

# A Review of Challenges in Implementing UK's New Feed-in-Tariff: Relevance for “Market Premium” Discussions in Germany?

**Briefing Paper by the Regulatory Assistance Project (RAP)<sup>1</sup>  
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*Discussions in Germany over the future of feed-in-tariffs (FiTs) for renewables are in full force. One of the market support designs under considerable debate is the so-called “Market Premium” FiT, which Germany put in place at the beginning of 2012 as a voluntary option, while still making its longstanding fixed FiT available to renewable energy producers. In essence, Germany’s Market Premium FiT is a version of what the UK is developing to replace its current renewable obligation/quota scheme: a new “Contract-for-Difference” (CfD) FiT. The challenges the UK is experiencing with respect to implementing this new FiT design, in terms of the management of policy and market risk and other considerations, seem of particular relevance to the current debate in Germany over “fixed versus market premium” FiT offerings for renewables. Therefore, the Regulatory Assistance Project commissioned this briefing paper to help inform discussions about future market support policies for renewables, as investment in these resources will need to steadily grow in the coming years to meet Germany’s aggressive Energiewende targets. More generally, the lessons learned from the UK experience are relevant to all countries across Europe as the power system progressively decarbonises.*

## Context for UK’s New FiT — Electricity Market Reform

The UK Government is undertaking a major reform of the electricity market with the intention of attracting sufficient investment to decarbonise the electricity system whilst maintaining security of supply and ensuring that power supplies remain affordable. There are four major changes being introduced:

1. A carbon tax designed to set a floor to the overall carbon price,
2. A new contract-for-difference style feed-in-tariff (CfD FiT) to support investment in low carbon generation (renewables, carbon capture and storage, and nuclear),

3. A capacity mechanism to ensure that sufficient fossil-fuelled generation plant is available to maintain security of supply, and
4. An emissions performance standard (EPS) to effectively prevent the construction of unabated coal-fired generation.

An Energy Bill to implement the CfD FiT, capacity mechanism, and EPS is currently passing through the parliamentary process and is expected to become law by the end of the year (the carbon tax has already been introduced). It is intended that the CfD FiT will replace the current Renewables Obligation (RO) quota scheme to support new investment in low carbon generation from 2017 forward.

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<sup>1</sup> This paper was prepared for RAP by Simon Skillings, Trilemma UK Ltd, in collaboration with Meg Gottstein, RAP principal and policy lead for RAP’s work in Germany. Valuable peer review was also provided by Philip Baker, University of Exeter, and policy advisor to RAP.

The overall objective to decarbonise the power system is common to all EU countries. This briefing paper identifies some of the issues being faced by the UK Government as they attempt to introduce the CfD FiT as the new support system for low carbon generation.

## **Rationale for CfD FiT**

The CfD FiT design was chosen to address two key objectives of UK Electricity Market Reform:

1. The need to attract sufficient levels of investment and to ensure low financing costs in a manner that could be applied to all types of low-carbon resources,<sup>2</sup> and
2. To ensure that the integrity of the overall energy market is maintained and that low carbon generation is fully integrated into the trading processes.

Although the existing Renewable Obligation (RO) mechanism did achieve the second objective, it had effectively already been transformed into an inflexible and inefficient feed-in-tariff system through the introduction of technology price bands. These bands were introduced in recognition of the fact that a range of renewable technologies would be required and that these would be at differing stages of development with widely different costs. Also, future earnings for renewables receiving support under the RO system depends on wholesale power prices, and this introduces significant risk for investors. Although these risks are generally considered manageable by existing energy market players, they will potentially deter the participation of new sources of finance that will be required going forward. Therefore, continuation of the RO was not viewed as a credible long-term option.

The new CfD FiT has therefore been designed with the objective of ensuring that all low carbon generation is traded through the wholesale markets whilst restricting earnings exposure to fluctuating wholesale prices. It was recognised at the outset that all low carbon support

mechanisms carry a degree of policy risk and that any perceived increase in policy risk associated with introducing the new support mechanism could outweigh the reduction in market risk and undermine the benefit of the change. Therefore, as discussed further below, the support is provided in the form of a contract, rather than a regulation, thereby providing the additional protections afforded to counter-parties under contract law.

