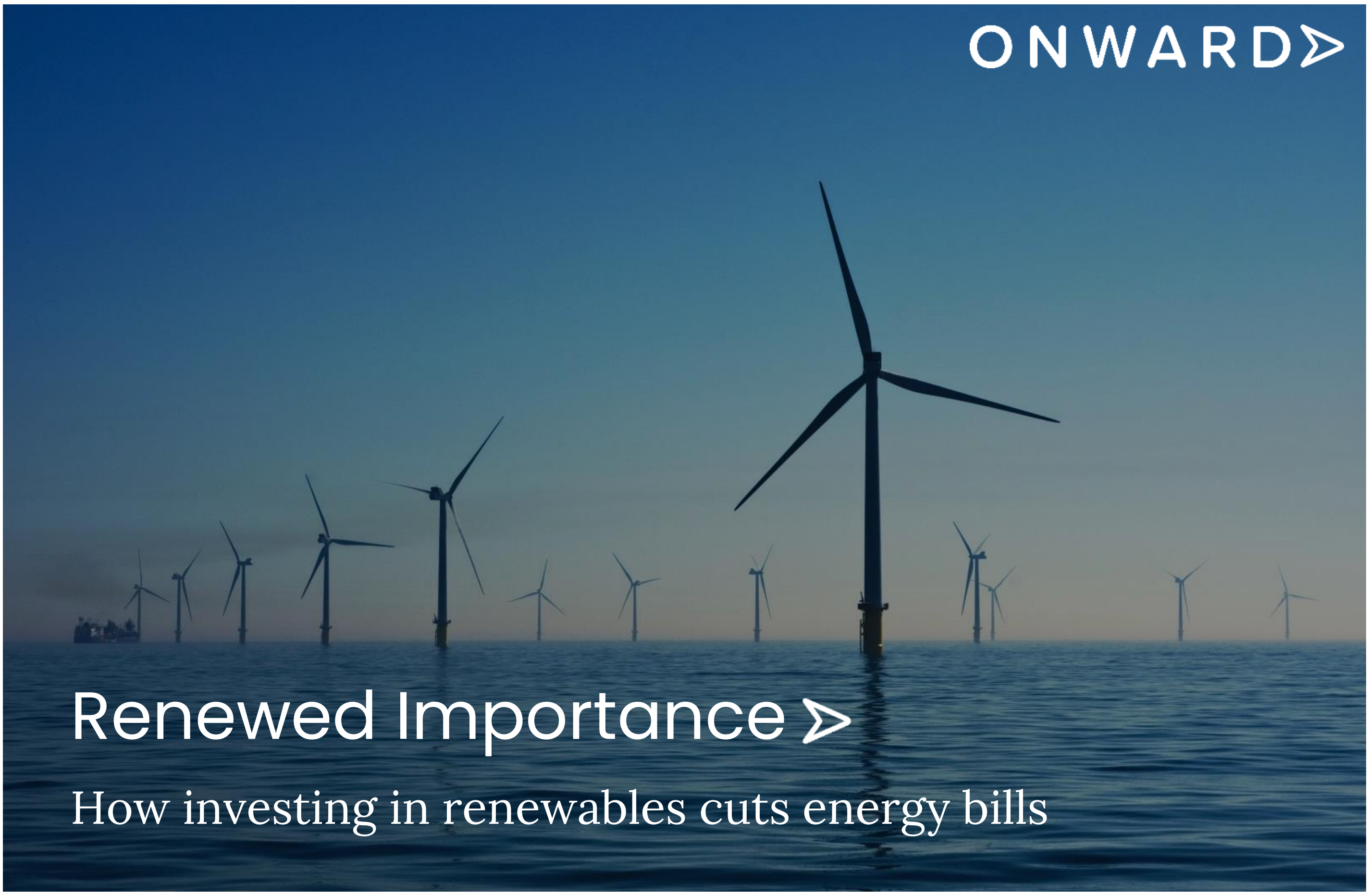

Renewed Importance

How investing in renewables cuts energy bills

RESEARCH NOTE

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Executive Summary

The cost of living, and in particular the cost of energy, will dominate this year's political agenda. Even before the Ukraine conflict, wholesale energy prices had risen sharply, resulting in Ofgem increasing the Energy Price Cap by 54% in April to £1,971 per year for a typical household. With inflation running at 5.5% - the highest level since 1992 - and the likely fallout from sanctions on Russia, households will face financial pressure not seen since the 1970s.

This has precipitated an intense debate about the future of UK energy policy. Some have focussed their criticism on the UK's investment in renewables and the wider net zero agenda for driving costs up. One solution, they argue, is to abolish so-called 'green levies' or 'green taxes' on energy bills, which fund investment in renewable energy projects through schemes such as the Contracts for Difference (CfD) and Feed-in Tariffs, as well as energy efficiency measures.

But how accurate is it to say that renewables subsidies contribute additional costs to household bills? Are taxpayers still subsidising a nascent market, or do renewables now save customers money? This note seeks to answer these questions by comparing the volume and price of renewable energy generated with the gas displaced from the UK's energy mix. From this we can calculate the level of implied saving for the UK as a whole and on a per household basis, both from existing renewables and from those recently commissioned.

We find that:

- The vast majority of the current energy price crisis has been driven by the UK's exposure to rising gas prices. 85% of the recent rise in electricity prices can be attributed to increases in the gas price - along with 90% of the rise in consumer's energy bills. Gas prices in the UK are closely linked to those in European and global markets. Therefore reducing our dependence on gas for both electricity generation and domestic use is crucial to protecting consumers from further volatility and maintaining security of supply.

- Renewables already make a significant contribution towards reducing the UK's dependence on gas and other fossil fuels. In 2021, renewables were responsible for 29% of the electricity generation in the UK. This alone displaced around £6.1 billion worth of gas, equivalent to £221 of gas per household. Replacing these renewable sources with gas power plants would have increased total UK gas demand by 17%, further raising prices for consumers. However, the price of electricity is typically set by the price of gas - since it is gas that is used to meet peak demand. To end this dependency, reform of energy markets or the entire energy system is likely to be required.

- Supporting investment in renewables through green levies on energy bills is already paying dividends. Levies are used to support Contracts for Difference (CfD) schemes, which promote investment by guaranteeing a fixed price for the energy generated by renewable assets over time. Recent wholesale prices for electricity have averaged around £170.41 per MWh, more than three times as much as the contracted prices in real terms for renewables projects in the most recent CfD allocation round.

This means that CfD projects are now helping to protect consumers against booming electricity prices. From November 2021 to January 2022, CfDs paid back £114.4 million to energy suppliers. Since September, the CfD levy paid by consumers has been set at £0. If this rate of payback is maintained over a year, then the average household will save £6.46 as a result of CfD projects beginning to pay back.

