

Title: Consultation on the Feed-in Tariffs Scheme IA No: BEIS012(C)-18-CE RPC Reference No: N/A Lead department or agency: Department for Business, Energy and Industrial Strategy Other departments or agencies: N/A	Impact Assessment (IA)			
	Date: July 2018			
	Stage: Consultation			
	Source of intervention: Domestic			
	Type of measure: Secondary legislation			
	Contact for enquiries: feedintariff@beis.gov.uk			

Summary: Intervention and Options	RPC Opinion: Not Applicable
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Cost of Preferred (or more likely) Option				
Total Net Present Value	Business Net Present Value	Net cost to business per year (EANDCB in 2014 prices)	One-In, Three-Out	Business Impact Target Status
£1.3bn - £1.9bn	N/A	N/A	Not in scope	Non qualifying provision

What is the problem under consideration? Why is government intervention necessary?
 Electricity generation accounts for over 20% of UK greenhouse gas emissions and without government intervention, market incentives would not have not been sufficient to meet the UK's climate change commitments. The Feed in Tariffs (FIT) scheme was introduced in 2010 to provide support for small-scale low-carbon generation (generation tariff) and a route to market (export tariff). As costs decline, public attitudes change and technology develops, the requirement for government support is reducing. Government proposes to close the current FIT flat rate export tariff, given the government's desire to move towards fairer, cost reflective pricing and the continued drive to minimise support costs on consumers as set out in the Industrial Strategy and Clean Growth Strategy. Further, in 2015, government announced its intention to end generation tariffs for new entrants in March 2019 and is now seeking to implement that decision.

What are the policy objectives and the intended effects?
 The policy intention is to close the scheme to new applicants. Specifically, to limit the impact of the FIT scheme on consumer bills. The primary objective is to close the existing export tariff at the same time the generation tariff will close, on 31 March 2019, so that no new applications will be accepted under the scheme (subject to a number of exceptions) after 31 March 2019. In parallel an administrative measure to the FIT scheme is suggested, specifically allowing net metered exports to be included in the levelisation fund.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)
Option 0 – Do nothing. From March 2019 the flat export tariff continues along with generation tariffs. No administrative changes are made to the scheme. This counterfactual is subject to uncertainty and should be considered illustrative only.
Option 1.a – Close the FIT scheme to new applicants. Implement the 2015 decision to close the generation tariff in March 2019, and close the export tariff in parallel.
Option 1.b – Implement Option 1.a and allow the levelisation of net metered exports (see section 4 for more detail).

Will the policy be reviewed? It will not be reviewed. If applicable, set review date: N/A				
Does implementation go beyond minimum EU requirements?			No	
Are any of these organisations in scope?			Micro Yes	Small Yes
			Medium Yes	Large Yes
What is the CO ₂ equivalent change in greenhouse gas emissions? (Million tonnes CO ₂ equivalent)			Traded: 4 - 10	Non-traded: 0

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible Minister: _____ Date: _____

Summary: Analysis & Evidence Policy Option 1.a

Description: Close the FIT scheme to new applicants

FULL ECONOMIC ASSESSMENT

Price Base Year 2017	PV Base Year 2019	Time Period Years 40	Net Benefit (Present Value (PV)) (£m)		
			Low: £1.3bn	High: £1.8bn	Best Estimate: N/A

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	-	-	£0.3bn
High	-	-	£0.4bn
Best Estimate	-	-	N/A

Description and scale of key monetised costs by 'main affected groups'

Under this policy option, the deployment of small-scale low-carbon generation decreases relative to the 'Do Nothing' baseline. The scale of this impact is uncertain therefore a range is estimated with no central best estimate. The key monetised cost identified is from forgone low-carbon generation being met by marginal grid plants which typically have higher greenhouse gas content (valued at PV £0.3bn to £0.4bn). No other monetised costs have been identified.

Other key non-monetised costs by 'main affected groups'

Non-monetised costs identified for this policy option are:

- a potential reduction in employment in the low-carbon sector from lower deployment (qualitatively assessed); and
- a reduction in air quality from displacing small-scale low-carbon generation with marginal grid generation, which features more thermal generation such as gas (qualitatively assessed).

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	-	-	£1.6bn
High	-	-	£2.2bn
Best Estimate	-	-	N/A

Description and scale of key monetised benefits by 'main affected groups'

The benefits of this policy option are also driven by the estimated reduction in small-scale low-carbon generation, again estimated as a range with no central best estimate. The key monetised benefits identified are: a reduction in the resource costs of electricity generation (valued at PV £1.5bn to £2.2bn) from replacing small-scale generation (higher cost) with marginal grid generation (lower cost); and a reduction in administrative costs to the scheme administrator (valued at PV £7m).

Other key non-monetised benefits by 'main affected groups'

Non-monetised benefits identified for this policy option are:

- A reduction in subsidy support costs to electricity consumers of £90m (2011/12 prices) per year from 2025 as a result of closing the FIT scheme to new applicants; and
- The associated impact on consumer bills from closing the scheme to new applicants. Estimated as a £1 saving to an average household.

Key assumptions/sensitivities/risks

Discount rate (%)

3.5

The largest single uncertainty in this analysis is the choice of deployment scenarios for small-scale low-carbon generation under all the policy options (including Do Nothing). These underpin all the monetised costs, benefits and support costs presented in this assessment. To reflect this uncertainty this assessment does not present a single central scenario. Rather it considers a spectrum of deployment scenarios, and presents two specific scenarios in this appraisal.

BUSINESS ASSESSMENT (Option 1.a)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m: N/A
Costs: N/A	Benefits: N/A	Net: N/A	
			N/A

Summary: Analysis & Evidence Policy Option 1.b

Description: Close the FIT scheme to new applicants and implement an administrative change

FULL ECONOMIC ASSESSMENT

Price Base Year 2017	PV Base Year 2019	Time Period Years 40	Net Benefit (Present Value (PV)) (£m)		
			Low: £1.3bn	High: £1.8bn	Best Estimate: N/A

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	-	-	£0.3bn
High	-	-	£0.4bn
Best Estimate	-	-	N/A

Description and scale of key monetised costs by 'main affected groups'

Same as option 1.a.

