

Summary: Analysis & Evidence

Policy Option 2

Description: RO closure to Solar PV above 5MW from April 2015 with grace periods

FULL ECONOMIC ASSESSMENT

Price Base 2012	PV Base 2013/14	Time Period Years 29	Net Benefit (Present Value (PV)) (£m)		
			Low: £480m	High: £710m	Best Estimate: £480m ¹

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost ² (Present Value)
Low	N/A	£8	£250
High	N/A	£11	£310
Best Estimate	N/A	£9	£260

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 is deployed, generation from fossil fuels increases and as a consequence more EUAs are purchased, compared to the Do Nothing option).

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

Wider impacts of a reduction in solar deployment (e.g. on employment in the sector). Air quality impacts due to increased fossil fuel generation. Increased risk of UK failing to meet 2020 renewables target.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit ³ (Present Value)
Low	N/A	£26	£740
High	N/A	£35	£1020
Best Estimate	N/A	£26	£740

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

The monetised benefits are the lower resource costs of generating electricity through cheaper alternatives rather than solar PV, due to reduced solar PV uptake compared to the Do Nothing option.

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

Wider macroeconomic impacts of any decrease in electricity prices due to lower levels of solar PV generation.

Key assumptions/sensitivities/risks

Discount rate (%) 3.5%

Please note that the low estimate quoted in this sheet is consistent with the central deployment estimate. Please see section 5 for a fuller explanation.

Uncertainty exists around:

- The level, speed and cost of future solar PV deployment
- The level of future deployment of other renewable technologies to 2020.
- The level of future fossil fuel prices

BUSINESS ASSESSMENT

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

¹ Figures may not add due to rounding.

² Figures are rounded to the nearest £10m

³ Figures are rounded to the nearest £10m

Evidence Base

The evidence base is set out as follows:

1. Strategic overview;
2. Rationale for intervention / policy objective;
3. Description of options considered;
4. Impacts of shortlisted options considered;
5. Summary and response option.

1. Strategic overview

- 1.1. 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, is currently the Government's main financial policy mechanism for incentivising the deployment of large scale renewable electricity generation in the UK. The RO places an obligation on UK electricity suppliers to source an increasing proportion of the electricity they supply from renewable sources. Renewables 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 obligation⁴.
- 1.2. Since the introduction of the RO in 2002, there has been a significant increase in the UK's renewable generation, from 1.8% to 14.9% in 2013. The RO will close to new renewable generating capacity from 1st April 2017⁵, whilst maintaining support for existing generating capacity in the scheme out to their respective end dates (of which the latest would be expected in 2037). As part of the Electricity Market Reform (EMR), large-scale renewable electricity will be eligible to receive support through the new Feed-in Tariff with Contract-for-Difference scheme (CfD). The first allocation round will open on 16 October 2014.
- 1.3. The Levy Control Framework (LCF) sets annual limits on the overall cost of DECC's levy funded policies⁶. As the LCF forms one overall capped amount, any increase in spend for one sector under these financial incentives will reduce the level of support available for other sectors within the Framework. 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.

4 If suppliers do not present a sufficient number of ROCs to Ofgem (who administer the scheme) to meet their obligation, they can pay an equivalent amount into a buy-out fund, which is re-distributed to those that submit ROCs once Ofgem's administration costs are paid for. Further detail on the Renewables Obligation can be found on Ofgem's website: <https://www.ofgem.gov.uk/environmental-programmes/renewables-obligation-ro>

⁵ The Renewables Obligation Closure 2014 came into effect on 9th September 2014 and provides, subjected to limited grace periods, for the RO to close to new capacity from 31 March 2017.

⁶ The LCF covers the Renewables Obligation, the small-scale Feed-In Tariffs scheme, Warm Homes, Investment Contracts for the Final Investment Decision Enabling for Renewables process, and Contracts for Difference.

