Title: Smart Export Guarantee **IA No:** BEIS040(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:** 10 June 2019 **Stage: Final** **Source of intervention:** Domestic **Type of measure:** Secondary legislation **Contact for enquiries:** futureofsmallscalesupport@beis.gov.uk
Summary: Intervention and Options	**RPC Opinion:** Not Applicable

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**
-£19m to £8m	N/A	N/A	Not in scope	Non qualifying provision

What is the problem under consideration? Why is government intervention necessary?

Energy supply accounts for over 20% of UK greenhouse gas emissions. Historically, market incentives had not been sufficient to meet the UK's climate change commitments. To this end, the Feed-In Tariffs (FIT) scheme for small-scale low-carbon generation has been successful in supporting over 6GW of deployment to date.

Following the scheme closure in March 2019, an underdeveloped private market presents a significant barrier for small-scale low-carbon generators being able to capture the value of the electricity they export. Some groups of generators may not hold the required information or commercial expertise to negotiate private contracts with suppliers or end users, whilst revenue streams for small-scale generators are limited under current market structures. Without intervention it is unlikely that competition with larger generators will take place on a level playing field.

What are the policy objectives and the intended effects?

The policy objective is to support the transition of small-scale low-carbon generators from the Feed-In Tariffs scheme by ensuring generators receive payment for exported electricity, whilst allowing the space for market competition and innovation. The intended effect is that market led tariffs can come forward which capture the value of this electricity. The scale of impacts is uncertain given that the small-scale low-carbon export market is in early stage development. This has been captured in the range of scenarios analysed.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

Option 0 – Do nothing. No further policy support will be put in place for small-scale generators following the closure of the Feed-In Tariff scheme in March 2019.

Option 1 – Introduce the Smart Export Guarantee. Under the Smart Export Guarantee (SEG) government would legislate for large suppliers (those with more than 150,000 domestic electricity supply customers) to offer remuneration to small-scale low-carbon generators for the electricity they export to the grid. The tariffs offered would be available to all the technologies currently eligible for the Feed-In Tariffs scheme up to 5MW in capacity.

Will the policy be reviewed? It will be reviewed. **See chapter {xx} of the government response**

Does implementation go beyond minimum EU requirements?		No			
Are any of these organisations in scope?	**Micro** No	**Small** No		**Medium** No	**Large** Yes
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)		**Traded:** -0.1, -0.4		**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

Description: Introduction of the Smart Export Guarantee – Large suppliers are mandated to offer an export tariff to small-scale low-carbon generators

FULL ECONOMIC ASSESSMENT

Price Base	PV Base	Time Period	Net Benefit (Present Value (PV)) (£m)		
Year: 2018	**Year:** 2019	**Years:** 42	**Low: -£19m**	**High: £8m**	**Best Estimate:** N/A

COSTS (£m)	**Total Transition** (Constant Price)	Years	**Average Annual** (excl. Transition) (Constant Price)	**Total Cost** (Present Value)
Low	-		-	**£0m**
High	-		-	**£38m**
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 increases relative to the 'Do Nothing' baseline. As the level of the export tariff and new generators' response is uncertain, the amount of deployment is unclear. Therefore, a range is estimated with no central best estimate, to give an indication of the potential impact rather than an exact estimate. The key monetised cost identified is from the higher resource cost associated with generation from small-scale low-carbon technologies compared to the long run variable cost of the GB grid. For Scenario 1, the net resource cost is negative, meaning the generation from small-scale low-carbon generation is cheaper than the marginal unit of electricity provided by the GB grid. This represents a net benefit to society therefore monetised costs in this scenario are £0m. Scenario 2 returns a cost of £38m. The key differences between scenarios is explained in Section 5.2.

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

Non-monetised costs identified for this policy option are:

- An increase in administration costs for suppliers and the scheme administrator.