Other key non-monetised costs by 'main affected groups'

Same as option 1.a. The introduction of the proposed admin measure would not change how any payments are made to FIT generators. It would ensure that the costs of the scheme, paid by electricity suppliers, are efficiently proportioned amongst suppliers.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	-	-	£1.6bn
High	-	-	£2.2bn
Best Estimate	-	-	N/A

Description and scale of key monetised benefits by 'main affected groups'

Same as option 1.a.

Other key non-monetised benefits by 'main affected groups'

Same as option 1.a.

Key assumptions/sensitivities/risks

Discount rate (%)

3.5

Same as those presented above. Note key assumptions and sensitivities are the same as option 1.a. and explored in more detail in section 5.4.

BUSINESS ASSESSMENT (Option 2.b)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs: N/A	Benefits: N/A	Net: N/A	
			N/A

Section 1: Background, and problem under consideration

The Feed-in Tariff scheme

1. The Feed-in-Tariff (FIT) scheme was introduced to support the widespread adoption of proven small-scale (up to 5MW) low-carbon electricity generating technologies. The scheme was intended to give the wider public a stake in the transition to a low-carbon economy and in turn foster behavioural change that would support the development of local supply chains and reductions in energy costs.
2. The FIT scheme is funded through levies on electricity suppliers, and ultimately consumers, regardless of whether or not they directly participate in the scheme. That is why controlling costs was paramount in the reviews of the scheme in 2011/12¹ and 2015,² the latter of which provided consumers and industry with clarity on levels of small-scale low-carbon electricity support until March 2019.

Section 2: Rationale for intervention

3. Electricity generation has been a significant contributor to greenhouse gas emissions and government intervention has been necessary to ensure market incentives are sufficient to meet the UK's climate change commitments. To this end the FIT scheme has been one of the key enablers in driving the uptake of a range of small-scale low-carbon electricity technologies. As costs decline³ and new, smart technologies become accessible, market incentives are beginning to align with government objectives (see section 5.2 for more detail) meaning that it is important that interventions reflect such development and do not place an undue burden on consumer bills.
4. The specific intervention considered in this impact assessment (IA) is the implementation of the 2015 policy decision to close the scheme's generation tariff in March 2019, in combination with the proposal to also close the export tariff (Option 1.a) and implement an administrative change to the scheme (Option 1.b). The FIT scheme would therefore be closed to new applications from the 31 March 2019 and export tariffs would not be available to new applicants. Exceptions to this rule are set out in the accompanying consultation document. Alongside this proposal, an administrative change to the scheme is also proposed. In the context of declining technology costs and the emergence of smart technologies, these proposals would ensure that the support costs of the FIT scheme are kept under control and that these costs are distributed efficiently.

Section 3: Policy objectives

Closure of the scheme

5. The policy objective regarding the closure of the FIT scheme is to ensure value for money of subsidy support as technology costs decline and limit the impact of future deployment on consumer bills. This builds upon the objective of the 2015 FIT review that sought to control spending under the FIT scheme with the introduction of deployment caps and a £100m budget.

Administrative measure

¹ <https://www.gov.uk/government/consultations/feed-in-tariffs-first-phase-of-a-comprehensive-review>

² <https://www.gov.uk/government/consultations/consultation-on-a-review-of-the-feed-in-tariff-scheme>

³ See 2015 FIT review or more recent evidence from BNEF.

6. The administrative measure proposed is described in more detail in section 4. The policy objective of this measure is to improve the administrative functioning of the scheme.

Section 4: Description of options considered

Option 0: Do nothing

7. This is the baseline counterfactual against which the policy options are compared. The 2015 FIT Review government response announced the decision to end generation tariff support on 31 March 2019⁴; however this change has not yet taken place. Therefore the 'do nothing' baseline presented in this impact assessment consists of continued support under both the generation and export tariff. This baseline counterfactual is subject to uncertainty and should be considered illustrative (more detail on how this scenario is constructed is in section 5.2).
8. The net costs and benefits of this option are zero. For the purposes of this appraisal we assume that in the counterfactual the scheme would run for an additional five years. Over this period deployment would not be constrained by any caps and new applicants would receive both a generation and export tariff.⁵ Estimates of potential levels of deployment and subsidy support are set out in section 5. Consumer support under this option would increase relative to current projections of the cost of the scheme set out by the Office for Budget Responsibility⁶ (OBR) and therefore require larger payments to be levied on consumer bills.

Option 1.a: Implement the 2015 decision to close the generation tariff to new applications, and close the export tariff in parallel

9. This option closes the scheme to new applicants from the 31 March 2019. Specifically, both generation and export tariffs would cease to be available to any new applicants from this date. Exceptions to this rule, such as those granted a pre-accreditation window, are set out in Part A of the accompanying consultation document. Deployment caps and tariffs set out in the 2015 FIT review and administered by Ofgem would remain in place until this date. Any unused capacity accumulated by March 2019 would not be re-allocated. Under this option consumer support under the scheme would be consistent with those reported by the OBR. Unsupported deployment in the future would not receive additional payments, and therefore this policy option avoids additional costs being levied on consumer bills.
10. Government has considered extending the export tariff in a revised form. However, it concluded that the case for this has not yet been made and that it does not yet have sufficient information and evidence on whether (and if so, to what extent) the different sub-sectors within the small-scale low-carbon sector require support; or how to design any new export tariff in a way that protects consumer bills and takes advantage of the developments in the energy market and smart agenda, achieving the vision set out in the Industrial Strategy and Clean Growth Strategy. The call for evidence, accompanying this consultation, looks to address these evidence gaps.

⁴ For further detail, see: <https://www.gov.uk/government/consultations/consultation-on-a-review-of-the-feed-in-tariff-scheme>

⁵ It is assumed tariffs decline with default depression.

⁶ <http://obr.uk/efo/economic-fiscal-outlook-march-2018/>

11. Government is therefore minded to close the scheme in full from March 2019. This option is deemed to meet the aforementioned objectives. Government plans, in the accompanying call for evidence, to work with the sector to consider proposals that are sustainable in the longer term and fit for purpose in a smarter, more flexible and evolving policy context.