2. Rationale for intervention / policy objective

- 2.1. The Government Response to the RO Banding Review and the last comprehensive banding review of RO support in December 2012⁷, announced RO bands for the period 1st April 2013 to 31st March 2017 that will contribute towards growth in renewable electricity deployment to help meet the UK's 2020 renewable energy targets. At the conclusion of the last comprehensive banding review of RO support in December 2012⁸, DECC stated that the levels of ROC support were intended to encourage slow but steady deployment of solar PV.
- 2.2. The accompanying analysis to the EMR Final Delivery Plan published indicative scenarios of deployment of renewable technologies in 2020.⁹ This analysis suggested around 2.4GW to 4GW of solar could be deployed to the end of 2020, within the LCF budget.
- 2.3. Figures from Ofgem and industry projections collated for the consultation impact assessment¹⁰ gave an estimated range of deployment without action under the RO of between 2.8GW and 6.3GW of solar PV deployment by the end of 2017, compared with the range of 2.4GW to 4GW in 2020 in the Final Delivery Plan. Responses to the consultation did not suggest that these projections were inconsistent with industry expectations, see a full summary in the government response.
- 2.4. DECC has updated its assessment of the solar PV pipeline since the consultation was published in May 2014, using the Renewable Electricity Planning Database (REPD), information from Distribution Network Operators (DNOs), industry commentary and discussions with solar experts. While there is considerable uncertainty about solar deployment in general, and in particular as a result of the proposed closure of the RO to projects >5MW, the evidence clearly indicates that the potential deployment is increasing. This means that while there is a range presented around the figures set out below – as there was in the consultation document and accompanying impact assessment – there is no doubt that solar is deploying at a significantly faster rate than was previously estimated in the impact assessment accompanying the RO Banding Review for solar PV in December 2012¹¹. It is also very likely that without intervention, more solar will deploy than was estimated at the time of the Final Delivery Plan in December 2013 or in the consultation impact assessment.
- 2.5. Discussions with the DNOs suggest that their connection pipeline could be as much as 4GW of solar capacity in 2014/15 (across all capacities under the RO). Although this is likely to include some projects which will be subject to attrition the REPD database supports that this amount of deployment in 2014/15 is plausible, based on the following analysis (which is based on an extract from the REPD as of 27th August 2014):
 - There is c2.2GW of solar (total) that is either operational or under construction.
 - There is c1.7GW of solar that has planning permission.
 - There is c2.2GW of solar that has applied for planning permission.

⁷ <https://www.gov.uk/government/consultations/levels-of-banded-support-for-solar-pv-under-the-renewables-obligation-for-the-period-1-april-2013-to-31-march-2017>

⁸ <https://www.gov.uk/government/consultations/levels-of-banded-support-for-solar-pv-under-the-renewables-obligation-for-the-period-1-april-2013-to-31-march-2017>

⁹ See 'Report from the system operator, National Grid':

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/267614/Annex_D_-_National_Grid_EMR_Report.pdf

¹⁰ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/310431/2014-05-13_-_RO_closure_Consultation_IA.pdf

¹¹ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/66610/7366-impact-assessment-for-the-government-response-to-t.pdf

2.6. It is improbable that all of this deployment will go ahead, particularly either that with planning permission or that which has applied for planning permission. Some is likely to have received planning permission and will not go ahead because, for example, the site is no longer viewed as economic. DECCs estimate is that 2GW of new build could deploy in 2014/15 in the absence of intervention. This is based on an assessment of individual projects within the REPD, combined with market intelligence and assumptions about how long it takes projects to deploy. Commercial sector-monitoring organisations (such as SolarBuzz¹² and IHS¹³) have predicted a 2014/15 pipeline of a similar magnitude.

2.7. Since the consultation was launched on 13th May 2014, around 1.7GW of planning applications for solar PV above 5MW has entered the planning system. This suggests that these projects can potentially deploy in time (i.e. even in the knowledge that the preferred policy response could be to close the RO to large scale solar PV from 1st April 2015; though we would expect that some will be looking towards CfD allocation rounds). While this does not mean that higher levels of deployment will definitely happen, it does, combined with the information from DNOs and commercial pipeline analysis services, support the case that it is possible.

2.8. Therefore, in the absence of intervention, the risk is that deployment is higher than the estimates in the scenarios in the Final Delivery Plan, as well as being higher than estimated in May 2014 for the consultation. The updated estimates, in the absence of intervention, are set out in table one below. Additional spend against the LCF, relative to the Final Delivery Plan, is now estimated to be £270m in the central deployment scenario, in the absence of intervention.

Table 1: Deployment and annual spend for the Final Delivery Plan and revised estimates (Do Nothing option) (£2011/12)

	Deployment Scenario	Low	Central	High
Final Delivery Plan scenarios ¹⁴	Deployment in 2020 under RO and CfD (GW)	2.4	2.7	4.0
	Annual RO spend	-	£170m	-
Consultation document; Do Nothing option	Deployment in 2016/17 under RO (GW)	2.8	4.5	6.3
	Annual RO spend (from 2017/18)	£170m	£270m	£370m
Government Response Option 1; Do Nothing option	Deployment in 2016/17 under RO (GW)	6.6	7.6	10.0
	Annual RO spend (from 2017/18)	£380m	£430m	£570m
Change in RO annual spend for Option 1 relative to the Final Delivery Plan scenario one from 2017/18		+£210m	+£270m	+£400m

Note: For consistency of comparison between options, a simplifying assumption has been made in calculating spend, in that all solar deployment comes in under the RO and not CfDs. Spend figures are rounded to the nearest £10m and therefore may not add due to rounding.

¹² <http://www.solarbuzz.com/reports/uk-deal-tracker>

¹³ <http://www.ihs.com/index.aspx>

¹⁴ The low scenario is consistent with high technology cost scenario in the Final Delivery Plan. The high scenario is consistent with the low technology cost scenario and the central estimate is consistent with the remaining scenarios as set out in the Final Delivery Plan including; scenario one, high and low fossil fuel prices, high and low demand and higher offshore and biomass conversion deployment. See Final Delivery Plan documentation, Annex D: report from the system operator National Grid: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/267614/Annex_D_-_National_Grid_EMR_Report.pdf

2.9. These figures are based on a continuation of around 2GW of deployment per annum in 2014/15, 2015/16 and 2016/17. The lower end of this range, of around 1.7GW new build per year, is based on the REPD and relatively conservative assumptions about the amount of deployment that could happen given the planning database. As set out above, there is considerable uncertainty about what solar deployment will be in 2014/15, but there is nothing to suggest that deployment will be lower than in 2013/14 (which is currently assessed at up to 1.2GW new build – higher than was estimated in the central case for the consultation of 1.1GW).

