Going, Going, Gone

The role of auctions and competition in renewable electricity support

Simon Moore
Edited by Guy Newey

Policy Exchange

About the Authors

Simon Moore joined Policy Exchange in August 2010 as a Research Fellow for the Environment & Energy Unit.

Before joining Policy Exchange, Simon worked for London-based think tank The Stockholm Network.

He has a Master's degree in Public Policy from the University of Maryland and a Bachelor's degree in Politics from Lancaster University, where he was awarded the Oakeshott Prize for best overall performance in political theory and comparative politics.

Guy Newey is Head of Environment and Energy at Policy Exchange.

Before joining Policy Exchange, Guy worked as a journalist, including three years as a foreign correspondent in Hong Kong. He has an MSc in Environmental Technology from Imperial College, London. Guy's research interests include energy efficiency, renewable energy policy, biodiversity and changing energy behaviour.

Acknowledgements

The author would like to thank Dong for its support of this research. The author would also like to thank all those who provided advice and information to support this report. Any errors in the report are the author's alone.

Published by

Policy Exchange, Clutha House, 10 Storey's Gate, London SW1P 3AY

www.policyexchange.org.uk

ISBN: 978-1-907689-65-9

Printed by Heron, Dawson and Sawyer

Designed by Soapbox, www.soapbox.co.uk

Contents

	Policy Exchange's Environment & Energy Unit	4
	Executive Summary	5
1	Context	13
2	Auctions	18
3	Immature Technologies	35
4	Loan Guarantees	42
5	Conclusion and Summary of Recommendations	45

Policy Exchange's Environment & Energy Unit

Policy Exchange's Environment & Energy Unit conducts innovative and independent policy research into a wide range of environmental, infrastructure and regulatory challenges. Our objective is to influence policy making and to shape debate. We produce publications, organise events and use the media to promote our findings and policy proposals.

A key focus of our work is to identify ways to tackle environmental challenges effectively, while minimising adverse impact on living standards. We promote well-designed regulation to exploit the power of markets to achieve environmental outcomes innovatively and cost-effectively.

If you would like to find out more about our work, please contact:

Guy Newey
Head of the Environment and Energy Unit
Policy Exchange
Clutha House
10 Storey's Gate
London SW1P 3AY

Email: info@policyexchange.org.uk
Telephone: 0207 340 2650
Fax: 020 7222 5859
www.policyexchange.org.uk

Executive Summary

Reducing the carbon emissions of the UK power sector is a huge challenge. Low-carbon electricity generating technologies are, at present, more expensive than conventional gas and coal-fired power stations. Reducing the cost of low carbon power generation, including renewables, is a policy imperative both for environmental and economic reasons. An expensive transition to low-carbon electricity sources will be painful for billpayers already facing straitened financial circumstances due to the struggles of the wider economy. Rising energy bills are unpopular and can impose costs borne disproportionately by the worst off in society. Average electricity bills are currently £563, out of a total dual fuel bill of £1255. By 2020, with current policy expectations, the electricity bill is expected to be £598 (out of a £1331 dual fuel bill).[1] The Renewables Obligation and Electricity Market Reform policies are expected to contribute £37 of that amount today, and £110 in 2020.[2] A policy that imposes higher-than-necessary costs risks failing if public support is lost. Investors who believe the policy will not be sustained will be reluctant to put up money. If policy to address emissions is not seen as cost-effective, the degree of ambition also risks being curtailed.

In the UK, renewable electricity generation requires subsidy to compete with other forms of generation. Reforms to the electricity market will embed a system that requires government to make many key decisions in the market. This report will look at how to re-introduce competitive mechanisms back into the UK power market as soon as possible. In particular, the report will consider how cost-control and competitive processes have been applied to renewable energy support programmes in other countries.[3] It will highlight lessons from those countries' experiences and the UK's previous attempts at auctioning low carbon power generation. In addition to a review of the literature and data, the research draws on interviews and discussions with utilities, renewable energy firms, financiers and civil servants. Those interviews were held under condition of anonymity so the participants could speak candidly. The report will make recommendations as to how those approaches and principles can be applied to the UK.

Background

Electricity Market Reform (EMR) is the Coalition Government's flagship energy policy. Described by the Department for Energy and Climate Change (DECC) as the "biggest change to the electricity market since privatisation", it is the way the government aims to address the three objectives of getting an electricity supply that is affordable, secure and has low greenhouse gas emissions. Policy Exchange, along with others, has previously been critical of the proposed reform,[4] which will see more and more decisions being made by central government rather than

1 DECC; Estimated impacts of energy and climate change policies on energy prices and bills

2 In the Government's calculations, these cost rises are offset by improved energy efficiency.

3 As the barriers facing nuclear energy are very different from those facing renewable energy technologies, this report focuses on renewables rather than all potential zero-carbon generation options.

4 Simon Moore; *Gas Works?* Policy Exchange; 2012; www.policyexchange.org.uk/publications/category/item/gas-works-shale-gas-and-its-policy-implications?category_id=24

in the market. However, the mechanisms it introduces are likely to dominate investment decisions in the next few years. This report tries to establish how competitive processes can be reintroduced as soon as possible within this, albeit unsatisfactory, framework.

DECC has laid out a four-phase vision of EMR, moving from the first phase where guaranteed prices are set administratively for low carbon technologies, through technology-specific and technology-neutral auctions to a final "fully competitive and open" phase. However, the transition to competition is, at present, ill-defined and unnecessarily slow, held up in large part by the misguided target for renewable energy deployment that raises costs while doing nothing for the environment. This report aims to fill some of the gaps in the argument, and make the case for a more rapid transition away from the first, administrative price setting period, towards a more competitive system.

Auctions

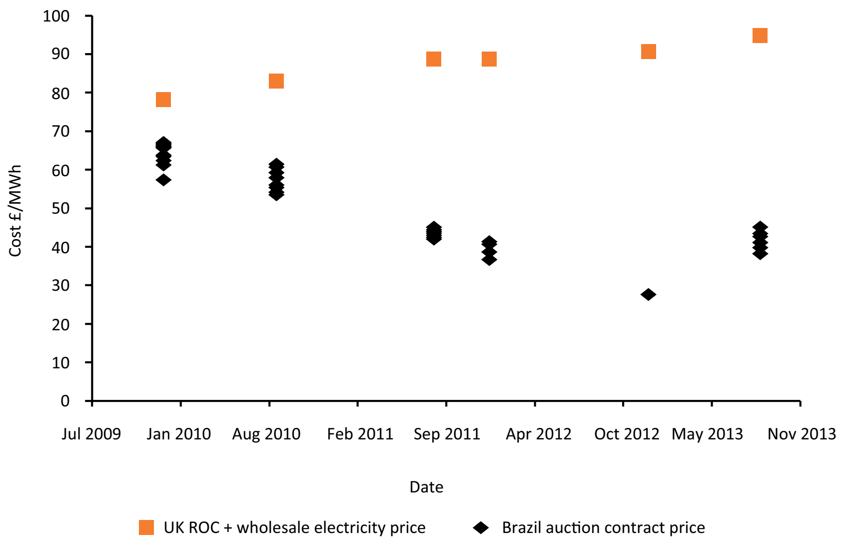
There has been an upsurge in interest for auctions for renewable energy projects, in the UK and around the world. While in Europe they have fallen out of favour in recent years (in part due to the excessive pressures of the EU renewable energy target, and in part due to some flaws in the early policy designs that were trialled) on other continents, most notably South America, use of them is expanding. European countries, including the UK through EMR and Germany in its new coalition agreement, are revisiting them as a policy option.The historical examples are instructive. The UK Non Fossil Fuel Obligation (NFFO), which ran in the 1990s, showed the perils of having too loose a mechanism for ensuring that winning bids are translated into actual development. Too many projects that won in NFFO auctions never generated any electricity because companies simply bid too low and there was no penalty for not completing the contract. That example demonstrates the importance of a thorough regime of deposits and incentives to encourage responsible, credible bids. Brazil has seen renewable energy auctions flourish in recent years, with (onshore) wind, small scale hydropower and biomass generation all being supported in part through auctions. This has shown that a credible auction-based system can be operated, and can lead to rapidly reducing cost (Figure ES1). Conversely, in the UK the combination of more ambitious renewable programme, which has pushed up the marginal price of Renewable Obligation Certificates, and a higher wholesale price, has meant that the overall cost to consumers of renewable power generation has gone up. Costs for wind power have halved in Brazil since auctions were introduced. An equivalent outcome in the UK would see (onshore) wind become competitive with conventional power sources in fewer than five years. That would allow for more decarbonisation under the available budget.

One should be cautious about the impressive cost reductions seen in Brazilian wind power. Although auctions played their role, unusually high wind speeds, a surplus of discount wind turbines, and hidden incentives in grid charging structures have also played a part in achieving such low prices. Nonetheless, the trend in Brazil is encouraging, and moving in the opposite direction from the one the UK has seen lately.

Auctioning still requires lots of centralised decisions, such as how much capacity is likely to be needed in the future, and runs some risks on project completion.

Nonetheless, it should be preferred to administrative price setting because of its ability to reveal price information. The government has recognised this and has spoken throughout the EMR process about transitioning (eventually) to auctioning. However, there is scope for the government to move faster on introducing auctioning, if it is prepared to abandon some of the current constraints.

Figure ES1.1: Prices for wind power in Brazil, UK



The government should accelerate the planned timetable for introducing auctions into EMR. Our analysis of the different markets finds that technologies including onshore wind, biomass, and energy from waste (possibly also solar PV, although the maturity of the large-scale solar market is not clear) could feasibly compete in auctions for renewable power now, or at least very soon. They have large numbers of players, some spare capacity, and are closer to being able to compete with carbon-priced fossil fuel generation. While the outgoing policy to subsidise renewable energy, the lame-duck Renewables Obligation, remains open to new entrants, there is little incentive for developers to compete in CfD auctions. However, those auctions should begin for projects coming online after the RO expires. Rather than going through an intermediate stage of technology-specific auctions, for these most mature technologies at least, inter-technology competition should begin sooner – potentially in 2014 or 2015 for projects with a commissioning date after 1st April 2017.

The importance of reducing the cost of renewable subsidies is not simply a UK problem. Germany, one of the leading supporters of renewable technology over the past 10 years, has said as part of the proposed Coalition agreement that it will pilot competitive tendering for solar projects in 2016, in the hope of introducing wider auctions in 2018.

Our analysis finds that open descending clock auctions are preferable to sealed bids. The government's concern about collusion when bids are visible is counteracted both by the value in revealing common information to other bidders, and decisively, in the ability for the auctions to be effectively scrutinised by outside organisations.

Immature Technologies

Some forms of renewable generation are not yet ready to compete in a technology-neutral auction. This is because they are too immature, both in terms of the technology's cost and the competitiveness of the market. The government argues that the need to retain a portfolio of options for long-term decarbonisation means it should not be too eager to cut off uncompetitive technologies' support in the near term. Nevertheless, at some point, if the policy is to accomplish the Government's stated aim for cost-effectiveness, it will need to overcome this squeamishness about ending support to technologies that cannot bring their costs down. Policy Exchange has previously argued for criteria by which government should decide which technologies to support – technologies which have long-term *global* potential to contribute to greenhouse gas mitigation, and where government support can play a role in maximising global cost reductions.[5]

Technologies which are not ready to compete with others might be auctioned in isolated technology-specific auctions, with a fixed budget. Those technologies should be subject, within that process, to a reserve price in the auction with a descending cost structure to ensure it is available at competitive terms by a designated time. If the technology proves unable to reach those benchmarks no contracts would be allocated from that auction. The industry-agreed aim to get offshore wind costs down to £100/MWh for projects beginning in 2020 would be an obvious starting point – one that should be changed from an aspirational target to a hard cap on 2020 prices in the EMR delivery plan strike price structure. Some offshore developers have argued publicly that subsidies should be phased out quickly. Government should be prepared to toughen up the CfD plans to hold them to that. Developers who were unable to reduce their costs would be squeezed out by more efficient companies, and the billpayer would not be on the hook for covering expensive broken promises into the next decade.

At the moment, the UK Government does not appear willing to go down this route. It has portrayed its technology support policies as ones that lead to the widest possible range of options for the even-more ambitious electricity sector decarbonisation intended for the 2020s and beyond. This position is incompatible with one that cuts off support to expensive technologies – either you insist the widest possible range, or you accept that choice is being reduced. The Government's arguments try to have it both ways. In the end, its actions will be what matters. So far, it has not shown the will to cut off support to uncompetitive technologies. Only if it develops a more ruthless approach can overall costs to consumers come down. Conditionality is crucial here. Offshore wind may be an important part of our future energy mix but, critically, only at a reasonable price. The industry cannot be afraid of reducing subsidies, but must see them as the only way it can survive and thrive in the medium term.

Barriers to greater competition

Greater competition and better cost-control would be a valuable improvement to current EMR plans. Earlier, inter-technology auctions would be a way to achieve

5 Boaz Moselle; *Climate Change Policy – Time for Plan B*; Policy Exchange; 2011

this. However, three factors are preventing their earlier use, meaning billpayers will end up having to pay over the odds for several years.