Option 1.b: Implement Option 1.a and make an administrative change to the scheme

12. This option would build on Option 1.a by making an administrative change that would amend the delivery of the existing FIT scheme. The change relates to how support costs of the scheme are shared across electricity suppliers – a process known as ‘levelisation’. Specifically, levelisation is the mechanism by which the cost of the FIT scheme is apportioned across all licensed electricity suppliers according to their share of Great Britain’s electricity market, taking into account any applicable exemptions.⁷
13. Currently only the net costs of export tariffs for deemed exports (export tariff payments made to generators under 30 kW) are included in the levelisation process. In practice this means suppliers submit the annual cost of deemed payment, to the levelisation process (in a similar approach to aggregated generation payments). Ofgem then determines the value of these payments based on the Secretary of State’s annual determinations.⁸ Any difference, i.e. net difference, between the two is then factored into the levelisation fund. For example, if total deemed payments made by a supplier exceed the value set by Ofgem then the difference (i.e. the excess paid by the supplier) is included in the levelisation fund. The result being that all suppliers bear an equal proportion of scheme costs.
14. Under this option the levelisation process would be amended to include the net costs of *metered export* payments (i.e. export payments made to generators above 30kW receiving the FIT export tariff) as well as net *deemed export* payments. There would be no change in actual generation or export payments to generators. Rather, the distribution of costs between supplies would change to reflect actual costs to suppliers.

Section 5: Monetised/non-monetised costs and benefits

5.1 Approach to assessing the policy options

15. The framework for assessing the impact of the policy options is based around deployment scenarios of small-scale low-carbon generation under the baseline counterfactual, and subsequently the two policy options. Comparisons are then made between the policy options and the baseline counterfactual to determine the impact across a number of metrics. These deployment scenarios are highly uncertain, therefore a range is estimated and at this stage no central estimate is made (see section 5.2 below for more detail).
16. Based on these deployment scenarios, the following monetised impacts are estimated and included in the cost-benefit analysis:

⁷ For example if a supplier makes 20% of all FIT payments in a given year and their share of the electricity market in that year is 10% then the supplier will be compensated via the levelisation fund. Conversely, a supplier making only 5% of annual FIT payments with a market share in excess 10% in the same year would be required to pay into the levelisation fund.

⁸ <https://www.gov.uk/government/publications/feed-in-tariffs-fits-determinations>

- *Generation costs* – the resources (capital, operating, financing and development costs) used to generate electricity. Primarily this analysis compares the costs of generation from small-scale low-carbon capacity against those of meeting the same level of generation from the GB electricity grid.
 - *Value of greenhouse gas emissions* – varying the mix of small-scale low-carbon generation and generation from the GB electricity grid will affect the levels of greenhouse gas emitted, as a significant share of power from the GB grid – at least in the near term – is from fossil fuel sources.
 - *Administrative costs* – whether the FIT scheme remains open (as under the baseline counterfactual) or closes to new applications (as under options 1.a and 1.b) will affect the costs of administering the scheme. Estimates of this are taken from the current scheme administrator, Ofgem.
17. Details on how these impacts are estimated and monetised is in section 5.4. The monetised costs and benefits are calculated and discounted in accordance with HM Treasury’s *Green Book* and supplementary guidance on valuing energy use and greenhouse gas emissions.⁹
18. Not all of the anticipated impacts of the policy options can be quantified, and for some, where they can be quantified, it is not possible (or appropriate) to include them in the cost-benefit analysis – for example because of methodological differences or double-counting with impacts already captured under ‘Monetised impacts’ above. The non-monetised impacts considered in this assessment are:
- *Impact on jobs* – in scenarios where closing the FIT scheme to new applicants reduces deployment of generation capacity, it is likely that levels of employment in the small-scale low-carbon sector will change. These effects are assessed qualitatively, as based on the evidence available it is not possible to robustly quantify these effects.
 - *Air quality* – similarly to greenhouse gas impacts, where electricity demand is met from the GB grid rather than from small-scale low-carbon generation, there will be a greater use of thermal generation technologies (such as gas) under Options 1.a and 1.b. This will likely have an impact on the air quality around sites where these plants are located. There will also be air quality improvements as less anaerobic digestion generators would be expected to deploy in this scenario. This is assessed qualitatively at this stage.
 - *Support costs and consumer bills* – in scenarios where the FIT scheme closes the level of subsidy support provided from electricity consumers will reduce, which would lead to a reduction in consumer bills compared to if the scheme remained open to new applicants.
19. The deployment scenarios that drive the impacts described here assume that deployment continues for five years after 31 March 2019. This time period should be considered illustrative. The impacts are then assessed over a 40 year period, reflecting the asset lifetime of 35 years from the last installation that is assumed to be made in the year 2024.

⁹ Available here: <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government>

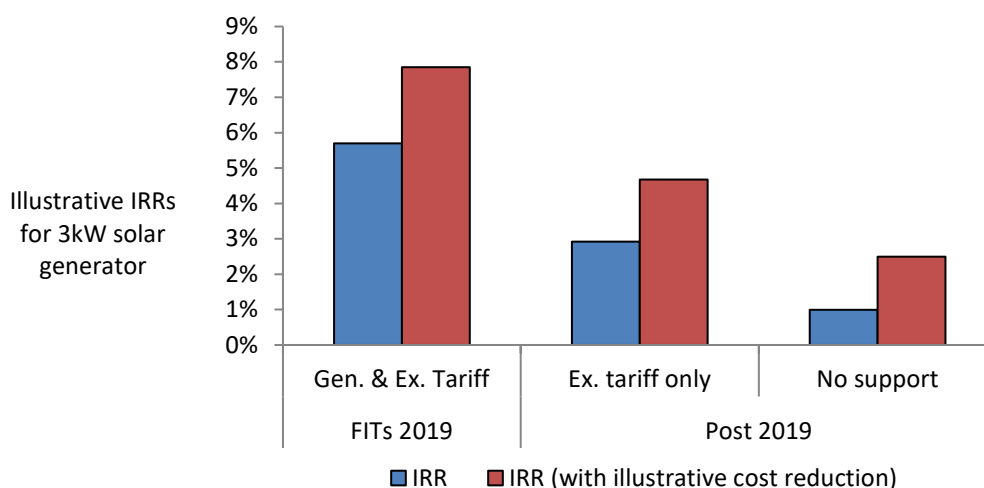
5.2 Deployment scenarios

20. The appraisal methodology in this assessment uses a scenario based approach to understand the uncertainty surrounding future deployment. Multiple scenarios, encompassing varying trajectories of future deployment and generation, are first established and then used to ascertain the potential impact of option 1.a and 1.b relative to the counterfactual of option 0.