## **The Proposed CfD FiT Design**

The high level principles behind the CfD FiT are simple:

1. A Government-backed entity signs a long-term contract<sup>3</sup> with the low carbon generator.
2. The contract involves three key parameters: strike price, reference price, and term.
3. The reference price involves an appropriate wholesale market indicator and, when this price is below the strike price, the Government-backed entity pays the generator the difference between the strike price and the reference price for the volume of low carbon generation produced. When the reference price increases above the strike price then payment flows are reversed.
4. This arrangement continues throughout the term of the contract.
5. The strike price therefore fulfils the functions of stabilising and increasing earnings to provide the appropriate level of subsidy.

These principles are illustrated in the Figure 1.<sup>4</sup>

The overall earnings for the low carbon generator is therefore the sum of the earnings achieved through selling output in the wholesale markets and the difference payment calculated under the terms of the contract. The generator is therefore left with the task of managing the earnings risk arising from the difference between the achieved sales price and that represented by the reference

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2 As discussed herein, the CfD FiT was designed in principle to apply to all low-carbon generation, including nuclear. However, we focus our discussion in this paper on the implementation issues/challenges that have been raised by investors, developers, and other stakeholders with respect to renewables—in particular, with respect to generation from those renewables that are weather dependent/variable, such as wind and solar.

3 The Government has suggested 15 years for wind contracts, 10 years for carbon capture and sequestration, and longer terms of 30-40 years for nuclear. This is still being finalized.

4 DECC Electricity Market Reform Consultation Document (2010), page 50. Available at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/42636/1041-electricity-market-reform-condoc.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/42636/1041-electricity-market-reform-condoc.pdf).

price, thereby providing incentives to both generate and sell in the markets when prices are highest and system need is greatest.<sup>5</sup> See Figure 2.<sup>6</sup>

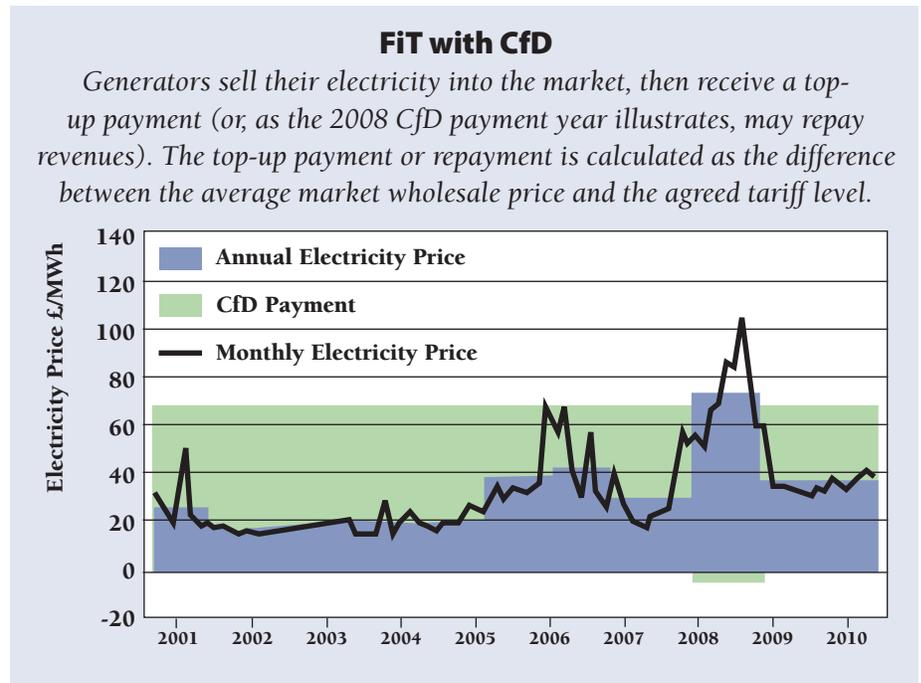
The optional "Market Premium" FiT introduced in Germany at the beginning of 2012, represents a similar "Contract-for-Difference" design. Germany's current "strike price" (long-term contracted tariff) under the optional Market Premium FiT is the current fixed FiT price. The associated "reference price" is an average monthly electricity price minus a management premium. Unlike the UK CfD design, the current Market Premium FiT does not require pay-back of market revenues when the reference price exceeds the strike price. There are other differences between the two designs, but in principle they are both Contract-for-Difference approaches that require a similar managing of market risks by the generator.<sup>7</sup>

Several variations of a market premium approach are being debated in Germany today to further reform the current renewable energy law. We believe that many of the implementation challenges the UK is addressing are relevant to this discussion, particularly the potential obstacles to future development of independent renewable projects.