2.10. For the high scenario, up to 4GW new build per annum has been assumed in 2014/15, if the same assumption were used in future year this would result in around 13.5GW of solar deployment by the end of 2016/17. However, combined with solar deployment under FITs, this would mean that there was more solar deployment than the grid could currently cope with. Deployment in the high scenario has therefore been artificially limited to 10GW, which, combined with FITs deployment, is how much the grid is currently thought to be able to cope with without changes to current operational practices.¹⁵ With necessary changes for services and upgrades, solar deployment could be higher.

2.11. Of this pipeline, 20% in the central scenario is assumed to be small scale (≤ 5 MW) solar PV. The assumption is that small scale is 0.3GW in the low scenario, 0.4GW in the central scenario and 0.5GW in the high scenario, per annum.¹⁶

2.12. As explained in the consultation document, an increase in spend on one technology may have adverse consequences for Government's management and use of the LCF as a whole. The proportion of the LCF which is available for other renewable technologies and other policies under the LCF, such as CfDs and small scale FITs would be reduced, as a higher proportion of the LCF would necessarily be allocated to the RO to cover the costs of the additional solar projects.

2.13. Government's view is that the CfD is a more cost-effective mechanism than the RO. The CfD provides for earlier certainty of support levels than the RO and greater stability of revenue streams by providing a fixed strike price, investors are protected from wholesale price volatility and should benefit from a reduction in their cost of capital, making the development of low carbon generation cheaper for both investors and consumers.

2.14. In the absence of intervention on large scale solar PV, DECC expects it would overspend against the LCF, unless spending was cut on other renewable technologies or policies under the LCF. Therefore, in order to remain within the LCF, the preferred response option is to close the RO to large scale (>5 MW) solar projects from 1st April 2015, with a grace period aimed at projects that have made a significant financial commitment on or before 13th May 2014.

¹⁵ <http://www2.nationalgrid.com/UK/industry-information/future-of-energy/>.

¹⁶ The projected range of sub-5MW deployment was derived by using an analysis of previous annual deployment of solar PV in the sub-5MW range, factoring in the potential for projects which might, otherwise have been deployed under the RO between 5-10MW being downsized to 5MW. As above, there are significant uncertainties in this range since the projection of future solar PV deployment using historical data has been difficult.

3. Description of options considered

3.1. The consultation document described the following options for limiting deployment of Solar PV under the RO;

- Supplier cap
- Capacity cap
- RO Banding Review
- Closing RO to new build Solar PV (>5MW).

Supplier or Capacity cap

3.2. A supplier cap works by limiting the number of ROCs from large scale solar which electricity suppliers can submit for compliance against their obligation. It is set as a percentage of their obligation that suppliers can meet with that technology and is fixed in legislation in advance of each obligation period. A capacity cap works by setting the maximum level of new build solar PV capacity that DECC considers acceptable and affordable.

3.3. The consultation impact assessment¹⁷ analysed these options and provided reasons why these options were not recommended by DECC. The majority of respondents were in agreement with the proposal not to introduce a capacity or supplier cap, please see a summary contained within the government response. Given this, these options are not analysed in detail in this impact assessment.

RO Banding Review

3.4. The Government response summarises the replies DECC received on our proposal not to undertake an RO banding review at this time for solar PV. The same number of responses agreed and disagreed with this proposal. However, we did not receive any evidence, e.g. on the extent of changing costs, or compelling arguments to change our view that a banding review would be an ineffective means of controlling costs from rapid solar PV deployment in the short period between now and full RO closure at the end of March 2017. In coming to this conclusion, we have also taken into account the length of time such a review would take and the past experience of banding reviews in setting the appropriate levels of support for this technology. However, the Government retains the option of carrying out a banding review of RO support for small-scale (≤ 5 MW) solar PV if new evidence on costs emerges or monitoring indicates that deployment is growing more rapidly than can be afforded under the LCF.

Small scale (≤ 5 MW) solar PV

3.5. As proposed in the consultation document, the RO will remain open to projects above 50kW¹⁸ and up to 5MW in size. Our current information remains consistent with the consultation that at

¹⁷ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/310431/2014-05-13_-_RO_closure_Consultation_IA.pdf

¹⁸ Projects of 50kW and less are 'micro-generators' and eligible for support under the small scale Feed in Tariff (FiT) scheme.

present, projects below 5MW are a relatively small part of expected future solar deployment. This suggests that the rate of deployment of these smaller solar PV projects poses less of a risk to the LCF at this time when compared to the risk from projects above 5MW in size. Deployment under the RO of solar projects $\leq 5\text{MW}$ in 2015/16 and 2016/17 for the purposes of this impact assessment is estimated to be around 20% of the pipeline in the central case (0.3GW in the low scenario, 0.4GW in the central scenario and 0.5GW in the high scenario).