Internal Rate of Return

21. The extent to which generators deploy under the baseline and policy options will depend heavily on how attractive it would be to an investor with and without FIT support. The following illustrative graph sets out the economics for a representative 3kW solar generator in three scenarios; where i) generation and export tariffs continue, ii) export tariffs continue only, and iii) all tariff support is removed. Each is shown in turn to demonstrate the marginal impacts of each. Specifically, it considers the internal or expected rate of return of a project (IRR). For more detail on the methodology consult Annex A.

Figure 1: Illustrative IRRs for 3kW solar generator



22. The first scenario, where generation and export tariffs continue (the counterfactual), has the largest IRRs. Holding all other factors constant, this would suggest that this scenario would likely produce the highest levels of future deployment as generation tariffs, export tariffs and bill savings provide the maximum possible revenue to a generator. Conversely, the scenario whereby all support is removed has the lowest IRR and would likely result in the lowest levels of deployment. Note that the private economics are most attractive with FIT support; however, it is likely that even though IRRs will be lower without support they are likely to be sufficient in some cases for deployment to occur, and therefore we would expect to see some – though uncertain – deployment in the absence of FIT support. Indeed, lower generation costs¹⁰ (reflected in the red bars in figure 1) or un-representative characteristics (e.g. high on site consumption) would make the generator economics more attractive.
23. The case whereby the export tariff is maintained, in absence of a generation tariff, is more nuanced. In the illustrative example presented above, the FIT export tariff, in

¹⁰ This analysis assumes a further 10% reduction in capex costs above the rates specified in the 2015 FIT impact assessment.

absence of a generation tariff, has a sizeable impact to the economics of a representative generator. However, in some cases generators will be able to negotiate a power purchase agreement (PPA) at a value above that of the FIT export rate. One could assume that in such circumstances the presence of the FIT export tariff has no bearing on the economics of a project. However, a long-term PPA market may only give revenue security for a few years ahead. Unlike the FIT export tariff they do not necessarily provide revenue security over the lifetime of an asset. Thus in such cases, the export tariff can still provide a boost to the site specific economics of a generator by effectively working as a floor price for the lifetime of the asset. Consequently, one would expect deployment in the presence of an export tariff to exceed deployment in a scenario where both generation and export tariffs are removed. For more detail consult Annex A.

Deployment ranges

24. While it is likely that investor returns with and without FIT support will lead to some level of future deployment, forecasting this is inherently uncertain. Consequently, the approach taken here considers a range of potential deployment scenarios. They can be broadly summarised as follows:

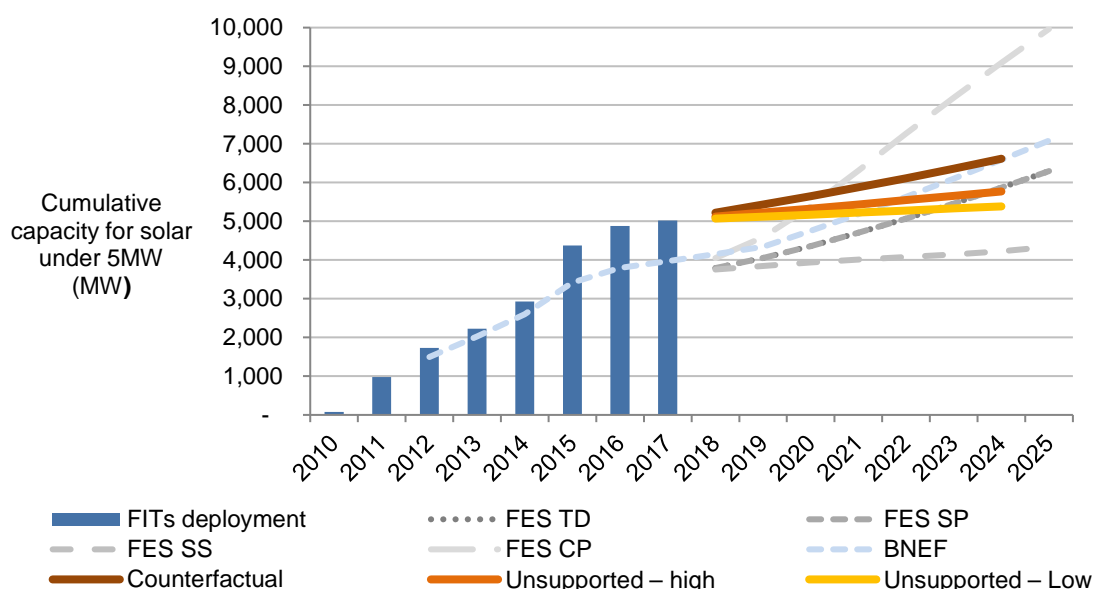
Table 1: Summary of deployment scenarios	
Scenario	Detail of assumptions behind scenario
Supported (counterfactual)	Assumes that future deployment continues along observed trends. Specifically, trends observed since the introduction of deployment caps. Note total applications (which can exceed caps), not granted capacity (which is constrained by caps), is used to establish these trends.
Unsupported – high	Assumes that only half of the deployment observed in previous scenarios comes forwards.
Unsupported – Low	Assumes that only a quarter of deployment in the supported scenario takes place.

25. For example the case of solar (sub 5MW) is presented in figure 2. The blue horizontal bars represent the cumulative installed solar capacity observed under the FIT scheme until the end of 2017. The several dotted grey lines represent deployment scenarios outlined in external publications. In this case these are taken from National Grid’s Future Energy Scenarios¹¹ and Bloomberg New Energy Finance.¹² The solid brown, orange and yellow lines represent the three deployment scenarios used for solar PV in this appraisal. The “supported” (counterfactual) deployment scenario, where the FIT scheme remains open to new applicants, assumes an annual growth of 4% whereas the “unsupported-high” and “unsupported-low” scenarios assume growth rates of 2% and 1% respectively.