BENEFITS (£m)	**Total Transition** (Constant Price)	Years	**Average Annual** (excl. Transition) (Constant Price)	**Total Benefit** (Present Value)
Low	-		-	**£8m**
High	-		-	**£19m**
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 increase in small-scale low-carbon generation, again estimated as a range with no central estimate. The key monetised benefits identified are greenhouse gas abatement from displacing marginal grid plants which are more carbon intensive (valued at PV £5m to £19m). As discussed in the costs section, Scenario 1 results in a net resource benefit from increased small-scale low-carbon generation (valued at PV £3m).

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

Non-monetised benefits identified for this policy option are:

- A potential increase in employment, relative to the do-nothing option, in the low-carbon sector from increased deployment (qualitatively assessed).
- An improvement in air quality from displacing marginal grid generation, which features more thermal generation such as gas, with small-scale low-carbon generation (qualitatively assessed).

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. This appraisal considers 7 years of deployment.

BUSINESS ASSESSMENT (Option 1)

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

Section 1: Background, and problem under consideration

1. To date, small-scale low-carbon generation has been driven by The Feed-in-Tariffs (FIT) scheme, with over 6GW of small-scale capacity deployed[1]. The scheme was closed to new applications on March 31st 2019 and the government has been considering what level of support is required for small-scale low-carbon generators. Evidence has been reviewed from the call for evidence[2] (July 2018) and responses received during the Smart Export Guarantee (SEG) consultation (January 2019)[3].

Section 2: Rationale for intervention

2. Electricity generation has been a significant contributor to greenhouse gas emissions and historically 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 with over 6GW of low-carbon electricity deployed under the scheme. As costs decline[4] and new, smart technologies become accessible, market incentives are beginning to align with government objectives.

3. However, an underdeveloped private market presents a significant barrier for small-scale generators being able to capture the value of the electricity they export. Some groups of generators may not hold the required information or commercial expertise to negotiate private contracts with suppliers or end users, whilst revenue streams for small-scale generators are limited under current market structures. Without intervention it is unlikely that competition with larger generators will take place on a level playing field.

4. As we move to a smarter and more efficient energy system, small-scale low-carbon generators are likely to play a significant role, therefore it is important that a route to market for generators is established.

5. The specific intervention considered in this impact assessment is the introduction of the Smart Export Guarantee (SEG).

Section 3: Policy objectives

6. The policy objective is to support the transition of small-scale low-carbon generators from FITs by ensuring small-scale generators receive payment for exported electricity. The tariff that large suppliers are mandated to provide aims to facilitate market interaction between generators and suppliers, such that competition and innovation drives new opportunities for generators to secure tariffs, or other market offerings, reflective of the value of the electricity they export in a given time period. With this aim, the policy has been set so that suppliers have the ability to introduce tariffs that can utilise and accelerate the

[1] https://www.ofgem.gov.uk/publications-and-updates/feed-tariff-fit-annual-report-2017-18

[2] https://www.gov.uk/government/consultations/the-future-for-small-scale-low-carbon-generation-a-call-for-evidence

[3] https://www.gov.uk/government/consultations/the-future-for-small-scale-low-carbon-generation

[4] See 2015 FIT review or more recent evidence from BNEF.

interrelationships between small-scale low-carbon generators and emerging smart technologies, such as storage.
Over time, this is expected to have the transformative effect of incentivising small-scale generators to optimise consumption and export profiles with respect to market conditions and price signals, in turn bringing the sector in line with the wider movement towards a smarter energy system.

Section 4: Description of options considered

Option 0: Do nothing

7. This is the counterfactual against which the policy options are compared. The counterfactual considers the level of small-scale low-carbon generation without any policy support. This reflects the government's decision to close the FITs Scheme from 31 March 2019. The net costs and benefits of this option are zero.

Option 1: Introduction of the Smart Export Guarantee

8. This option is the introduction of the Smart Export Guarantee (SEG). Under the SEG, mandated electricity suppliers will be required to offer small-scale low-carbon generators a tariff (price per KWh) for the electricity they export to the grid. The customer threshold for mandated suppliers has reduced to 150,000 from the proposed 250,000 at consultation stage as a lower threshold is seen to be more equitable, align with other BEIS schemes and facilitate a more competitive export market for eligible small-scale low-carbon generators.