- 3.6. As noted in the consultation and government response, a possible consequence of closing the RO early to solar PV projects above 5MW is that some developers will choose to either downsize larger projects to 5MW or split them into separate generating stations of 5MW and below in order to ensure that they can access RO support, potentially undermining some of the financial control intended to be introduced through these measures. It is also possible that given the prevailing uncertainty about solar deployment, there is significantly more potential $\leq 5\text{MW}$ deployment than we have set out. DECC will therefore be closely monitoring deployment of projects of 5MW and below, and will consider taking further action to protect the LCF should it be necessary to do so. Deployment and cost projections shown in this impact assessment include small scale ($>50\text{Kw}$ - 5MW) projects.

RO closure to new build solar PV ($>5\text{MW}$) (option 2: preferred response option)

- 3.7. The preferred response option is to close the RO to large scale ($>5\text{MW}$) solar projects from 1st April 2015, with a grace period aimed at projects that have made a significant financial commitment on or before 13th May 2014. This includes extensions to projects of all sizes, if the project is already greater than 5MW or would become greater than 5MW in size as a result of the extension.
- 3.8. The costs and benefits of this option are assessed in section 4, against the updated Do Nothing option (taking no action under the RO to constrain deployment of large scale solar PV).
- 3.9. This option allows all solar PV projects above 5MW to apply for RO accreditation until 31 March 2015. Projects which had made a significant financial commitment on or before 13th May 2014 can apply for a grace period, the detailed requirements for which are outlined in the government response.
- 3.10. This option will allow spend (and deployment) of large scale solar PV to be reduced under the RO in 2015/16 and 2016/17 relative to not intervening, whilst still providing a grace period designed to protect projects that made a significant financial commitment on or before the 13th of May 2014. Projects that are no longer eligible to apply for the RO may be able to apply for support under a Contract for Difference (CfD) in 2015/16 and 2016/17. The first allocation round will open on 16 October 2014.
- 3.11. A number of changes have been made to the grace period for this option compared to the consultation proposals, in the light of the consultation response from industry. A full description of the changes can be found in the government response, but in summary the changes to the grace period requirements are:
- removing the requirement on the developer to obtain a letter from the network operator estimating or setting a date for the grid connection to be made which is on or before 31 March 2016; developers will still have to present evidence of a grid connection offer and acceptance of that offer, both dated no later than 13 May 2014;
 - expanding the ways of demonstrating an interest in the land on which the solar project is to be located, by including options to lease or to purchase the land, dated no later than 13 May 2014;
 - removing the requirement on developers to have spent a total of £100,000 per MW of installed capacity of total pre-commissioning costs or to demonstrate that all material equipment contracts have been entered into by 13 May 2014, and;

- replacing the requirement that projects should have obtained planning permission with a requirement for the application for planning permission to have been received by the relevant planning authority on or before 13 May 2014.

- 3.12. There remains a significant amount of uncertainty around solar deployment. With the information we have available, our best estimate is that extending the grace period in this way, especially in requiring projects to have only applied, not received, planning permission, could bring forward around 300MW of additional solar PV deployment in 2014/15. This is based on an analysis of the pipeline for projects that had applied for planning permission by 13 May 2014, combined with assumptions about what proportion of these projects are likely to proceed.
- 3.13. It is highly uncertain if projects will accelerate their plans as a result of RO closure. DECC expect that some projects could accelerate; conversely, some projects that were intending to deploy in 2014/15, especially towards the end of the year, may no longer go ahead.
- 3.14. The updated deployment estimates are outlined in table 2 below. This clearly demonstrates that even with closure of the RO from 2015/16 to new build large scale solar PV projects, we are likely to spend more compared to the projections from the Final Delivery Plan, (range £60m to £220m compared to scenario one in the Final Delivery Plan). Compared to the Do Nothing option, the saving could be in the range of £140m to £180m.

Table 2: Solar deployment from 2016/17 onwards and associated annual spend under the RO based on updated pipeline projections under Option two (2011/12 prices)

	Deployment Scenario	Low	Central	High
Option 2 (recommended option) Close RO to new build solar PV (>5MW) from 1 st April 2015 with grace periods	Deployment (GW)	3.8	4.6	6.5
	Spend (£m)	£230m	£280m	£390m
	Change in spend compared to scenario one in the Final Delivery Plan, of £170m (£m)	+£60m	+£110m	+£220m
	Change in spend (£m) compared to Do Nothing option	-£140m	-£150m	-£180m