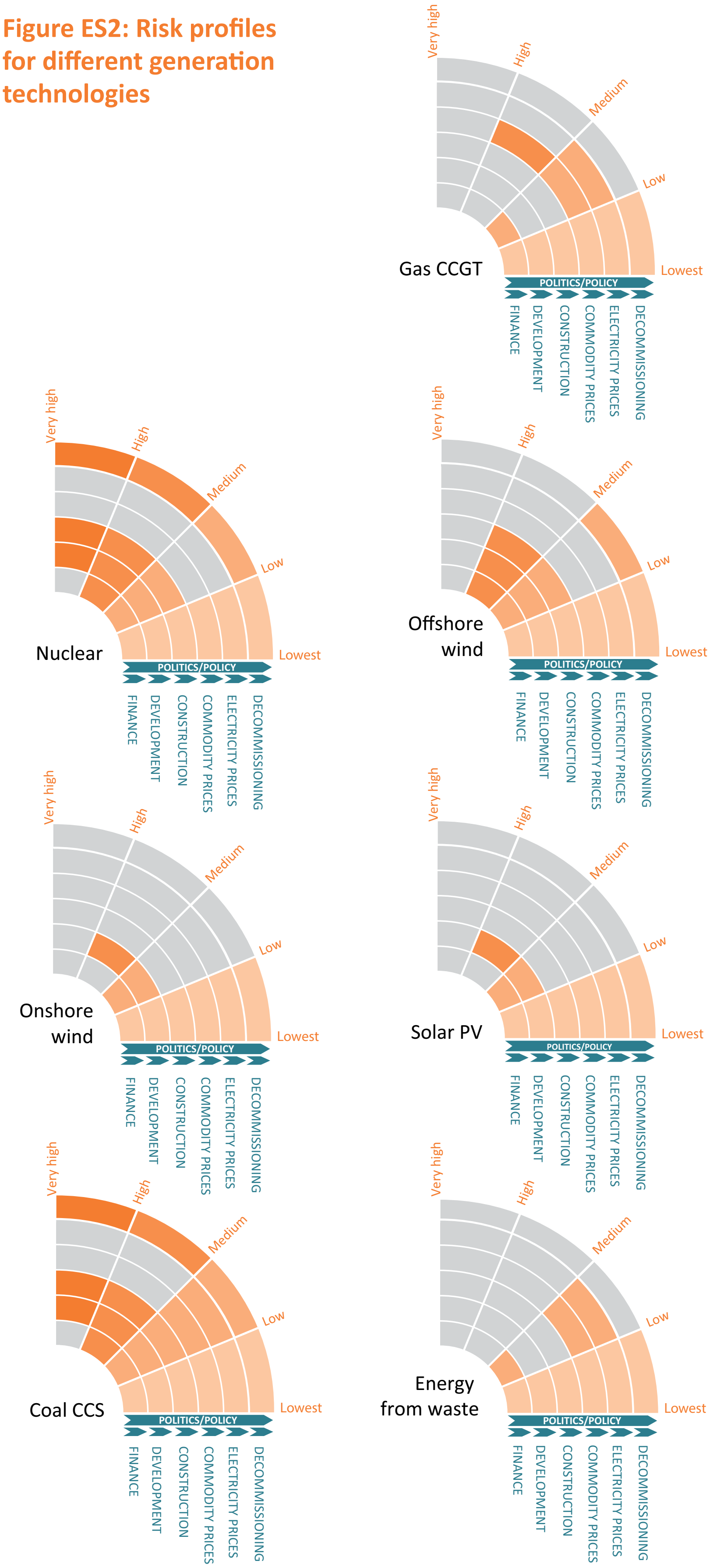
- **Renewable Energy Target:** The European Renewable Energy Directive requires that 15% of final energy demand for the UK – roughly 30-35% of electricity – is from renewable sources by 2020. Because emissions from the electricity sector are already capped by the European Emissions Trading System, the target saves no additional carbon – however, it does ensure that emissions reductions are achieved using more expensive technologies, wasting resources that could otherwise be more usefully deployed. While the renewable energy target exists, introducing effective means of competition, or of cost-control more broadly, is seen as impossible. The legally-binding target makes no allowance for the potential high expense of meeting it – at least, not formally. Whether in practice the UK would be penalised by the European Commission for introducing a more cost-conscious renewables support mechanism is hard to predict. However, understandably, the Government is not inclined to disobey a legal commitment. As a result, it has shied away from earlier auctioning, because bidders would be aware of the government's pledge, and know it may have to pay whatever it takes to get renewable generation built.
- **Renewables Obligation commitments:** The initial suite of strike prices was constrained by the condition that, for developers, there should be no difference between the returns offered under EMR compared with those already pledged under the RO (because if the RO was more favourable, developers wouldn't utilise the EMR arrangements). With strike prices being announced shortly after an RO banding review, there was also seen to be no evidence to justify altering returns. This meant that EMR prices are unable to offer much, if any reductions in cost compared to the previous policy in the first few years of its operation. This is despite Government arguments that the CfD mechanism would reduce overall costs, by limiting investor risks and therefore reducing the cost of capital – a claim disputed by many in the City.
- **Option value:** Part of the Government's approach to cost-effective decarbonisation of the entire economy has been to ensure that it keeps open as many realistic options for low-carbon technologies. Because of this preference, it is unwilling, at least at this stage, to choose a policy that would disfavour as-yet uncompetitive technologies like offshore wind, for which it has high hopes in future years if costs come down as it hopes. Of course, there could be other methods for supporting these technologies, such as through R&D support, or through loan guarantees without aiming immediately for mass deployment. But for now, while that remains a goal of the policy, it is difficult to make the competitive environment too hostile.

Without removing any of these constraints, the potential for EMR to achieve its aim of cost reduction in low carbon energy is limited. Therefore, government should consider which constraints can be loosened as a priority.

Loan Guarantees

In 2012 the Government introduced a new programme to provide loan guarantees for infrastructure projects. While it does not formally constitute part of the EMR

Figure ES2: Risk profiles for different generation technologies



programme, it will be coming into effect at the same time, and will target some of the same projects.

Loan guarantees aim to reduce the cost of capital for private sector borrowers financing investment projects. With government taking responsibility for repayment of the loan should the original borrower default, the cost of borrowing for the project should decrease to reflect the government's likelihood of default rather than the original borrowers. Since government borrowing costs are usually well below those in the private sector, this should lead to an overall reduction in the cost of financing the project, albeit with the taxpayer having to step in should things go awry.

Deciding who bears responsibility for the different elements of risk has become one of the most critical elements of policy formation in privatised energy systems. The list of risk types is extensive – a few of the more significant ones are illustrated in Fig. ES2.

The government should publish an assessment of the interaction between the UK Guarantees Scheme and the CfD regime, including whether loan guarantees should lead to a discounted strike price, and whether in some circumstances they are a more cost-effective way of lowering the finance costs of capital intensive energy investments.

Summary of Recommendations

Auctions

- **The government should accelerate the planned timetable for introducing auctions into EMR.** Technologies including onshore wind, biomass, and energy from waste (possibly also solar PV, although the maturity of the large-scale solar market is not clear) could feasibly compete in auctions for renewable power now. While the lame-duck Renewables Obligation remains open to new entrants, there is little incentive for developers to compete in CfD auctions. However, those auctions should begin for projects coming online after the RO expires. **Rather than going through an intermediate stage of technology-specific auctions, for these more mature technologies at least, inter-technology competition should begin sooner – potentially in 2014 or 2015 for projects with a commissioning date after 1st April 2017.**
- **Open descending clock auctions are preferable to sealed bids.** The government's concern about collusion when bids are visible is counteracted both by the value in revealing common information to other bidders, and decisively, in the ability for the auctions to be effectively scrutinised by outside organisations.
- **The government should avoid domestic jobs or supply chain requirements in allocation decisions.** Domestic supply chain requirements have the potential to drive up costs unnecessarily. If components or finished equipment can be sourced more cheaply overseas, then it should be. Job creation has been an alluring but misguided part of the debate around renewable energy. The UK should avoid such provisions in the EMR legislation.

Immature Technologies

- **Technologies which are not ready to compete with others might be**

auctioned in isolated technology-specific auctions, with a fixed budget. Those technologies should be subject, within that process, to a reserve price in the auction that corresponds to a descending cost structure, so that it is on competitive terms by a designated time. If the technology proves unable to reach those benchmarks no contracts would be allocated from that auction. The industry-agreed aim to get offshore wind costs down to £100/MWh for projects beginning in 2020 would be an obvious starting point – one that should be changed from an aspirational target to a hard cap on 2020 prices in the EMR delivery plan strike price structure. Some offshore developers have argued publicly that subsidies should be phased out quickly. Government should be prepared to toughen up the CfD plans to hold them to that. Developers who were unable to reduce their costs would be squeezed out by more efficient companies, and the billpayer then would not have to pick up the costs for any failure of the renewable industry to achieve the cost reductions they promise.

Other Recommendations

- **The government should publish an assessment of the interaction between the UK Guarantees Scheme and the CfD regime**, including whether loan guarantees should lead to a discounted strike price, and whether, in some circumstances, these would be a more cost-effective way of lowering the finance costs of capital intensive energy investments.
- **The government should seek to scrap the EU Renewable Energy Target.** It is a bad piece of policy that imposes unnecessary costs on attempts to decarbonise. It is standing in the way of competition in EMR, underscoring how damaging its effects are.

1 Context

Low-Carbon Electricity Needs to Be Cheaper

A decade ago, Professor Dieter Helm observed that for nuclear and renewable energy, "competitive status with other fuels was [in 1999] just around the corner, but sufficiently around the corner to require continuous support."[6] The observation was true of the prevailing mood in the period he was writing about, in 1999, still true at the time he was writing in 2003. It still rings true in 2013. Low-carbon electricity sources remain expensive, even with measures in place to put a price on carbon. Certainly, there is variation in that cost and there has been some progress, with some technologies inching closer to cost-competitiveness – onshore wind being among the cheaper, offshore wind the more expensive. The government recently offered the first contract for new nuclear reactors at a strike price slightly below that offered to onshore wind in the next five years, but guaranteed it for more than twice as long, and supplemented it with other government guarantees, meaning that by the time Hinkley C comes online it is almost certain to be more expensive per MWh generated than onshore wind (although direct comparisons are not straightforward). The real cost of carbon capture and storage (CCS) will remain a mystery until a viable project (or more likely several) can be funded and built. But the requirement for ongoing support for low carbon generation does not appear to have markedly diminished in the decade and a half of policy aimed at addressing it.

Reducing the UK's greenhouse gas emissions is an important policy objective, and cutting emissions from the power sector is a crucial part of that. However, the expense of low-carbon technologies makes achieving that objective more challenging. An expensive transition to low-carbon electricity sources will be painful for billpayers already facing straitened financial circumstances due to the struggles of the wider economy. Rising energy bills are unpopular and impose costs borne disproportionately by the worst off in society.[7] A policy that imposes higher-than-necessary costs risks failing if public support is lost. It is also a problem if the cost of the UK's transition is viewed by other countries as punitively expensive, as it could deter them from making their contributions to what will need to be a global effort to limit greenhouse gas concentrations. Other countries are also recognising this problem – as Germany's new coalition government takes shape negotiations have been devoted to finding ways to lower costs and increase competition in its renewable energy support programmes. The new German coalition agreement has announced a number of reforms to renewable energy policy. The German government will pilot competitive

6 Dieter Helm; *Energy, the State and the Market*; Oxford University Press; 2003; p. 362

7 Neil O'Brien and Anthony Wells; *Northern Lights (Appendix 1); Policy Exchange; 2012;* http://www.policyexchange.org.uk/images/pdfs/northern%20lights%20appendix%201.pdf; p. 63

tendering for solar projects in 2016, with a view to adopting the competitive tendering model for other technologies in 2018.[8]

A key measure of the success of policy is whether low-carbon technologies are becoming cheaper. This is important for UK decarbonisation efforts, but, more importantly, also critical in getting other countries to adopt low-carbon options in preference to more polluting alternatives. (Being able to compete against fossil fuel technologies with a carbon price imposed on them is the first marker of success, although the true measure of success in this area would be bringing down costs of low-carbon energy so far that they can compete with carbon-emitting energy forms even without a carbon price.) That degree of affordability may be necessary to bring about change in those countries most apathetic about tackling climate change, and also to address the other, serious issue of improving energy availability around the world.

In summary, clean energy is currently expensive – making it cheaper will be beneficial for environmental and economic reasons.

Methodology

This report will look at how to introduce competitive mechanisms into the UK electricity market as soon as possible. In particular, the report will consider how cost-control and competitive processes have been applied to renewable energy support programmes in other countries. It will highlight lessons from those countries' experiences, and make recommendations as to how those approaches and principles can be applied to the UK. It will look at experiences of reverse auctions, including a look back at the UK Non Fossil Fuel Obligation, and a study of what is presently occurring in Brazil. It will assess the possibility of exchanging longer time commitments for constantly reducing prices through systems of price degression. It will look at the role of construction guarantees, whereby Governments absorb risk during the most problematic construction phase of capital intensive projects, rather than for their entire lifespans.

In addition to a review of the literature and data, the research draws on interviews and discussions with utilities, renewable energy firms, financiers and civil servants. Those interviews were held under condition of anonymity so the participants could speak candidly.

Electricity Market Reform

Electricity Market Reform (EMR) is the Coalition Government's flagship energy policy. Described as the "biggest change to the electricity market since privatisation", it is the way the government aims to address the three objectives of getting an electricity supply that is affordable, secure and has low greenhouse gas emissions.[9] EMR has several different components, each targeted at addressing a different part of the market, or policy problem. Contracts for Difference (CfDs) are designed to encourage investment in low-carbon generation, the Capacity Mechanism to encourage investment in dispatchable capacity, the Emissions Performance Standard to block new coal power stations, and the Carbon Price Floor to bolster the weak EU ETS carbon price signal. The most significant instrument, particularly for renewable technologies, are the CfDs.

CfDs guarantee the price that generators receive (the strike price) per megawatt hour of electricity generated. When the reference (market) price of electricity

8 Henning Gloystein and Christoph Steitz; "Germany sets out plan to rein in surging energy costs" on Reuters News Service; 27th November 2013; http://www.reuters.com/article/2013/11/27/us-germany-coalition-energy-idUSBRE9AQ0WJ20131127. Government of Germany; *Deutschlands Zukunft gestalten – Koalitionsvertrag zwischen CDU, CSU und CPD (available in German only); p. 54;* https://s3.amazonaws.com/s3.documentcloud.org/documents/842704/koalitionsvertrag.pdf

9 DECC; *Electricity Market Reform;* https://www.gov.uk/government/publications/electricity-market-reform-delivering-uk-investment

is below the strike price, the CfD Counterparty (a government-owned limited company) tops it up; when the reference price goes above the strike price, generators have to pay back. Different technologies will be awarded contracts at different strike prices, which also change depending on which year the project is contracted in.

