Title: Government response to the consultation on proposals for the levels of banded support for solar PV under the Renewables Obligation for the period 2013-17	**Impact Assessment (IA)**
	Date: 19/12/12
IA No: DECC0103	**Stage:** Final
	Source of intervention: Domestic
Lead department or agency: Department of Energy and Climate Change (DECC)	**Type of measure:** Secondary legislation
Other departments or agencies:	**Contact for enquiries:** Andrew.Jones1@decc.gsi.gov.uk

Summary: Intervention and Options

RPC: N/A

Cost of Preferred (or more likely) Option				
Total Net Present Value	**Business Net Present Value**	**Net cost to business per year** (EANCB in 2009 prices)	**In scope of One-In, One-Out?**	**Measure qualifies as**
£1,590-1,720m	N/A	N/A	No	N/A

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

Evidence from the FITs Comprehensive Review suggests that solar photovoltaic (PV) costs have fallen significantly since support levels were proposed in the Renewables Obligation (RO) Banding Review Consultation published in October 2011. The Government Response to the RO Banding Review, published in July 2012, set the level of support for various renewable technologies for the period 2013-17 and confirmed that a further consultation would be held on support rates for solar PV. The absence of a further review of solar PV bands under the RO could lead to support levels that overcompensate solar investors and fail to deliver value for money for electricity consumers for solar power deployment.

What are the policy objectives and the intended effects?

RO bands for solar PV for 1st April 2013 to 31st March 2017 are proposed at levels that should increase the cost-effectiveness of the RO and offer greater value for money to consumers. The introduction of separate bands for building and ground mounted PV projects account for differences in the operating efficiency (i.e. load factors) of these types of installations. The analysis considers the costs and benefits associated with changes to support rates for all sizes of solar PV installation eligible for support under the RO.

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

This IA considers two options:

(i) Option 1: Do nothing – maintain current solar PV bands for new installations during the period 1st April 2013 to 31st March 2017 (banding review period), which are the same for building and ground mounted projects.

(ii) Option 2: Response bands – reduce solar PV bands for new installations during the banding review period and create separate bands for building and ground mounted installations.

Option 2 is the preferred option. It proposes support levels that offer greater value for money to electricity consumers

Will the policy be reviewed? DECC will continue to monitor costs and deployment in the usual way, and may review solar PV bands if there is evidence that the legal criteria for an early review are met.

Does implementation go beyond minimum EU requirements?			**N/A**		
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.	**Micro N/A**	**< 20** N/A	**Small N/A**	**Medium N/A**	**Large N/A**
What is the CO2 equivalent change in greenhouse gas emissions? (Million tonnes CO2 equivalent)			**Traded: -12.7 to -13.4**	**Non-traded:**	

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: 19/12/12

Summary: Analysis & Evidence Policy Option 2 Response bands

Description: reduce current solar PV bands during the period 1st April 2013 to 31st March 2017. Impacts presented relative to the Do Nothing Option 1.

FULL ECONOMIC ASSESSMENT

Price Base	PV Base	Time Period	Net Benefit (Present Value (PV)) (£m)		
2011/12	2012/13	**38** Years	**Low*: £690-860m**	**High*: £870m**	**Best Est**: £1,590-1,720m**

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low				**90-100**
High				**130**
Best Estimate				**190-210**

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.

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

Wider macroeconomic impacts of a reduction in solar deployment (e.g. on employment). Air quality impacts due to increased fossil fuel generation. Increased risk of UK failing to meet 2020 renewables target. Security of supply costs from any reduction in diversity of supply.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low				**780-960**
High				**1,000**
Best Estimate				**1,790-1,930**

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

The monetised benefits are the lower resource costs of generating electricity through CCGT rather than solar PV with 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%

(i) Cost and performance assumptions for large-scale (>5MW) ground–mounted PV is taken from the evidence gathered through the solar PV consultation. Hurdle rates and revenue assumptions are taken from the RO Banding Review. Maximum technical potential is based on a National Grid assessment of solar capacity grid constraints.

(ii) Support rates and uptake for small scale (<5MW) PV have been modelled using evidence from the FITs 2A Government Response.

(iii) There are significant uncertainties around current and future solar PV cost and performance characteristics, and future costs trajectory. Sensitivity analysis varies capex learning rates and load factors.

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

* The high Net Benefit estimate relates to the "High uptake" sensitivity. The low Net Benefit estimate relates to the "Low uptake" sensitivity (see Section 8C for more details of the uptake scenarios).