Note: a) For the consultation it was assumed that 25% of pipeline deployment is from small scale ≤5MW that applies for accreditation under the RO. In updating the projections for the government response this assumption has been altered. Based on updated information from REPD and from the ROCs register, the assumption has been revised slightly downward to 20% of the pipeline being ≤5MW in the central scenario. Based on an estimated pipeline of 2GW, this reduces the ≤5MW deployment to 400MW per year. b) For consistency of comparison between options, a simplifying assumption has been made in calculating spend, in that all solar deployment comes in under the RO as opposed to CfDs c) Spend figures are rounded to the nearest £10m

- 3.15. As explained in the consultation, this option would increase the administrative costs of the scheme, faced by Ofgem. 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, the buyout fund in 2012/13 was around £170m in £2012/13 prices, of which around £3.5m were Ofgem's administration costs.
- 3.16. We have updated our deployment projections following the consultation and made a number of assumptions in our projections. There remains considerable uncertainty around likely deployment under this option. Therefore, the estimated deployment and spend figures quoted in section four should be considered as plausible scenarios, used to give an indicative range.

4. Impacts of options considered

4.1. This section outlines the monetised and non-monetised costs and benefits of the following shortlisted options:

- Option 1: Do Nothing
- Option 2: RO closure to Solar PV above 5MW from April 2015 with grace periods

Option 1: Do Nothing

4.2. Under this option RO bands for new build large scale solar PV installations would remain at current levels, for both building-mounted and ground-mounted solar PV as set out in table 3. Deployment and therefore spend is now estimated to be above the modelled projections accompanying the Final Delivery Plan, outlined in tables four and five.¹⁹

Table 3: RO support bands for new build large scale solar PV installations from 2013-17 (ROCs/MWh of renewable electricity supplied)

Current bands	2013/14	2014/15	2015/16	2016/17
Building-mounted	1.7	1.6	1.5	1.4
Ground-mounted	1.6	1.4	1.3	1.2

4.3. Table four below summarises the updated deployment and spend projections against those estimated for the Final Delivery Plan. The Final Delivery Plan examined a range of scenarios, for the purposes of this impact assessment the low estimate is consistent with the high technology cost scenario in the Final Delivery Plan. The high estimate is consistent with the low technology cost scenario in the Final Delivery Plan and the central estimate is consistent with the remaining scenarios in the Final Delivery Plan including; scenario one, high and low fossil fuel prices, high and low demand and higher offshore and biomass conversion deployment. The cost to consumers per annum of 2.7GW of solar deployment is estimated to be around £170m in 2011/12 prices (rounded to the nearest £10m); consistent with the assumptions used for the Final Delivery Plan²⁰. Both options one and two have been compared to this spend estimate.

4.4. Deployment projections of Solar PV under the RO for the consultation document were between 2.8GW and 6.3GW by the end of 2016/17, as set out in table one. Spend in scenario one of the Final Delivery Plan is estimated to be £170m. The consultation document and accompanying impact assessment set out that this could increase by between £0m and £200m given the high pipeline deployment estimates (and this range assumes no further deployment beyond the end of 2016/17).

4.5. The updated projections estimate spend on solar PV, in the absence of intervention, could be between £380m and £570m, or between £210m and £400m above what was estimated for the Final Delivery Plan in December 2013.

¹⁹ See Final Delivery Plan documentation, Annex D: report from the system operator National Grid https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/267614/Annex_D_-_National_Grid_EMR_Report.pdf

²⁰ Including the deployment profile and an 11% load factor.

Table 4: Solar deployment from 2016/17 onwards and associated annual spend (£2011/12) in 2020 under the RO based on updated pipeline projections under option one

	Deployment Scenario	Low	Central	High
Final Delivery Plan scenarios	Deployment (GW)	2.4	2.7	4
	Spend (£m)		£170m	
Option 1 (Do Nothing)	Deployment (GW)	6.6	7.6	10.0
	Spend (£m)	£380m	£430m	£570m
	Change in spend compared to delivery plan scenario one (£m)	+£210m	+£270m	+£400m

Note: a) For the consultation it was assumed that 25% of pipeline deployment is from small scale ≤ 5 MW that applies for accreditation under the RO. In updating the projections for the government response this assumption has been altered. Based on updated information from REPD and from the RO, the assumption has been revised slightly downward to 20% of the pipeline being ≤ 5 MW. Based on an estimated pipeline of 2GW in the central scenario, this reduces the ≤ 5 MW deployment to 400MW per year.²¹ b) For consistency of comparison between options, a simplifying assumption has been made in calculating spend, in that all solar deployment comes in under the RO and not CfDs. c) Spend figures are rounded to the nearest £10m and may not sum due to rounding

Table 5: Annual solar deployment and associated annual spend under the RO, based on updated pipeline projections under Option one (2011/12 prices).

Option 1 - Cumulative deployment (GW)	2013/14	2014/15	2015/16	2016/17
Low	1.5	3.2	4.9	6.6
Central	1.5	3.5	5.6	7.6
High	1.5	5.5	8.5	10.0

Note: this table may not appear to follow the explanation in the text due to rounding, but the assumption is that there could be between 1.7GW and 4GW new build solar PV per annum (central 2GW) from 14/15 onwards, with the high scenario capped at 10GW due to grid constraints. Small scale (≤ 5 MW) solar PV deployment is assumed to be between 0.3GW and 0.5GW per annum (0.4GW in the central estimate, equivalent to 20% of the pipeline).