¹¹ <http://fes.nationalgrid.com/fes-document/fes-2017/> Note that some of these scenarios are supported deployment whereas others are not. See source for more info.

¹² <https://about.bnef.com/> See NEO 2017 for more info on assumptions used in these forecasts.

Figure 2: Sub 5MW solar deployment



26. In this assessment the counterfactual scenario is assumed to represent the “supported” counterfactual. Specifically, option 0, where generation and export tariffs continue. This is driven by the greater economic incentives due to the scheme remaining open, as outlined in the IRR analysis.
27. Following the same reasoning this assessment assumes that policy option 1.a and option 1.b, whereby FIT payments cease, would be associated with a lower deployment trajectory than the counterfactual. Consequently, this analysis assumes that the “unsupported-high” and “unsupported-low” deployment scenarios reflect the potential deployment ranges of policy option 1.a and option 1.b. Note that the two scenarios used to investigate the impacts of policy option 1.a and option 1.b are a range of possible future deployment levels. It is possible that deployment falls above or below these ranges. Indeed, to reflect this uncertainty no central scenario is considered. For more detail on these assumptions consult Annex B.
28. It would be expected that deployment under an export tariff only support option to also be lower than deployment in the counterfactual. However, it would also be likely that deployment in such a scenario would exceed deployment in the scenarios whereby all support is removed. These conclusions were set out in preceding IRR analysis. Deployment forecasting is inherently uncertain and consequently no specific deployment trajectory for an export tariff only support option has been developed.

5.3 Generation and deployment

29. Table 2 shows the assumed deployment trajectories for the counterfactual, option 0, and intervention, option 1.a and option 1.b, for each FIT technology. As outlined previously the “supported” deployment scenario represents the counterfactual, option 0, and the “unsupported-high” and “unsupported-low” scenarios reflect the possible outcomes of the intervention scenarios, option 1.a and option 1.b. Note there is no central deployment scenario, reflecting the uncertainty on future deployment.

Table 2: Additional capacity (MW) added per annum.						
	2019	2020	2021	2022	2023	2024
Option 0, “supported” Counterfactual						
Solar	210	218	227	236	246	256
Wind	72	78	85	93	101	111
Hydro	16	17	18	19	20	22
AD	19	21	22	23	25	26
mCHP	0.003	0.003	0.003	0.003	0.003	0.003
Option 1.a, “unsupported-high”						
Solar	103	105	107	109	112	114
Wind	34	36	38	39	41	43
Hydro	8	8	8	8	9	9
AD	9	10	10	10	11	11
mCHP	0.001	0.001	0.001	0.001	0.001	0.001
Option 1.a, “unsupported-low”						
Solar	51	51	52	53	53	54
Wind	17	17	18	18	18	19
Hydro	4	4	4	4	4	4
AD	5	5	5	5	5	5
mCHP	0.001	0.001	0.001	0.001	0.001	0.001

30. Generation resulting from the deployed capacities has been calculated by taking the load factor assumptions outlined in the 2015 FIT impact assessment and applying these to the cumulative capacity for the relevant technology in our deployment scenarios. Specifically, these are the load factor assumptions used in setting tariffs. Additionally, for the purposes of this appraisal, total deployment is broken down by various sizes of installations. For example, approximately a quarter of all solar deployment is assumed to be over 50kW, and approximately three quarters at or below 50kW. More detail on these assumptions is outlined in Annex B. No specific assumption on export volumes has been established for this appraisal.

5.4 Monetised costs and benefits

31. The monetised costs and benefits of the policy options, net of the baseline counterfactual, are combined into a net present value estimate. The net present value is calculated as the discounted value of all benefit less the discounted value of all costs. The social discount rates specified in the Green Book guidance have been applied in this assessment. Each monetised cost or benefit is examined here in turn.

Generation cost savings

32. The generation cost savings of option 1.a and option 1.b compared to option 0 is generation forgone from FIT technologies being supplied by cheaper non-FIT technologies via the GB electricity grid. Specifically, this is calculated as the difference between the levelised cost¹³ of FIT generators and the long run variable cost (LRVC) of electricity supply from the GB grid. This assumes that any generation that would have

¹³ A 'levelised cost' is the average cost over the lifetime of the plant per MWh of electricity generated. It reflects the cost of building, operating and decommissioning a generic plant for each technology. Potential revenue streams are not considered. See 2016 BEIS Electricity Generation costs report, available here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/566567/BEIS_Electricity_Generation_Cost_Report.pdf

come from a FIT generator in option 0 is now replaced by generation representing the average marginal GB grid generator in that particular year. Typically, FIT generators have a higher levelised cost, in £/MWh, than the LRVC and therefore there is a net resource benefit from implementing option 1.a and option 1.b.

Table 3: £m, total discounted savings (2017 prices)	
Option 1.a & 1.b, “unsupported-high”	£1,545m
Option 1.a & 1.b: “unsupported-low”	£2,211m

Value of changes in greenhouse gas emissions

33. FIT installations are low-carbon generators and reducing their deployment will result in larger amounts of more carbon intensive generation being sourced from the rest of the GB electricity system. This assessment therefore estimates the value (or cost) of the increase in greenhouse gas emissions associated with reducing deployment of FIT generators. Specifically, the costs associated with reduced deployment of solar, wind and hydro projects are considered.¹⁴ This is estimated by taking the two scenarios of generation forgone by implementing option 1.a and option 1.b and the long run marginal generation based emission factors in the Green Book supplementary guidance. Carbon volumes are then assigned a cost by using the centrally traded carbon values set out in the Green Book supplementary guidance.

Table 4: £m, total discounted carbon costs (2017 prices)	
Option 1.a & 1.b, “unsupported-high”	£257m
Option 1.a & 1.b: “unsupported-low”	£372m

Administrative savings

34. Closing the FIT scheme to new applicants will reduce, albeit not remove, the administrative burden on the scheme administrator, Ofgem. This administrative cost saving, over the entire appraisal lifetime, has been estimated with Ofgem as approximately £7m in 2017 prices. Savings cover the entire appraisal period and are assumed to start in 2020, thus allowing one year of familiarisation and reflecting that processing applications will extend beyond 2019. Savings are assumed to be constant in the intervention scenarios. This appraisal also expects the FIT licensees’ (i.e. electricity suppliers responsible for making FIT payments) administrative costs, which are assumed to be passed through to consumer bills, to reduce; these savings have not been monetised at this stage. Government would welcome evidence on this during the consultation.