Setting strike prices is among the most important of the many decisions that must be taken to operate the CfD programme. It also ranks among the most difficult to get 'right' – set prices too high, and consumers end up paying more than they would otherwise have had to; set them too low, and the investment the government desires will not materialise. With no mechanism by which prices can adjust to reflect market conditions, the government's decision-making dominates, yet it cannot possibly hope to compile and comprehend the vast quantities of information required to set prices *optimally*. It can merely take a best estimate and hope.

The first round of strike prices was finalised in December 2013 (see Table 1.1).

Table 1.1 CfD Strike Prices[10]

	Strike prices for projects commissioning in year in column (2012 £/MWh)					
Renewable Technology	**2014/15[11]**	**2015/16**	**2016/17**	**2017/18**	**2018/19**	**Range of potential deployment by 2020 (GW)**
Advanced Conversion Technologies (standard and advanced gasification and pyrolysis)	155	155	150	140	140	≈0.3
Anaerobic Digestion	150	150	150	140	140	≈0.2
Biomass conversion	105	105	105	105	105	1.2-4
Dedicated biomass with CHP	125	125	125	125	125	≈0.3
Energy from waste with CHP	80	80	80	80	80	≈0.5
Geothermal	145	145	145	140	140	<0.1
Hydro	100	100	100	100	100	≈1.7
Landfill gas	55	55	55	55	55	≈0.9
Offshore wind	155	155	150	140	140	8-16
Onshore wind	95	95	95	90	90	9-12
Sewage gas	75	75	75	75	75	≈0.2
Large solar photovoltaic	120	120	115	110	110	2.4-3.2
Tidal stream	305	305	305	305	305	≈0.1
Wave	305	305	305	305	305	

The government's belief is that the security provided by clear prices and removal of wholesale price exposure (mainly attributable to gas price fluctuations) will lead to renewable developers facing reduced risk, and thus be able to access capital at lower rates than was the case under the RO. In theory, the savings from this should then accrue to consumers. However, it is far from clear at this stage whether the lower capital costs the government has posited throughout EMR development will materialise in practice,[12] nor whether they will counteract potential inefficiencies stemming from the removal of market price signals and competitive pressures in identifying which, and how many, renewable energy

10 These prices are in all cases maximum strike prices. In the case that constrained allocation applies earlier, the actual strike price will be the outcome of the constrained allocation process if that is a lower value. DECC; Investing in renewable technologies – CfD contract terms and strike prices; www.gov.uk/government/uploads/system/uploads/attachment_data/file/263182/Final_Document_-_Investing_in_renewable_technologies_-_CfD_contract_terms_and_strike_prices.pdf

projects to subsidise. Some investors in renewable energy projects told us that price risk could already be managed through power purchase agreements, and that EMR created massive additional political risk (potentially made worse by recent interventions from politicians). In their judgement, the effects of EMR would at best be neutral on cost of capital, with a significant chance that the political uncertainty would end up raising finance costs.

A Sense of Purpose

One of the contributing factors behind EMR's extraordinary complexity is its hazy sense of purpose. David Kennedy, chief executive at the Committee on Climate Change complained during parliamentary scrutiny that "there is not a clear objective for the EMR"[13] Is it a decarbonisation programme? An energy security programme? A cost control programme? A market restructuring programme? An innovation and technology development programme? A jobs programme? A programme to get rid of coal, and reduce use of gas? A programme to get nuclear power stations built? In reality it is all of these things and more. But by trying to tackle so many problems simultaneously, it runs many risks. What will 'success' look like for EMR? The Government is reluctant to set performance benchmarks. With such sweeping changes, it has little option but to wait and see what happens once the bill is in place. Investors that were contacted during the research of this report said they were reluctant to commit at this stage, and that they would be waiting to see whether EMR works. If investors prove not to be tempted by the new arrangements, will further reform be required? On the other hand, if new CfDs prove very popular with developers, the budget limits will be put under severe stress, which could also lead to pressure for further change.

Introducing Competition

The transition to competition in EMR has also not been fully fleshed-out. The Department for Energy and Climate Change (DECC) has laid out a four-phase vision of EMR, moving from the first phase where strike prices are set administratively, through technology-specific and technology-neutral auctions to a final "fully competitive and open" phase, although there is no firm timetable for this to occur. With DECC's attention fully consumed with the process of implementing the ambitious and exceptionally complex first phase of EMR, far less consideration appears to have been given to how the transition to auctions and from technology-specific to technology-neutral auctions will occur, let alone how it intends to get back from that to an open market.[14]

The 'first phase' of EMR could in fact incorporate as many as three different ways of allocating contracts to projects. It begins with a first come, first served application process, which continues until a specified proportion of the budget is used up. At that point, if the Delivery Body determines that there is insufficient room under the Levy Control Framework, then twice-annual 'Allocation Rounds' will be used to ration which projects receive support. If during the course of an Allocation Round the Delivery Body determines that there is more capacity bidding for CfDs than there is remaining money to pay for it all, it moves again to a 'constrained allocation process', effectively a sealed-bid auction in which the least expensive projects are given preference. The listed strike prices would

11 For comparison only as no CfDs expected before April 2015

12 In its pre-legislative scrutiny of the Draft Energy Bill the House of Commons Energy and Climate Change Committee heard from investors that the EMR proposals at the time were uninvestable. They cited quotes that:

"I have not spoken to a single other investor who thought that the publication of the draft Bill was a positive step"

"The policy is on its way to a train wreck"

"There is an assumption that £100bn will be invested in the UK. Where will this come from? ... This question of where the money will come from has not come close to being addressed"

Conversations with investors carried out by Policy Exchange in the course of this research confirmed that these concerns have not dissipated in the following year and a half. The difficulties inherent to EMR have been compounded by the political uncertainty around the sector exemplified by the Labour Party proposals for a price freeze should it win the next election. The combination of policy and political uncertainty makes for a very unattractive investment climate around the UK energy sector at present.

13 David Kennedy; *Draft Energy Bill Pre-Legislative Scrutiny; Energy and Climate Change Committee; House of Commons; 2012;*

14 "When market conditions allow" is the commitment the Government has made, happening in the late 2020s at the earliest, and measured against the following criteria:

"The following conditions will need to be in place for Government to stop issuing CfDs, and for the wholesale market (and Capacity Market if required) to support ongoing investment to ensure decarbonisation and security of supply goals are met at least cost:

• a sustainably high carbon price (either through the EU-ETS or carbon price floor);
• falling technology costs (i.e. through technological learning and economies of scale); and
• innovation in financial risk management products (e.g. to help manage long-term price risk)."I.e. products which fill the

become effectively a maximum for that technology, rather than the rate received by all projects.[15 16]

After 2017, EMR is supposed to begin to move through phases that incrementally increase the amount of competition involved. Irrespective of what happens during the first phase allocation rounds, some technology specific auctions are due in the second phase (2018–2023), with dedicated biomass and onshore wind identified as the most mature technologies likely to be auctioned.[17] Developers within those technology groups will, if all goes according to plan, bid against each other for the amount of support they require. Less mature technologies will continue to be given administratively-set strike prices. In the third phase (roughly, 2024 and beyond) the government goes no further than saying "it is possible" that auctioning could be expanded including some competition between technologies (and it is as yet unclear which might be asked to compete with each other, or how this will be conducted).[18] Given the vagueness around even this third stage of inter-technology competition, the fourth phase when a return to open market processes is anticipated is barely described.

This vagueness perhaps reflects a desire to wait and see how the reforms contained in the EMR package take hold. Nonetheless, it makes it difficult for companies to make long-term investment plans, and for analysts to assess properly the value for money of the EMR package.

This report attempts to fill some of those gaps. It proposes a clearer trajectory towards competition on an accelerated timescale from that which DECC is currently proposing. It argues that the government has constrained itself with unnecessary secondary priorities, that reduce the cost effectiveness of spending on renewable energy, and thus in the energy sector more broadly. For less mature technologies, most prominently offshore wind, it argues that clear affordability benchmarks must be passed if they are to retain public support, and that they should set a firm timetable to be competing openly with other alternatives.

in short, we would not have chosen to start from here. Electricity Market Reform (EMR) is a complex and bureaucratic mess, an unnecessary and hugely risky substitution of Whitehall planning for market processes in identifying and supporting the technologies that will supply electricity in the coming decades. Nevertheless, as it is now in place, the priority now is to work out how to bring back the elements of cost-control and competition back into the sector, and to phase out administrative price setting as soon as is practicable. This improvements set out in this report would help make that happen.

role of reducing wholesale price risk which CfDs will handle by fixing a strike price (e.g. improved forward liquidity or longer-dated swaps).

DECC, *Energy Bill Contracts for Difference Impact Assessment*, 2013, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/197904/cfd_ia_may_update.pdf, p. 19

15 DECC; *EMR: Contract for Difference: Contract and Allocation Overview*; 2013, paras 3.14 to 3.16 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/233004/EMR__Contract_for_Difference__Contract_and_Allocation_Overview_Final_28_August.pdf.

16 Because the transition between allocation methods is dependent on the uptake of CfDs, the timing is not known at this stage. An early flurry of bids in the comparatively generous first come first served period could see these stages moved through rapidly. On the other hand, if developers are initially hesitant to participate in the new and untested CfD process, it may be longer before constrained allocation occurs.

17 DECC; *Electricity Market Reform: Policy Overview*; Nov. 2012; www.gov.uk/government/uploads/system/uploads/attachment_data/file/65634/7090-electricity-market-reform-policy-overview-.pdf; p. 28

18 Ibid; p. 16

2
Auctions

Auctions for renewable energy projects are witnessing a revival. While in Europe they have fallen out of favour in recent years (in part due to the excessive pressures of the EU renewable energy target, and in part due to some flaws in the early policy designs that were trialled) on other continents, most notably South America, use of them is expanding.

Auctions allow for developers to get clear prices, potentially guaranteed for relatively long (eg 15 or 20 year) terms. However, crucially, they apply at the same time an open and transparent competitive pressure on developers to lower prices and improve the cost-effectiveness of their technologies.

Auctions have been used successfully in other areas of policy, allowing the Treasury to maximise the returns for sales of certain public goods, such as bandwidth used by communications companies. For example, in February 2013, 4G spectrum auctions raised £2.3 billion for the British government.[19] However, auctions for CfDs will operate with a very different dynamic – rather than selling a single, desirable good, they are instead about paying people as little as possible to take on the risk of building a varied set of energy generation infrastructure.

Getting auctions working in the UK is important for the long-term viability of the government's EMR programme. Without an effective measure for competitive price discovery, billpayers risk being forced to pay over the odds for electricity if the Government cannot set strike prices at the 'right' level. This chapter will investigate how greater competitive price discovery can be brought forward in the EMR timetable. It will assess the obstacles, and suggest ways of surmounting them. Better methods of price discovery should be introduced into EMR rapidly, and the timing of truly competitive auctioning set for as soon as possible and a commitment made to achieving full competition. However, auctions are far from a cure-all to the problems in EMR. While they are preferable to the early administrative price setting method, they still require much government decision making and demand trade-offs that can stifle competition or risk increasing project failure rates.

Features

In reverse auctions for renewables, potential developers bid against each other to determine who is able to provide generation capacity, or a specified quantity of delivered electricity, for the lowest price. The attraction to policymakers and billpayers should be obvious, as the cost should be that sufficient to bring the required amount of electricity or volume of capacity to market, without overpaying. The feed-in tariff (FIT) or premium (PFIT) policies common in many

19 Ofcom; "Ofcom announces winners of the 4G mobile auction"; 20 February 2013; http://media.ofcom.org.uk/2013/02/20/ofcom-announces-winners-of-the-4g-mobile-auction/

European countries allow Governments or utilities to specify the price with which renewable generators will be rewarded, and the quantity that will be delivered depends on developers' response to those prices. EMR's strike price system will initially work the same way, allocating funds to projects on a first-come first-served basis until the budget is depleted. An auction system reverses that dynamic. The government or utility instead determines the quantity (either of capacity or of electricity supplied to the grid) and developers' response, through the auction process, determines the price.

Another feature of auction systems is that only the winners get the subsidy, rather than making them available to anyone entering the system. While this provides a cost-control mechanism, by guaranteeing the amount of subsidy taken up, it can restrict opportunities for new entrants to enter the market, and over time can lead to the industry being dominated by a small number of firms, among whom collusion is more achievable (and thus cost escalation more likely).

Reverse auctions can be structured in different ways depending on the objectives of the auction.[20]

Descending clock auctions

An auction that takes place over several rounds. The auctioneer offers a price for renewable electricity, and bidders offer a volume of electricity that they are prepared to supply at that price. In each successive round, the price offered descends, until the quantity the auctioneer desires to buy matches the cumulative volume that remaining bidders are willing to sell.

Sealed bid auctions

All bids are made at once, under secret terms, stating a quantity and a price the seller is willing to offer. The auctioneer ranks them from cheapest to most expensive (although this may be altered in the event of selection criteria such as those outlined below – preference may be given to more expensive projects whose seller is on a firmer financial footing, or who offers more domestic jobs as part of the bid). Once this ranking has been made, the best projects are approved until the desired quantity of supply has been fulfilled.

Hybrids

Some systems (including Brazil's) use a combination of the two. Lucas *et al* explain that, "the use of a hybrid auction aims at taking advantage of the benefits of both auction systems: price discovery in the descending clock auction and avoidance of collusion between small numbers of participants for setting the final price in the sealed-bid auction."[21]

Auctions can either be technology-specific, technology-limited, or technology-neutral. Technology specific auctions may contract for a certain volume of, say, wind capacity (a subset of technology-specific auctions are project-specific auctions, which offer rights to develop one specified project, for instance a hydroelectric dam). Technology-limited auctions may include criteria that restrict the kind of technologies to be used. For example, an auction for renewable electricity that required the ability to produce on-demand might be open to biomass or pumped-storage hydro, but not to weather-dependent technologies like wind or solar. Finally, technology-neutral structures would specify volumes

20 Hugo Lucas, Rabia Ferroukhi and Diala Hawila; *Renewable Energy Auctions in Developing Countries*; International Renewable Energy Agency; 2013; www.irena.org/DocumentDownloads/Publications/IRENA_Renewable_energy_auctions_in_developing_countries.pdf; pp.11–12

21 Lucas, Ferroukhi and Hawila; p. 12

of capacity or delivered electricity, with fewer stipulations or restrictions as to how it is generated.