While this saving is small, it is evidence that CfDs are now providing a net saving to customers. As further CfD renewables projects come online over the next five years, these savings will grow if wholesale prices remain high. By 2027, CfDs for intermittent renewables like wind and solar will be paying back £10.49 billion a year to customers at current electricity prices - saving each household £97.53 per year. These savings would also increase along with any further increases in electricity prices. In essence, CfD projects are now acting as an insurance policy, offsetting a significant portion of any future increases in electricity prices.

Whatever steps are taken to assure energy security in the short term, now is not the time to divest from renewables or to delay the transition to cleaner energy sources. The opposite is true. Renewable energy increasingly delivers lower costs for consumers and industry. If ministers want a way out of the current crisis, it lies in doubling down on current policy rather than diluting it.

The origins of the current crisis

Wholesale gas prices began rising in international markets from the middle of 2020, rebounding from historic lows during the peak of the first Covid-19 lockdown. Prices rose more rapidly from mid-2021 and are now at near historic levels.

The origins of this price increase are hotly debated, but most experts agree that it was in part driven by increasing economic activity as countries began to emerge from the COVID-19 pandemic. It takes time for energy supply to ramp up as new gas fields need to be commissioned and lower-than-average gas storage levels across Europe further increased demand.[1] Growing demand from China for gas in 2021 was another key contributor to spiking prices, and exacerbated the issue of depleted European storage levels.[2]

Another factor may have been constraints on gas supply to Europe. Russia was accused of supplying less gas to Europe in a bid to push for the certification of the Nord Stream 2 pipeline, while a power crisis in Texas also led to a reduction in Liquified Natural Gas (LNG) exports.[3][4]

These factors were outside of the control of UK policymakers. Natural gas storage levels in the UK in 2021 were well within usual boundaries, while demand was not unusually high or low[5]. However, gas is an internationally-traded commodity and thus the price paid by the UK for the gas it imports is determined by regional and global supply and demand - with the exception of the US, in which prices are detached from European and Asian gas prices due to a combination of high domestic production a limited export capacity (whether through pipelines or LNG).

The UK is not alone in experiencing these effects, and much of Europe is experiencing similar difficulties. Electricity prices in Germany increased sixfold in the year up to October 2021. This is partly because European electricity prices are closely related to gas prices - because gas-fired power stations are typically the marginal source of generation, as discussed later in this note.

In the UK, energy suppliers have been unable to fully pass on these rising costs to consumers, due to the pricing restrictions imposed by the Energy Price Cap. Because many suppliers did not hedge sufficiently, 31 energy suppliers have ceased trading since the beginning of 2021. Following these failures, more than 2 million customers have been transferred to new suppliers, which are charging prices at or very close to the maximum allowed under the price cap. In addition, Bulb Energy, the UK's seventh largest supplier, entered administration in November 2021.[6] Its continued operations are being funded by HM Treasury.

The energy crisis has been further complicated by Russia's invasion of Ukraine. As the world's largest natural gas exporter, Russia's actions have plunged global markets into more uncertainty and further driven up the cost of gas.[7] In early March 2022, wholesale gas prices spiked to more than 500p per therm - a ninefold increase from a year previously, and around ten times the average price from 2015 to 2019.[8]

The rising importance of energy security

Russia's invasion of Ukraine has thrown the importance of energy security into sharp relief, especially in Europe. Russia exports much of its natural gas to Europe, and these supplies have continued uninterrupted throughout the invasion. Russian gas accounts for around 41% of Europe's gas supply, undermining the ability of the West to impose economic sanctions on Russia in response to the invasion.[9] There is a risk that, if the conflict continues, Russia will weaponise its gas supply by reducing exports. The EU responded with a new energy strategy in March, outlining plans to cope without Russian gas, and Germany has suspended the certification of the new Nord Stream 2 pipeline.

While less than 4% of the UK's natural gas supply is imported from Russia, UK ministers have nevertheless quickly moved to reassure voters that "the Government is urgently reviewing what can be done to drive this down even further, while maintaining our strong security of supply".[10] [11] Because the UK wholesale gas price is closely linked to prices in continental Europe, UK customers are still heavily impacted by Russian gas flows. The Government's forthcoming energy security strategy is expected to include plans to further raise ambition for future renewables, both by boosting targets for new offshore wind and by relaxing planning regulations for new onshore wind farms.[12] [13] The Secretary of State for Business, Energy and Industrial Strategy described renewables as a "matter of national security".[14]

The role of renewables

The UK has committed to completely decarbonise the UK electricity grid by 2035 through the rapid deployment of renewables. Those sceptical of the net zero agenda have criticised this decision, pointing to the fact that renewable energy projects are currently funded through a levy on domestic energy bills - often referred to as "green levies".

Furthermore, rising energy prices - combined with a wider cost-of-living crisis - have prompted a wider political debate about net zero. Several MPs have launched the Net Zero Scrutiny Group to campaign for the Government to scrap green levies on electricity bills and to increase the amount of natural gas extracted from the North Sea[15], as well as an end to the moratorium on fracking.[i] Nigel Farage, meanwhile, launched "Vote Power Not Poverty" in March 2022 to campaign for a referendum on net zero.[16]

In light of the growing debate around net zero investment in renewables, it is important to understand the role they play in the UK's energy mix and how they contribute to reducing dependency on gas. Given the political debate is focussed on costs, it is also crucial to examine the impact renewable energy investment has had on energy bills to date and will have moving forward.

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[i] Fracking is the process by which fissures in rocks underground are forced open, first by drilling down into the rock and then by injecting a liquid at high pressure, in order to extract the oil or gas inside. A moratorium on fracking was introduced by the Government in 2019, following a report from the Oil and Gas Authority which stated that it was not possible to predict the probability or magnitude of seismic activity as a result of fracking operations.