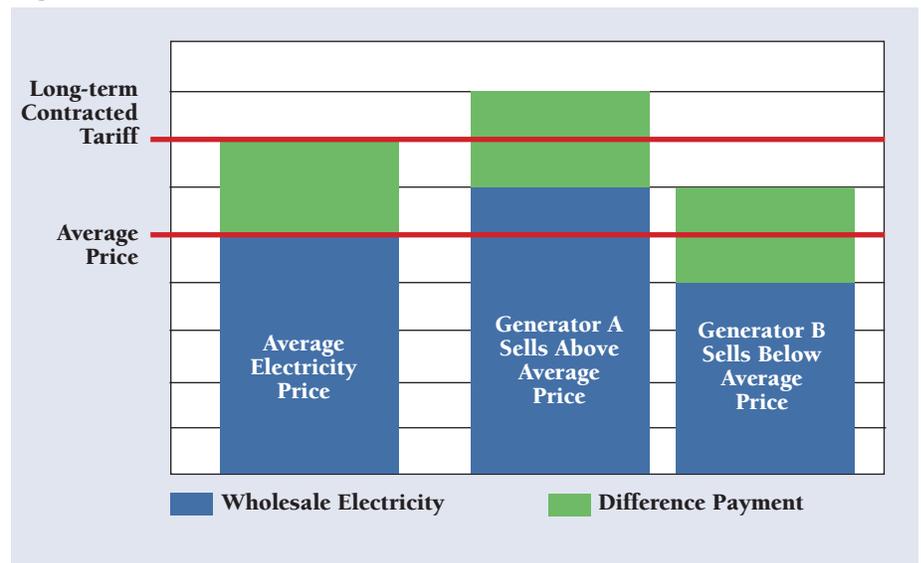
### Challenges in CfD FiT Implementation

The implementation of this new CfD FiT regime in the UK has proven to be an enormous challenge involving the specification of the detailed contract design and

**Figure 1**



**Figure 2**



5 As discussed under "management of market risk" below, the need to manage this energy risk introduces particular difficulties for smaller projects required to sell output under a power purchase agreement.

6 DECC Electricity Market Reform Consultation Document (2010), page 53. Available at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/](https://www.gov.uk/government/uploads/system/uploads/attachment_data/)

<file/42636/1041-electricity-market-reform-condoc.pdf>.

7 The German Feed-In Tariff: Recent Policy Changes (Deutsche Bank, September 2012) available at: [http://www.dbresearch.com/PROD/DBR\\_INTERNET\\_EN-PROD/PROD000000000294376/The+German+Feed-in+Tariff%3A+Recent+Policy+Changes.pdf](http://www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD000000000294376/The+German+Feed-in+Tariff%3A+Recent+Policy+Changes.pdf).

the associated governance and operational framework. In summary, the roles and responsibilities for CfD FiT implementation are as follows:

- UK Government
  - ▶ Creates Government-owned counter-party for contracts
  - ▶ Establishes a delivery plan for allocation of CfD FiT market support based on advice from the System Operator – this has initially involved the creation of a spending cap to cover the period out to 2020
- Government-owned Contract Counter-Party
  - ▶ Signs the CfD Fit with each generator
  - ▶ Pays (or receives) the difference payments arising from the CfD FiT
  - ▶ Collects costs (or disperses payments) to cover the difference payments from suppliers (“Supplier Obligation”)
- System Operator (National Grid)
  - ▶ Serves as delivery agent, providing advice to Government on the delivery plan (e.g., tariff rates to recover CfD-FiT costs under Supplier Obligation)
  - ▶ Conducts the contract allocation process (e.g., first-come, first-serve or competitive auctions)

Many important issues remain unresolved and are subject to on-going consultation processes.<sup>8</sup> Indeed, a number of issues have proved particularly challenging and controversial, as summarised below.