9. Government has considered the responses carefully and decided to legislate for mandated suppliers to offer eligible low carbon generators, as a minimum, a 'simple' flat rate tariff (i.e. option A in the consultation). Remuneration must be greater than zero all times and exported electricity should be metered and registered for settlement in accordance with the BSC. The aim of SEG is that over time suppliers offer smart export tariffs where the price paid varies on a half-hourly basis to reflect the wider electricity system conditions and maximise the benefits available to energy consumers. However, it's recognised that some suppliers will not be ready to move to this type of tariff immediately.

Section 5: Costs and benefits

5.1 Approach to assessing the policy options

10. The framework for assessing the impact of the policy options is based around deployment scenarios of small-scale low-carbon generation under the SEG (policy option 1) and the counterfactual (Do-nothing option). These deployment scenarios are highly uncertain, therefore no attempt has been made to forecast deployment, high and low scenarios are explored instead. Deployment under the SEG is presented as additional deployment against the counterfactual (see section 5.2 below for more detail).

11. Based on these deployment scenarios, the following monetised impacts are estimated and included in the cost-benefit analysis:

- *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. These can be negative (benefits) if the low carbon generation carries a lower resource cost than the variable cost of supply 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.

12. 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.[5]

13. 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 the introduction of the SEG increases 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, including the extent to which jobs in this sector would displace employment elsewhere.
- *Air quality* – similarly to greenhouse gas impacts, where electricity demand is met from small-scale low-carbon generation rather than the GB grid, there will be a reduction in the use of thermal generation technologies (such as gas), resulting in an improvement in the air quality around sites where these plants are located. Where the SEG increases deployment of anaerobic digestion generators, there may be a negative impact on air quality. Anaerobic digestion generators are unlikely to be located in urban areas, where air quality is a particular issue.
- *Consumer bills* –The overall impact on consumer bills is uncertain however there is not expected to be a direct impact on consumer bills from the introduction of the SEG. As suppliers under the SEG set their own tariff for exported electricity, tariffs can be set so that net costs to suppliers are avoided. The SEG is therefore unlikely to carry any policy costs which are typically paid for by final consumers. Other potential consumer bill impacts are outlined in section 5.6.
- *Fuel poverty and energy efficiency* – Where onsite generation leads to reduced bills for those households on low incomes facing high energy costs, this can alleviate fuel poverty while also contributing to the government's 2030 fuel poverty target and Clean Growth Strategy aspiration for as many homes as possible to be EPC Band C by 2035.

[5] Available here: https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent and https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal

- *Administration Costs* – The introduction of the SEG is expected to result in an administration cost for suppliers. These have not been estimated as it is expected that the costs facing mandated suppliers will vary widely dependent on their approach for implementing the SEG and is therefore highly uncertain. The scheme administrator will also face administration costs. There is not sufficient evidence to estimate these costs at this stage, although we expect them to be significantly less than the costs of administering the FITs scheme, given the light touch nature of the Authority's role, in line with the market based approach of SEG.

5.2 Deployment scenarios

14. The appraisal methodology in this assessment uses a scenario-based approach to take account of 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 relative to the counterfactual of the Do-nothing option.

15. The deployment scenarios that drive the impacts described here assume that that the SEG scheme is implemented for 7 years after June 2019. The impacts are assessed over a 42 year period, reflecting the asset lifetime of 35 years from the last installation that is assumed to be made in the year 2026 (the last assumed year that the SEG would be available in).

Deployment ranges

16. Under Option 1, mandated suppliers are able to set tariffs, so long as they are above zero. The response to any tariff offered will in turn depend on the business model adopted by prospective small-scale low-carbon generators. Given there are a wide range of possible business models that small-scale generators could deploy under, the deployment scenarios chosen for this analysis are not intended to be forecasts but illustrative of a range of different potential impacts that the SEG may have on deployment. The deployment scenarios are summarised in Table 1.