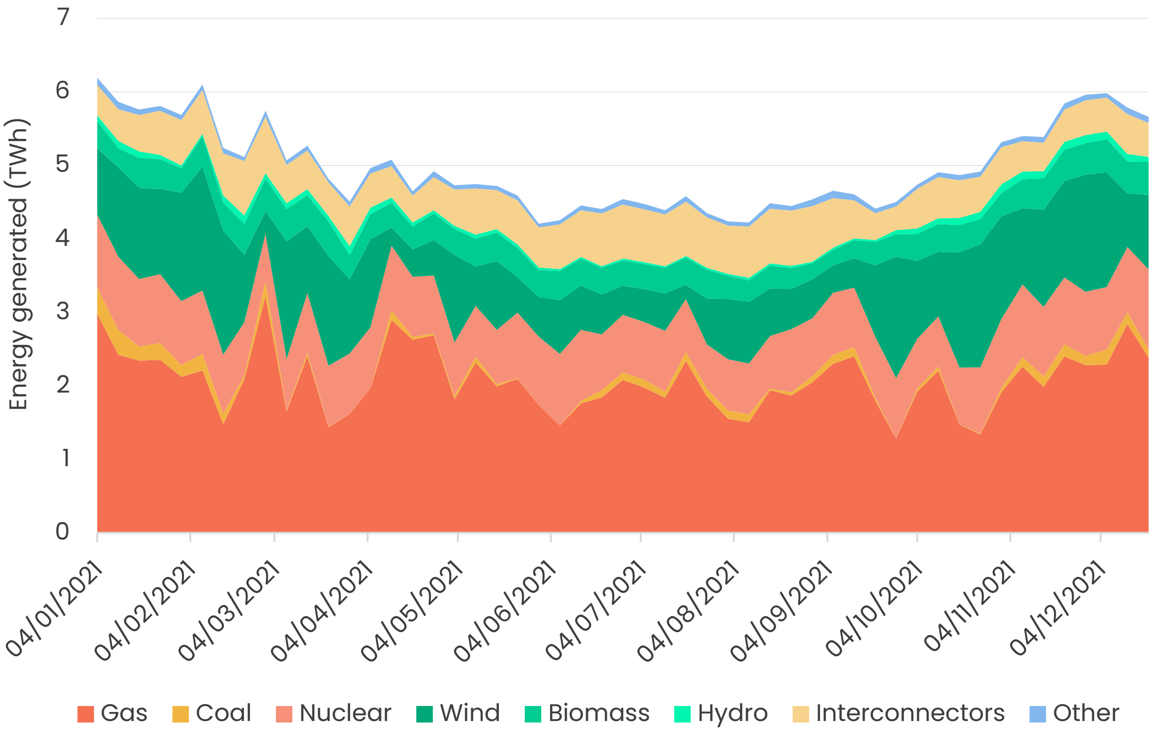
The UK's electricity generation landscape

The UK's electricity mix is recorded by the Balancing Mechanism Reporting Service (BMRS). This research note uses BMRS data showing historical generation by fuel type in 2021.[17] [ii]

Electricity generation in the UK in 2021 was 254 Terawatt Hours (TWh). The BMRS data only reports on large scale sources of electricity generation, with a capacity of 50MW or greater. This therefore excludes small-scale "embedded" sources of electricity generation, such as small solar and onshore wind farms, and some small gas and diesel power plants.[18] The UK's total electricity generation, inclusive of embedded generation, will therefore have been higher than this, and the share of renewables understated.[19]

Figure 1: Estimated energy generation from different sources on a weekly basis (TWh)

Source: BMRS, Onward analysis

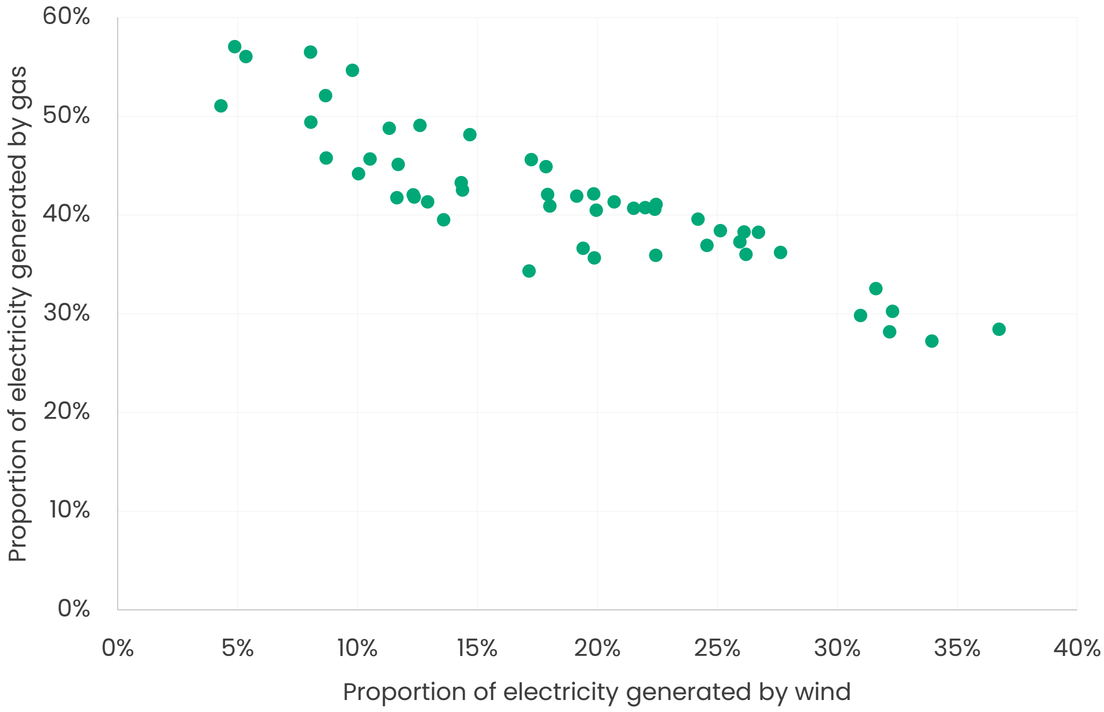


As Figure 1 shows, there was a significant dip in wind throughout the summer months - as was widely reported by various media sources at the time.[20][21] A clear relationship is visible between times when wind and other renewables were generating less energy, and an increase in generation from gas as a result. This relationship is further demonstrated in Figure 2 below, which shows the proportion of electricity generation accounted for by gas and wind sources, on a daily basis. Evidently there is, at present, a very strong inverse relationship between gas and wind.

[ii] Note: all figures used in this report exclude Northern Ireland.

Figure 2: Daily proportion of electricity generated by wind and gas

Source: BMRS, Onward analysis



The share of actual electricity production from sources tracked by the BMRS in 2021 is shown in Table 1.

Table 1: Actual electricity production by fuel type, 2021 (TWh)

Source: BMRS, Onward analysis

Fuel type	Share of electricity supply (%)	Electricity generation by fuel type (TWh)
Gas	41.6%	105.6
Coal	1.9%	4.9
Nuclear	16.6%	42.2
Wind	18.7%	47.6
Hydro	1.2%	3.2
Biomass	7.3%	18.5
Interconnectors	11.3%	28.6
Other	1.4%	3.5