## Political

In line with the situation across Europe, the UK is operating within tight public spending constraints. Moreover, increasing energy costs are creating significant pressures on household budgets and additional costs for businesses attempting to compete in difficult market conditions. The CfD FiT will represent a subsidy for low carbon generation that will both increase energy costs and is also treated as public spending. Much consideration has, therefore, been given to the balance of cost control whilst ensuring that the UK can deliver its renewables targets and decarbonisation objectives (which are both enshrined in legislation).

After intense political negotiation, the adopted approach has been to set an overall spending cap until 2020. The Department of Energy and Climate Change (DECC) negotiated an amount with the Treasury that increases

annually up to £7.6 billion in 2020 (in real 2012 prices, nearly £10 billion in nominal 2020 prices) from £2.35 billion in 2012. The Government claims that this cap will still allow the UK to deliver its 2020 renewable energy targets. Nevertheless, it has been necessary to establish allocation rules to cater to the situation in which there is a risk that the spending cap will be violated.<sup>9</sup> Proposals include operating on a ‘first-come, first-served’ basis for early projects and ring fencing funding for certain emerging technologies.

It has also been decided to exclude energy intensive industries from the obligation to fund the CfD FiTs by exempting them from the so-called ‘Supplier Obligation’ mechanism by which the costs of the CfD FiT are recovered. No proposals have yet been published as to how this might be achieved.

The Government is very sensitive to criticism that this policy represents a more centralist approach to energy policy and a move away from the market philosophy. It has, therefore, set out a plan to evolve the contract allocation process from administrative price setting to technology specific auctions to technology neutral auctions and, by around 2030, to remove the mechanism entirely. However, this plan has little practical impact on the mechanisms which are being designed entirely for the first stage of this transition.

## Management of Policy Risk

Despite the design objective to provide investors with the protections of contract law to insulate them from policy uncertainty, the Government was initially very reluctant to take on a long-term contract and the associated financial liabilities, and proposed implementing the CfD FiT through a regulation designed to mimic a contract. The

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8 The most recent summary of the CfD FiT design (“Operational Framework”) was published in December 2012 and can be found at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/65635/7077-electricity-market-reform-annex-a.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/65635/7077-electricity-market-reform-annex-a.pdf).

9 A report published by PricewaterhouseCoopers at the end of March 2013 suggested that a figure of around £8 billion would be required and this could increase to £8.5 billion if wholesale power prices decline (this report can be found at: <https://docs.google.com/file/d/0B1cEvov1OlyHTkE2bEN-jck9yX00/edit?pli=1>).

financial community expressed significant concern with this proposal and demanded a public law contract with a single counter-party. This has now been conceded, and a Government-owned counter-party will be established.<sup>10</sup>

Nevertheless, concern over long-term policy risk remains: experience to date with long-term contracts has been that one party ends up 'out-of-the-money' and seeks contract re-negotiation. Consideration is, therefore, being given to providing some 'change of law' protection for investors and the draft contracts also include processes to cover dispute resolution. The Government is also trying to insulate itself from picking up the liabilities in circumstances such as supplier default on collection/payment of CfD FiT-related costs. The Government is therefore proposing that the counter-party company only be required to pay generators when it has received money from suppliers. It is, as yet, unclear how the investor community will assess the policy risks associated with the overall package.

### **Management of Market Risk**

The overall revenue of the generator will be the combination of the CfD FiT difference payment and the earnings obtained from selling energy in the market. If the generator were able to guarantee that it could sell output into the market from which the reference price is derived, then future earnings would be fixed. However, this is not possible and in consequence, future earnings are uncertain. Much design effort has been devoted to limiting this risk and ensuring that it does not deter potential investors.

Part of the concern can be addressed by selecting the appropriate market from which to draw the reference price. For variable renewables (e.g., solar, wind)<sup>11</sup> it has been decided to choose the hourly day-ahead price derived from the GB zone which is expected to be established in 2014 as part of the implementation of the target model for the European internal energy market. However, this is deemed inappropriate for 'base load' generation since they are expected to trade the bulk of their output in longer term markets, and an alternative for these generators has yet to be established.