** The 'Best Estimate' of costs and benefits relates to the central uptake scenario. Net benefits are highest in this scenario, since the reduction in solar PV uptake from Option 1 to Option 2 is higher than in either of the sensitivities. For more details see Section 8C.

Evidence Base (for summary sheets)

1. Executive summary

1. The Government response to the Consultation on proposals for the levels of banded support for solar photovoltaic (PV) under the Renewables Obligation (RO) reduces ROC support for all solar PV generating stations which accredit or add additional capacity on or after 1st April 2013 and up to 31st March 2017 (banding review period). The Government response to this Consultation introduces separate bands for building and ground mounted installations; and, establishes the use of existing cost control arrangements under RO legislation to control the costs of solar PV within the RO during the review period, if required.

2. This Impact Assessment (IA) analyses two options for new solar PV installations that accredit or add additional capacity under the RO during the banding review period:

   - **Option 1: Do Nothing:** RO bands for all new solar PV installations remain at 2 ROCs/MWh of renewable electricity supplied in 2013/14, 2014/15, 2015/16 and 2016/17.
   - **Option 2: Response Bands:** RO bands for new solar PV installations are reduced from current levels with the introduction of separate bands for building mount and ground mounted installations (see Table 1 below).

Table 1. Solar PV RO support bands (ROCs/MWh)

Option	2013/14	2014/15	2015/16	2016/17
1. Current bands	2.0	2.0	2.0	2.0
2. Response Bands				
• Building-mounted	1.7	1.6	1.5	1.4
• Ground-mounted	1.6	1.4	1.3	1.2

3. The summary costs and benefits of the preferred option (Option 2) relative to the do nothing counterfactual (Option 1) for low, central and high "Uptake" scenarios are presented in Table 2 below. These uptake scenarios are derived from sensitivity analysis on learning rates and load factors.

Table 2. Summary costs and benefits (Option 2 relative to Option 1, £m 2010/11 prices, discounted)[1]

	Scenario		
Item	Low uptake	Central uptake	High uptake
Change in resource cost	-780 to -960	-1790 to -1930	-1000
Change in carbon saving benefit (avoided lifetime EUA costs)	-90 to -100	-190 to -210	-130
NPV	690 to 860	1590 to 1720	870

Source: DECC in-house modelling

4. Option 2 is the preferred option. It encourages the deployment of the most economically sound solar PV projects under the RO and offers greater value for money to electricity consumers who pay for the RO through their electricity bills, as well as recognising the different characteristics of building and ground mounted installations.

5. This IA considers the impacts of reduced RO support rates on all sizes of solar PV installation from 50kW upwards. DECC's in-house models were used to generate the analysis in this IA: the ROCs model was used to measure impacts on installations above 5MW and the FITs model was used to

[1] The NPV for Option 2 versus Option 1 is highest in the central uptake scenario. This is because in the central uptake scenario the reduction in solar PV deployment between Option 1 and Option 2 is greatest. In addition to this the unit cost of solar PV is higher under the central uptake scenario relative to other scenarios. For more detail see section 8C.

measure impacts on installations up to 5MW. These models estimate the costs and revenues over the lifetime of the technology and assess the proportion of potential investors that could be incentivised in different years at particular RO support rates.

6. Cost and performance assumptions for large-scale[2] PV installations have been developed by DECC based on evidence from the consultation responses; other assumptions (i.e. hurdle rates, price received for exported electricity etc) were taken from the RO banding review consultation[3]. Assumptions for modelling uptake of small-scale[4] (sub-5MW) installations applied those developed by Parsons Brinckerhoff (PB) for FITs analysis[5]. Evidence gathered from the FITs consultation was used to set support rates for small scale installations.

7. The potential impacts of the cost control mechanism are not quantified in this IA. It is hard to anticipate when such a review would take place and whether such a review will result in changes to RO support levels.

[2] 'Large-scale' refers to installations of greater than 5MW throughout this IA. These are assumed to be exclusively ground-mounted installations due to the lack of building roofs large enough to house more than 5MW. 'Small-scale' refers to installations below 5MW, which can be ground-mounted or building-mounted.
[3] See http://www.decc.gov.uk/assets/decc/11/consultation/ro-banding/5945-renewables-obligation-government-response-impact-a.pdf
[4] 'Small-scale' refers to installations below 5MW, which can be ground-mounted or building-mounted.
[5] See http://www.decc.gov.uk/en/content/cms/consultations/fits_rev_ph2a/fits_rev_ph2a.aspx and http://www.decc.gov.uk/assets/decc/11/consultation/fits-comp-review-p1/3365-updates-to-fits-model-doc.pdf

2. Strategic overview

8. 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 – small scale renewable electricity generation is incentivised mainly through a separate Feed-in-Tariff (FITs) scheme. The RO and FITs have played an important part in securing reductions in carbon dioxide emissions, as the UK strives to achieve 15% of its energy needs from renewable sources by 2020 as required by the EU Renewable Energy Directive.

