

<b>Title:</b> Government response on changes to financial support for solar PV projects at 5MW and below under the Renewables Obligation <b>IA No:</b> DECC0192 <b>Lead department or agency:</b> Department of Energy and Climate Change <b>Other departments or agencies:</b> HMT, Defra, CLG, BIS, Scotland Office, Welsh Office, Northern Ireland Office	<b>Impact Assessment (IA)</b>		
	<b>Date:</b> 17/12/2015		
	<b>Stage:</b> Development/Options		
	<b>Source of intervention:</b> Domestic		
	<b>Type of measure:</b> Secondary legislation		
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<b>Summary: Intervention and Options</b>	<b>RPC:</b> 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 (EANCB on 2009 prices)	In scope of One-In, Three-Out?	Measure qualifies as
£605m	N/A	N/A	No	N/A

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

Renewable electricity deployment is currently supported through the Renewables Obligation, Contracts for Difference, and Feed In Tariffs. This includes solar projects at or below 5MW capacity. The costs of these schemes are managed through the Levy Control Framework, which sets annual limits on the overall costs imposed on consumers by DECC's levy funded policies. In the absence of intervention, it is likely that there will be significantly higher deployment of and spending on solar than previously expected. In addition, costs of solar have fallen significantly since support levels were set in 2012. Government intervention is therefore required to reduce projected spending under the Levy Control Framework.

**What are the policy objectives and the intended effects?**

The proposed interventions intend to limit projected spending under the Renewables Obligation, while not harming projects that have already made significant financial commitments. This is to limit the impact on the LCF of significantly greater solar deployment than previously anticipated.

The preferred option would result in a reduction in deployment of solar projects at or below 5MW under the Renewables Obligation compared to current forecasts, which would reduce projected spending under the Levy Control Framework from 2016/17 onwards.

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

To limit the deployment of solar PV at or below 5MW, the following proposals were considered:

- Option 1: Do Nothing;
- Option 2: Early closure to the RO from 1 April 2016, combined with the removal of grandfathered support for new projects from 22 July 2015; and

Option 2 is the preferred option, as it would limit spend on solar PV as early as possible, while providing certainty to projects that have made a significant financial commitment. Either intervention in option 2 on its own is unlikely to have as much of an effect as is intended. The removal of grandfathered support is assessed in IA DECC0201.

<b>Will the policy be reviewed?</b> It will not be reviewed. <b>If applicable, set review date:</b> Month/Year					
Does implementation go beyond minimum EU requirements?			Yes / No / N/A		
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.	<b>Micro</b> No	<b>&lt; 20</b> Yes	<b>Small</b> Yes	<b>Medium</b> Yes	<b>Large</b> Yes
What is the CO <sub>2</sub> equivalent change in greenhouse gas emissions? (Million tonnes CO <sub>2</sub> equivalent)			<b>Traded:</b> N/A	<b>Non-traded:</b> N/A	

*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: 16/12/2015

# Summary: Analysis & Evidence

# Policy Option 1

**Description:** Early closure to the RO from 1 April 2016. Projects that had applied for planning permission, had accepted a grid connection offer and had land rights as of 22<sup>nd</sup> July 2015 qualify for a grace period. Under this, they will receive the current ROC support rate if they accredit by the end of 2015/16. They are permitted to accredit until the end of 2016/17, though if the project accredits in 2016/17 its level of support will be determined by the outcome of the Banding Review.

## FULL ECONOMIC ASSESSMENT

Price Base 2014	PV Base Year 2016	Time Period Years 25	Net Benefit (Present Value (PV)) (£m)		
			Low: £455	High: £755	Best Estimate: £605

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	N/A	30	420
High	N/A	50	695
Best Estimate	N/A	40	560

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

The monetised costs are the increase in costs of EU Emissions Trading Scheme allowance (EUA) purchases to the UK power sector compared to the 'Do Nothing' option. As less solar PV is deployed, generation from fossil fuels increases and as a consequence more EUAs are purchased. The displaced solar generation is assumed to be replaced by existing gas plants increasing their output, given relatively low amounts of solar generation displaced.