UK's dependence on gas

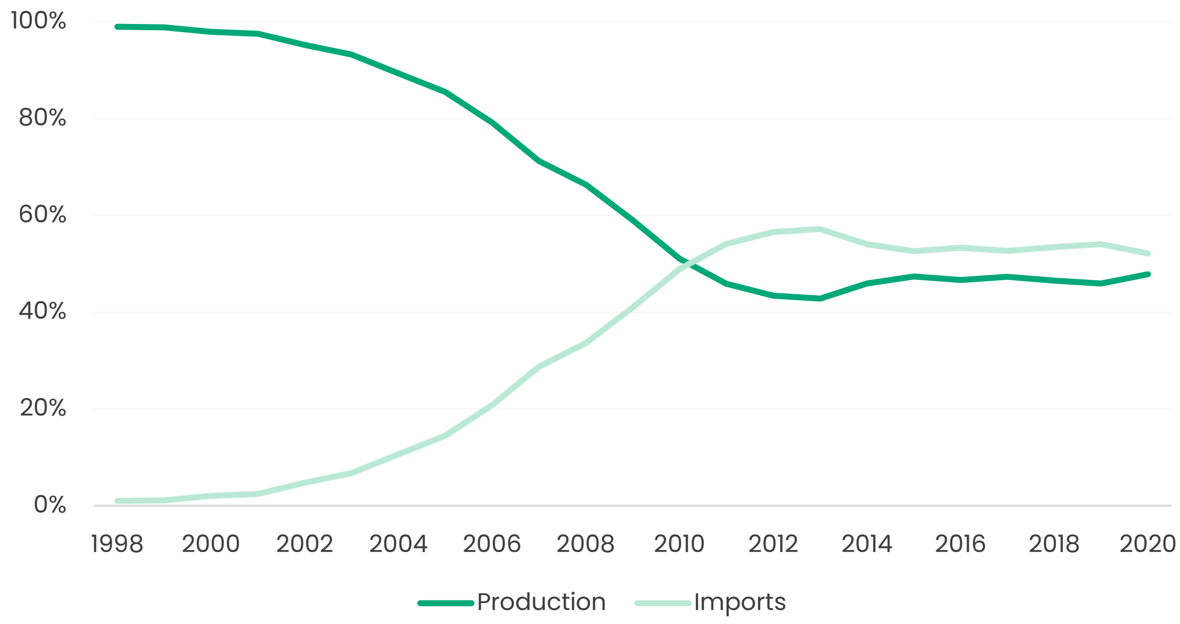
Recent analysis has shown that almost 90% of the increase in energy bills in the UK in 2021 is as a result of rising gas prices across Europe, and the rest of the world.[22]

Around 52% of the UK's natural gas supply is imported from international markets. This is up considerably since the turn of the millennium, when 99% of the UK's natural gas was supplied by domestic production and only 1% from imports.[23] However, this does not prevent the UK from exposure to rises in international gas prices. Even as a net exporter, or with entirely domestic production, the UK would remain exposed - since prices for gas produced domestically are closely linked to European markets. This is due to the pipelines and interconnectors connecting the UK to Europe, along with the UK's role in the liquified natural gas (LNG) supply chain.[24]

However, the UK's status as a net importer presents a risk to the security of supply of gas, as the price consumers must pay to attract sufficient quantities of gas to the UK has increased. Rising international gas prices will also have a negative impact on the UK's balance of payments.

Figure 3: Share of UK natural gas supply from imports and exports

Source: BEIS Energy Trends, Onward analysis



Consumers are exposed to gas prices in two ways. First, through the use of gas in domestic heating, hot water and cooking, and, second, through the cost of generating electricity from gas-fired power stations. The former makes up around a third of the UK's natural gas usage, while a further quarter is used to generate electricity in gas-fired power plants - with most of the remainder used by industry.[25]

While it is simple to understand why consumers' gas bills increase when the price of gas goes up, it is less obvious why electricity bills should also increase significantly - especially considering gas-fired power plants were only responsible for generating 41.6% of the UK's electricity in 2021. However, electricity bills rise too because the price of electricity is typically determined by gas-fired power plants.

This is because the price of electricity is set by the 'marginal generation unit' - which is whatever power source generates the last unit needed to meet peak demand. In the UK, this is almost inevitably met by gas-fired power plants.

In times of lower demand, the marginal unit is typically a high-efficiency Combined Cycle Gas Turbine (CCGT) power plant. In times of higher demand, the marginal unit is typically a 'gas peaking plant' - less-efficient gas plants designed to operate during periods of high demand or short supply, with much higher running costs.[iii]

However, this means that electricity prices closely track gas prices. Analysis from Ember has shown that the rise in gas prices was behind 85% of the rise in wholesale electricity prices in 2021.[26] By April 2022, the average price consumers will pay for their energy will have increased by 47% for electricity and 133% for gas relative to prices a year prior, to 28p/kWh and 7p/kWh respectively. These increases are driven primarily by increases to the wholesale cost of electricity and gas. For a typical dual-fuel bill, wholesale costs under the forthcoming price cap from April 2022 will be 250% more than in April 2021.

Network costs have also increased by 38% during this period, due primarily to the costs incurred by suppliers acting as a 'Supplier of Last Resort', who step in to take on the customers of failed energy suppliers.[27][28] Before the current crisis, wholesale gas and electricity made up 35% of a typical dual-fuel energy bill, but from April 2022 this will rise to 55%.[29]

The avoided cost of gas from renewables

The UK's dependence on gas leaves consumers exposed to fluctuating prices in global gas markets and drives up both domestic gas and electricity bills. Renewables have, however, started to reduce this dependence on gas.

In 2021, renewables (including wind, hydro, biomass, solar and others) provided approximately 29% of the UK's electricity - equivalent to around 72.8 TWh. Assuming an efficiency of approximately 50% for gas-fired power plants in the UK - slightly higher than average - this means that ~146 TWh of gas (5 billion therms) would have been required to produce the equivalent amount of electricity.[30]