17. The difference between the deployment scenarios is driven by changing assumptions about how much generators can consume the power they generate on-site. On site consumption means generators can avoid drawing power down from the grid at the retail price of electricity. This means that by generating on-site they can achieve bill savings which are expected to be significantly greater than any available export payment. A higher level of self-consumption increases bill savings and the overall revenue stream for generators, leading to a greater return on investment. The greater the possible return on investment, the larger the number of generators that should be in scope to benefit from the SEG. The extent to which higher levels of on-site consumption is possible (e.g. via the use of battery storage) is uncertain, therefore we vary this assumption between the two scenarios.

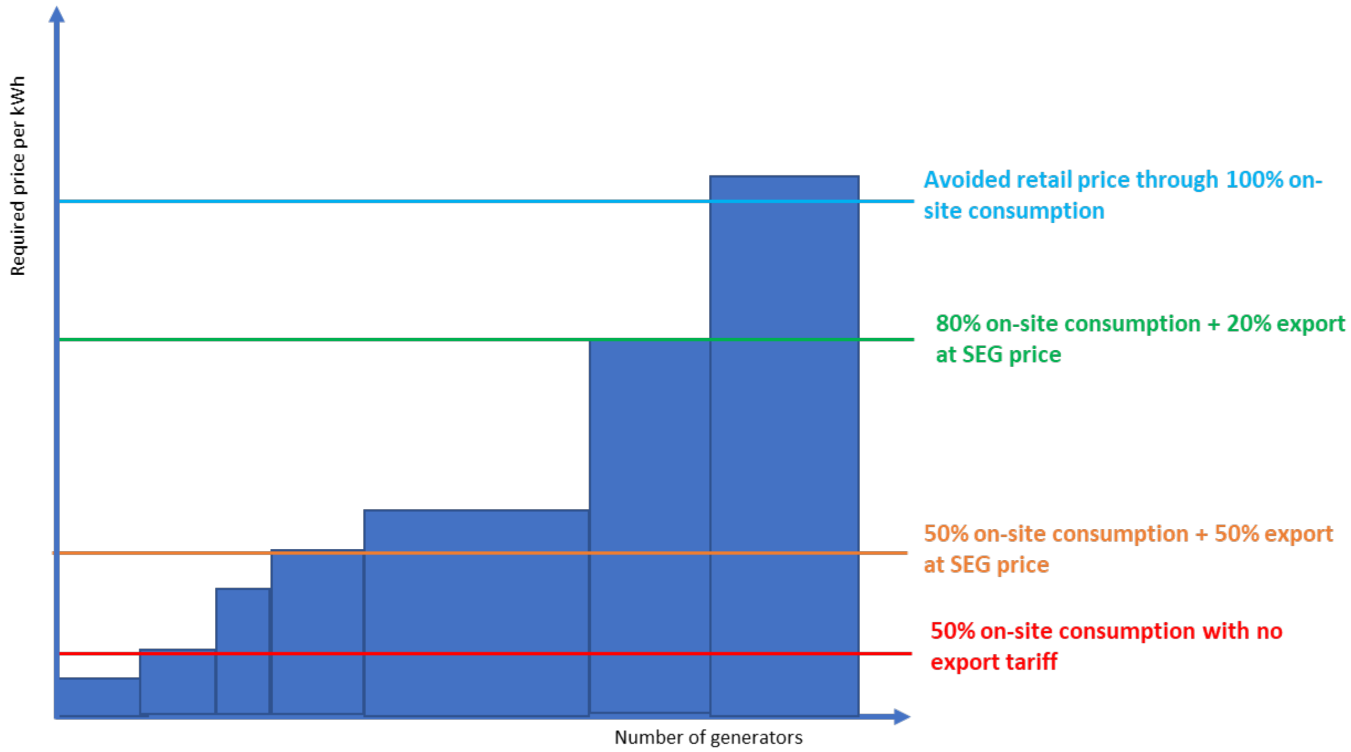
18. Figure 1 demonstrates the effect that self-consumption rates have on revenue and consequently the difference in deployment rates under the two illustrative SEG scenarios. If the SEG incentivises deployment at lower levels of self-consumption, as in Scenario 1, the revenue stream is restricted by higher levels

of export, therefore the levelised cost of electricity (LCOE) of those generators would have to be relatively low in order to be a viable investment. Consequently, deployment is restricted as only a small number of generators can operate at lower levelised costs. On the other side, if the SEG provides an additional incentive to deploy amongst generators that can achieve high self-consumption rates, the total revenue streams will be greater, meaning the LCOE would not be required to be as low. When the LCOE requirement is relaxed, a greater number of generators are in scope to benefit from the scheme.