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

Wider impacts of a reduction in solar deployment (e.g. on employment in the sector). There may be some air quality impacts due to increased fossil fuel generation. There may also be some administrative costs to Ofgem.

The potential indirect impacts on other renewables investment have not been considered.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	N/A	50	870
High	N/A	85	1,455
Best Estimate	N/A	70	1,160

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

The monetised benefits are lower resource costs of generating electricity through alternatives rather than solar PV as a result of reduced solar PV deployment compared to the 'Do Nothing' option. The solar generation is assumed to be replaced by existing gas plants increasing their output. For these plants, the short-run marginal cost is below the levelised cost of solar, and hence there is a resource benefit.

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

Wider system impacts of any decrease in system balancing costs due to lower levels of intermittent solar PV generation.

In the 'do nothing' option, there is greater pressure on the LCF and therefore also on consumer bills – the intervention reduces deployment and therefore spend under the LCF and impact on consumer bills.

Key assumptions/sensitivities/risks

Discount rate (%) 3.5%

The high and low ranges reflect uncertainty around:

- The level, speed and cost of future solar PV deployment.
- What generation fills the gap of the reduction in solar generation – it is assumed to be gas generation, but it could be alternatives. This is discussed as a sensitivity in the main document.
- The risk that solar PV deployment that would have come forward under the RO either accelerates and comes forward in 2015/16, or transfers to Feed-in Tariffs. Both effects would reduce savings.

## BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: N/A	Benefits: N/A	Net: N/A	No	N/A

# 1. Strategic overview

1. The EU Renewable Energy Directive commits the UK to meeting 15% of its energy needs from renewable sources by 2020. The Renewables Obligation (RO), introduced in 2002, has been the Government's main financial policy mechanism for incentivising the deployment of large scale renewable electricity generation in the UK including solar PV at or below 5 Megawatts (MW). The RO places an obligation on UK electricity suppliers to source an increasing proportion of the electricity they supply from renewable sources. Renewable Obligation Certificates (ROCs) are issued to operators of accredited renewable generating stations for the eligible renewable electricity they generate. ROCs are then used by suppliers to demonstrate that they have met their obligation.
2. Different technologies receive different levels of support under the RO, reflecting their underlying costs. The support levels that currently apply were set in 2012, as part of the Renewables Obligation Banding Review. This set support levels for the RO from April 1<sup>st</sup> 2013 to 31<sup>st</sup> March 2017.<sup>1</sup>
3. Under current policy, the RO will close to all new renewable generating capacity from 1 April 2017 (with grace periods), whilst maintaining support for existing generating capacity in the scheme out to their respective end dates (of which the latest would be 31<sup>st</sup> March 2037).
4. The Levy Control Framework (LCF) sets annual limits on the overall cost of DECC's levy funded policies. The proposed closure of the RO to small scale (<5MW) solar was consulted on in response to the Office of Budgetary Responsibility's (OBR) LCF projections in July, which showed the LCF was forecast to exceed its caps in every year out to 2020/21. The updated projections published by the OBR on 25 July showed that this continues to be the case if no action to control projected costs is taken. As the costs of the levy funded schemes are paid for by consumers through their energy bills, the Government takes potential risks to the LCF very seriously and will act where necessary to ensure that costs are contained and that consumers receive value for money from initiatives supported by the LCF.
5. DECC took action to close the RO to large-scale (>5 MW) solar in October 2014.<sup>2</sup> It has also consulted on and responded to the consultation on removing grandfathering for biomass conversions, and has also announced early closure of the RO to onshore wind.<sup>3</sup>
6. This impact assessment only assesses the effects of the closure of the RO to solar projects up to and including 5MW from the end of 2015/16. The impacts of the Banding Review and the removal of grandfathering for projects not meeting the grace period criteria are assessed in a separate impact assessment. This is published alongside the consultation on the proposed new bands for solar projects up to and including 5MW.<sup>4</sup>

## 2. Rationale for intervention/policy objective

7. As set out above, the Government Response to the RO Banding Review in December 2012 announced RO bands for the period 1 April 2013 to 31 March 2017. DECC stated that the levels of ROC support were intended to encourage slow but steady deployment of solar PV. Support rates reduced over the period, from 1.6 ROCs per MWh of ground-mounted solar in