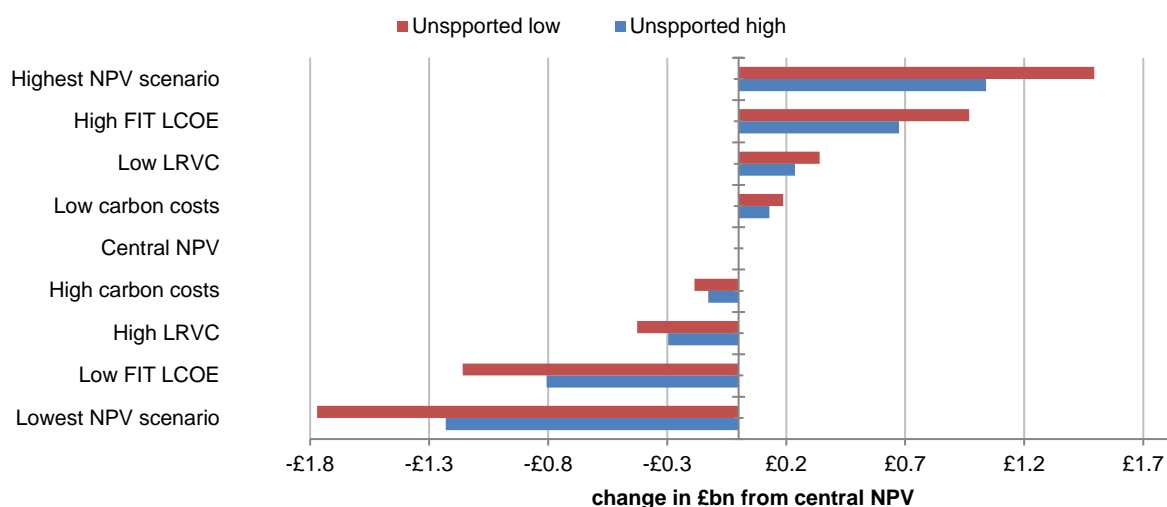
Net present value (NPV)

35. The NPV from implementing options 1.a and 1.b range between £1.3bn and £1.8bn. Note there is no central value reflecting the underlying uncertainty on deployment.
36. The monetised assessment presented here is subject to sensitivity. To reflect this uncertainty the following chart outlines how the NPV changes when the key inputs are changed. Specifically, these inputs are the levelised costs of FIT technologies, the LRVC, and value of greenhouse gas emissions. Broadly speaking: a higher FIT LCOE will

¹⁴ Note that the carbon costs from lower deployment of anaerobic digestions have not been quantified as part of this appraisal.

increase the NPV, a higher LRVC will reduce the NPV, and higher carbon costs will reduce the NPV. These inputs are all assessed individually in the chart below before a highest and lowest NPV case is presented based upon a combination of the inputs.

Figure 3: Changes to the NPV



Lowest NPV scenario is combination of high carbon costs, low FIT LCOE, high LRVC.
 Highest NPV scenario is combination of low carbon costs, high FIT LCOE, low LRVC.

37. The changes in NPV shown in figure 3 do not turn the NPV negative in any of the scenarios examined. This includes the most pessimistic “Lowest NPV scenario”, where combining ‘low’ FIT generation costs with ‘high’ LRVC and high carbon costs reduces the central NPV range almost to zero.

5.5 Non-monetised costs

Impact on jobs

38. Under policy options 1.a and 1.b the assumed reduction in deployment of FIT generators will likely result in decreased employment in the low-carbon sector. The 2017 REA KMMG report¹⁵ said the renewable energy industry employed close to 126,000 people – anaerobic digestion (AD) 2,952, hydro 5,778, wind (including offshore) 41,766 and solar PV 13,687. The ONS low-carbon survey¹⁶ said solar employment in 2016 was 5,000 FTE and onshore wind 5,500 FTE.
39. Given the inherent uncertainty in relation to the number of jobs supported in small-scale low-carbon sector and the extent to which a reduction in deployment would lead to rises or falls in employment in related sectors, employment impacts have not been quantified in this assessment. If feasible, information provided through the consultation will be used to provide an updated assessment of jobs impact in the IA to accompany the government response.

Air quality impacts

¹⁵ http://www.r-e-a.net/upload/final_low_res_renewable_energy_view_-_review_2017.pdf

¹⁶ <https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/finalestimates/2016>

40. Under policy options 1.a and 1.b, small-scale low-carbon generation is replaced by power from the GB grid, which includes generation from thermal plants (such as gas) that can affect air quality. Conversely, a reduction in some FIT generation, such as AD, could lead to a small improvement in air quality. It has not been possible to quantify these impacts in this assessment. The government would welcome evidence on this as part of the consultation.

5.6 Support costs and consumer bill impacts

41. In the counterfactual scenario, option 0, generation payments would continue to be granted to eligible installations post 2019. These payments are ultimately passed on to consumers bills through the levelisation process and would represent costs to consumers.
42. Table 5 shows the additional costs to consumers, above and beyond published OBR projections¹⁷ from allowing generation tariffs to continue post 2019. For the purposes of this appraisal, tariffs post 2019 have been assumed to continue declining with default depression. Note 'additional' in this context is defined as the cost of any supported deployment post 2019 and the end of the existing capped scheme. This does not capture any additional supplier administration costs.