Table 1: Summary of deployment scenarios

Scenario	Details of assumption behind scenario
Unsupported (counterfactual)	In most cases the most valuable revenue stream for generators is bill savings, therefore it's likely some generators that can operate at high levels of self-consumption will deploy independently of whether the SEG is in place.
SEG Scenario 1	Assumes that the SEG incentivises increased deployment from generators that can't achieve high levels of self-consumption and therefore can't deploy without a guaranteed export payment in place. Typically, generators that could deploy in this scenario would only be ones that can generate at a low cost as measured by the LCOE. As a result, deployment levels would be relatively low.
SEG Scenario 2	Assumes generators that can achieve higher levels of self-consumption are incentivised to increase deployment with the introduction of SEG. This means that even plants that cannot achieve the very lowest generation costs are able to increase deployment resulting in increased deployment across generators with higher levelised costs.

Figure 1: Illustration of self-consumption and impact on deployment rates under the SEG[6]



[6] This is intended to be a graphical representation rather than estimates of different revenue streams and levelised costs

5.3 Generation and deployment

19. Table 2 shows the deployment trajectories for the two scenarios under Option 1, net of the counterfactual, for each small-scale low-carbon technology under the SEG. These trajectories are illustrative of future deployment that receives a SEG tariff, rather than a forecast of total future small-scale low-carbon deployment. Note there is no central deployment scenario. This reflects the uncertainty over future deployment given the nascent state of the small-scale low-carbon export market.

20. Proposed changes to network charging under Ofgem's Targeted Charging Review[7] could affect the deployment incentives for small scale generators, and these have not been explicitly considered in the analysis as final announcements have not yet been made.

Table 2 Additional capacity per year against the counterfactual (MW)

	2019	2020	2021	2022	2023	2024	2025	2026
Scenario 1								
Solar	3.1	3.1	3.2	3.2	3.3	3.3	3.4	3.4
Wind	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5
Hydro	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
AD	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
mCHP[8]	0	0	0	0	0	0	0	0
SEG Scenario 2								
Solar	11.0	11.2	11.4	11.6	11.8	12.0	12.2	12.4
Wind	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.7
Hydro	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5
AD	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
mCHP	0	0	0	0	0	0	0	0

21. Generation resulting from the deployed capacities has been calculated by taking the load factor assumptions outlined in the 2015 FIT impact assessment[9] and applying these to the cumulative capacity for the relevant technology in our deployment scenarios.

5.4 Monetised costs and benefits

22. The monetised costs and benefits of the policy options, net of the counterfactual, are combined into a net present value estimate. The net present value is calculated as the discounted value of all benefits less the discounted value of all costs. The social discount rates specified in the Green Book guidance have been applied in this assessment.

Additional generation costs/benefits

[7] https://www.ofgem.gov.uk/publications-and-updates/targeted-charging-review-minded-decision-and-draft-impact-assessment

[8] Micro CHP deployment is rounded to 0.

[9] https://www.gov.uk/government/consultations/consultation-on-a-review-of-the-feed-in-tariff-scheme

23. The generation costs of the SEG compared to the Do-Nothing counterfactual results in cheaper, larger scale technologies via the GB electricity grid being displaced by small-scale low-carbon generation technologies. Specifically, this is calculated as the difference between the levelised cost[10] of small-scale generators and the long run variable cost (LRVC) of electricity supply from the GB grid[11].