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<sup>1</sup> <https://www.gov.uk/government/consultations/renewables-obligation-banding-review>

<sup>2</sup> <https://www.gov.uk/government/consultations/consultation-on-changes-to-financial-support-for-solar-pv>

<sup>3</sup> <https://www.gov.uk/government/news/changes-to-onshore-wind-subsidies-protect-investment-and-get-the-best-deal-for-bill-payers>

<sup>4</sup> <https://www.gov.uk/government/consultations/consultation-on-the-level-of-banded-support-for-new-solar-pv-under-the-renewables-obligation>

2013/14 to 1.2 ROCs in 2016/17, reflecting cost reductions expected over the period at the time of the Banding Review.

8. On 2 October 2014, the Department of Energy and Climate Change (DECC) published a response to a consultation on changes to financial support for solar PV, confirming the decision to close the RO to new solar PV generating stations above 5 MW in scale from 1 April 2015, and to additional capacity added to existing accredited stations from that date, where the station is, or would become, above 5 MW.
9. Information available at the time of the consultation suggested that projects of 5 MW and below formed a relatively small part of the expected future solar PV deployment under the RO. The rate of deployment of these smaller solar PV projects was assessed as posing a lower risk to the LCF when compared to the risk from projects above 5 MW in size. It was therefore decided to keep the RO open to new solar PV projects at or below 5 MW until 31 March 2017.
10. However, the Government stated in the Government response that 'consistent with our responsibility for managing RO expenditure under the LCF and mindful of how quickly the solar sector has adapted to past policy changes we will continue to monitor the deployment pipeline. As indicated in our consultation document, if this monitoring indicates deployment is growing more rapidly than can be afforded we will consider taking measures to protect the LCF'.
11. Subsequent monitoring suggests that deployment of solar projects at 5 MW and below is likely to be significantly greater than anticipated in DECC's previous forecasting (see Table 1 below). At the time of the RO closure for projects greater than 5 MW, it was estimated that 300-500 MW of solar at 5 MW and below would come forward in each of 2015/16 and 2016/17.
12. DECC has updated its assessment of the solar PV pipeline using the Renewable Electricity Planning Database (REPD), industry commentary and discussions with Distribution Network Operators (DNOs)<sup>5</sup> with solar experts. While there is considerable uncertainty about solar deployment in general, the evidence indicates that the potential for deployment is increasing substantially. The updated estimates used in the consultation ranged from 800 MW to 2 GW each year in 2015/16 and 2016/17.
13. While no information was received during the consultation that challenged this assessment of future deployment, deployment estimates in both 2015/16 and 2016/17 have been revised. This is based on updated information from the Renewable Energy Planning Database (REPD), which has shown significant numbers of projects that have applied for and received planning permission in 2015/16. As in the impact assessment for the Banding Review, this includes:
  - Around 100 MW of projects that have either accredited or are under construction;
  - Up to 1 GW of projects that have planning approval and are awaiting construction;
  - Up to 300MW of projects that applied for planning approval prior to the 22<sup>nd</sup> July that have yet to find out the outcome of their application; and
  - Up to 500MW of projects that have applied for planning permission since the announcement to close the RO to solar on the 22<sup>nd</sup> July.
14. As per the RO Banding Review IA, this would suggest a maximum of 1.8 GW could come forward in 2015/16. The low estimate is 1.2 GW, and the central is taken as the midpoint (1.5GW). There is considerable uncertainty about this – for example, the announcement on

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<sup>5</sup> For solar projects to go ahead, they need a connection which comes from the DNO.

the 22<sup>nd</sup> July could have prompted a rush of applications, to accredit before the end of 2015/16 even without the grace period. Conversely, it could have resulted in projects that were planning to apply not doing so, given the removal of grandfathering and proposed lower banding for support. These effects are assumed to be equivalent, and so solar deployment in 2015/16 is estimated to be 1.2-1.8 GW.