A risk, however, and the reason many countries have abandoned auction-based systems, is that developers bid a price to win the auction that is too low to sustain their project – the so-called 'winner's curse' – leading to that project's failure and a shortfall in available electricity. Consequently, the most successful auction programmes have introduced additional requirements to judge winning bids beyond price, in many cases to overcome the 'winner's curse' problem. In addition, some countries have chosen to use constraints or prerequisites in their auction structures to address other policy objectives.

Requirements used in other auction systems include:

- Deposits: for a winning bid to be approved, developers may be required to provide capital up front, to be returned on completion of the auctioned contract, as an indemnity against project failure. (In Brazil there are several required deposits – a bid bond of 1% of the estimated investment costs to ensure a bid translates into a signed contract, and a project completion bond of 5% of the investment cost, which is released as project milestones are reached. In Peru, the bid bond is US$20k/MW of capacity and a performance bond of US$100k/MW of capacity is required to ensure timely construction).

  Deposits are among the strongest tools available to deter 'winner's curse'. However, they can also deter small participants, and even larger ones if they are not completely confident of the stability of the policy environment and their ability to deliver the project on time. Deposits aim to reduce the societal risk of non-delivery leading to electricity supply shortages, transferring it solely to the developer.
- Financial capability requirements: for a winning bid to be approved, the bidder may be required to have a specified amount of cash-on-hand, or fulfil other balance sheet requirements, to determine that they are in sufficient financial health to complete the auctioned contract. This blunt assessment of the financial viability of a project forms a barrier to entry for smaller companies, which governments may or may not see as a problem.
- Experience: in some markets, winning firms are required to demonstrate experience in delivering the kind of project being auctioned (for example, Morocco had a pre-qualification rule in its tendering process for six 150MW wind farms, that the bidder must have completed a minimum of 10 wind projects and at least two of them must be over 10 MW.[22] While this is intended to prevent project failure due to inexperience in the industry (or more serious fraudulent practice), it does favour incumbent operators and remove a path to market from new entrants. A more open variant of this rule would allow bids from companies with experience anywhere in the world rather than just the host country, to enable foreign entrants to compete.
- Proven technology: winning bids can be required to use a technology that has been successfully demonstrated.
- Land secured: ensuring developers already have rights to develop the land they need prevents this becoming a reason for project failure.
- Environmental licence obtained: for the same reasons as the land requirement, environmental permits may be required in advance of bids winning approval. Both requirements impose a risk on developers that they may pay the cost of

22 Lucas, Ferroukhi and Hawila; p. 30

securing land and environmental permits and then lose at auction. Set too stringently, these requirements can deter participation in the auction and undermine the competitiveness of the process.

- Domestic jobs: some regimes, (for example, in South Africa), require a fixed number or fixed proportion of jobs related to the development to be in the country in question.[23] While this can impose significant burdens on companies who may have to establish supply chain factories in new markets, it is often politically attractive for obvious (if not necessarily economically sound) reasons.

Of these, it is only the last criterion that is problematic. Domestic supply chain requirements have the potential to drive up costs unnecessarily. If components or finished equipment can be sourced more cheaply overseas, then that should be the preferred outcome. Job creation has been an alluring but misguided part of the debate around renewable energy. The illogicality of such an approach is evident if we think about the European targets for renewable energy. It is expected that 27 Member states all expand their renewable energy supply. In doing so, dis is realistic to expect them each to develop manufacturing capabilities to supply themselves, and no one else? If so, what is the point of the European common market, the main advantage of which is usually the consolidation of such industry in places that have the greatest comparative advantage and which do it best? Such duplication could be hugely wasteful, and could undermine cost-effectiveness tremendously. Far better would be to facilitate genuine specialisation wherever it is best located, rather than insisting on arbitrary and costly domestic jobs requirements. The UK should avoid such provisions in the EMR legislation.

Evaluation of bids, then, may be solely based on price, or may use price in addition to some or all of the listed factors before winning bids are chosen.

To look at some of the challenges DECC will face as it tries to move the EMR programme to auctioning, two case studies may be helpful. The first looks at the last time the UK tried to auction subsidies for renewable energy, with mixed results. The second looks at Brazil, which is among a group of countries pioneering new approaches to auctioning renewable energy in middle-income countries.

Case Study 1: The UK and the NFFO

The Non Fossil Fuel Obligation (NFFO) was the UK's first attempt to introduce an imperative to support low-carbon energy into the liberalised electricity market. Designed largely as a way to get the newly privatised conventional generation sector to support the nuclear sector,[24] which was still in state hands, the scope of the NFFO expanded to encompass renewable technologies. Though a sizable nuclear fleet remained from the days before privatisation, renewable energy was still in its infancy – a few hydroelectric dams were the only renewable energy sources of note.[25] The NFFO changed that, bringing forward investments in a range of renewable technologies, including wind power, hydropower, waste to energy, biomass, and sewage gas.[26]

However, the NFFO was not without its problems, and in 2002, at which time renewables had reached 3% of electricity supply,[27] it was replaced with the Renewables Obligation (RO). A number of factors contributed to the demise of

23 Lucas, Ferroukhi and Hawila; p. 39

24 "Renewables received none of the revenues in 1990/91 and still only 8 per cent of the revenues by 1995/96". Dieter Helm; *Energy, the State and the Market*; Oxford University Press; 2003; p. 350

25 Digest of United Kingdom Energy Statistics; Power Stations in the United Kingdom (table 5.11); https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/251251/dukes5_11.xls

26 www.uea.ac.uk/~e680/energy/energy_links/renewables_Obligation/Nffo_review.htm

27 DECC; Electricity Growth; https://restats.decc.gov.uk/cms/electricity-growth/#percentage

the NFFO. First, renewable energy promotion had emerged as a more important policy objective, first in the 1997 Labour Party General Election manifesto,[28] and later reinforced by European targets. As a consequence, a policy that sustained renewables essentially only as a by-product of its support for nuclear was deemed insufficient. Changes to electricity market structure at the time of the introduction of the New Electricity Trading Arrangements (NETA), meant the NFFO would have needed significant restructuring to reflect the abolition of the old Pool system. The NFFO also suffered from a design problem, which meant it was, as time went on, increasingly unable to deliver on its promises – it was very successful at producing cheap contracts for energy, but increasingly struggled to have those projects realised (Table 2.1).[29]

Setting aside the arguments about governments making technology choices – those are less relevant for this study and have been covered extensively elsewhere.[30] Instead, the rest of this case study will focus on the design elements that scuppered the NFFO, and suggest lessons that might be learned.

The NFFO was established by the 1989 Electricity Act (more notable for privatising the electricity sector). The NFFO made five 'Orders' to buy non-fossil generated electricity.[31] Contracts from the first two Orders have now expired; the fifth and final round of NFFO contracts will come off the books in 2019. Each Order was a set of technology specific auctions, for a fixed quantity of declared net capacity (DNC).[32] Holding separate auctions for different technologies meant that wind projects were in competition with other wind projects, but not with waste or hydro projects. The then-regulator, OFFER, reviewed each application, supposedly to ensure technical and commercial feasibility. After sign-off by OFFER, the cheapest bids received contracts.[33] Electricity companies were obliged to buy the power produced, but at market prices, with the cost above market price of these contracts then apportioned to the various regional electricity companies, and paid via a levy applied to bills (the fossil fuel levy).[34]

The total cost of the NFFO was set by the Department for Trade and Industry (DTI) in conjunction with the Treasury, as Professor Catherine Mitchell explains:

> *"The DTI has to decide the highest price/kWh it is prepared to pay for each technology band… The total annual subsidy of each project is calculated in the following way. The MW DNC is multiplied by 8760 (representing the total annual hours generation because DNC is assumed to take account of load factors) (6) multiplied by the subsidy (the difference between market price and premium price). The DTI is then able to sum the annual cost of supporting each technology band, depending on where it sets the highest bid-price. This process is undertaken for each technology band. The DTI then has a cost of the Order. It may be that this total cost is above or below the annual amount of FFL it is allowed to spend. The DTI then juggles the final bid-prices of each technology band so the final mix of technologies, projects, capacities, and total cost of the Order are decided… the amount of capacity they were able to support in total is directly related to how much subsidy they were allowed to spend. Put the other way around, the cost of the NFFO Orders is related to the maximum allowed level of the FFL, and this is controlled by the Treasury."*[35]

The DTI was required to reduce the price paid per kWh in each successive Order. After the first Order was completed, bidders knew what the average price of the last Order was, and that they would have to be able to beat that price if they

28 Labour Party; *New Labour: Because Britain Deserves Better*; 1997; www.politicsresources.net/area/uk/man/lab97.htm

29 A fact acknowledged by consultants Redpoint when they assessed the policy options for the Energy Bill that is currently pushing the EMR programme through Parliament. Redpoint Energy, Electricity Market Roefm Analysis of Policy Options; 2010; https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/42638/1043-emr-analysis-policy-options.pdf p. 13

30 Simon Moore; *2020 Hindsight*; Policy Exchange; 2011; http://policyexchange.org.uk/publications/category/item/2020-hindsight-does-the-renewable-energy-target-help-the-uk-decarbonise?category_id=24

31 In 1990, 1991, 1994, 1997 and 1998

32 The equivalent capacity of base load plant that would produce the same average annual energy output

33 Catherine Mitchell; 'The England and Wales Non-Fossil Fuel Obligation: History and Lessons" in *Annual Review of Energy and Environment*; 2000; 25-285-312; pp 287–288

34 The model of applying policy costs to energy bills pioneered by the Fossil Fuel Levy has since seemingly become standard practice in the UK, leading to several of the problems facing the present Government.

35 Ibid; p. 288

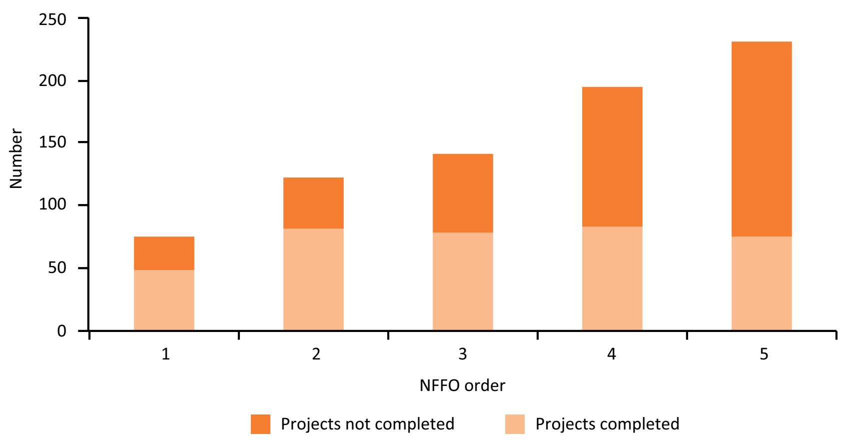
were to win. The low – and lowering – cost structure of the NFFO was one of its most attractive features. However, it also proved to be its undoing.

Bids were made at prices low enough to win the auction but too low to sustain the project, using optimistic accounting and hoping for technology costs to reduce between the time of bid and construction. The regulator, which was meant to be weeding out bids which were not financially viable, let through many projects that could not be completed at the price they had bid. The application process cost time and money – firms bid lower to make sure that money wasn't going to be wasted by the project not being chosen. Projects that passed that hurdle then had to obtain planning permission and not all of them were able to win approval. Importantly, here was no punishment for failing to commission. Project failure became widespread (Table 2.1, Figs 2.1 and 2.2).

Table 2.1: Completion Rate of NFFO renewable energy projects, by NFFO round[36]

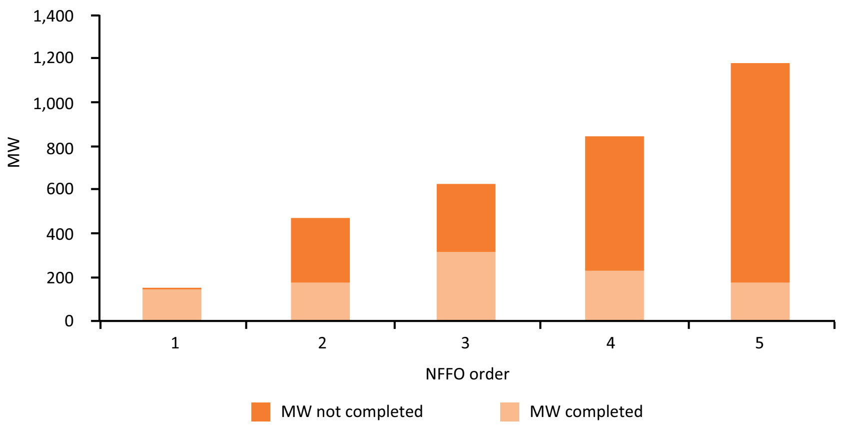
	Year	MW Contracted (DNC)	Projects contracted	MW completed (as %age)	Projects completed (as %age)
NFFO1	1990	152.12	75	144.53 (95)	61 (64)
NFFO2	1991	472.23	122	173.73 (37)	82 (67)
NFFO3	1994	626.91	141	315.60 (50)	79 (56)
NFFO4	1997	842.72	195	229.03 (27)	84 (43)
NFFO5	1998	1177	261	170.96 (15)	87 (33)

Figure 2.1: Completion rate of NFFO renewable energy projects, by NFFO Round



36 Adapted from Mitchell; p. 289 with additional data from Non-Fossil Purchasing Agency Limited; http://www.nfpa.co.uk/projects.html

Figure 2.2: Completion rate of NFFO renewable energy projects, by NFFO Round (MW)



While it may have been the changing technology priorities that brought about the end of the NFFO, its project failure rate has also become a cautionary tale about over-optimism in the use of auctions to achieve efficiencies.