24. Typically, small-scale generators have a higher levelised cost, in £/MWh, than the LRVC which drives the resource cost seen in Scenario 2. In contrast, Scenario 1 evaluates deployment where only the most efficient small-scale generators are able to deploy under the SEG. The LCOEs of these generators are lower to the point where the cost per unit of electricity generated by these sources is cheaper than the variable cost of the GB electricity grid. As a result, there is a resource benefit in this scenario. The impacts have changed from the consultation impact assessment due to updated technology costs and carbon assumptions

Table 3: £m, total discounted resource impacts (2018 prices)	
"SEG Scenario 1"	£3m (benefit)
"SEG Scenario 2"	£38m (cost)

Value of changes in greenhouse gas emissions

25. Small-scale installations under the SEG are low-carbon generators and increasing their deployment will result in the displacement of larger amounts of more carbon intensive generation from the rest of the GB electricity system. This assessment therefore estimates the value of the decrease in greenhouse gas emissions associated with increasing deployment of small-scale generators.

26. Specifically, the costs associated with increased deployment of solar, wind and hydro projects are considered.[12] This is estimated by taking the two SEG deployment scenarios, estimating the generation that would be displaced in the GB electricity grid as a result, using the long run marginal generation based emission factors in the Green Book supplementary guidance to estimate the carbon displaced. The volumes of carbon saved are then assigned a value by using the centrally traded carbon values set out in the Green Book supplementary guidance (sensitivities on high and low carbon values are shown in Figure 2).

Table 4: £m, total discounted carbon savings (2018 prices)	
Option 1, "SEG Scenario 1"	£5m
Option 1: "SEG Scenario 2"	£19m

Net present value (NPV)

[10] 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

[11] The LRVC values used are presented in the Green Book supplementary guidance

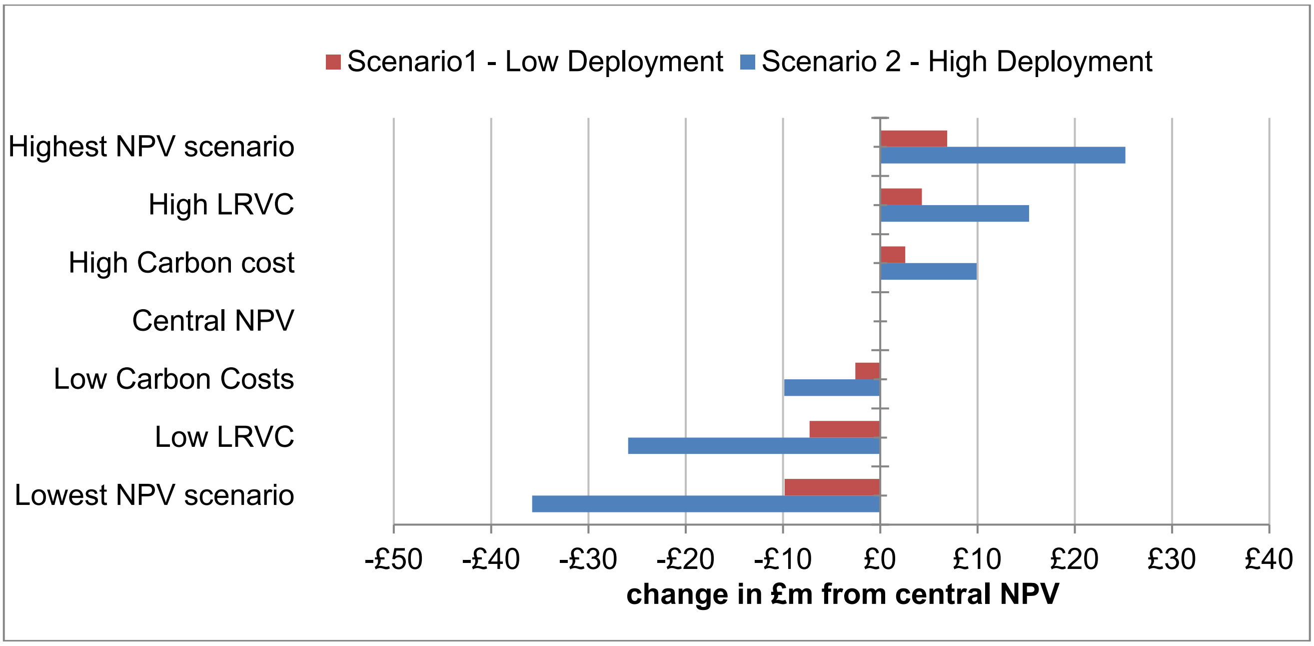
[12] Note that the carbon savings from increased deployment of anaerobic digestions or MicroCHP have not been quantified as part of this appraisal due to insufficient data availability.