	2019	2020	2021	2022	2023	2024
Solar	6	11	16	21	26	26
Wind	4	8	11	15	19	19
Hydro	1	2	3	4	5	5
AD	7	15	23	31	40	40
mCHP	0	0	0	0	0	0
Total	17	35	53	71	90	90

43. The figures in table 6 show the corresponding additional impact on consumer bills from leaving the FIT scheme open post 2019, i.e. option 0. These figures can also be interpreted as the bill savings from implementing option 1.a and option 1.b. Note that this does not look at the impact of exempting EILs from FIT scheme costs. The outcome of this consultation may impact on the timing for introducing an exemption for Energy Intensive Industries (EILs) from the indirect costs of the FIT scheme. This exemption will have further impacts on electricity prices and bills. A note on these impacts can be found on the BEIS website.¹⁸

¹⁷ See <http://obr.uk/efo/economic-fiscal-outlook-march-2018/>

¹⁸ <https://www.gov.uk/government/consultations/implementing-an-exemption-for-energy-intensive-industries-from-the-indirect-costs-of-the-ro-and-the-fits>

Table 6: Estimated marginal impact of continuation of FIT post 2019 on average price and bills by illustrative group.¹⁹ (annual average across 2019 – 2030, 2017 prices)			
	Marginal impact of FITs on end user's bill	Marginal Price Impact (£/MWh)	Percentage of total electricity bill
Average households (inc VAT)	£1	£0.5	<0.5%
Businesses - small energy users (nearest £100)	£100	£0.5	<0.5%
Business – medium energy users (nearest £1,000)	£3,000	£0.5	<0.5%
Energy Intensive Industries (nearest £10,000)	£30,000	£0.5	<0.5%

44. This appraisal does not monetise potential bill impacts from an export tariff only support option. This is due to the difficulty in estimating deployment under an export tariff only support regime and the difficulty in establishing what constitutes a subsidy. In its current form the FIT export tariff can potentially impact on energy bill payers. For example, the current fixed export tariff does not track the prevailing wholesale price. As such when the value of the export tariff exceeds the wholesale price, as is currently the case, generators may be overcompensated for their export. Indeed, with increasing amounts of intermittent generation on the system the wholesale price may be a poor proxy of the true value of FIT export. Moreover a fixed and flat export tariff does not reflect many of the market signals such as local grid constraints, value varying by time of day or intra season values. Indeed, the current export tariff can disincentivise behaviour viewed as desirable for the purposes of alleviating grid constraints, such as self-consumption or the installation of storage.

5.7 Risks and Uncertainties

45. The largest single uncertainty in this analysis is the choice of deployment scenarios. These underpin all the monetised costs, benefits and support costs presented in this assessment. To reflect this uncertainty this assessment does not present a single central scenario. Rather it considers a spectrum of deployment scenarios, and presents two specific scenarios in this appraisal. Closely associated with deployment scenarios is future capital cost reductions. These are expected to decline alongside technological development; however, there is uncertainty in estimating at what level. If cost declines exceed those assumed in this analysis then the generation cost savings would be overestimated.
46. There is also uncertainty in estimating the value of greenhouse gas emissions associated with implementing option 1.a and option 1.b as this will depend on times of day and seasons that FIT technologies generate in. For example, if onshore wind under FIT

¹⁹ Over the period 2019-2030, an illustrative small business energy user has an assumed electricity consumption of between 230-240MWh per year. An illustrative medium business energy user has an assumed electricity consumption of between 9,800-10,000MWh per year. An illustrative EII has an assumed electricity consumption of 92,000-93,000MWh per year but EII consumption varies significantly from 2,000,000MWh per year to 2,000MWh per year. Assumed electricity consumption is adjusted to take into account policy derived reductions in consumption.

would have generated (i.e. under option 0) at a similar time to when offshore wind under the CFD is the marginal plant on the GB electricity grid, then the greenhouse gas impacts from closing the FIT scheme (i.e. option 1.a and option 1.b) would be zero. Whereas, if a gas plant is the marginal plant there would be an increase in the cost of greenhouse gas emissions associated with closure of the FIT scheme. This level of granularity is not factored in to our analysis.

47. An additional area of uncertainty is the overall impact on the electricity system. The analysis has considered the impact of FIT on generation costs, but at this stage it has not been possible to assess the wider impacts on the electricity system such as network, transmission and balancing costs.

Section 6: Additional impact of Option 1.b, introducing the net costs of metered export payments to levelisation

48. Levelisation is the mechanism by which the costs of the FIT scheme are apportioned across all licensed electricity suppliers according to their share of Great Britain's electricity market. Currently only the net costs of export tariffs for deemed exports²⁰ are included in the levelisation process.
49. The policy proposal under Option 1.b is that net metered export payments be included in the levelisation process.²¹ These are the export payments to metered FIT generators less the value of the export to FIT licensees.²² The current position is that the net costs of metered export payments are borne exclusively by the FIT licensee of each generator under metered export arrangements. FIT licensees making proportionally more metered export payments are thus currently unduly burdened. In practice, this administrative measure would not change how any payments are made to FIT generators but would ensure the costs of metered export payments are more efficiently apportioned amongst suppliers.

Section 7: Summary and preferred options

50. Government is minded to close the FIT scheme to new applicants from the 31 March 2019, and to amend levelisation to include the net costs of metered exports. This would meet the stated objectives of reducing the cost to consumers and ensuring these costs are shared appropriately. Indeed, this analysis indicates that closure of the export tariff alongside the generation tariff would be associated with a NPV of £1.3bn to £1.8bn and ensure additional undue support costs are not levied on bill payers. The latter having been assessed quantifiably and qualitatively.

²⁰ For installations below 30kW the amount exported is 'deemed' at 50% of generation for solar, wind and anaerobic digestion; and at 75% for hydro. Installations over 30kW must have an export meter.

²¹ Note that the levelisation fund consist of other scheme costs in addition to net deemed exports and generation costs. These are not discussed here.

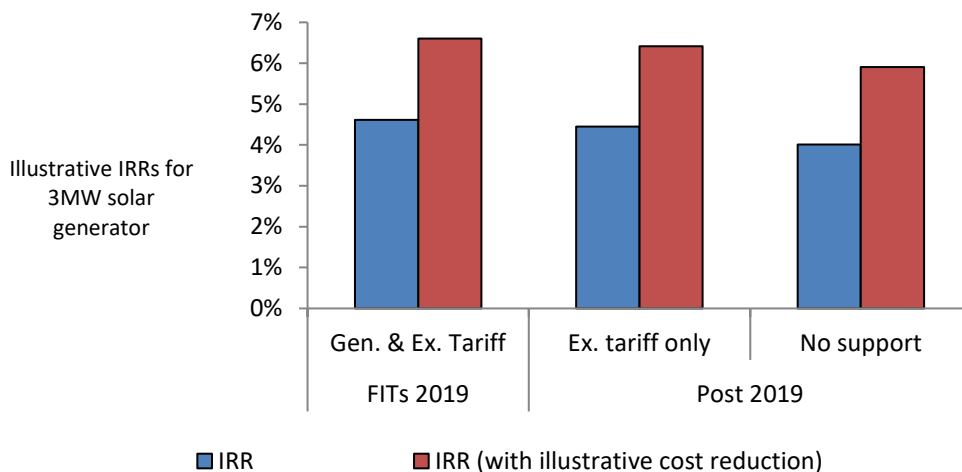
²² Consultation is seeking views on the value of metered export to be used if introduced into the levelisation process.