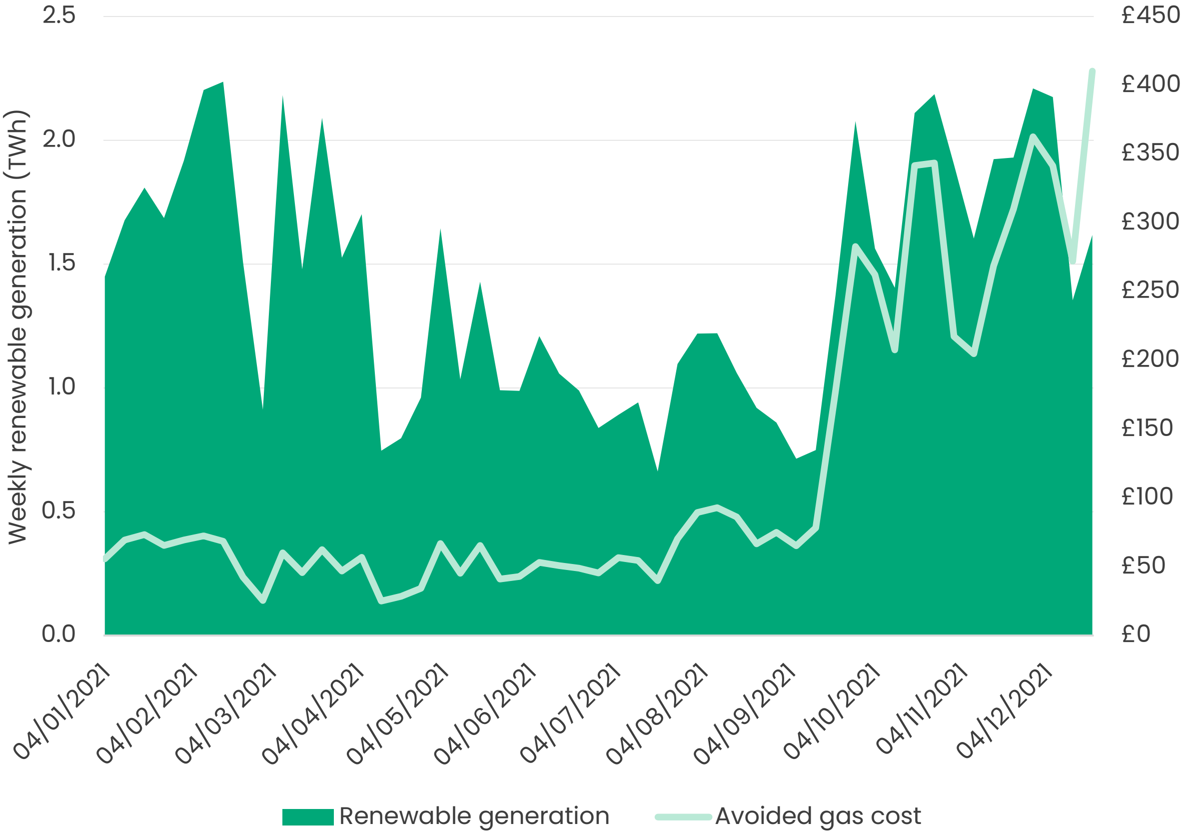
[iii] This phenomena is outlined by Ronan Bolton in his book 'Making Energy Markets'. He writes that "the idea was that high marginal prices – often set by expensive-to-run gas peaking plants – would signal when capacity limits are reached, providing clear incentives to consumers to reduce or delay demand at these peak periods.

This, in theory, would lead to an overall more efficient system, and in the long run, if average prices exceeded the costs of entering the market, new investments would be made, thus pushing the more expensive and inefficient plants off the system."

With gas prices exceeding 300p/therm in recent weeks, renewables have avoided a significant national gas bill. Using data on the gas price at the beginning of each week throughout 2021, the cost of the gas displaced by UK renewables is estimated at £6.1 billion. This is equivalent to £221 per household.[31]

Figure 4: Weekly avoided gas cost and renewable electricity generation in the UK

Source: BMRS, BBC Natural gas price data, Onward analysis



It is important to caveat that this estimation of the avoided cost of gas through use of renewables does not constitute an equivalent saving for consumers, for the reason outlined above: the price for electricity is essentially set by the price of gas. Therefore, while renewables mean that the UK has bought less gas, the electricity generated from renewables will still have cost consumers nearly the same amount.

However, without renewables, the UK would have required around 69% more gas in the electricity sector, raising the UK's demand for natural gas by more than 17%. This increased demand would likely have pushed UK and European gas prices up further, hitting consumers and industry in the pocket. In future, as long as gas remains the marginal generation unit, the price of electricity will continue to closely track the price of gas without significant changes to the energy system or energy markets.

The Climate Change Committee argues that transitioning to a more flexible energy system could work towards ending the reliance on gas as the marginal generation unit. For example, a future energy system may be able to flex supply and demand throughout the day to meet each other, and would rely on electricity storage in times of surplus generation which could then be used to meet demand in times of lower generation.[32]

A sweeping reform of electricity markets could also change how the price of electricity is set. There are a number of potential options the Government could explore, including decoupling renewable electricity from wholesale electricity markets entirely, moving to a model of locational marginal pricing, or simply taking an average price.[33]

The impact of the Contracts for Difference scheme

In recent months, the growing debate around the UK's net zero agenda and green policy has seen some politicians and media outlets argue for the Government to abolish or suspend so-called "green levies" or "green taxes".[34] These levies, which currently make up around 12% of a typical energy bill at the price cap, are used to fund a number of initiatives. One such initiative is the Energy Company Obligation, which requires energy suppliers to install energy-efficiency measures in "low income, fuel poor and vulnerable households".[35] The levies also fund the Warm Home Discount, which issues a rebate on electricity bills for low-income pensioners and those at risk of fuel poverty. In addition, they fund Feed-in Tariffs, which support small-scale renewable electricity generation for households and businesses by paying them a set tariff per kWh of electricity they generate.[36]

A significant proportion of the levy is used to fund the Contracts for Difference (CfD) scheme, which was introduced to bring down the cost of renewables over time. It is therefore worth examining whether CfDs costs are likely to add additional pressure to household bills in the coming years, and what the consumer impact of diluting renewables investment would be.

Box 1: How Contracts for Difference for renewables work

CfDs work by guaranteeing a fixed price for the energy generated by renewable assets over time, which reduces uncertainty for investors in renewable energy projects by shielding them from wholesale price volatility.

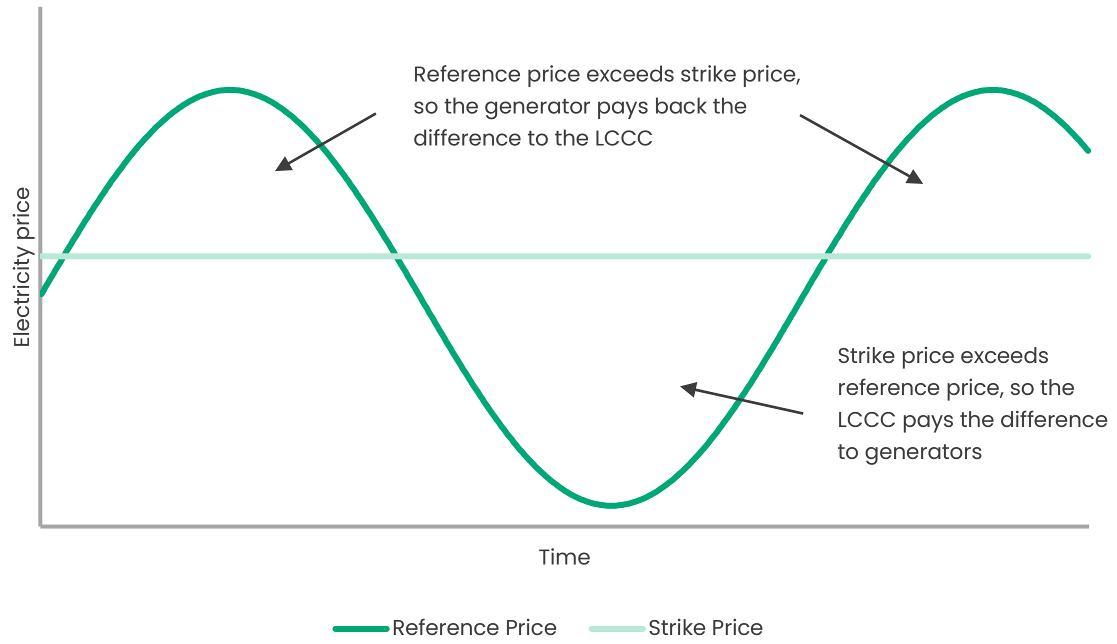
Each CfD contract dictates a 'strike price' - the guaranteed price that will be paid per unit of electricity. The difference between this 'strike price' and the 'reference price', which is the measure of the average market price for electricity in the market, is where CfD payments occur. If the strike price is greater than the reference price, then the energy suppliers - through the Low Carbon Contracts Company (LCCC) - make up the difference. However, if the reference price exceeds the strike price, then the generator pays back the difference.