9. From the RO's introduction in 2002 until 2008/09, all eligible renewable energy technologies received the same band of support at 1 Renewable Obligation Certificate (ROC) per MWh of renewable electricity generated. Different RO bands of support for eligible technologies were set for new stations in the four years from 2009/10 to 2012/13, which sought to remove overcompensation of lower cost technologies and provide incentive for more expensive technologies that had significant development and deployment potential.

10. The Government response to the Consultation on the RO Banding Review published on 25th July 2012 set RO bands for new installations of various renewable technologies for the period 1st April 2013 to 31st March 2017[6]. The response set out the Government's intention to re-consult on RO bands for new solar photovoltaic (PV) installations over this period[7]. This decision reflects the evidence produced for the FITs comprehensive review which suggested that the costs associated with the deployment of solar PV have come down substantially since the consultation on the RO Banding Review was first published in October 2011.

11. The Government response to the Consultation on proposals for the levels of banded support for solar PV under the RO reduces ROC support for all solar PV generating stations which accredit or add additional capacity on or after 1st April 2013 and up to 31st March 2017, introduces separate and lower bands for building and ground mounted installations; and proposes the use of existing cost control arrangements under RO legislation to control the costs of solar PV within the RO during this period.

12. The recently-agreed Levy Control Framework (LCF) is set at £7.6bn in 2020/21 (real 2011/12 prices). Support costs for solar PV under the RO will have to fit within the overall spending cap under the LCF. However, more detailed analysis of the affordability implications of this policy within the context of the newly agreed LCF have not been carried out given uncertainties around what the overall renewables mix will look like.

3. Problem under consideration

13. The costs of Solar PV have come down substantially since the RO Banding Review consultation was published in October 2011. In response to falling costs, support rates for small scale solar PV installations under the FITs scheme were lowered as part of the FITs comprehensive review which spanned 2011 and 2012. Similarly, solar PV support rates under the RO have been subject to review as part of the solar PV consultation to help avoid potential overcompensation of investors and poor value for money for consumers.

14. Consultation responses have indicated that there are technical differences between building–mounted and ground–mounted projects. For example, the load factor for building-mounted installations will depend on the tilt of a building's roof and its orientation, meaning that output per panel is generally less than for ground-mounted installations where panel tilt can be optimised and panels can be oriented southwards. In addition, a significant proportion of the output from building-mounted installations tends to be used on site, whereas that from ground-mounted installations tends to be exported. As a result, differentiated support for building-mounted and ground-mounted

[6] http://www.decc.gov.uk/assets/decc/11/consultation/ro-banding/5936-renewables-obligation-consultation-the-government.pdf
[7] http://www.decc.gov.uk/assets/decc/11/consultation/ro-banding/6338-consultation-on-proposals-for-the-levels-of-banded.pdf

projects is created to encourage deployment of these technologies whilst reducing the risk of overcompensating one technology which arises with a single band.

4. Rationale for intervention

15. Whilst encouraging deployment to help the UK meet its interim and 2020 EU renewable energy targets, RO support rates for renewable technologies must offer value for money to electricity consumers, who pay for the RO through their electricity bills. This is achieved by incentivising cost effective deployment of renewable technologies and avoiding overcompensation of renewable electricity generators.

16. The costs of solar PV have fallen dramatically in recent years and small scale deployment has increased substantially over the last 12 months. As a result of these developments, the RO support levels for solar PV proposed in the earlier RO banding review consultation (2 ROCs/MWh in 2013/14 and 2014/15, 1.9 in 2015/16, 1.8 in 2016/17) risk overcompensating generators. Whilst reducing support rates for solar PV overall, separate bands for building-mounted and ground-mounted installations are created to encourage deployment of these technologies whilst attempting to reduce the risk of over or under-incentivising one of these types of project through a single support band.

5. Policy Objective

17. The objective is to set support rates that bring on the most economically sound building mount and ground mount solar PV projects under the RO, thereby encouraging the steady growth of the sector in the UK, whilst avoiding overcompensation of investors and creating greater value for money for electricity consumers.

18. The consultation set out proposals to control the costs of solar PV support within the RO by making use of the existing provisions for early review, where this is warranted. This is intended to ensure that any future rapid cost changes in the industry do not lead to windfall gains for developers.