15. Deployment in 2016/17 that would have come forward in the absence of intervention is estimated using the same baseline information. 2015/16 is assumed to be indicative of 2016/17, even though the support rate was due to decline to 1.2 ROCs. This reflects the falling costs of solar. Given that solar deployment has tended to increase year on year, the deployment assumed that would have come forward in 2016/17 is 1.2-2 GW, with a central estimate of 1.6GW.
16. Combined with higher deployment than previously anticipated, there is also evidence from the first CfD allocation round to suggest that solar PV costs have dropped significantly since the last banding review completed in 2012.
17. The December 2013 Electricity Generation costs report concluded that for solar projects commissioning in 2016 the levelised cost would be £104/MWh, with a range from £97/MWh to £111/MWh,<sup>6</sup> falling to £72-£81/MWh by 2025. The fact that the 2014 CfD allocation round saw three solar projects clearing for the 2016/17 delivery year at £79.23/MWh<sup>7</sup> suggests that levelised cost reductions in the solar industry have occurred at a much faster rate than DECC previously estimated when setting the support rate under the RO, and consequently under CfDs.<sup>8</sup> This suggests that some solar projects are receiving more support under the RO than would be required for them to construct.
18. DECC has also recently undertaken a review of costs across technologies. The result for solar, published alongside the consultation for the Banding Review for solar projects up to and including 5MW<sup>9</sup> suggests that the levelised cost of a solar project coming forward in 2016 is £88.60/MWh, in £2014 prices. The levelised cost is based on the capital expenditure (“capex”) and operating expenditure (“opex”) figures published in the evidence update, and is significantly lower than previous levelised costs estimates.
19. In the absence of intervention, it is therefore likely that deployment is higher than the previous estimates. The updated estimates are set out in Table 1 below, which sets out both the deployment estimates and the LCF spend associated with the estimates.

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[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/269888/131217\\_Electricity\\_Generation\\_costs\\_report\\_December\\_2013\\_Final.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/269888/131217_Electricity_Generation_costs_report_December_2013_Final.pdf). This range of levelised costs reflects variation in capital costs for projects commissioning in 2014 at the technological specific hurdle rate (estimates are in 2012 values). In addition to capital costs, solar PV levelised cost estimates are particularly sensitive to assumptions around hurdle rates, load factors, and cost reduction trajectories. DECC is currently undertaking an update to its generation cost estimates, however these are not yet available.

<sup>7</sup> <https://www.gov.uk/government/statistics/cfd-auction-allocation-round-one-a-breakdown-of-the-outcome-by-technology-year-and-clearing-price>  
There were also two projects that cleared in 2015/16 at £50, though neither of these projects signed their contracts. It is important to note that there is a difference between the strike price for CfDs and the levelised cost.

<sup>8</sup> While the likely costs of these projects are not necessarily reflective of the costs of projects up to and including 5MW, the data gathered by Arup on the costs of solar generation, published alongside this document, and the WSP Parsons Brinckerhoff report into costs of solar projects under FITs both suggest that solar costs have fallen rapidly. The WSP Parsons Brinckerhoff report is available at <https://www.gov.uk/government/consultations/consultation-on-a-review-of-the-feed-in-tariff-scheme>, and the Arup solar evidence is available at [www.gov.uk/government/consultations/consultation-on-the-level-of-banded-support-for-new-solar-pv-under-the-renewables-obligation](http://www.gov.uk/government/consultations/consultation-on-the-level-of-banded-support-for-new-solar-pv-under-the-renewables-obligation)

<sup>9</sup> [www.gov.uk/government/consultations/consultation-on-the-level-of-banded-support-for-new-solar-pv-under-the-renewables-obligation](http://www.gov.uk/government/consultations/consultation-on-the-level-of-banded-support-for-new-solar-pv-under-the-renewables-obligation)

**Table 1: Deployment and annual spend on solar PV projects at or below 5MW (2011/12 prices)<sup>10</sup>**

			Low	Central	High
DECC view - from IA October 2014	2015/16	Deployment (MW)	300	400	500
		Spend in 2020/21 (£m)	15	20	25
	2016/17	Deployment (MW)	300	400	500
		Spend in 2020/21 (£m)	15	20	25
DECC view - consultation	2016/17	Deployment (MW)	800	1,250	2,000
		Spend in 2020/21 (£m)	40	60	100
DECC view - now	2016/17	Deployment (MW)	1,200	1,600	2,000
		Spend in 2020/21 (£m)	60	80	100
Difference in spend in 2020/21 (£11/12m)	2016/17, new vs old deployment estimate		+45	+60	+75