CfD contracts are awarded through allocation rounds, of which there have been three to date - in addition to 'investment contracts' (early CfD contracts handed out to prevent an investment hiatus while the CfD programme was finalised). These contracts have been awarded to both 'baseload' and 'intermittent' technologies.

Baseload technologies consist of biomass conversion and 'energy from waste' projects, which generate a stable base of electricity, while intermittent technologies include solar PV, onshore wind, and offshore wind. The reference price is different for these two types. Payments for baseload technologies are calculated against the Baseload Market Reference Price (BMRP), whereas payments for intermittent technologies are calculated against the Weighted Intermittent Market Reference Price (IMRP), which is usually higher.

Figure 5: Explanation of how CfDs work

Source: LCCC



As described, CfD costs are funded through a levy on electricity suppliers - the costs of which are then passed onto customers. However, the benefit is that, when CfDs pay back, customers should benefit through a discount on their bills. The CfD programme has been designed to reach this cost-neutral (or indeed profitable) stage at which the strike price falls to equal or below the expected wholesale electricity price over the duration of the contract (the reference price).

The initial investment contracts and subsequent first two allocation rounds had significantly higher strike prices - over the past year they were £143.81/MWh, in real terms). As a result, CfDs as a whole have not generally paid back to customers. For example, in 2020, they cost the average household £34.82.

The intermittent projects supported by CfD contracts in these allocation rounds have averaged an annual generation of 14.5 TWh per year since 2020, but at an average strike price weighted by output in 2021 of £156.71/MWh. The breakdown for both intermittent and baseload projects across 2021 is shown below in Table 2.

Table 2: Output and strike prices of existing CfD-supported projects in 2021

Source: LCCC, Onward analysis

Allocation round	Technology type	2021 Generation (TWh)	Average strike price weighted by output (£/MWh)
Investment Contracts	Intermittent	10.36	£169.16
	Baseload	6.45	£120.39
AR1	Intermittent	4.16	£125.68
	Baseload	0.13	£92.10
All	Intermittent	14.52	£156.71
	Baseload	6.58	£119.82

However, the competitive nature of the auction process has encouraged innovation and driven strike prices down in subsequent auctions. This effect has been far more pronounced than expected. In 2016, BEIS estimated that the 'levelised cost' of generating electricity - the cost per MWh over the entire lifetime of a project - in 2025 would be £106/MWh for offshore wind. In 2020, it revised these estimates down by 46%, to £57/MWh.

In the latest round of CfD auctions (AR3), strike prices reached as low as £39.65/MWh (in 2011/12 prices). For Round 3 as a whole, the Government expects projects to pay money back to customers, because the strike prices are lower than the forecast wholesale electricity price).[37] This means that - unless the price of wholesale electricity crashes to below what it was before the crisis - every renewable project added in AR3 will be saving consumers money on their electricity bills.

However, CfDs have begun to provide savings in advance of AR3 projects coming online. On September 6th 2021, wholesale electricity prices surged and CfDs paid back to customers for the first time. The average price paid to suppliers per MWh of electricity generated with CfD support varied significantly during 2021, but dropped rapidly as the gas price crisis started to take hold. Since October 2021, the average payment has been negative, meaning that generators have been paying back to suppliers - and therefore consumers - since then.

In the period from November 2021 until the end of January 2022, CfDs paid back £114.4m. If this rate was maintained for an entire year, CfDs would pay back £457.6m to suppliers. Since September, the CfD levy paid by customers has been set at £0. If all of the savings from projects paying back are therefore passed on to customers, the average household will benefit from a net saving of £6.46 per year. As further projects come online (at potentially even lower strike prices), these savings will grow.