19. The proposed support levels take into account the six statutory factors for RO banding decisions set out in the Electricity Act 1989 and summarised below:

    i. the costs (including capital costs) associated with each renewable electricity technology;

    ii. the income associated with generating electricity from each renewable electricity technology;

    iii. the supplies from renewable sources exempted from the Climate Change Levy (CCL) in relation to generating electricity from each renewable electricity technology;

    iv. the desirability of promoting the industries associated with renewables;

    v. impacts on the market for ROCs and on consumers; and

    vi. contributions towards achieving European targets, including the interim and final 2020 renewables target.

6. Options considered

20. This section sets out the options considered in this IA as part of the Government response to the consultation on proposals for the levels of banded support for new solar PV generating stations, which accredit or add additional capacity under the RO on or after 1st April 2013 and up to 31st March 2017.

Option 1 – Do nothing

21. RO bands for new solar PV installations remain at current levels (i.e. 2 ROCs/MWh of renewable electricity supplied in 2013/14, 2014/15, 2015/16 and 2016/17) for both building mount and ground

mount installations.

22. The Do-Nothing option is the same as that in the solar PV consultation document published on 7th September 2012 and also the Government response to the consultation on the RO Banding Review published on 25th July 2012[8].

Option 2 – Revised bands

23. RO bands for new solar PV installations are reduced to take account of latest available evidence and analysis. A mechanism exists for controlling the costs of solar PV within the RO.

Solar PV RO Bands

24. Policy set out in the Government response introduces separate bands for building mount and ground mount installations, reflecting the evidence that relates to solar PV costs and performance received through the consultation. Support rates are set with the aim of incentivizing the most cost-effective projects and fall in line with projected reductions in system costs. The revised bands remain close to projected FITs tariffs at the outset for both building-mounted and ground-mounted installations.

25. Stations accrediting (and additional capacity added) before 1 April 2013 will be able to take advantage of the existing RO subsidy rate of 2 ROCs. Current grandfathering policy will be maintained so that RO support levels for these solar PV stations will not change once they are accredited (or in the case of additional capacity added to an accredited station, should not change after the additional capacity was added).

26. The solar PV consultation proposed a single band for both building and ground mounted installations (see table 3 above). However, the consultation responses provided evidence on the different characteristics of the two types of installations which justified an introduction of two separate bands. Detail on the different characteristics of building and ground mounted installations is provided in section 7A.

Solar PV cost control

27. Future solar system costs are highly uncertain, and depend on factors such as panel prices which are set in a fast-moving global market. Faster than expected cost reductions could result in over compensation for RO developers. The Government proposes to continue to use those powers that already exist under the RO to ensure that support levels for solar PV remain sustainable. The Government will continue to monitor the industry very closely and consider holding an early review if there is evidence that the legal criteria for an early review, as set out in article 33 of the Renewables Obligation Order 2009, are met. Table 3 above shows the banding level for solar PV in each year of the review period under the two options considered in this IA, as well as the support levels proposed in the consultation for reference.

28. It can be seen that the final ROC rates in the Government response degress more slowly than those proposed in the consultation. The rates in the consultation were intended to be FITs-equivalent, and therefore reflect projected falls in FITs tariffs. FITs tariffs are projected to fall quickly due to a combination of falling technology costs and projected rising retail electricity prices[9] over the period in question[10], whereas degression for large-scale installations that export all their electricity is more closely linked to reductions in the costs of solar PV itself.

[8] The Government response to the Banding Review proposed a band of 2 ROCs/MWh in 2013/14 and 2014/15, 1.9 in 2015/16 and 1.8 in 2016/17 for solar PV. However these bands were not introduced when the response to the Banding review was published and were subject to further consultation. Therefore the Do-Nothing option is that RO bands remain at current levels as stated above.

[9] FITs modelling assumes that 50% of electricity generated by solar installations connected to a building is used on site. The foregone electricity purchase that results is valued at the retail price of electricity.

[10] FITs electricity price assumptions taken from DECC projections, see http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/en_emis_projs/en_emis_projs.aspx.