4.6. DECC's prices and bills analysis suggests that the impact of this option on average household electricity bills could be an increase in the range of £2 (0.4%) to around £5 (around 0.8%) per household per annum from 2016/17 (central estimate of around £3 (0.5%) per household per annum) compared to the Final Delivery Plan scenario one. The impact on business electricity bills²² is estimated to be similar in percentage terms, from around 0.6% to 1.5%, with a central estimate of around 1%.

4.7. The potential for rapid deployment of solar PV under the RO, risks even greater increases in estimated spend against the LCF in future. This option would not provide effective control of spending under the LCF and is therefore not recommended.

Option 2: Preferred Response Option - RO closure to Solar PV above 5MW from April 2015 with grace periods

4.8. This option would allow all solar PV projects above 5 MW to apply for RO accreditation until 31 March 2015. Projects which had made a significant financial commitment on or before 13th May 2014 would benefit from a grace period giving them until 31st March 2016 to apply for RO accreditation. The detailed criteria for the grace period are set out in the Government Response.

²¹ To note, there is uncertainty about this figure, and so DECC will be monitoring the ≤ 5 MW pipeline to see if there are further issues arising from the levels of deployment of solar. The 20% assumption has not been applied to the maximum pipeline – 4GW – as the working assumption is that the bigger the pipeline, the more likely the projects are to be > 5 MW. DECC has assumed 0.5GW of small scale (≤ 5 MW) solar PV in the high scenario. See footnote 15.

²² Bill impacts do not include VAT

Estimated deployment and spend under this option is given in tables six and seven below, compared to the estimates for the Final Delivery Plan and the Do Nothing option above.

Table 6: Solar deployment from 2016/17 onwards and associated annual spend under the RO based on updated pipeline projections under Option two (2011/12 prices)

	Deployment Scenario	Low	Central	High
Option 2 (response option)	Deployment (GW)	3.8	4.6	6.5
	Spend (£m)	£230m	£280m	£390m
	Change in spend compared to scenario one in the Final Delivery Plan, of £170m (£m)	+£60m	+£110m	+£220m
	Change in spend (£m) compared to Do Nothing option	-£140m	-£150m	-£180m

Note: a) For the consultation it was assumed that 25% of pipeline deployment is from small scale ≤5MW that applies for accreditation under the RO. In updating the projections for the government response this assumption has been altered. Based on updated information from REPD and from the RO, the assumption has been revised slightly downward to 20% of the pipeline being ≤5MW. Based on an estimated pipeline of 2GW in the central scenario, this reduces the ≤5MW deployment to 400MW per year. b) For consistency of comparison between options, a simplifying assumption has been made in calculating spend, in that all solar deployment comes in under the RO as opposed to CfDs c) Spend figures are rounded to the nearest £10m

Table 7: Annual solar deployment and associated annual spend under the RO, based on updated pipeline projections under Option two (2011/12 prices).

Option 2 - Cumulative deployment (GW)	2013/14	2014/15	2015/16	2016/17
Low	1.5	3.2	3.5	3.8
Central	1.5	3.8	4.2	4.6
High	1.5	5.5	6.0	6.5

Note: a) this table may not appear to follow the explanation in the text due to rounding, but the assumption is that there could be between 1.7GW and 4GW new build solar PV in 2014/15. The central pipeline estimate is 2.3GW new build in 2014/15, consisting of 2GW new build as in the Do Nothing option and 300MW of 2015/16 projects coming forward using the grace period. Small scale (≤5MW) solar PV deployment is assumed to be between 0.3GW and 0.5GW per annum in 2015/16 and 2016/17 (0.4GW in the central estimate, equivalent to 20% of the pipeline).

4.9. Tables six and seven clearly demonstrate that even with closure of the RO from 2015/16 to new build large scale solar PV projects, we are likely to spend more compared to the projections from the Final Delivery Plan, (range £60m to £220m compared to scenario one in the Final Delivery Plan). Compared to the Do Nothing option, the saving could be in the range of £140m to £180m

4.10. DECC's price and bills analysis suggests that the impact of this option on household electricity bills could be an increase in the range of around £1 (0.1%) to around +£3 (0.4%) from 2016/17 (central estimate of an increase of around +£1 (0.2%) per household per annum) compared to the Final Delivery Plan, scenario one. The impact on businesses is estimated to be around 0.2% to 0.8% (with a central estimate of around 0.4%).

4.11. However, compared to the Do Nothing option this option could reduce average household electricity bills by around -£2 (-0.3 to -0.4%) from 2016/17 per household per annum. The impact on businesses is estimated to be from around -0.4% to -0.7% (with a central estimate of around -0.6%). Therefore, in terms of the impact on electricity prices and bills, the option to take action under the RO is preferred to the Do Nothing option.