Figure 6: Daily CfD payments vs Weighted IMRP

Source: LCCC, Onward analysis

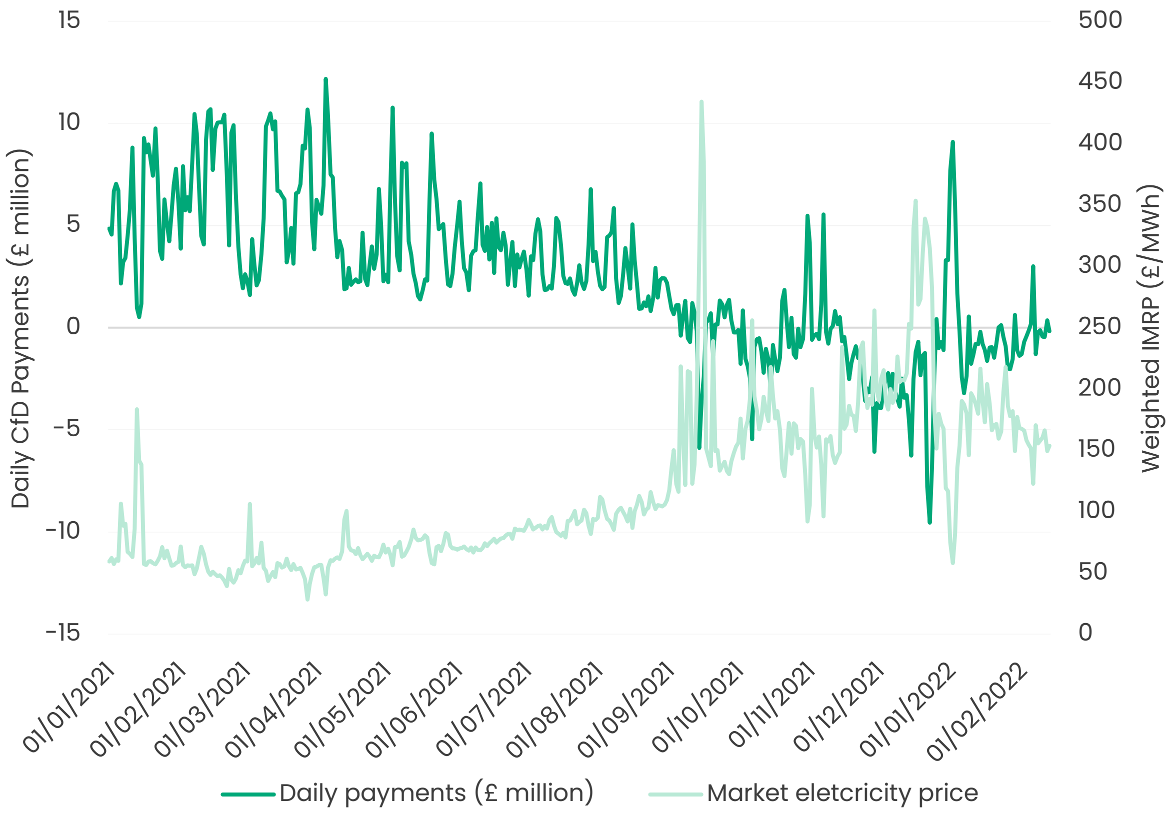
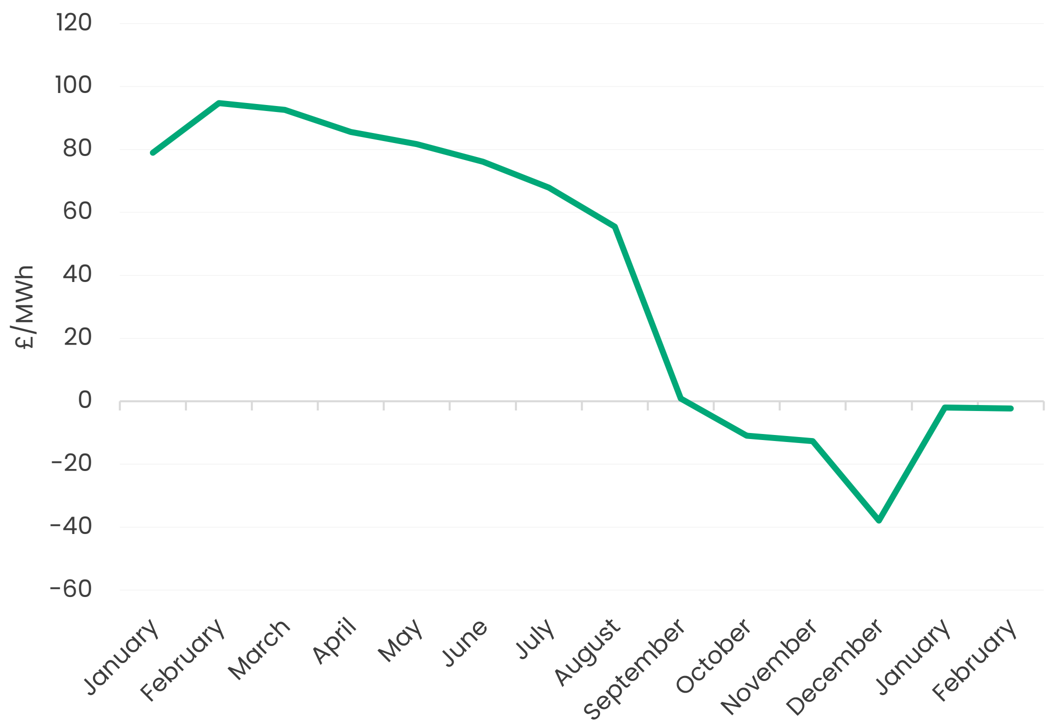


Figure 7: Monthly average CfD payment to generators per MWh in 2021

Source: LCCC, Onward analysis



Future savings from CfDs

The capacity of CfD-supported projects is accelerating at pace. Allocation Round 2 (AR2) projects are now reaching delivery stage, with the first projects brought online midway through 2021, while projects from Allocation Round 3 (AR3) have been awarded contracts for delivery between 2023 and 2025. Projects from AR2 and AR3 will begin to deliver significant savings to consumers, however, as strike prices have fallen considerably from the initial Investment Contracts and AR1 stages of the scheme. The expected outputs from AR2 and AR3 projects are detailed in Table 3 below.[38] [39] [40] [41] Average strike prices, weighted by expected output, are given in both 2011/12 prices and real terms, as strike prices rise with inflation.[42]

Table 3: Expected output from CfD Projects in AR2 and AR3

Source: BEIS Allocation Round 2 and 3 Frameworks, BEIS Contracts for Difference Second and Third Allocation Round Results, Onward analysis

Allocation round	Technology type	Capacity added (MW)	Expected generation (TWh/year)	Average strike price (£/MWh, 2011/12 prices)	Average strike price (£/MWh, real terms)
AR2	Intermittent	3,196	13.35	£62.14	£74.98
	Baseload	150	1.07	£72.86	£87.84
AR3	Intermittent	5,741	29.1	£40.39	£48.70
	Baseload	34	0.26	£40.01	£48.23

The weighted average market price of electricity from intermittent generators (known as the Weighted IMRP, in £/MWh) for electricity in 2022 has been £170.41/MWh. There is significant uncertainty as to the future market price of electricity. However, if it will remain at this level, and using expected generation output estimates, CfD-supported intermittent technologies in all allocation rounds to date are expected to pay back significantly to consumers, as set out in figur 4.[iv]

[iv] Note that baseload technologies have been excluded from this analysis as they only represent a small proportion of future CfD-supported capacity. As they use the BMRP as the reference price, which is generally lower than the IMRP, any savings they generate will be smaller.

Table 4: Expected payback from CfD contracts agreed, up to AR3

Source: BEIS Allocation Round 2 and 3 Frameworks, BEIS Contracts for Difference Second and Third Allocation Round Results, Onward analysis

Allocation round	Amount paid back per MWh (£/MWh)	Amount paid back in one year (£/year)
IC & AR1	£13.70	£289 million
AR2	£95.49	£1.28 billion
AR3	£121.72	£3.54 billion

Altogether, once the renewable projects from AR3 come online across 2023/24 and 2024/25 (and assuming the Weighted IMRP of electricity remains at £170.41/MWh), intermittent CfD projects will pay back approximately £5.02 billion per year to suppliers, in 2022 prices. If these savings are entirely passed onto customers, then the average household will save £46.64 per year by 2025.[v]

Allocation Round 4

Allocation Round 4 (AR4) is the fourth round of auctions under the CfD programme. AR4 is ongoing, with results expected between April and July 2022.[43] The capacity target for AR4 is 12GW, double the capacity of AR3, and there is no maximum on the amount of offshore wind that could be successful in the auction, subject to the budget constraint. Projects awarded contracts in AR4 will start operating between 2023 and 2027.

AR4 sees the reinclusion of 'established technologies' - primarily onshore wind, solar photovoltaic, energy from waste and hydro - for the first time since AR1.