Case Study 2: Brazil

In recent years, auctions have grown in popularity as a means for allocating money to renewable energy projects, particularly in developing economies. Among the most prominent of the new wave of auction adopters has been Brazil. It is a country with a rapidly growing electricity sector, and abundant resources for wind, hydro, and biomass generation. The Brazilian electricity sector was privatised in the 1990s, to cope with the need to expand provision. However, Brazil remains a middle-income country. Its average gross national income per head of $11,630 is high for the region, but low in comparison to other countries pushing ambitious renewable energy goals. World Bank figures show around 20% of the population lives below the national poverty line.[37] This has meant that, though the opportunities for renewable energy are ample, cost-control is important. Brazil is not a country that can afford the luxury of extending high-cost, low value-for-money subsidies to marginal energy sources.

Hydroelectricity has had a long history in Brazil, and accounts for more than three quarters of the country's electricity supply.[38] In the early 2000s, however, the Brazilian government decided it wanted to expand the use of other renewable energy sources. It established a feed-in-tariff programme (PROINFA) to support these technologies. Several factors contributed to the failure of PROINFA. Its high tariff rates meant that, while it succeeded in kick-starting domestic industries in wind, biomass, and small-scale hydro, it was an inefficient way of allocating the money.[39] In addition, approval under PROINFA was granted in order of the date of the environmental permit for each project. This led to corruption – the development of a black market in permits – and caused many projects to be delayed or to fail.[40]

PROINFA was replaced in the mid 2000s with an auction-based system. Beginning with technology-specific auctions for biomass and hydro in 2007, every year since then renewable energy projects have been contracted through the auction mechanism. The results have been striking.

37 US$1.25 a day, adjusted by Purchasing Power Parity. The World Bank; Brazil; http://data.worldbank.org/country/brazil

38 IEA; Electricity/Heat in Brazil in 2009; www.iea.org/stats/electricitydata.asp?COUNTRY_CODE=BR

39 Luis Barroso; Renewable Energy Auctions: the Brazilian Experience; www.irena.org/DocumentDownloads/events/2012/November/Tariff/4_Luiz_Barroso.pdf

40 Lucas, Ferroukhi and Hawila; p. 16

Prices for onshore wind have dropped substantially since auctioning was introduced (Fig. 2.4). The 2012 winning bids at the 2012 auction became the cheapest onshore wind generation of any market in the world.[41] It has also meant that, in the Brazilian market, power from those wind generation projects is selling for less than gas or hydro power. However, excitement about the low prices has been tempered by fears that they reflect, at best, unusual circumstances around the 2012 auction (and indeed, prices did tick back up in 2013 at the next auction), or worse, re-emergence of the old "winner's curse" problem, which has hindered auctioning worldwide.

Figure 2.3: Auctioned Wind Capacity in Brazil

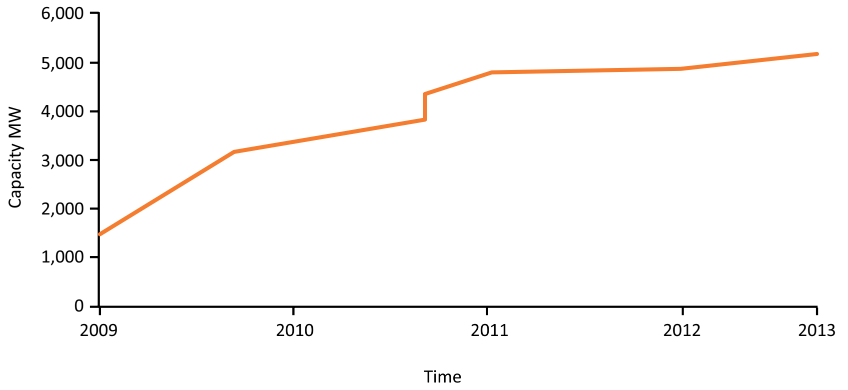


Figure 2.4: Prices for Wind Power in Brazil, UK

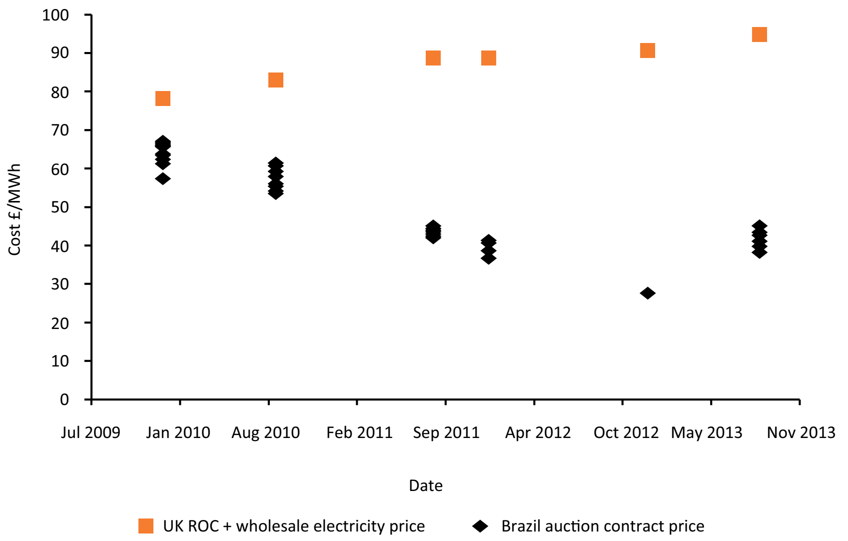


Fig. 2.3 shows that auctions have been able to sustain a growing wind industry in Brazil. (Additional wind capacity has been built there that is not supported by auctioned contracts but by selling power on the open market). Fig. 2.4 shows that Brazil has achieved that growth while also steadily reducing contracted prices

41 Stephan Nielsen and Christiana Sciaudone; "Wind Power Sells at World's Lowest Rate in Brazil Auction"; Bloomberg; 15 December 2012; www.bloomberg.com/news/2012-12-14/four-developers-sign-wind-contracts-in-brazil-for-282-megawatts.html

for wind power – the opposite direction from the UK where rising wholesale prices and RO certificate buyout prices have seen a steady increase in returns. Even the reduction in subsidy from 1 to 0.9 Renewable Obligation Certificates barely slowed the increase due to wholesale electricity price and ROC value escalation.[42, 43]

Has Brazil succeeded in defeating the 'winner's curse' problem, or has it simply taken until now for auctions to be competitive enough for it to re-emerge? A conversation with a representative from a Brazilian utility company highlighted some of the ways in which those headline figures may be illusory. Capacity factors for wind turbines in Brazil can reach extraordinary levels: recent wind farms have recorded capacity factors of 60–65%, and 40–45% is common in other parts of the country, whereas in the UK and much of Europe, 30–35% is at the high end of expectations. This means wind farms can generate much more electricity per unit of capacity installed, making them a more cost-effective proposition. He also explained that costs had been suppressed by a flood of excess turbines from European projects reaching Brazil at discounted prices, while auction prices were also disguising subsidy built into the transmission and distribution system, where wind operators are given a 50% discount on grid costs, which are instead loaded onto other sources. These factors contributed heavily to the "world record" low prices seen in Brazilian auctions. Policymakers should not expect that instituting auctions here will deliver equivalent results. If they do reveal more cost-reflective prices than the administratively set strike price system, though, the trend of lowering rather than rising prices could well be achieved.

Auctioning in EMR

The government's initial EMR White Paper reported that "in the Electricity Market Reform consultation document, the Government signalled that it was attracted to a greater use of auctioning or tendering as a mechanism to set the level of FiT CfD support. This was because the price discovery characteristics of an auction should enable financial support to be set at a level just high enough to promote deployment but not high enough to lead to excessive profits, with bids driven down by competition." However, it also noted that, "the majority of respondents [to the consultation] were sceptical about the use of auctions to set the level of support for low-carbon generation,"[44] – as experience of the NFFO had not been positive and questions remained about DECC's ability to design a well-functioning auction system.[45]

Overcoming a recalcitrant renewables industry is not the only challenge facing government as it attempts to bring competition in quickly. Both the design of the future auction system, and its integration within the wider suite of electricity policy decisions, require serious thought.

Design Questions

- **Quantity decisions:** In any auction system, one of the most important decisions made by the auctioning body (the government, regulator or the system operator) is how much capacity to auction for. Where the generation source being auctioned is a compartmentalised part of whole market, or is driven, for example by a fixed quantity target this can be fairly simple (if not always ideal from a value-for-money perspective). When this extends to

42 Brazil auction data from CCEE www.**ccee**.org.br/**ccee**/documentos/**CCEE**_125445 . UK average annual electricity price history from DECC Updated Energy and Emissions Projections https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/254831/Annex-f-price-growth-assumptions-2013.xls

43 This is rights to build wind capacity remunerated through auctions. It is not currently built wind capacity, and does not include wind capacity built to participate in open markets. Most projects are on a three year construction timetable so capacity should be installed three years after having been auctioned.

44 DECC; *Planning our electric future: a White Paper for secure, affordable and low–carbon electricity*; 2011; https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48129/2176-emr-white-paper.pdf p.44

45 DECC; *Planning our electric future: a White Paper for secure, affordable and low–carbon electricity*; 2011; Annex A; https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48130/2173-planning-electric-future-white-paper.pdf

a large part or all of the market, though, it requires the auctioner to develop a much clearer view of the relative balance of supply and demand in future years. This is far from straightforward. There are risks in both directions – auction for too much capacity, and it could lead to charging the public for unneeded generation plant; auction for too little and the risk of supply interruptions becomes more acute. Faced with the lopsided risk profile of cost (distributed widely among the population) on one side, and highly visible, highly disruptive blackouts or brownouts on the other, most governments are likely to err on the side of overestimating required capacity.

Subordinate to the overall amount of capacity required, the EMR structure is likely to require the government to determine how much contribution different technologies will be expected to provide. At time of writing DECC still appears to be deciding whether they will stipulate maximum and/or minimum quantities that may be allocated to different technologies. Setting out such information in advance would be helpful to provide a clear direction to the industry and suppliers about the size of market they can expect in future years and to minimise political incentive to chop and change. However, it does run the risk of reducing the competitive pressure being exerted between different technologies that would ensure that the most cost-effective were chosen, rather than ensuring that each technology will have some guaranteed market share. Alternatively, as some industry sources have backed, they could make those criteria constraints in a single auction, rather than run separate auctions for each technology category, and gradually eliminate those constraints as technology and market developments allow.[46]

Either way, while minima may be justified on the basis of developing technological diversity, maxima should be unnecessary. Other constraints – the availability of projects, the budget available under the Levy Control Framework in a given allocation round, and the need to furnish bidders from other technologies with the minimum required CfDs – mean a further explicit cap on a particular technology would be redundant. Furthermore, a technology so preferable that it is dominating the auction to the extent that it would exceed an imposed maximum is likely to be one of the more cost-effective options.

Whichever method is chosen has significant connection to the way that budgets are drawn up and allocated

- **Budget or budgets:** Presently overall spend on CfDs is capped by the Levy Control Framework. Underneath that headline figure, though, there is considerable uncertainty about how the money remaining under the LCF will be allotted among different technologies once the move to auctions has taken place. Will each technology be allocated a pre-determined budget for CfDs or will they all draw from a common pot? If the former, how will the relative size of those budgets be determined? If the latter, will higher-cost technologies be able to survive and contribute to the government's technological diversity objective?

Prioritising (present day) cost-effectiveness would see just one auction open to all technologies. More expensive technologies would lose out, and the budget would be stretched to extract the most MWh for a given expenditure. To promote greater technological diversity, a more complex system would be

46 Dotecon; *Comments on proposed allocation methods for CfDs*; pp. 33-34

needed, as more expensive technologies would have to be assured of some continuing development. Offshore wind is the technology most obviously in this position – too expensive to beat onshore wind or biomass in an open auction, but apparently too important to the government's plans to be left behind. This could involve removing them/keeping them out of the auctioning process altogether and subsidising them by an alternate method, or it could mean guaranteeing some provision in the auction (either a separate pot of money or a required capacity) that would be allocated to them.

There are advantages and disadvantages to guaranteeing a place for particular technologies by assigning them a designated budget or minimum capacity. An auction with a technology-specific budget tries to get the most capacity for that budget; one with a minimum capacity requirement tries to deliver that capacity at least cost. Both demand extra central decisions, to set what the budget or target should be. Both will ensure that the overall renewable energy build will be less cost-effective, in order that greater technological diversity is promoted. A minimum capacity provision might provide more comfort for offshore developers and their supply chain, but a separate budget should prevent further cost overruns. While both are imperfect systems, carving off a discreet budget for offshore wind auctions is probably the better approach because of the cost certainty it provides.

- **Pre-approval:** One of the risks of a reverse auction system is of project failure. If projects that win a bid to provide capacity are unable to complete their development, a capacity shortage can arise and, as has happened in several historical examples, the policy has to be changed. It is important to learn the lessons and understand the trade-offs in system design to help prevent this. If auctioned projects must go through other regulatory approval processes, such as for planning permission, it is important to consider where in the order of events each stage of the process falls. Requiring planning/permitting before bidding reduces the failure rate of winning bids, but imposes high upfront costs which may deter many participants. Without a system of deposits or some other means of penalising non-completion, project failure rates can be high and an incentive is created to bid artificially low. However, such requirements can deter participation by new entrants and those with low capital reserves. Planning for projects is difficult enough with the fixed commitment of a FIT or RO eligibility at the end. Combining more stringent pre-approval with auctions (which are inherently less certain for developers than a FIT system) could severely dampen participation. Ultimately, the Government has to decide whether the savings made through increased competition outweigh these competition-suppressing aspects.

- **Penalty regime:** A strict penalty regime is one of the main tools available to prevent unrealistically low bids. Making bidding companies put forward deposits, which are lost if the project is not completed, can act as a significant deterrent to low-balling bid prices. However, it can also be a deterrent to participating in the auction at all, suppressing involvement and lowering the competitive pressure exerted by the process. If firms are too fearful of being treated punitively, they will be reluctant to risk participating. This can then have the knock-on effect of reducing the ability of the auction to accurately discover cost imformation. DECC proposes to reduce strike prices or the length of the contract for projects that are delayed. This should encourage prompt completion of approved projects (both under allocated CfDs and under auctioning). However, this also may deter entries from all but the most well-established or wealthiest operators.