20. For consumers, the equivalent impact on average household electricity bills for the deployment projections as of October 2014 are £0.20 in 2020/21, based on the central deployment scenario (range from £0.20 to £0.30, all figures rounded to the nearest 10p). For the deployment as set out in the consultation, the equivalent impact on average household electricity bills is £0.80 in 2020/21, with a range from £0.50 to £1.20.

### 3. Description of options considered

21. The following options have been considered:
- Option 1 : Do Nothing
  - Option 2: Early closure to the RO from 1 April 2016, combined with the removal of grandfathered support for new projects from 22 July 2015
22. The consultation also included an option of restricting deployment under the RO through a capacity or supplier cap. This is no longer considered as an option, as early closure is felt to be the better way of achieving the policy aim.

<sup>10</sup> Please note that in this table, and throughout the document, figures are given to the closest £5m. Figures here and throughout may not sum precisely due to rounding.

## **Option 1 – ‘Do Nothing’**

23. Under this option, no further intervention would be taken on solar at or below 5 MW within the RO, and such projects would continue to be able to accredit until the end of March 2017. As set out above, we would anticipate 1.2 GW – 2 GW to accredit each year. This would increase the size of the RO relative to previous estimates, and mean that a greater proportion of the LCF is spent on the RO.
24. From here on, 1.2 GW per year is referred to as the “low” scenario, 1.6 GW is the “central” scenario, 2 GW is the “high” scenario.

## **Option 2: Early closure to the RO from 1 April 2016, combined with the removal of grandfathered support for new projects from 22 July 2015**

25. The early closure to accreditation for new solar projects of 5 MW and below (and additional capacity added to an accredited solar PV station up to 5 MW) would apply from 1 April 2016, thus projects (or additional capacity) not accrediting by 31 March 2016 would not be eligible for support under the RO.
26. New solar PV projects of 5 MW and below (and additional capacity added to an accredited solar PV station from 1 April 2016 up to 5MW) will continue to be eligible to enter the RO after 31 March 2016 (until the full closure of the RO on 31 March 2017) if one of the following criteria is met:
  - Preliminary accreditation under the RO has been obtained for the station (or additional capacity) on or before 22 July 2015
  - Significant financial commitments<sup>11</sup> have been made on or before 22 July 2015
  - Delays in the planned grid connection to the electricity grid occur due to factors outside developers’ control
27. This Government response is confirming the closure of the RO from the end of 2015/16 for new generation. The exception is for plants that meet the grace period criteria as set out in paragraph 26. These plants will be able to accredit up until the end of 2016/17.
28. Alongside this Government response, DECC has also published a consultation on the Banding Review for solar projects.<sup>12</sup> The level of support proposed in the Banding Review consultation is intended to apply to projects that do not meet the criteria for significant financial commitment and accredit either in 2015/16 or in 2016/17. These are the projects for which grandfathering has been removed. More information on the removal of grandfathering and the Banding Review is set out in the consultation and accompanying impact assessment.

## **4. Impact of shortlisted options**

29. This section outlines the monetised and non-monetised costs and benefits of option 2 – the early closure to the RO in 2016/17 combined with a banding review combined with an end to grandfathering in 2015/16. This is assessed against the baseline of doing nothing, as set out in option 1.

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<sup>11</sup> The consultation proposes that developers will be able to qualify for this where they can provide evidence of a valid planning application, grid connection agreement and land rights on or before 22 July 2015.

<sup>12</sup> [www.gov.uk/government/consultations/consultation-on-the-level-of-banded-support-for-new-solar-pv-under-the-renewables-obligation](http://www.gov.uk/government/consultations/consultation-on-the-level-of-banded-support-for-new-solar-pv-under-the-renewables-obligation)

## Option 1 – ‘Do Nothing’

30. If there is no intervention, it is currently estimated that between 1.2 GW and 2 GW of solar comes forward.
31. These deployment scenarios for 2016/17 equate to a spend range under the LCF of around £60m to around £100m per year from when the plants are operational. This spending would continue for 20 years, and would come from consumer bills.
32. This is the baseline against which the interventions are assessed.