Monetised impacts

- 4.12. The monetised costs and benefits associated with Options 1 and 2 are presented in tables eight to ten below. The low, central and high scenarios are based on the low, central and high deployment scenarios presented in tables four to seven. The lifetime resource costs are calculated as the difference between the central levelised cost estimates of large scale solar PV and the long run variable cost (LRVC) of electricity supply.²³ In other words, a lower level of solar PV deployment is assumed, in this analysis, to be replaced by an increase in electricity generation from alternative sources, captured by the LRVC of electricity supply which includes a mix of fossil fuel, renewable and other forms of low carbon generation (as well as transmission and distribution costs)²⁴.
- 4.13. In summary, Option 2 leads to lower resource costs as deployment of solar PV is reduced compared to the Do Nothing option. This is because solar PV has higher capital costs and operating costs relative to cheaper electricity generating alternatives. Option 2 also has lower benefits compared to Option 1, as avoided emissions and lifetime EUA costs under Option 2 are lower compared to Option 1. Specific impacts can be summarised as follows:
- Lower levels of relatively more expensive solar PV deployment lead to lifetime resource costs of £1,660m to £2,850m under Option 2, which are significantly lower at the high end of the range compared to Option 1.
 - Lower levels of solar PV deployment, and its assumed substitution with future electricity generating alternatives²⁵, leads to lower avoided CO2 emissions of around 15Mt to 27Mt under Option 2.
 - The emissions reductions (offset by increases elsewhere in the EU26) under Option 2 are valued at the DECC central traded carbon appraisal values²⁷ and amount to around £300m to £530m of EUA purchase cost savings, compared to savings of £540m to £840m under Option 1.
 - The present value of monetised impacts range from -£1,360m to -£2,310m under Option 2, compared with -£1,870m to -£3,030m under Option 1.

Table 8: Costs and benefits associated with Option 1, Do Nothing (calculated over an assumed technology lifetime of 25 years for solar PV to 2041/42²⁸, 2012 prices)

Deployment Scenario	Low	Central	High
Lifetime resource costs, £m, 2012	-2410	-2760	-3870
Avoided lifetime emissions, MtCO2e	+26	+31	+41
Avoided lifetime EUA costs, £m, 2012	+540	+640	+840
Present Value (PV), £m, 2012	-1870	-2120	-3030

Source: DECC internal modelling. Note: all spend figures are rounded to the nearest £10m and discounted at the social discount rate, figures may not sum due to rounding

²³ See DECCs levelised cost estimates and IAG guidance table 9 here:

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/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>

²⁴ See 'Background documentation for guidance on valuation of energy use and greenhouse gas emissions.'

<https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>

²⁵ Including fossil fuel, renewable and other forms of low carbon generation

²⁶ The UK power sector is part of the EU Emissions Trading System (EU-ETS). This means that any reductions in UK power sector greenhouse gas emissions will be offset by increases (or foregone reductions) elsewhere in the EU-ETS. However, there is a benefit to the UK from such emissions reductions in terms of avoided carbon allowance (known as EUAs) purchase costs.

²⁷ Which can be found on DECC's website here:

http://www.decc.gov.uk/en/content/cms/about/ec_social_res/iag_guidance/iag_guidance.aspx

²⁸ Over an assumed 29 year period, with a PV base of 2013/14 and assuming the final (small scale) solar PV projects enter the RO in 2016/17.

4.14. The Present Value (PV) is calculated as the lifetime resource costs plus the avoided lifetime EUA cost, so in the central scenario under Option two this is; -£2,020m plus £370m equals a PV of -£1,650m. Compared to the consultation both the costs and benefits of additional solar PV deployment have increased. More solar PV deployment leads to both increased resource costs and an increase in avoided lifetime EUA costs, though the former is higher and so increased solar PV deployment overall yields a lower NPV to society.

Table 9: Costs and benefits associated with Option 2, RO closure (calculated over an assumed technology lifetime of 25 years for solar PV to 2041/42, 2012 prices)

Deployment Scenario	Low	Central	High
Lifetime resource costs, £m, 2012	-1660	-2020	-2850
Avoided lifetime emissions, MtCO ₂ e	+15	+19	+27
Avoided lifetime EUA costs, £m, 2012	+300	+370	+530
Present Value (PV), £m, 2012	-1360	-1650	-2310

Source: DECC internal modelling. Note: all spend figures are rounded to the nearest £10m and discounted at the social discount rate, figures may not sum due to rounding

Table 10: Net Present Value (NPV) of Option 2 compared to Option 1 (calculated over an assumed technology lifetime of 25 years for solar PV to 2041/42, 2012 prices)

Deployment Scenario	Low	Central	High
Present Value (PV) of Option 2, £m, 2012	-1360	-1650	-2310
Present Value (PV) of Option 1, £m, 2012	-1870	-2120	-3030
NPV (£m, 2012 prices)	+500	+480	+710
NPV breakdown as follows:			
Benefits: Reduced resource costs, £m, 2012	+750	+740	+1020
Costs: Increased EUA costs, £m, 2012	-250	-260	-310

Source: DECC internal modelling. Note: all spend figures are rounded to the nearest £10m and discounted at the social discount rate, figures may not sum due to rounding

4.15. The Net Present Value of Option 2 compared to Option 1 in the table above is calculated in the central scenario as the PV of Option 2 minus the PV of Option 1 so -£1,650m minus -£2,120m equals £480m²⁹. In conclusion, it is preferable to take action under the RO to limit spend (and therefore deployment) of large scale solar PV compared to the Do Nothing option.