Half-building renewable energy ventures is not a profitable exercise, and there is little advantage for a firm in winning a contract it cannot complete. However, when subsidy (under the levy control framework) or capacity in the auction, or both, are constrained, a failed project has costs not only for its builders, but also for other projects that could have won a CfD had it not bid.

There is a delicate balance to be struck between a penalty regime that is too loose, and which facilitates unrealistically low bidding strategies and high project failure rates (even though project failures can lead to a saving to consumers overall as they are not required to pay for power generation that is not build), and one which is too strict, and that leads to unnecessarily costly bidding strategies. It is hard to judge how successful DECC's proposals in this area will be in advance of the first auctions, but they appear conscious of the issues and to have sought to achieve the required balance. Careful assessment and refinement of penalty regime and auction structure after it is operational will therefore be necessary.

- **Collusion:** Among DECC's worries when deciding when the market is in a fit state to handle greater competition, and the form that competition might take, is the risk of collusion among bidders. In a market with few viable participants (something that might be true of offshore wind, and is almost certainly true of nuclear and CCS) ensuring genuine competition is a challenge.

  The fear of collusion may also lead DECC into opting for a sealed bid auction structure. Their concern is that, when bidders can see each other's offers, they may refrain from making the most competitive bid, instead calibrating their offer to that of their competitors. However, it is not clear (and it probably will not ever be clear before the auctions begin) to what extent this is a real problem. What is lost by avoiding an open auction structure is the ability for information about other bids to shape understanding about market conditions that affect all participants ("common value uncertainty" in the jargon). Open auctions have been preferred to sealed bids in telecoms bandwidth auctions for exactly that reason.

  Open auctions also, not trivially, allow for third party scrutiny of both the process and the results. This is something that a sealed bid process makes difficult – even if some form of filtered report on the auction is published, it is not a substitute for the greater visibility provided by an open auction and the greater oversight it affords.

Barriers

The barriers to earlier or more extensive auctioning are:

- **Renewable Energy Target:** The EU requires that 15% of the UK's final energy demand – roughly 30-35% of electricity – comes from renewable sources by

2020. Because emissions from the electricity sector are already governed by the European Emissions Trading System, the target saves no additional carbon – however, it does ensure that emissions reductions are achieved using more expensive technologies, wasting resources that could otherwise be more usefully deployed. While the renewable energy target exists, introducing effective means of competition, or of cost-control more broadly, is impossible. The legally-binding target does not allow for failure because of the expense of meeting it – at least, not formally. Whether in practice the UK would be penalised by the European Commission for introducing a more cost-conscious renewables support mechanism is hard to predict. However, understandably, the Government is not inclined to disobey a legal commitment. As a result, it has shied away from earlier auctioning, because bidders would be aware of the government's pledge, and know it would have to pay whatever it took to get renewable generation built.Policy Exchange has argued before that the Renewable Energy Target is a bad piece of policy that imposes unnecessary costs on attempts to decarbonise.[47] That it is standing in the way of competition in EMR underscores how damaging its effects are. The government should seek to scrap the target.

It should be recognised that some key decisionmakers are more bullish about the UK's prospects of meeting the RET and in the existence of extra capacity in the renewable energy supply chain. For instance, between 2011 and 2013, National Grid raised expected renewable energy capacity in 2020 from 36 to 41GW in its more optimistic Gone Green scenario and from 26 to 28GW in its more pessimistic Slow Progress scenario.[48] This may enable earlier auctioning as it means that demand for CfDs exceeds the supply of them, which is necessary to create any competitive tension.

- **Renewables Obligation commitments:** The initial suite of strike prices was constrained by the condition that, for developers, there should be no difference between the returns offered under EMR compared with those already pledged under the RO (because if the RO was more favourable, developers wouldn't utilise the EMR arrangements). With strike prices being announced shortly after an RO banding review, there was also seen to be no evidence to justify altering returns. This meant that EMR prices are unable to offer much, if any, reductions in cost compared to the previous policy in the first few years of its operation. This is despite Government arguments that the CfD mechanism would reduce overall costs, by limiting investor risks and therefore reducing the cost of capital.[49]
- **Option value:** Part of the Government's approach to cost-effective decarbonisation of the entire economy has been to ensure that it keeps open as many realistic options for low-carbon technologies. Because of this preference, it is unwilling, at least at this stage, to choose a policy that would disfavour as-yet uncompetitive technologies like offshore wind, for which it has high hopes in future years if costs reduce as it hopes. Of course, there could be other methods for supporting these technologies, such as through R&D support, or through loan guarantees (see Chapter 4) without aiming immediately for mass deployment. But for now, while that remains a goal of the policy, it is difficult to make the competitive environment too hostile.

47 Simon Moore; *2020 Hindsight*; Policy Exchange; 2011; http://policyexchange.org.uk/publications/category/item/2020-hindsight-does-the-renewable-energy-target-help-the-uk-decarbonise?category_id=24

48 National Grid; *UK Future Energy Scenarios 2011* and *UK Future Energy Scenarios 2013*; http://www2.nationalgrid.com/WorkArea/DownloadAsset.aspx?id=24676 and http://www2.nationalgrid.com/WorkArea/DownloadAsset.aspx?id=10451

49 Liberum Capital analysis found a marginal difference in regimes for onshore wind developments between ROCs and CfDs, suggesting the strike prices have achieved their objective. Liberum Capital; *CfD strike price change & stock implications*; 2013; www.liberumcapital.com/pdf/Xk0HiTzx.pdf

- **Insufficient number of bidders:** DECC have outlined three criteria for moving technologies to auctioning:
  - "having confidence that there are enough potential participants in the auction or tender for there to be competitive tension;
  - knowing that the development capacity of the potential participants exceeds the volume of new development sought by the institution in a given time period or tendering round; and
  - knowing that the projects or technologies eligible for the tender or auction are comparable so that the strike price is a meaningful way to discriminate between them."

For some technologies there are perceived to be too few viable operators to make an auction worthwhile. As these technologies mature, their cost structure reduces and their engineering needs become more commonplace, it is hoped their maturity will coincide with more firms being able and willing to operate them. Table 2.2 shows these criteria measured against some publicly available data points. Comprehensive data on the number of developers of different renewable technologies in the UK is not readily available. We have attempted to come up with a rough survey to give an approximate indication using different sources. The number of potential participants was measured against the number of developers listed in the membership directories of the main renewable energy trade bodies This is not a comprehensive measurement, and some industries will be underrepresented due to the patchy quality of information contained in directories. It also difficult to make an assessment of how credible these companies' involvement in their industries really is. However, the numbers do give an indication of the relative level of activity in different sectors.

To assess project availability, we compared the National Grid's *EMR Analysis* central scenario with their highest deployment scenario for each technology, to see whether they thought there to be underused capacity in each technology. Finally, the pattern of production is noted as this forms the main divide in getting comparable strike price information. Those metrics suggest that several technologies are close to being ready when measured against the outlined criteria. Onshore wind and solar have dozens of developers already working in their market, while even offshore wind has matured to the extent that 16 firms are listed in the trade bodies' registers. Energy from waste, anaerobic digestion and biomass also appear capable of being brought into competition earlier than currently proposed.

Table 2.2: Readiness for auctioning of renewable energy technologies

Technology	Many companies for competitive tension? Developers listed in various trade association membership directories[50]	More projects available than capacity demanded? National Grid core scenario vs National Grid highest scenario for additional build 2013-2020 in GW[51]	Can compare on strike price?
Onshore wind	RenewableUK and the Renewable Energy Association list 51 onshore wind developers in their directories.	5.7 (6.8)	Weather-dependent variable
Offshore wind	RenewableUK has 16 offshore wind developers in its directory	6.4 (13.4)	Weather-dependent variable
Wave/tidal	The British Hydropower Association lists 28 hydro developers/operators.	0.1 (0.1)	Weather-dependent or time-of-year dependent variable
Dedicated Biomass	The Renewable Energy Association lists 10 biomass power project developers. This seems likely to be a significant underestimate.	0.1 (0.1)	Baseload
Biomass conversion	Not applicable – biomass conversion relies on ownership of an existing coal power station.	1.2 (4.0)	Baseload
Anaerobic digestion (CHP)	Data from WRAP and NNFCC, lists 52 agricultural, 46 community and 23 industrial anaerobic digestion CHP units. However, ownership details are not clear.	0.2 (0.2)	Baseload
Energy from Waste	WRAP list 60 installations currently operating, albeit with some operators managing several installations. There appears to be 40-50 developers, though several of this will be one-off on-site waste management options with no scope for further expansions.	0.4 (0.4)	Baseload
Solar PV	There are currently 19 developments of greater than 5MW capacity listed in the RO database, each of which has a different listed owner. At <5MW size there are many more.	2.9 (2.9)	Weather- and time-of-year dependent variable

If the government and National Grid were to apply their readiness for competition test today, they might find that technologies including onshore wind, biomass, (possibly also solar PV) could feasibly compete in auctions for renewable power now. Even offshore wind, by these measures, looks to have enough participants that technology specific auctions could work, although it remains too immature to compete in technology neutral auctions (approach to immature technologies is considered in the next chapter).

The timetable for introducing intra-technology auctioning is being held back by the European renewable energy target. This has left DECC waiting until the latter part of the decade for competitive auctions, as it is only for projects

50 From websites of: RenewableUK, Renewable Energy Association, British Hydropower Association, WRAP and Ofgem.

51 National Grid; EMR Analysis; 2013; p. 40; www.gov.uk/government/uploads/system/uploads/attachment_data/file/223655/emr_consultation_annex_e.pdf

commissioning after 2020 that the EU renewable energy target does not create a credibility problem. Before then, the legal obligation that the Government has to meet that target – supposedly at any cost – may make it difficult for it to bear down on the cost of renewable energy support while maintaining its commitment to Brussels. Renewable project developers have much greater bargaining power over the Government while the target remains in force, as it is only through the completion of their projects that the Government will be able to fulfil its own obligation.

Were it not for these constraints, some self-imposed and some derived from EU policy, there is no reason not to begin auctions earlier. Without a renewable energy target, it would be possible to auction contracts for projects commissioning before 2020; without the aim to match incentives with the Renewables Obligation they could begin almost immediately for projects commissioning before the RO closes in 2017 for technologies closest to cost-competitiveness (energy from waste, biomass, and onshore wind and possibly solar PV are the most likely candidates). The government should therefore urgently accelerate the planned timetable for introducing auctions into EMR. While the lame-duck Renewables Obligation remains open to new entrants, there is little incentive for developers to compete in CfD auctions. However, those auctions should begin for projects coming online after the RO expires. Rather than going through an intermediate stage of technology-specific auctions, for these most mature technologies at least, inter-technology competition should begin sooner – potentially in 2014 or 2015 for projects with a commissioning date after 1st April 2017.

Conclusions and recommendations

Auctioning requires a host of centralised decisions and is more risky than some other subsidy models with regard to completing projects. Nonetheless, it is a significantly preferable alternative to the system of central administrative price setting because of its ability to reveal price information. The government has acknowledged this and has spoken throughout the EMR process about transitioning (eventually) to auctioning. However, there is scope for the government to move much faster on the introduction of auctioning, if it is prepared to dismantle some of the current constraints. Getting rid of the renewable energy target would allow the government to bring forward auctioning to projects beginning in 2017 – something it should do if at all possible.

Inter-technology auctions for the mature renewables (energy from waste, biomass, onshore wind) should begin at that point rather than waiting, with any other technologies being brought in once their costs are in line with technologies already being auctioned (the rapid progress made in solar PV costs might make it a contender by then). Other technologies the government is committed to support (offshore wind) will be auctioned in future if sufficient competition can be reached between different companies. If this can happen, it may still be appropriate, as the government proposes, to keep these auctions separate from the technology-neutral ones going on simultaneously, with a budget dedicated to offshore wind developments. However, as described in Chapter 3, these separate auctions should have stringent requirements to ensure that costs are continuing to fall, and a trigger to cut off support if progress stops being made.

Open descending clock auctions are preferable to sealed bids. The government's concern about collusion when bids are visible is counteracted both by the value in revealing common information to other bidders, and decisively, in the ability for the auctions to be effectively scrutinised by outside organisations.

3
Immature Technologies

While some renewable technologies are ready for auctioning immediately, others are less mature. Offshore wind, for example, features relatively few major players and has far higher costs than rival technologies. Placing offshore wind quickly into auctions against other, cheaper technologies, would be likely to see it unable to compete on cost terms. For this reason the government seems prepared to insulate it longer from competition and to retain comparatively generous set strike prices (far higher than for any other technology with aspirations to mass deployment, see Table 1.1). Offshore wind is not a natural fit for the processes already planned to increase competition in EMR. Yet it is also, because of its price, arguably the technology for which cost reduction is most important.[52]

The government has clearly taken the view that offshore wind is an important technology for UK decarbonisation and one in which the UK can become a "world leader". At present this judgement is based on the *potential* for costs to come down. The government, therefore, needs to find a way to reconcile financial support today with incentives and pressures to reduce costs over time, and to set clear benchmarks so it can be decided if offshore wind can live up to its potential, or is destined to be an expensive flop.

With limited access to competitive pressures, another way of putting pressure on offshore wind developers to bring down costs might be through clearer and longer-term degression in the strike price offered to offshore developers.

Degression –pre-planned and pre-determined reduction of subsidies – is another approach that can be taken, prior to or in conjunction with the competitive elements outlined in the previous chapter. EMR currently has limited degression applied to strike prices in the later years for which prices have been outlined (Table 1.1). Other countries have had success in reducing the costs of renewable energy while simultaneously providing longer-term clarity for the industry by stipulating in advance 'degression rates' – i.e. reductions in future rewards for developers based on fixed criteria. In exchange for greater predictability about future returns, developers are expected to find ways to make their technologies cheaper.