The principle issue, however, arises from the fact that projects will generally not be able to secure finance until future earnings have been locked-in under contract. This requires both a CfD FiT allocation process that allocates contracts ahead of financial close, as well as the ability of the generator to sell output under a long-term power purchase agreement (PPA). The first of these issues has been addressed through establishing allocation rules that combine early allocation for projects meeting certain criteria (e.g. they have received the necessary planning permissions) with mechanisms to financially incentivise prompt project delivery.<sup>12</sup> However, the second issue has proved more problematic.

Extensive analysis of the market and consultation with market players has revealed that there is very weak demand for long-term PPAs, and renewable project developers are only able to sell contracts at a significant discount.<sup>13</sup> This could present a significant obstacle for the future development of independent<sup>14</sup> renewable projects,

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10 As outlined above, the system operator will separately act as delivery agent, providing advice to Government on tariff rates and conducting the contract allocation process (e.g. first-come, first-served or auctions).

11 We use the term "variable" resources/renewables in this paper to refer to sources such as solar and wind where the availability to produce electricity is largely beyond the direct control of operators. "Intermittent" is also a term used to describe these sources.

12 This is another area where rules have, as yet, only been established for renewables and not for nuclear or carbon capture and sequestration. Even for renewables, important elements remain to be defined such as how and under what conditions the allocation process changes from first-come, first-served to some form of auction.

13 In addition to a weak and illiquid PPA market (one provider accounted for 80% of agreements in the last financial year), other issues causing suppliers to offer PPAs at a significant discount to energy price include the expected long-term increase in the costs of managing intermittency, which is likely to be exacerbated by regulatory intervention to sharpen imbalance charges.

14 A UK Government consultation paper on the barriers to the development of independent renewable projects can be found at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/66553/5684-call-evidence-barriers-ind-ren-gen-inv.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/66553/5684-call-evidence-barriers-ind-ren-gen-inv.pdf); useful background information is also available in a report by Cornwall Energy that deals with the impact on small community energy projects: <http://www.cornwallenergy.com/System/The-Energy-Bill-and-its-impact-on-Community-Energy>.

which are expected to make a significant contribution to the achievement of the UK's renewable objectives. The Government has not, as yet, proposed any policy remedy and is hoping that the market will naturally become more liquid once the CfD FiTs are in place. However, it recognises that there is a risk this will not happen and has reserved powers to deal with this eventuality. Options currently being considered range from establishing a Green Power Auction Mechanism, which would extend the existing auction arrangements operated by the Non-Fossil Purchasing Agency<sup>15</sup> to set the reference price for individual renewable projects, to a simple strike price uplift. Neither of these extremes would be ideal however, as the Green Power Auction Mechanism option would essentially make renewable projects indifferent to electricity market prices, while adjusting the CfD strike price to reflect PPA discounts would amount to a windfall for those projects not required to seek PPAs in the open market.

There is a broader concern that the UK Government has raised throughout the development of its CfD-FiT (and Electricity Market Reform in general) with respect to sufficient market liquidity. Even if the generator manages to sell a PPA, the holder of the PPA (e.g., a private energy supplier or municipality), will need to refine its position in shorter term markets once the expected generation of the renewable generator becomes more certain. This can be highly risky when these markets are not liquid.<sup>16</sup> The UK Government has, therefore, asked the industry regulator Ofgem to come up with solutions to promote market liquidity across all timescales.<sup>17</sup>

Market risks are not only a concern for the generators. The introduction of the new Supplier Obligation to recover the costs of the CfD FiTs introduces risks for retailers. Apart

from the need to post potentially significant collateral with the counter-party company,<sup>18</sup> the costs of the CfD FiTs will form an increasingly significant proportion of wholesale purchases and these costs could be very difficult to predict and hedge. This presents a major risk, particularly for small suppliers, and the Government is currently considering how to structure the Supplier Obligation such that it does not represent a barrier to smaller suppliers and reduce retail market competition.

### **Risk of Market Disruptions When Prices Are Negative**

The design of a FiT with payments linked to short-term market prices brings with it the challenge of containing potentially disruptive market interactions when those prices become negative. For reasons discussed previously, the reference prices for variable renewables under the UK CfD-FiT will be tied to day-ahead market prices, which could fall below zero when total generated output exceeds demand on the system.<sup>19</sup> Maintaining CfD payments under these circumstances could significantly increase the total level of CfD payments (area shaded green in the figures above) as renewable generators attempt to outbid each other in order to continue access to those payments, thereby driving reference prices ever more negative.