## Option 2: Option 2: Early closure to the RO from 1 April 2016, combined with the removal of grandfathered support for new projects from 22 July 2015

33. This option is (i) early closure of the RO to solar PV of 5 MW and below from 1 April 2016, combined with (ii) removal of grandfathering for new projects that do not meet the significant financial commitment milestone, as of 22 July 2015, and a banding review for these projects.
34. The two strands have different effects on deployment and thus spend.
  - (i) *Early closure*
35. The early closure to the RO will take effect from 1 April 2016 and would be expected to result in no solar deployment in 2016/17 under the RO. This would reduce deployment by an estimated 1.6 GW (central scenario) with the low estimate being 1.2 GW and the high estimate 2 GW (see Table 2 below).
36. It is possible that projects that qualify for a grace period may still be able to deploy in 2016/17. It is, however, expected that projects qualifying for the grace period to deploy in 2015/16, given the usual speed of solar deployment at this size.
37. Support for solar PV projects of 5 MW and below remains open under the Feed-In Tariffs (FITs). This may offset some of the financial control intended through these measures.<sup>13</sup>
38. It is estimated that the early closure of the RO would lead to a reduction of spending under the LCF of between £60m and £100m per annum from when plants are fully operational (see Table 2 below), in the low and high scenarios.
39. For consumers, the impact on average household electricity bills could be a decrease in of £1.00 in 2020/21, based on the central deployment scenario, with a range from £0.70 to £1.20. Figures are rounded to the nearest 10p, and are in 2014 prices.

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<sup>13</sup> The Government response to the FITs consultation is published alongside this Government response, and is available at <https://www.gov.uk/government/consultations/consultation-on-a-review-of-the-feed-in-tariff-scheme>



**Table 2: Solar PV deployment at 5MW and below from 2016/17 onwards and associated spend in 2020/21 on updated deployment projections under Option 2 (2011/12 prices)**

	Deployment scenario	Low	Central	High
Option 1 – Do Nothing	Deployment (MW)	1,200	1,600	2,000
	LCF spend in 2020/21 (£m)	60	80	100
Option 2 – closure solar PV at 5 MW and below from 1 April 2016	Change in LCF spend compared to 'Do Nothing' (£11/12m)	-60	-80	-100

40. Given that solar projects with a capacity of 5 MW and below can also deploy under FITs, there is the possibility that savings are not as high as set out above, as projects may transfer to FITs. It is difficult to say at this stage by how much this could reduce savings. However, DECC has also announced the introduction of greater financial controls under the FITs scheme, which will mean that the potential impact of projects transferring into FITs is limited.

*(ii) Removal of grandfathering, and Banding Review*

41. The removal of grandfathering will take effect from the day of the publication of the consultation, alongside measures to close the RO to all solar developers from 1 April 2016. This is covered in more detail in the consultation on the Banding Review (which has been published alongside this Government Response).<sup>14</sup>

**Monetised impacts**

42. The monetised costs and benefits associated with this option are set out below. The low, central and high scenarios correspond to 1.2 GW, 1.6 GW and 2 GW of deployment respectively per year. The monetised impacts are calculated in line with the DECC Greenhouse Gas appraisal guidance, and are in 2014 prices, rounded to the nearest £5m.