52 Previous Policy Exchange reports, including *Climate Change Policy – Time for Plan B* (2011), *2020 Hindsight* (2011) and *Fuelling Transition* (2012) argued that the government should scale back ambition for offshore wind, especially prior to 2020, and look to more cost-effective ways to reduce greenhouse gas emissions. This report reflects that ambition has been scaled back considerably, from 18 to 13 to 11 to now around 8-10 GW of offshore wind expected by 2020.

Box 3.1 Advantages and Disadvantages of Degression

Policy stability: Establishing clear support reduction rates (either based on time or on market growth measured by capacity) is one way to reduce subsidy policy uncertainty. Systems without planned cost reductions can be susceptible to sudden and arbitrary changes in terms, particularly if the surrounding financial environment worsens or political attitudes to renewable energy become more hostile. Knowing costs are being forced down can alleviate some political pressure to change policy, while enabling developers to better assess the case for a potential investment.

An end in sight: Demanding technologies' costs are reduced over time should ensure that technologies are either capable of competing with other alternatives, without subsidy, at some point in the future, or will have their support cut off. This should be seen as an advantage, as the cheaper a clean energy source becomes, the more likely it is to be widely adopted and displace polluting alternatives. It also limits the amount of money spent on technologies that do not prove worthwhile. However, in certain circumstances it may be seen as a problem, as it can reduce the amount of renewable energy deployment when technology costs fail to come down. This is only really a problem where governments have committed themselves to achieving particular amounts of renewable energy at any cost - unfortunately, this is exactly the position EU countries find themselves in until 2020. The better option would be to scrap the target and pursue cost-effectiveness in renewable energy deployment, but at present, the two objectives are in conflict.

Starting fast: In some circumstances, degression rates can encourage faster deployment. Knowing that support will decrease in future years, manufacturers may aim to take advantage of more generous rates early on. While such an outcome would probably indicate initial subsidy rates had been set too high, it may be a trade-off worth making for the knowledge that costs will have to come down in future. Reducing support based on installed capacity rather than time can limit the extent of this factor, as only a limited number of projects will be able to claim the highest rate before it is used up and triggers the reduction.

Getting the Rate Right: Identifying the appropriate rate of degression is not always straightforward. Some technologies (such as offshore wind in Europe) have seen costs rise in recent years, driven partly by commodities costs, partly by a move into deeper waters, and partly by a rush to build as much as possible before the renewable energy target deadline in 2020 putting pressure on supply chain and skills capacity. On the other side of the coin, Germany chose a reduction rate for solar PV that ended up being insufficiently demanding, as the cost reductions for PV outpaced the rate of subsidy decline, meaning the subsidy regime became increasingly generous and expensive. As a result, even with degression in place, governments have reconsidered subsidy rates. In this instance also, a degression rate based on capacity may have been preferable to the chosen method of price reductions over time, as it would have slowed any rush to take up the technology and its corresponding subsidy rewards.

The strike prices published by DECC give only 5–6 years of foresight for renewable technologies, and include no information on nuclear or CCS. After that, more mature renewable technologies will be expected to have strike prices set in competitive auctions. For less mature technologies, especially offshore wind, however, it only adds to an already uncertain landscape after 2020. With no target in place for renewable energy deployment after 2020, no clear strike price decision or process for then, all that the offshore wind sector has is a somewhat hazy objective to reach a cost of £100/MWh by 2020 (what happens if the industry achieves that target? What happens if it can't? How achieving that cost reduction translates into commitment, or not, to build more offshore wind in the 2020s is rather unclear).

Existing Price Control Mechanisms

There is little in the way of formal long-term degression in current EMR policy plans. There are some reductions in the strike prices in EMR that have been laid out for the next 5 years, but which provide no guide for what to expect beyond that period – they follow no pre-determined logic and will instead be negotiated and announced on a year-by-year basis. Other elements of policy contain some minor cost-containment measures, including:

- A non-binding ambition that the offshore wind industry get its costs down to £100/MWh for windfarms to be built in 2020.
- A clause in the contract for the Hinkley C nuclear reactor that lowers the strike price received by 3% if the company building it receives a contract to also build a new nuclear power station at Sizewell.

None of these constitutes degression as it is commonly understood. They are one-off price decisions, and offer no guidance as to where the remuneration of the relevant technologies will go beyond each of the specific dates. However, with several technologies due to move away from administratively set prices, longer-term degression pathways for them would be redundant.

The Government also proposes to use information contained in applications for CfDs to calibrate administratively-set strike prices. While it is unclear exactly how the information will be used, it does suggest that the government will be able to change future strike price plans if it is clear that proposals have moved out of sync with real-world prices. However, the opaque way in which this process may be implemented risks creating uncertainty for the industry. It also disincentivises bidders from offering to build for prices below the administratively set strike prices, as there is little advantage for the bidder to do so and a risk that DECC would respond to discount bids by lowering rewards.[53]

This contrasts sharply with the methods used in other countries, including many of the European countries striving to meet the same renewable energy target as the UK (see Table 3.1). Under the feed-in-tariffs commonly used to support renewables on the continent, clear degression pathways have been set. These can take the form of either *pre-established* or *contingent* degression (see Box 3.2)

53 Dotecon; *Comments on proposed allocation methods for CfDs*; p. 21

Box 3.2: Responding or Prescribing

Degression-rate policies fall into one of two types:

Pre-established Degression: Pre-determined downward adjustments (typically annual) for subsequent projects to track, and encourage, cost reduction

Responsive Degression: Enables the rate of market growth to determine the future rate of degression, and thus, the future FIT payment level.[54]

Pre-established degression tends to be more predictable for investors. Responsive degression means future rewards will depend on the behaviour of others in the market. For example, if I have a wind project I can begin generating with 18 months from now. Using a time-based pre-established degression system I know exactly what my returns will be. With a responsive system, on the other hand, I have to attempt to predict what others in the market will do – whether they will build enough capacity to cause rewards to come down – in order to calculate my own expected return. Responsive degression tends to avoid cases of overpayment, where an overly-generous subsidy level attracts far more uptake than was anticipated, meaning it can be more attractive for governments or regulators as well as consumers. It can be somewhat more complex to implement than a pre-established system (though it may simpler than the complexity currently being laden on the electricity market).

Figures 3.1 and 3.2compare the degression pathways outlined in Table 3.1. Figure 3.1 shows them as a proportion to current levels which are benchmarked to 100% in 2014. Figure 3.2 shows them in absolute terms, showing the guaranteed prices in the UK strike price system and the feed-in-tariffs offered in different European countries. With policy changes being so frequent, this is our best attempt to reflect policies at time of writing. These data also do not account for many other differences in policy, including the length of time subsidies are guaranteed for, the wholesale market price in different countries, different policies on grid charges and access, and many other factors which contribute to variation in rates in different countries.

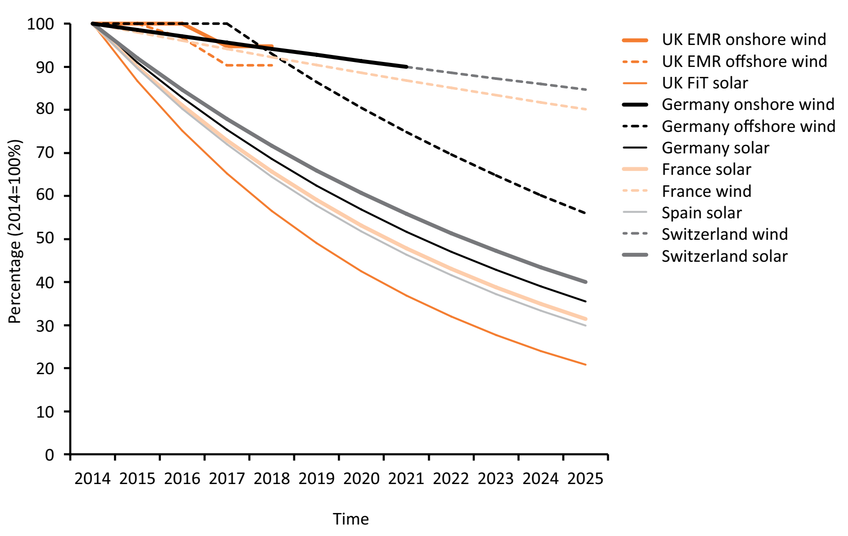
The figures show that while UK cost-reduction efforts, relative to current costs, are as ambitious or more so than other European countries, they are also much shorter in duration. For onshore wind this reflects the UK's commitment to moving away from fixed subsidy rates and to competitive price discovery in the future, something other European countries have yet to support. For solar, the UK is pursuing a very aggressive rate of degression compared with other countries, at least if expected build rates are achieved. For offshore wind, though, the short time frame may be more of a problem – there is little information about what to expect beyond the 2019.

54 Toby Couture, Karlynn Cory, Claire Kreycik, and Emily Williams; *A Policymaker's Guide to Feed-in Tariff Policy Design*; National Renewable Energy Laboratory; Golden, CO, USA; 2010; www.nrel.gov/docs/fy10osti/44849.pdf; p. xi & pp. 36–41

Table 3.1: UK and European degression policies

Country	Policy	Degression policy choice	Value	Years foresight	Notes
UK	Renewables Obligation	No formal degression. Irregular periodic reviews of subsidy after banding introduced in 2009		Variable, up to approx. 5 years	Expires in 2017, replaced by EMR
	Microgeneration Feed-in Tariff	Indicative degression pre-planned, but can be adjusted if deployment high or lower than expected	13.3% per year (3.5% per quarter) for solar PV, 5% for other eligible technologies, but can be skipped for 2 years if deployment low, rate doubled if deployment high[55]	Indefinite	For small-scale technologies only
	EMR	Pre-determined – see Table 1.1	No fixed amount. Negotiated in reviews.	6 years	
Germany	Feed-in tariffs (excl solar PV)	Pre-determined	1%–5% per year reduction depending on technology (1.5% for onshore wind, 7% for offshore wind starting in 2018)	Until 2021	At time of writing, the German government announced impending changes to the subsidy law, with a move to contingent degression for wind power among a number of mooted changes aimed at further reducing the cost of renewable energy policy.[56]
	Feed in tariffs (solar PV)	Contingent	9% per year base reduction, but can be varied depending on installations		
France	Feed in tariffs (legacy)	Pre-determined	Solar PV 5% per year, wind 3.4% per year from 2003		Superseded by more recent laws. Solar PV was not subject to subsidy degression between 2006 and 2011
	Feed in tariffs (solar PV)	Pre-determined	10% per year reduction[57]	Indefinite	
Switzerland	Feed in tariffs	Pre-determined	8% for solar, none for wind	Indefinite	Previous 1.5% degression rate for wind scrapped in 2013[58]

Figure 3.1: Rewable Subsidy Degression Rates, 2014=100%



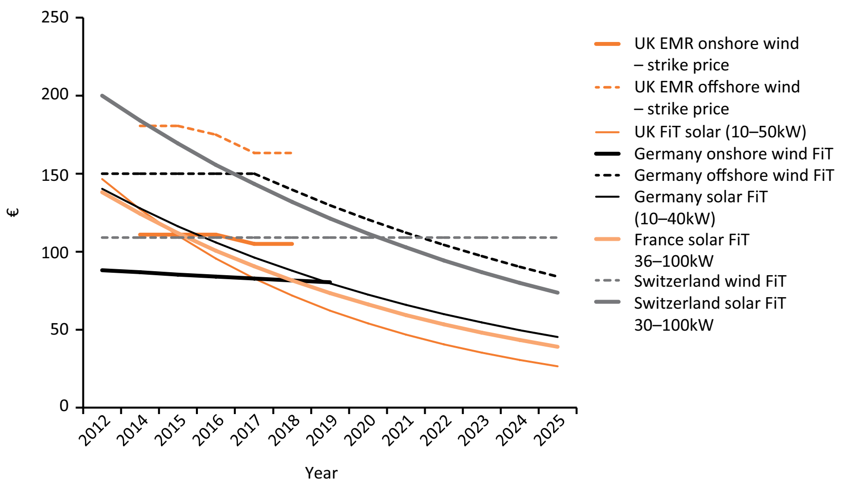
55 www.fitariffs.co.uk/eligible/levels/contingent/

56 Stefan Nicola; 'German Wind Industry Says Too Early to Panic on Subsidy Cuts' on Bloomberg.com; http://www.bloomberg.com/news/2013-11-11/german-wind-power-industry-says-too-early-to-panic-on-aid-cuts.html; Nov 11 2013.

57 http://books.google.co.uk/books?id=iRm4mz_gmVsC&pg=PT148&lpg=PT148&dq=france+degression+rate&source=bl&ots=_VA4wg5ZKS&sig=b5pug_tcxsHgW7evgiBvWWJ-KFc&hl=en&sa=X&ei=WP1LUvemH5KZ0QWEtYCQBQ&redir_esc=y#v=onepage&q=france%20degression%20rate&f=false

58 www.admin.ch/opc/de/classified-compilation/19983391/index.html#app3

Figure 3.2: Renewable Energy Subsidy Degression – cash terms



Longer Term Clarity?

One of the major claimed advantages of degression is that it can give industry (and politicians, and consumers) longer term clarity about the direction of policy. Rather than having to wait for often politically-fraught review processes or announcements from the civil service, companies know what returns will be in a given year, or after deploying a certain quantity of their technology. This makes it easier to plan and manage projects, and makes the risk analysis for developers and financiers more straightforward.

However, when it comes to *pre-established* degression systems, providing long-term clarity is not risk free for governments. Misjudgements in either direction can create problems. If cost reductions outpace subsidy reductions, governments can end up locking in high returns to investors, which can in turn attract more participants into the system, creating an unaffordable bubble. This is been seen in several markets with regard to solar PV subsidies as a result of the plummeting costs of the technology (including Spain, where the policy ended up being overwhelmed, and the UK where emergency subsidy reductions were made).

On the other side, if the government is too aggressive in its subsidy reductions, it may reduce or eliminate the chance of that technology being able to help with decarbonisation and electricity supply in future. This may, in certain circumstances, be the necessary thing to do. But it should be the outcome of reasoned decision making rather than accident. If governments are willing to allow technologies to fail, this policy is appropriate. But if they are not, they should not choose pre-established degression pathways only to recant them if given technologies stop being built.

