assessment confirm this statement and show that the market value of renewable technologies decreased with a higher share of variable renewables in total load (see Welisch et al. 2015b). At the same time, it could be observed, that sufficiently flexible power markets were able to integrate a substantial share of variable renewables without further reducing their market value.

Integrating high shares of renewables cost-effectively requires a system-wide approach including investments in additional flexibility, i.e. demand-side management, storage technologies, flexible conventional generators and coupling the power sector to heating and transport.

# 4 Policy options to enhance coordination of renewable energy support across EU Member States

## Background

In the past, EU Member States often experienced higher-than-expected volumes of renewable energy deployment, in particular for solar PV due to the dynamics of the global PV market. Feed-in tariffs (and increasingly feed-in premiums) are a wide-spread policy instrument in the EU to support renewable electricity generation, but pose the challenge of setting remuneration levels (strike prices), which are appropriately aligned with technological cost reductions.

While the EU Renewable Energy Directive provides various cooperation mechanisms between EU Member States (namely statistical transfers, joint projects and joint support schemes), the Directive states that "cooperation can also take the form of […] exchanges of information and […] other voluntary coordination between all types of support schemes".

There are several options to coordinate support for renewable energies across EU Member States. Harmonised tariff adjustment mechanisms with equal remuneration levels across countries seem not to be a feasible option because of different national market conditions and information asymmetries. Alternatively, governments can exchange information to coordinate support schemes, for instance to improve their tariff adjustment procedures. Such procedures are already often the norm, but usually based on historic national data. Countries could exchange different information, for instance about deployment, installation costs or prices, tariff levels, financing agreements, policy changes, tax frameworks, or administrative barriers.

## Solar PV

For solar PV, a frequent exchange (weekly or monthly) of data is crucial in order to avoid undesired production peaks and windfall profits. Coordinated schemes have to take into account the global nature of PV module prices, where common European demand can have price-effects. Simulation results show that if national adjustment procedures are coordinated this way, national and European deployment targets are reached more easily as long as countries have similar response rates between deployment and profit margins (see Grau and Neuhoff 2015). However, in the absence of these (i.e. in heterogeneous markets), national adjustment procedures should be based on national historic information. This finding is of particular interest since dependence on international information mimics in many ways integrated market premium or tradable certificate systems (e.g. harmonisation of premium or certificate trade).

Coordination could also take the form of information exchange between countries in the process of calibrating a separate or collaborative remuneration adjustment scheme. Such coordination might support in particular countries with less experience in a specific technology in setting appropriate tariff levels. Moreover, coordinated remuneration schemes may help to reduce incentives for strategic gaming. This can happen in small countries if incumbent companies or large projects withhold installations to increase prices.

## Wind

Wind energy technologies have different market characteristics compared to solar PV, such as less dynamic cost reductions, large technology price differences across countries, larger operation and maintenance cost, and longer project development durations. This means that a coordinated tariff adjustment mechanism for wind energy can be calibrated on lower frequency data, should account for operation and maintenance cost, can use a lower tariff adjustment frequency, could consider exogenous system price developments, and should account for longer project durations and the corresponding responsiveness of deployment.

## Biomass

Biomass (solid, liquid, gaseous) used for energy purposes differs from solar PV and wind power, as feedstock cost often add substantially to the levelised cost of heat, electricity and transport fuels. Furthermore, the types and cost of feedstock production and cost of delivering biomass to conversion plants vary substantially per region. Regional restrictions in economic supply of biomass sources have increasingly been overcome by large-scale inter-regional trading of liquid and solid biofuels. To facilitate and coordinate an efficient and sustainable deployment of biomass for bioenergy to 2020 and to 2030, insight is required in the prospective supply and demand markets, intra- and extra-EU trade of biomass as well as current and future feedstock requirements by different end-users.

Bioenergy is projected to remain the dominant source of renewable energy until 2030. However, the relative share of bioenergy in total RES production is projected to decline moderately from about 60% today to 51- 55% in 2030. In terms of final energy, heat will remain the largest contribution of bioenergy, providing over two-thirds of total final bioenergy supply to 2030 and well over one-third of total renewable energy generation in all scenarios. The major share of biomass will still be supplied from domestic sources, but the role of biomass trade and especially extra-EU trade is becoming increasingly important (see Hoefnagels et al. 2015). The share of extra-EU biomass increases up to 7% in 2020 and up to 13% in 2030. The main driver for increased trade of solid biomass is the heat sector. Furthermore, up to 15% of extra-EU solid biomass import is projected to be used for advanced biofuel production by 2030. To ensure the sustainable use of biomass, both from domestic and imported sources, binding sustainability criteria have been set in the Renewable Energy Directive for biofuels for liquid biofuels. However, these criteria do not apply to solid and liquid biofuels used for electricity, heating and cooling. Mandatory and voluntary sustainability criteria have therefore been implemented in different national support schemes in countries that import solid biomass including Belgium, Denmark, the Netherlands and the UK. However, with increasing Extra-EU imports of solid biofuels, also the need for harmonised sustainability criteria and support schemes is growing, preferably at the EU level.

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