*Costs*

43. As less solar PV is deployed, generation from alternative sources increases to meet electricity demand. There is uncertainty as to what will replace the solar PV generation that has been displaced; it could be replaced by new generating capacity being built, or it could be replaced with increased generation from existing capacity. Given the relatively small amounts of generation (2 GW of solar corresponds to a little under 2 terawatt hours (TWh) of generation), it is assumed in this instance that existing electricity generating capacity can produce a higher level of output. In practice, this is assumed to occur through CCGT (gas) plants increasing their output. As such, the resource costs of the replacement generation are the short-run marginal cost of CCGT generation, and the carbon costs are the additional carbon emissions.<sup>15</sup>

<sup>14</sup> [www.gov.uk/government/consultations/consultation-on-the-level-of-banded-support-for-new-solar-pv-under-the-renewables-obligation](http://www.gov.uk/government/consultations/consultation-on-the-level-of-banded-support-for-new-solar-pv-under-the-renewables-obligation)

<sup>15</sup> This differs from the approach in the consultation impact assessment, reflecting an updated methodology in assessing changes in renewables deployment – now, small changes in generation are assumed to be replaced by increased gas generation from the existing gas fleet. This also differs from the FITs impact assessment alongside the Government response to the FITs review. In this, the generation is assumed to be replaced by the LRVC. This is because gas is assumed less able to increase its output to meet the higher amount of generation displaced under the FITs intervention. The FITs impact assessment is available at <https://www.gov.uk/government/consultations/consultation-on-a-review-of-the-feed-in-tariff-scheme>

44. Alternatively, the displaced solar generation may be replaced by the grid average – i.e. the existing electricity generating capacity would not be assumed to be able to increase its output sufficiently to compensate for the displaced generation. This is the Long Run Variable Cost (LRVC) of electricity generation. The LRVC represents the average cost of providing a MWh of electricity, across a range of generating technologies (both renewable and non-renewable). As the amount of generation is relatively small, this is not assumed to be the case for this intervention. This option is, however, included as a sensitivity in the analysis below.
45. These additional emissions are valued at the DECC central traded carbon appraisal values.<sup>16</sup> Over the lifetime, if the solar generation is replaced by CCGT generation, there is estimated to be an additional 10.8 to 18.0 tonnes of CO<sub>2</sub> emissions. The present value of costs is estimated to be £560m, with a range from £420m to £695m. If instead the solar generation is replaced by the grid average, there is estimated to be an additional 4.4 to 7.4 tonnes of CO<sub>2</sub> emissions. The present value of costs in this instance is estimated to be £165m (central scenario), with a range of £120m (low scenario) to £205m (high scenario). These figures are included in Table 3 below as EU Emissions Trading Scheme Allowance (EUA) costs (see Table 3).

### *Benefits*

46. The main benefit is the lower level of lifetime resource costs. This is the difference between the levelised cost estimates of solar PV projects at or below 5 MW and the replacement generation, which is assumed to be short run marginal cost (SRMC) of electricity supply from CCGT.<sup>17</sup> A sensitivity is included where the displaced solar generation is replaced by the grid average generation, as measured by the LRVC.<sup>18</sup>
47. The SRMC of CCGT (generally £30-£45/MWh) is significantly lower than the levelised cost of solar of £88.60/MWh, meaning that there is a significant resource benefit of replacing solar generation with CCGT. For the sensitivity, the LRVC is higher than the SRMC of CCGT (starting around £55/MWh before rising towards around £90/MWh – both figures with transmission and distribution costs removed), but remains slightly lower than the levelised cost of solar over the lifetime of the plants. Therefore, there remains a resource benefit of replacing solar generation with the grid average, though this is significantly lower than the benefit of replacing it with CCGT.
48. The net present value (NPV) of Option 2, relative to Option 1, is set out in table 4 below. This is calculated as the NPV of lifetime resource costs under Option 2 relative to Option 1, less the NPV of lifetime EUA. The sensitivity – of replacing solar generation with the grid average – is also included.
49. In conclusion, it is preferable to take action under the RO to limit spend (and therefore deployment) of solar PV projects at or below 5 MW compared to the Do Nothing option. This is partly because of the higher Net Present Value (NPV), and partly because of the lower cost to consumers through the LCF.

<sup>16</sup> Table 1 available at <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>

<sup>17</sup> For both the LRVC and the cost of gas, values are assumed to change over time. The assumed LRVC is available in Table 9 of <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>. It has been adjusted to remove transmission and distribution costs, to make it more comparable with the levelised cost measure. The cost of gas is based on DECC internal analysis.

<sup>18</sup> For this analysis, the transmission and distribution costs are removed from the LRVC, so that it is more comparable to the levelised cost of solar generation. A weighted average of the LRVC from the domestic, commercial and industrial sectors is also used.