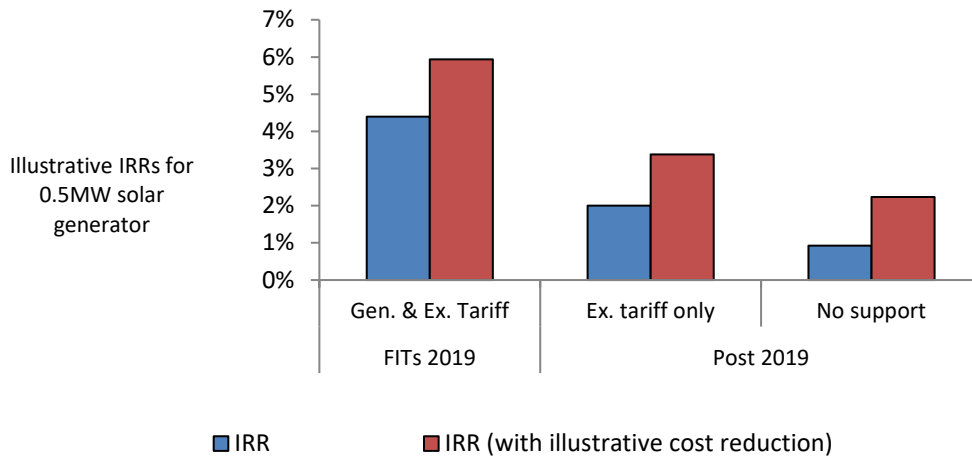
Annexes

Annex A: Internal Rate of Return (IRR) analysis

51. The extent to which generators deploy under the baseline and policy options will depend heavily on how attractive it would be to an investor with and without FIT support. As a result, the first step taken in the choice of deployment scenarios has been to consider how the private economics for a representative generator could potentially change in the future. This assessment has considered how the IRR could change in the future following the removal of any FIT payments. Note an IRR represents the expected return on an investment in a specific generator type and size. All else being equal, a higher IRR would indicate a more profitable generator and a lower expected payback period, and therefore we would expect greater deployment of that type and size of generator.
52. This is also to be considered alongside a hurdle rate – the financial return necessary for a positive investment decision – to determine if a representative project is economically viable. Hurdle rates vary by technology and are closely linked with the perceived risk to an investment. Broadly speaking an established technology that presents a lower risk to an investor would be associated with a lower hurdle rate than a less established or riskier investment. All else being equal, a generator whose IRR matches a specific hurdle rate would be more likely to deploy than a generator whose IRR fell below a specific hurdle rate. Further deployment is likely to be possible for non-representative projects in particular circumstances (for example, with high onsite consumption or where pre-existing grid infrastructure can be utilised).
53. The following graphs present the IRR for two representative wind and solar generators. Both generators were selected as examples given their prominence in the FIT scheme. The impacts should be considered illustrative and many of the mechanisms in this analysis apply across the various FIT generator sizes and technologies.

Figures 4 and 5: IRR for representative solar and wind generators





54. The evidence presented here builds upon the evidence base set out in the 2015 FIT impact assessment and as such should be treated as indicative. Inputs such as the avoided electricity price have been updated based upon BEIS' energy and emission projections.²³ Other inputs such as capex, opex are based upon the evidence base set out in the 2015 FIT impact assessment. These were collected from industry stakeholders at the time and will have likely changed. Indeed, if the removal of support introduces greater perceived financial risk to projects there may be circumstances where hurdle rates increase.
55. Note that in some cases generators will be able to negotiate a PPA at a value above that of the FIT export rate. However, evidence would suggest that the long term PPA market may only give revenue security for a few years, rather than revenue security over the lifetime of an asset. Thus even if the FIT export tariff is never called upon it can still provide a boost to the site specific economics of a generator by effectively working as a floor price. This analysis assumes that generators, excluding residential scale, receive a PPA with a 5% discount to the wholesale price.

²³ <https://www.gov.uk/government/collections/energy-and-emissions-projections>

Annex B: Deployment assumptions

53. The annual capacity growth used in this assessment's deployment scenarios is set out in the following table. These have been based on observed deployment trends under the current scheme. Specifically, applications submitted not applications granted have been used as this is assumed to be a better reflection of potential deployment volumes post 2019 if FIT continued with no caps. The medium and central scenarios are assumed to be a half and quarter of this deployment respectively.

Table 7: Annual capacity growth assumptions			
	Counterfactual	"unsupported-high"	"unsupported-low"
Solar	4%	2%	1%
Wind	9%	5%	2%
Hydro	7%	3%	2%
AD	6%	3%	2%
mCHP	0.7%	0.3%	0.2%

54. Once growth rates have been applied to determine total technology deployment volumes, in additional MW per annum, this analysis takes the next step of breaking capacity between various sizes of installations. This is necessary as different size generators have different costs. Thus making a distinction between different size generators in any given technology is necessary in estimating the NPV and the potential subsidy costs. Specifically, this analysis assumes that observed averages continue in the future. The specific assumptions are outlined in the following table.

Table 8: Assumed proportion of total capacity		
Size	Technology	Proportion of capacity
0 - 10 kW	Solar	63%
10 to ≤ 50 kW	Solar	12%
50 kW to ≤ 5 MW	Solar	25%
<50kW	Wind	20%
50 - 1,500kW	Wind	63%
1,500 - 5000kW	Wind	17%
<=50kW	Hydro	7%
50-500kW	Hydro	31%
500-5MW	Hydro	63%
<=250kW	AD	5%
250-500kW	AD	27%
500-5MW	AD	68%