Despite its popularity as a policy option among countries that are backing renewable energy policies, it is far from clear that degression has helped create a more stable policy framework. While there are other reasons why degression might be an attractive policy choice, recent experience around Europe demonstrates it offers no guarantee against further policy changes. They may be amended, as appears to be happening in Germany, to enable further cuts to renewable subsidies. Conversely, the government in Switzerland abandoned degression to stop further reductions in subsidy for wind energy (Table 3.1). Of course, there is no way of knowing what the counterfactual would have been – whether these changes would have happened *even earlier* in the absence of degression. But the idea that degression can promise policy stability is not always true.

Conclusions

The government argues that the need to retain a portfolio of options for long-term decarbonisation means it should not be too eager to cut off uncompetitive technologies' support in the near term. Nevertheless, at some point, if the policy is to accomplish the Government's stated aim for cost-effectiveness, it will need to overcome this squeamishness about ending support to the least competitive technologies.

Chapter 2 described the process by which certain technologies that are not ready to compete with the rest of the market might be auctioned in isolated technology-specific auctions, with a fixed budget. Those technologies should be subject, within that process, to a reserve price in the auction which corresponds to a descending cost structure, bringing it on competitive terms by a designated time (for offshore wind, this might be the mid-2020s). If the technology proves unable to reach those benchmarks no contracts would be allocated from that auction. The aim to get offshore wind costs down to £100/MWh for projects beginning in 2020 would be an obvious starting point – one that should be changed from an aspirational target to a hard cap on 2020 prices in the EMR delivery plan strike price structure. Some firms, at least, have said that those cost reductions are achievable and that the "need for subsidies will disappear pretty quickly".[59] Government should be prepared to toughen up the CfD plans to hold them to that. Developers who were unable to reduce their costs would be squeezed out by more efficient companies, and the billpayer would not be on the hook for covering expensive broken promises.

However, at the moment, the UK Government does not appear willing to do this. It has portrayed its technology support policies as ones which lead to the widest possible range of options for the even-more ambitious electricity sector decarbonisation intended for the 2020s and beyond. This position is incompatible with one that cuts off support to expensive technologies – either you insist on the widest possible range, or you will accept that choice being reduced. As with so many other elements of energy policy, the Government's arguments try to have it every way. In the end, its actions will be what matters. So far, it has not shown the stomach to cut off support to uncompetitive technologies. Only if it develops a more ruthless approach can costs come down. Conditionality is crucial here. Offshore wind way be important at a reasonable price but not at a higher one. It cannot be afraid of lowering subsidies, but must see them as the only way it can survive. At its current costs it is simply too poor value an investment to be allowed to continue much longer.

59 Brent Cheshire, quoted in Terry Macalister; "Dong Energy upbeat about offshore wind power thanks to higher subsidy" in *The Guardian*; 8th December 2013; http://www.theguardian.com/environment/2013/dec/08/dong-energy-offshore-wind-power-subsidies-north-sea

4
Loan Guarantees

In 2012 the Government introduced a new programme to provide loan guarantees for infrastructure projects. While it does not formally constitute part of the EMR programme, it will be coming into effect at the same time, and will target some of the same projects.

The UK Guarantees Scheme allocates £40bn to new infrastructure in energy, transport, and other sectors (with energy projects accounting for the lion's share). While at time of writing details were not confirmed, it has been reported that the Hinkley nuclear development could by itself take up to £10bn in guaranteed loans if the deal passes the European Commission's state aid test.[60]

Loan guarantees have also been used in other countries, most notably in the USA, where they formed the main feature of the federal government's aim to kick-start new nuclear build in the Energy Policy Act 2005 (as well as supporting other new energy technologies). They guarantee loans by agreeing to repay the borrower's debt obligation in the event of a default. The Department of Energy Loan Programs Office currently has $32.4bn in loans committed.[61]

Loan guarantees aim to reduce the cost of capital for private sector borrowers financing investment projects. With government taking responsibility for repayment of the loan should the original borrower default, the cost of borrowing for the project should decrease to reflect the government's likelihood of default rather than the original borrowers. Since government borrowing costs are usually well below those in the private sector, this should lead to an overall reduction in the cost of financing the project, albeit with the taxpayer having to step in should things go awry.

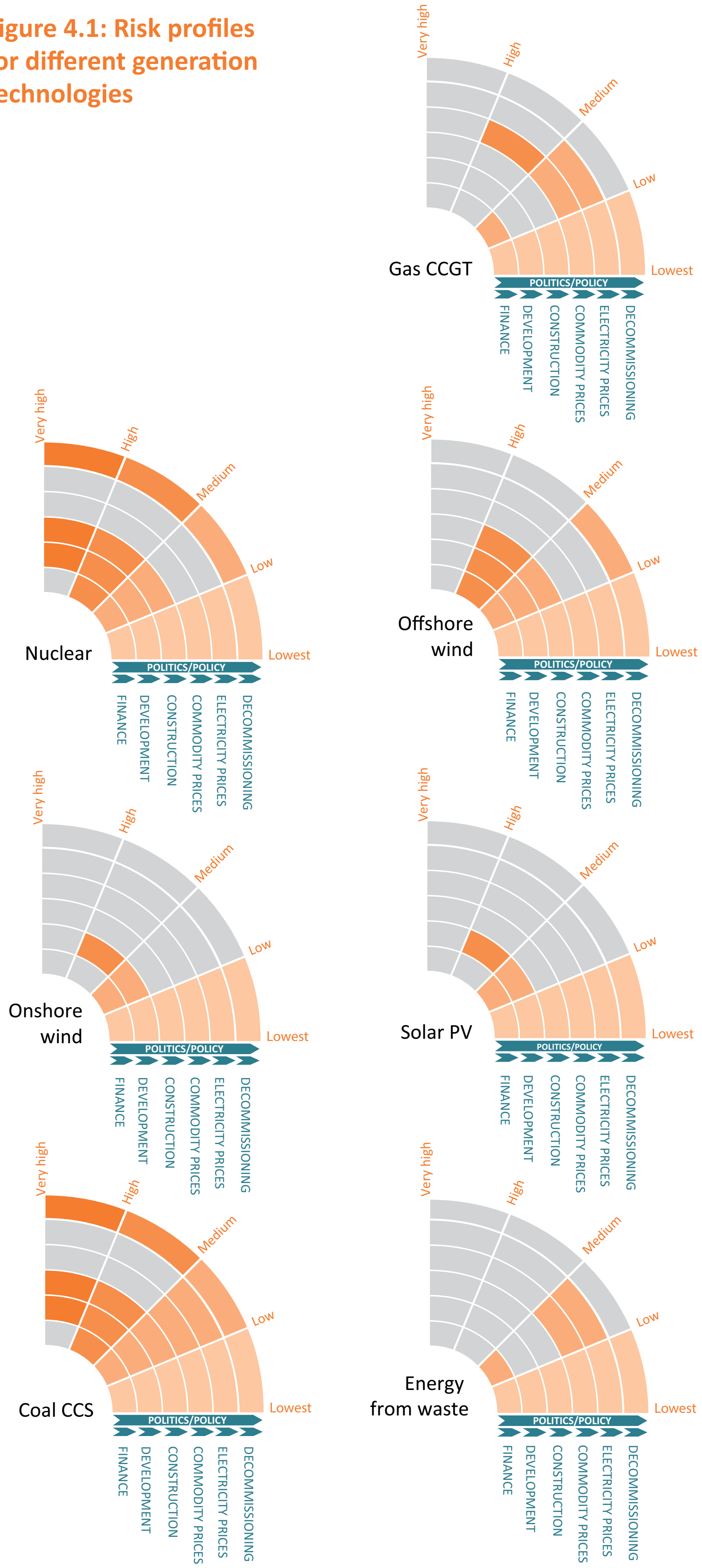
Table 4.1: Advantages and disadvantages of loan guarantees

Advantages	Disadvantages
• Directly target cost-of-capital – lenders assess guarantor's risk of default rather than the project company. • Time limited – no longer needed once construction complete • Public liability if construction problems arise may exist anyway – formalising public relationship with construction phase may be better than implicit backup role. • May not cost anything if there are no problems with project – government may be able to facilitate more projects without having to spend money. • When guaranteeing multiple projects, can pool risk lowering overall premium	• Creates public liability if construction problems arise • Don't address revenue uncertainty • Pooling risk can lead to adverse selection bias – the projects which are the most risky end up being more likely to want to participate in pool, meaning the government ends up backing the projects most likely to fail. • Direct government underwriting of loan guarantees could be considered to be unfair State Aid, and deemed illegal by the European Commission.

60 Emily Gosden; 'EDF Hinkley Point nuclear deal: an overview'; *The Telegraph*; http://www.telegraph.co.uk/finance/newsbysector/energy/10395169/Hinkley-Point-good-for-Britain-says-Ed-Davey.html

61 www.lgprogram.energy.gov/

Figure 4.1: Risk profiles for different generation technologies



Risk allocation

Deciding who bears responsibility for the different elements of risk has become one of the most critical elements of policy formation in privatised energy systems. Each stage of the process of preparing for, building, operating and decommissioning generating plant carries different risks, which vary according to the type of technology being used. Fig. 4.1 is an indicative illustration of the differing risk profiles of different technologies. Nuclear and offshore wind, with large upfront capital costs but barely any fuel source risk are very different from gas CCGT's, where construction is comparatively straightforward but there is much greater exposure to commodity price fluctuations. For all technologies, politics and policy play a major role throughout their lifetimes. In a market where each technology is increasingly reliant of government support, be it in the form of the CfD market or the capacity market, government decisions become increasingly predominant. Nuclear, with all its attendant controversy, is perhaps the most politically sensitive of all, but none of these technologies can claim, in current market conditions, to be immune to uncertainty and risk from policy design and shifting political preferences.

In EMR, the government has aimed, through the CfD, to transfer electricity price risk away from generators and to consumers. Generators will receive fixed contracted prices – any difference between that price and the market price is topped up by the customer. It does little, though, to address risk at the construction stage. Indeed, making the private sector responsible for construction risk has been one of the main justifications behind the chosen structure. That is where, so the argument goes, private sector efficiencies can be most valuably utilised, keeping overall costs down. In announcing the deal for the Hinkley Point C nuclear reactors, the Secretary of State, Ed Davey MP emphasised the importance of ensuring that construction risk was held by developers, not the public: "if the construction costs go higher, that risk is taken by the developer, by EDF, but if the construction costs are lower, the consumer will benefit. That has not happened before, and it is a welcome protection for the consumer."[62]

However, the financial risk in the construction phase, before the power station has started earning revenues, might mean that the government's much more favourable borrowing costs would be an advantage, and could be used to lower the overall costs of the project.

Things get more complicated when projects are due to receive both loan guarantees and subsidy, as with the Neart Na Gaoithe offshore wind farm in Scotland and as has also been suggested for Hinkley. Should receipt of loan guarantees mean a project should also receive a discounted strike price? After all most of the benefit that guaranteed prices were supposed to be providing in reassuring investors would be supplied by the loan guarantee and underwritten by the taxpayer- why is a high guaranteed price on behalf of energy consumers also needed?

The government should publish an assessment of the interaction between the UK Guarantees Scheme and the CfD regime, including whether loan guarantees should lead to a discounted strike price, and whether in some circumstances they are a more cost-effective way of lowering the finance costs of capital intensive energy investments.

62 Ed Davey; Hansard; www.publications.parliament.uk/pa/cm201314/cmhansrd/cm131021/debtext/131021-0001.htm#1310215000002

5
Conclusion and Summary of Recommendations

EMR is a badly designed, overly complicated and needlessly expensive intervention in the UK electricity market. It would be better off being abandoned. However, although the fundamentals of EMR seem set for the time being, there are ways that its performance can be improved.

Auctions

- **The government should accelerate the planned timetable for introducing auctions into EMR.** Technologies including onshore wind, biomass, and energy from waste (possibly also solar PV) could feasibly compete in auctions for renewable power immediately. While the lame-duck Renewables Obligation remains open to new entrants, there is little incentive for developers to compete in CfD auctions. However, those auctions should begin for projects coming online after the RO expires. **Rather than going through an intermediate stage of technology-specific auctions, for these most mature technologies at least, inter-technology competition should begin sooner – potentially in 2014 or 2015 for projects with a commissioning date after 1st April 2017.**
- **Open descending clock auctions are preferable to sealed bids.** The government's concern about collusion when bids are visible is counteracted both by the value in revealing common information to other bidders, and decisively, in the ability for the auctions to be effectively scrutinised by outside organisations.
- **The government should avoid domestic jobs or supply chain requirements in allocation decisions.** Domestic supply chain requirements have the potential to drive up costs unnecessarily. If components or finished equipment can be sourced more cheaply overseas, then it should be. Job creation has been an alluring but misguided part of the debate around renewable energy. The UK should avoid such provisions in the EMR legislation.

Immature Technologies

- **Technologies that are not ready to compete with others might be auctioned in isolated technology-specific auctions, with a fixed budget.** Those technologies should be subject, within that process, to a reserve price in the auction which corresponds to a descending cost structure, bringing it on competitive terms by a designated time. If the technology proves unable to reach those benchmarks no contracts would be allocated from that auction. The industry-agreed aim of getting offshore wind costs down to £100/MWh for projects beginning in 2020 would be an obvious starting point – one that should be changed from an aspirational target to a hard cap on 2020 prices in the EMR delivery plan strike price structure. Some offshore developers have argued publicly that subsidies should be phased out quickly. Government should be prepared to toughen up the CfD plans to hold them to that. Developers who were unable to reduce their costs would be squeezed out by more efficient companies, and the billpayer would not be on the hook for covering expensive broken promises into the next decade.

Other Recommendations

- **The government should publish an assessment of the interaction between the UK Guarantees Scheme and the CfD regime**, including whether loan guarantees should lead to a discounted strike price, and whether, in some circumstances they are a more cost-effective way of lowering the finance costs of capital intensive energy investments.
- **The government should seek to scrap the EU Renewable Energy Target.** It is a bad piece of policy that imposes unnecessary costs on attempts to decarbonise. It is standing in the way of competition in EMR, underscoring how damaging its effects are.