4.16. The central deployment scenario NPV estimate is lower than the low deployment scenario estimate because we are comparing option 1 against option 2. In this case, the difference in resource costs and avoided EUA costs is greater between the options in the low scenario than in the central scenario, resulting in a higher NPV. The RO closure central scenario includes 300MW of deployment in 2014/15, assumed to come online through the grace period, which is greater than the 2GW assumed to come on line that year in the Do Nothing central option. Therefore, there is a smaller difference between the Do Nothing option and the RO closure option in the central scenario in early years (which are discounted less), compared to the difference between deployment under each option in the low scenario.

4.17. As in the consultation impact assessment, this final impact assessment assumes that the counterfactual is the long run variable cost (LRVC) of electricity, which includes a mix of fossil fuel, renewable and other forms of low carbon generation (as well as transmission and

²⁹ Though figures don't sum exactly in this example, due to rounding to the nearest £10m

distribution costs)³⁰ expected in future years. In other words, if solar deployment were allowed to continue to deploy as in the do-nothing option it assumes (all other things being equal) electricity generated from a mix of other fossil fuel, renewable and low carbon alternatives would be displaced. Some of the consultation responses received argued that a renewables counterfactual should be considered. This might be because, for example, a reduction in large scale solar PV would remove the need to take action in other areas of the LCF, such as by reducing the CfD budget, in order to address the risk of over-spend from solar PV.

- 4.18. In reality it is highly uncertain what generation will come forward in future years and indeed, some solar PV may come online through CfDs. As such we have used a counterfactual in line with supplementary green book guidance, consisting of a mix of fossil fuel, renewable and other low carbon generation (as well as transmission and distribution costs) expected in future years, which we consider is the best representation available of generation that would be displaced by additional solar PV (in the Do Nothing option) in this instance.

Non-monetised impacts

- 4.19. It should be noted that 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.
- 4.20. 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 balancing services, back-up generation, interconnection, storage and/or demand-side response. 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 solar PV alone.
- 4.21. Risk of missing 2020 renewables target: Option 2 marginally increases the risk of missing the 2020 renewables energy target and interim targets by reducing incentives for solar PV deployment under the RO in the UK compared to the do-nothing option, if deployment of other renewable technologies does not come forward. However, option 2 still includes more solar deployment than that outlined in the Final Delivery Plan, which took account of the 2020 renewable energy target.
- 4.22. 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.
- 4.23. Environmental Issues: Option 2 will lead to lower levels of solar PV deployment and hence increased carbon emissions within the UK power sector relative to 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.
- 4.24. Small Firms: Compared to Option 1, Option 2 will result in slightly lower electricity RO support costs for electricity customers, including small firms. There may be an impact on small firms deploying mid- to large-scale solar PV; however, the majority of smaller businesses

³⁰ See 'Background documentation for guidance on valuation of energy use and greenhouse gas emissions.' <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>

involved in solar PV generation are likely to continue to seek support under FITs, as the simplicity and income-certainty of FITs makes it better suited to small business needs. Small businesses involved in licensed electricity supply should not experience any additional burdens from these proposals.

5. Summary and preferred response option

5.1. The preferred response option is to close the RO to new build large scale (>5MW) Solar PV from 1st April 2015. There would be no change to RO eligibility for small scale (≤5MW) solar projects, although this would be kept under review. Projects which had made a significant financial commitment on or before 13th May 2014 can apply for a grace period, the detailed requirements for which are set out in the consultation document. Table 11 below summarises the costs and benefits of Option 2, compared to the Do Nothing option (Option 1).

Table 11: Net Present Value of Option 2 compared to Option 1 (calculated over an assumed lifetime of 25 years for solar PV to 2041/42, 2012 prices)

Deployment Scenario	Low	Central	High
NPV (£m, 2012 prices)	+500	+480	+710

Source: DECC internal modelling. Note: all spend figures are rounded to the nearest £10m and discounted at the social discount rate

5.2. In conclusion, it is preferable to take action under the RO to remain within the LCF by limiting spend (and therefore deployment) of large scale solar PV compared to the Do Nothing option. This option has a positive net present value and helps to control costs to consumers and maintain the diverse generation mix set out in the EMR Final Delivery Plan.

Implementation

5.3. The RO is administered and enforced by Ofgem, who report annually on their administration of the RO and conduct regular audits in relation to compliance with the RO.

5.4. DECC is responsible for monitoring the impact of the RO on the development of renewable energy and collects detailed information on growth in renewable energy generation and projects under development.