How to avoid or contain this interaction was a topic of some debate during the development of the new UK FiT. One initial option under consideration was to build in a switch to payments based on "availability" (per KW) rather than output (per kWh) when reference prices fell below zero. That is, any generator selling power into the day-ahead market when prices were negative would receive a CfD payment based in some way on its available

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15 The inability to sell PPAs other than at a significant discount to expected market prices is a particular issue for independent renewable projects that are generally dependent on project finance. It is less of an issue for renewable projects developed by the large vertically integrated utilities (VIUs), which have access to contracted demand over the long term and are often financed off-balance sheet.

16 This agency auctions power from older renewable power projects built under the Non Fossil Fuel Obligation, which preceded the existing Renewables Obligation. Renewable energy is auctioned on a six-monthly basis and the auctions always clear with, on average, eight bids on every site. Because of the short contract timescales the discount to market price

is reduced, while relaxed credit requirements make the NFPA auctions attractive to a much wider range of suppliers, particularly smaller suppliers and new entrants.

17 For the most recent set of Ofgem recommendations, see: <http://www.ofgem.gov.uk/Markets/RetMkts/rmr/Documents/1/Secure%20and%20Promote%20Consultation.pdf>.

18 Generators will also be required to place collateral to cover the situation in which the difference payment is negative.

19 As reference prices for base load generation will be linked to long-term average prices, the possibility of negative reference prices is extremely unlikely.

production capacity during those hours, which for variable resources can be considerably less than installed capacity. However, following extensive analysis by the system operator and its advisors, concerns emerged that removed this option from further consideration. The key concern was that a CfD based on availability payments during negative reference prices could cause significant volatility in renewable output as prices approached zero, thereby disrupting normal market operation and increasing reserve requirements.<sup>20</sup> Another concern related to the difficulty in defining/measuring available productive capacity for variable renewables during those negative price hours as the basis of payment. Instead, the UK Government retained the original output-based CfD payment design described above, recognizing the mitigating effect of capping the CfD payment at the value of the strike price. A CfD cap does not prevent variable renewables from driving negative prices, but it does limit that potential impact. In this case, the adopted cap effectively prevents those prices from spiralling below a level equal to the negative value of the strike price. It is also expected to result in a "softer" reduction in renewable output as the energy price declines.

## **Nuclear**

The decision to support the construction of new nuclear power plant remains extremely controversial and, at the time of writing, the Government has yet to agree on a strike price with EDF Energy who will develop the first project. These discussions, and the development of an appropriate CfD FiT structure for nuclear, have been conducted largely outside the main policy development process, which has focused almost exclusively on support for renewables. The process associated with nuclear has been much more akin to an exercise in public procurement and is not relevant to the core policy development.

## **Conclusion**

The UK Government has embarked on a process to re-engineer subsidy mechanisms for low carbon generation with the intention that the structure will remain robust over the coming decades. This has proved extremely complex and challenging and many important details remain to be resolved. Indeed, it is likely that the new structure will need continued development in light of experience once the new mechanisms have been implemented.

The lessons learnt are relevant to all countries across Europe as the power system progressively decarbonises and the proportion of low carbon generation becomes increasingly significant.

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20 The market volatility issue centered around concerns that output would fall off a "cliff edge" as variable renewables faced negative energy prices. With an output-based CfD payment, and the reference price positive but falling towards zero, variable generators would still be incentivised to run in order to get the "difference" payment. However, if they were only paid for availability, that payment would be eaten away by the negative energy price and there would be a

clear incentive not to run. There was therefore concern about this sudden change in incentive and the potential "cliff edge" for output and market/operational volatility it would introduce—e.g., the need to carry additional reserves to cover the potentially very large decrease in renewable output that could occur as prices fell through zero. On the negative pricing issues more generally, see the Operational Framework reference in footnote 8, Annex A, paragraphs 167-173.

**The Regulatory Assistance Project (RAP)** is a global, non-profit team of experts focused on the long-term economic and environmental sustainability of the power and natural gas sectors. We provide technical and policy assistance on regulatory and market policies that promote economic efficiency, environmental protection, system reliability, and the fair allocation of system benefits among consumers.

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