To calculate the impact of AR4 on CfD payments, we make the following assumptions with regards to the capacity budget distribution, and use published figures for administrative strike prices and load factors as set out in Table 5.[vi]

[v] Note that businesses make up the majority of electricity demand and would receive a proportionate share of the savings as a result, unless the Government introduced new legislation. The methodology for this calculation is included in the methodology annex.
[vi] Administrative strike prices are the price cap per technology, while the load factor is the average proportion of maximum output at which electricity is generated.

Table 5: Assumptions used to calculate expected output and savings from AR4
Source: BEIS Allocation Round 4 Framework, BEIS Allocation Round 4 Draft Budget

Technology	Capacity awarded (GW)	Strike price (£/MWh, 2011/12 prices)[44vii]	Load factor (%)[45]
Offshore Wind	7 GW*	53 £/MWh	63.1%
Onshore Wind	2.5 GW (50% of Pot 1)	46 £/MWh	42.4%
Solar PV	2.5 GW (50% of Pot 1)	47 £/MWh	11.5%

Once online by 2027 these new projects would generate approximately 50.5 TWh/year of electricity. If contracts are awarded at the administrative strike prices, then the expected weighted average strike price for AR4 projects is £51.41/MWh in 2011/12 prices, equivalent to £61.98/MWh in real terms. This remains significantly cheaper than projects in the early rounds of the CfD scheme, and broadly in line with those that will be delivered in AR3 - demonstrating the success of the scheme at bringing down the cost of renewables over time.

Using the same methodology as above, these CfD projects will pay back an additional £5.48 billion per year to suppliers in real terms, equivalent to an additional £50.89 per household per year if all savings are passed on to customers.

Therefore, by 2027, all intermittent CfD-supported projects will collectively be paying back £10.49 billion per year to suppliers. If these savings are passed back to customers in their entirety, the average household stands to benefit by £97.53 per year, based on the current average Weighted IMRP. Potential outcomes under different average Weighted IMRP scenarios in 2027 are shown in Table 6 below.

[vii] We assume that projects will secure contracts at the administrative strike price (the price cap per technology). In previous rounds, projects have all secured contracts at prices lower than the ASP, so this is arguably a conservative assumption.

Table 6: Amounts paid back by CfDs to suppliers in 2027 under different electricity price scenarios (£ million)
Source: Onward analysis

Allocation round	£300/MWh	£250/MWh	£170/MWh	£100/MWh	£75/MWh
IC, AR1	2,081	1,355	199	-824	-1,187
AR2	3,233	2,512	1,275	348	-13
AR3	7,383	5,914	3,544	1,507	773
AR4	12,019	9,494	5,475	1,920	657
Total	24,717	19,275	10,493	2,951	231

A common criticism of renewables such as solar and wind is that their intermittency incurs significant additional costs on energy networks. These costs occur from 'balancing' the system - which may involve paying renewables not to produce in times of excess generation, or paying gas-fired power stations to fire up for a time to meet peak demand. Recent months have seen a sharp rise in these balancing costs, and the Government will need to plan to bring forward more flexible generation capacity (such as biomass and hydro) in order to minimise these costs in future.[46] [47]

The CCC estimate that balancing costs as more renewables are integrated into the energy system will only add a maximum of £25/MWh on top of wholesale prices - and this figure is likely to be lower.[48] This cost is small compared to the savings that will be generated by CfD-supported renewables if electricity prices remain high. It is therefore clear that investment in CfDs to date is paying off: by not only helping to mitigate the current spike in electricity bills, but also by insuring consumers against further spikes in prices.

CfD Reform

At present, CfDs pay back money to electricity suppliers, rather than directly to customers - since the CfD levy paid by customers cannot be set to below zero. These savings should then be reflected in future price cap decisions, which then passes the benefit onto customers. However, in recent months the money paid back to suppliers has been offset by 'additional costs', according to Energy UK.[49]

In order to ensure that customers benefit to the full extent from CfDs paying back, the Government should explore opportunities to reform the scheme to ensure that savings are paid back to customers, rather than suppliers. This could be achieved either by allowing the CfD levy on bills to be set at a negative rate, or through a direct rebate to customers.

Conclusion

This represents a critical time for energy policy and the wider net zero agenda in the UK. Skyrocketing energy bills and the wider cost of living crisis threaten to become dividing lines in British politics. But those arguing that we should move away from renewables are mistaken.

Not only do renewables provide electricity incredibly cheaply - at prices far below what was previously hoped for which are guaranteed for years to come - but they also pay back to consumers through CfDs. By 2027, this will be to the tune of £97.53 per household, and the programme will also help to insure consumers from any further increases to electricity prices.

The Government should continue to explore all avenues to reduce the impact of energy price rises on British households. But the evidence on renewables is clear - scrapping green levies will not help the environment, families, or British industry.

Annex: Methodology

Electricity generation estimates

The BMRS data provides a historical record of energy generation by fuel type, in MW, in half-hourly intervals. It should be noted that MW is a measure of power, not energy: power is the rate of flow of energy. Therefore, the BMRS data indicates the power at which each fuel type was generating electricity every half an hour.

Energy is equal to power multiplied by time, and is often expressed in denominations of Watt-hours (Wh). 1Wh is equal to 1 W of power flowing for 1 hour. The BMRS data was therefore used to estimate the actual amount of energy generated by these fuel types over the entirety of 2021. This makes the assumption that each fuel type generates power at the figure quoted every half hour, for the entire half an hour period. In reality, variation will occur within these half hour periods, however this methodology still represents a very good approximation, especially averaged over many time periods across 2021.

The BMRS data provides half-hourly data on generation in Gigawatts. Using the formula for energy above (Energy = Power x Time), a power station generating at 1 GW for half an hour would produce 1 x 0.5 = 0.5 GWh of electricity. Therefore, to calculate the energy produced in each half an hour period, the data is simply multiplied by 0.5. This can then be summed up into daily, weekly and monthly periods as required.

Estimates for household savings

CfD costs are paid to suppliers by both domestic and business customers. As a result, any savings from CfDs passed onto customers will be split proportionately between households and businesses, depending on their electricity consumption.

Estimates of expected generation from each round of CfD projects were calculated using figures for capacity and load factors given in allocation round framework and draft budget documents. Actual strike prices (adjusted for inflation to 2022 prices) were used for projects under investment contracts, AR1, AR2 and AR3. Administrative strike prices were used for projects under AR4. These prices were used to calculate an estimated saving per unit of generation (£/MWh) in future from CfDs.

To estimate the potential future savings from CfDs made by an average household, an average yearly energy consumption of 2,900 kWh was assumed. The expected electricity generation from each round of CfD projects was then calculated as a proportion of total UK electricity generation. This used the 2020 figure for total UK electricity generation from UK Energy in Brief 2021, and made the assumption that this level of electricity generation remained constant in future.

Savings for an average household were then calculated as follows:
Savings = CfD supported share of electricity generation (%) x Saving per MWh (£/MWh) x Average electricity consumption (2.9 MWh).

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