27. The NPV from implementing the SEG range between -£19m and £8m. Note there is no central value reflecting the underlying uncertainty on deployment.

28. Scenario 1 returns a positive NPV, however for Scenario 2, the monetised costs outweigh the monetised benefits. The key difference between the scenarios is the assumed levelised cost of deployment, therefore the analysis shows that if the SEG incentivises deployment across the most cost-effective business models, as in Scenario 1, then there is a higher probability of the economic impact from the SEG being positive. The impact on different business models is uncertain, however the fact that the magnitude of the NPV under scenario 2 is small - particularly over an appraisal period of 42 years - gives confidence that any negative economic impact from the SEG would be minimal, especially as this analysis hasn't quantified other potential benefits such as increased employment and improved air quality. As the NPV estimates are close to zero, it is important to consider a range of sensitives on key assumptions.

29. To reflect the uncertainty in this analysis, the following chart outlines how the NPV changes relative to the central NPV when the key inputs are changed. Specifically, these inputs are the long run variable cost of electricity supply (LRVC), and value of greenhouse gas emissions. The LCOE for SEG technologies are fixed for each scenario, so there is no individual sensitivity analysis for this assumption. Broadly speaking, a higher LCOE will decrease the NPV, a higher LRVC will increase the NPV, and higher carbon costs will increase 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 2: Changes to the NPV[13]



30. The sensitivity analysis shows that the magnitude of the NPV doesn't change significantly when key assumptions are changed, given the length of the time period considered for this appraisal, although the results are sensitive to key

[13] Note that this is the change relative to the central estimate, not the actual NPV returned

assumptions For Scenario 1, the lowest NPV scenario turns negative, demonstrating that under lower carbon costs and lower variable cost of the GB, small-scale generators are no longer as cost-efficient compared to the GB grid, resulting in a resource cost which offsets the benefit of carbon savings. Scenario 2, which is negative under central assumptions, turns positive in the highest NPV scenario, with the higher carbon prices and higher grid costs assumed having the opposite impact as outlined for Scenario 1. This introduces some additional uncertainty over whether the net impact of the introduction of the SEG

31. Overall, the NPVs returned across the range of scenarios and sensitivities are marginal, indicating that the SEG is unlikely to have a significant economic impact. BEIS projections for small-scale levelised costs indicate a downward trajectory, suggesting that the net resource cost in future years may be minimal or even reversed to a resource benefit for some technologies. If this is the case, then any costs associated with supporting small-scale low-carbon generators in the short term may be offset by providing the foundation for growth and further cost reductions over the medium to long term. On balance, the marginal effects of introducing the SEG suggest that the policy objectives can be achieved with relatively neutral economic impact.

5.5 Non-monetised Impacts

Impact on jobs

32. Under policy option 1 the assumed increase in deployment of small-scale generators will likely result in increased employment in the small-scale sector relative to the do-nothing option. Although it is not possible to quantify the impacts, there is evidence that the SEG will help to support a sector which supports a significant number of jobs. The 2017 REA KMMG report[14] said the low-carbon 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 survey[15] said solar employment in 2017 was 4,700 FTE and onshore wind 5,300 FTE.

Air quality impacts

33. Under policy option 1, small-scale low-carbon generation replaces power from the GB grid, which includes generation from thermal plants (such as gas) that can affect air quality. Conversely, an increase in some small-scale generation, such as AD, could lead to a small reduction in air quality. It has not been possible to quantify these impacts in this assessment due to lack of data availability.