**Table 3: Net Present Value of Option 2 relative to do nothing (2014 prices)**

Deployment Scenario	Low	Central	High
<b>Replaced by CCGT generation</b>			
Lifetime resource benefits, present value	870	1,160	1,455
Lifetime EUA costs, present value	-420	-560	-695
<b>NPV (£m, 2014 prices)</b>	<b>455</b>	<b>605</b>	<b>755</b>
<b>Replaced by grid average generation</b>			
Lifetime resource costs, present value	70	95	120
Lifetime EUA costs, present value	-120	-165	-205
<b>NPV (£m, 2014 prices)</b>	<b>-50</b>	<b>-65</b>	<b>-80</b>

### Non-monetised impacts

#### Costs

50. The monetised costs and benefits above do not include several wider impacts, principally those relating to security of supply, the UK meeting its environmental targets, and potential macroeconomic effects. These are covered below, though given the level of solar PV deployment projected in this impact assessment, these impacts are likely to be small.
51. Security of supply impacts: The Do Nothing option (option 1) would marginally reduce reliance on imported fossil fuels relative to Option 2, but would also increase the amount of intermittent generation, which would increase the need for grid balancing services. The costs of any additional balancing services have not been quantified. They will depend on the overall level and composition of intermittent generation on the grid, meaning it is difficult to isolate the costs associated with slight increases in solar PV deployment alone.
52. Risk of missing 2020 renewables target: Option 2 may marginally increase the risk of missing the 2020 renewables energy target and interim targets by reducing solar PV deployment under the RO in the UK compared to the do-nothing option. However, the risk of this occurring as a result of this action alone (given the relatively small overall contribution of solar) is considered to be small.
53. Macroeconomic impacts: Growth in the UK solar PV sector is anticipated to be lower under Option 2. However, certain resources are likely to be redeployed into other sectors, meaning any net impact on GDP is likely to be very small. While this could reduce the number of people employed in the solar sector, the net impact on UK-wide employment is uncertain.
54. Environmental Issues: Option 2 will lead to lower levels of solar PV deployment and hence marginally increased carbon emissions within the UK power sector relative to Option 1 (the do nothing option), but these will be offset by decreases in emissions elsewhere in the EU within the capped EU-ETS traded emissions sector. It is therefore expected there will be no net impact on greenhouse gas emissions within the EU. Given the expected change in electricity generated through solar PV is small under Option 2, compared to total UK electricity generation, the resulting impact on air quality from a change in the generation mix is expected to be small.

55. Administrative costs: Ofgem may face one-off administrative costs from the grace periods policy. These costs are paid for through the buyout fund and so do not increase the overall costs of the scheme, but instead mean those electricity suppliers that submit ROCs receive slightly less back from the buyout fund than they would have done otherwise. To put this into context, Ofgem's administration cost if the RO in 2014/15 were £3.9m, which represents 0.12% of the scheme.<sup>19</sup>
56. Ofgem is likely to incur a small administrative cost associated with identifying stations from whom grandfathering has been removed. However, as the detail of how this would be implemented is currently undecided, it is not possible to quantify the impact.
57. Impact on other renewables investment: There is a risk that intervention under the RO increases uncertainty around support for renewables deployment in the UK, beyond the impact on solar. Developers may put their plans on hold until there is certainty about the scale of any potential future allocation rounds. However, the action to manage spending under the RO is necessary to manage future funding under the LCF across the renewables sectors. Solar PV at 5MW and below will remain able to deploy under FITs.

## 5. Summary

58. As in the consultation, the preferred option is to close the RO to new build solar PV projects at or below 5 MW from 1 April 2016. It reduces projected spending under the LCF and has a positive NPV. This is set out in Table 3.
59. Table 3 does not include the impact of the removal of grandfathering or the effects of a potential Banding Review. These are covered in the consultation document and impact assessment published alongside this Government response and accompanying impact assessment.

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<sup>19</sup> <https://www.ofgem.gov.uk/ofgem-publications/89616/commentperiodon2014-15roadmincosts.pdf>