Administration Costs

34. The SEG is expected to impose an additional administration cost on mandated suppliers. These have not been estimated at this stage due to uncertainties about how obligated suppliers would intend to implement the SEG. However, as the SEG framework allows suppliers a high degree of flexibility in setting tariffs, suppliers can consider the relationship between these costs and different tariff

[14] http://www.r-e-a.net/upload/final_low_res_renewable_energy_view_-_review_2017.pdf
[15] https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/finalestimates/2017

options. We anticipate this will minimise administration costs with respect to each suppliers' objectives under the SEG.

5.6 Consumer bill impacts

35. It is expected that suppliers will set tariffs so that any administration costs incurred through the SEG are offset and that a surplus can be made in the retail market. As a result, there is a minimal risk that consumers could face any direct policy costs passed on to bills from the SEG.

36. There are two avenues through which the SEG could lead to reduced consumer prices. Firstly, if suppliers offer a tariff lower than the wholesale price, this would represent a cost saving which could be passed on to consumers. Secondly, increased small-scale generation may decrease demand in the wholesale market in turn reducing the wholesale price.

37. On the other hand, increased behind the meter deployment under the SEG will increase the policy and network costs paid by other consumers. Behind the meter generators currently avoid these costs, therefore increased deployment will result in a redistribution to other consumers. At the levels of additional deployment presented in this analysis it is expected that the marginal costs attributable directly to the SEG would be small.

38. Where onsite generation leads to reduced bills for those with relatively high energy bills and low incomes, this can lead to a reduction in fuel poverty. Respondents to the call for evidence highlighted the benefits that on-site generation from renewable technologies have brought to those in fuel poverty and the importance of an export tariff for these projects. Responses to the consultation reinforced this, as well as outlining that the bankability of projects that benefit these groups will rely heavily on the specific terms offered under SEG tariffs.

5.7 Risks and Uncertainties

39. The largest uncertainty in this analysis is the deployment of small-scale generators with and without the SEG. These underpin all the monetised costs and benefits 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. With higher levels of additional deployment under the SEG, the magnitude of the NPVs would increase. Given there is uncertainty around deployment levels there is a risk that the overall economic impacts are understated.

40. Closely associated with deployment scenarios are future capital cost reductions. Costs are expected to decline alongside technological development; however, there is uncertainty in estimating at what level. Different levelised cost estimates were not tested in the sensitivity analysis as 'low' and 'central' estimates are one of the main differences between the two illustrative deployment scenarios. In Scenario 1, where only low-cost deployment increases, the NPV is positive, highlighting that where the SEG enables deployment of the most cost-efficient technologies there is a positive benefit to society.

41. There is also uncertainty in estimating the value of greenhouse gas emissions associated with implementing option 1 as this will depend on times of day and seasons that SEG technologies generate in. For example, if onshore wind with a SEG tariff generates under option 1 at a similar time to when offshore wind is the marginal plant on the GB electricity grid, then the greenhouse gas impacts from introducing the SEG scheme would be zero. Whereas if a gas plant is the marginal plant there would be an increase in the benefit of greenhouse gas emissions associated with the introduction of the scheme. This level of granularity is not factored in to our analysis. There is a risk that not taking this into account could change whether the NPV was positive or negative, however given the magnitude of the NPVs would most likely remain small, the impact of this risk is judged to be low.

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

43. Uncertainties have, where possible, been tested quantitatively through a broad range of sensitivity analysis. The results are sensitive to different estimates for key assumptions, however given the magnitude of the NPVs is not significant under the different tests, it’s unlikely that the SEG would have a substantial economic impact, giving confidence in the conclusion drawn from this analysis.

Section 6: Summary and Preferred Option

44. The preferred option is to implement option 1, the introduction of the Smart Export Guarantee. The analysis of monetised costs and benefits is not definitive as to the overall economic impact of the policy. The key determinant will be the cost of small-scale low-carbon generation under the SEG, as demonstrated by the difference in NPV between the two scenarios considered. If only the most cost-efficient technologies deploy under the scheme, then there is likely to be a net positive benefit to society. The central aim of ensuring revenue streams come forward that are reflective of the market value of export should drive efficient deployment. Under this competitive framework, market signals place a greater incentive on generators to minimise costs and manage efficient business models that can operate under smart principles, which in turn may help deliver value to the GB electricity system.