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

Option	2013/14	2014/15	2015/16	2016/17
Option 1. Current bands	2.0	2.0	2.0	2.0
Option 2. Response Bands				
• Building-mounted	1.7	1.6	1.5	1.4
• Ground-mounted	1.6	1.4	1.3	1.2
Consultation Bands	1.5	1.3	1.1	0.9

Source: DECC in-house analysis

29. The potential impacts of the cost control mechanism are not quantified in this IA. It is difficult to anticipate when such a review would take place and whether such a review will result in changes to RO support levels**.**

7. Analytical approach

A) Evidence base

30. The original solar PV cost assumptions for the RO Banding Review were taken from the Arup report commissioned for this Review and published in October 2011[11]. Evidence gathered during the process of the FITs consultation indicated that the costs of small-scale solar PV, particularly 250kW-5MW installations, have come down substantially since the Arup report was published.

31. Prior to the solar PV consultation under the RO, evidence on costs associated with large scale solar PV installations was limited. The analysis in this IA concerning large scale installations is based on cost and performance information related to this type of project provided by stakeholders during the consultation[12]. Limited information on larger building-mounted installations (on commercial/industrial premises) was also received through the consultation. Installations of this size and type are the most cost-effective type of building-mounted project and therefore represent the type of project the new building-mounted band is seeking to incentivise. Modelling of building mounted deployment and costs is carried out through the FITs model alongside analysis of small-scale ground-mounted installations, using the assumptions developed by Parsons Brinckerhoff for the Government response to Phase 2a of the FITs review[13]. Supply curve modelling for larger building mounted projects is based on the limited information received through the consultation.

32. Whilst all evidence and assumptions have been scrutinised, they are subject to uncertainty especially in relation to building-mounted installations, where the consultation data set was much less extensive. For all types of solar PV projects, future costs are uncertain and difficult to predict. To a large extent future costs will depend on global solar PV deployment and economies of scale in their manufacture, technological progress and supply chain development. Sensitivity analysis around some of these assumptions has been undertaken to generate high and low impacts as set out in section 8C of this IA.

33. The key modelling assumptions for large-scale solar PV used for the analysis in this IA are summarised in Annexes A-D, along with changes in assumptions since the consultation IA. A brief summary of the changes to key assumptions, and the rationale behind these changes, are provided below. Key assumptions for small-scale solar PV uptake are set out in PB's report

[11] See http://www.decc.gov.uk/assets/decc/11/consultation/ro-banding/3237-cons-ro-banding-arup-report.pdf
[12] See annex for details on the evidence base
[13] See http://www.decc.gov.uk/en/content/cms/consultations/fits_rev_ph2a/fits_rev_ph2a.aspx

accompanying the FITs Comprehensive Review Phase 2A Government response[14]. Key assumptions for the supply curve analysis of larger building-mounted projects are set out below and in the annexes where these differ from PB's assumptions.

Costs (Capex and Opex)

34. Stakeholders generally indicated that PB's capex estimates from their update for the FITs 2A Government response[15] were too low if grid connection costs were included, and that opex costs were too low if cost categories relevant to a larger installation (e.g. asset management costs[16]) were taken into account. More details on DECC's revised capex and opex estimates can be found in Annex A.

Large Scale Ground-mounted

35. The revised central capex assumption based on consultation responses (£1180/kW) for current large scale solar PV installations (used to set the RO support rate for 2013-14, taking into account construction timescales) is very similar to PB's estimate for 2012-13 installations (£1170/kW). The revised central capex assumption includes both project development and grid connection costs[17]. While there do appear to be additional costs for large-scale projects owing to their greater complexity and risk, these are to an extent counteracted by economies of scale and buying power (through the purchase of large numbers of panels and other parts).

36. DECC's revised capex estimates are appreciably higher than PB's from 2013-14 onwards, due to a shallower assumed cost reduction trajectory (see 'reduction in capex' below). DECC's revised opex estimate for current installations (£23/kW) is slightly higher than PB's (£22/kW). This reflects additional running costs faced by large-scale installations besides installation operation and maintenance (e.g. those related to asset management). Land lease costs have been excluded, in line with the treatment of other technologies eligible under the RO.

Large Scale Building-mounted

37. Revised central capex gathered through the Consultation (£1075/kW) is lower than for ground-mounted installations. This may be due to building-mounted installations not generally incurring grid connection costs, although it is hard to draw firm conclusions given limited information

Reduction in capex (learning rates)

38. Evidence received during the consultation suggests that the learning rates estimated by PB, which we applied to capex costs in our modelling assumptions to generate future costs estimates, were too high, especially in the near-term where PB projected 10% annual falls in capex between 2012/13 and 2013/14. Stakeholders' evidence suggested that the solar PV industry was not expected to witness further linear cost reductions in line with the recent past.

39. Based on this the Government has revised its central learning rate estimate downwards, based on a trajectory for solar PV system cost estimated by Bloomberg[18]. Given the considerable uncertainty around the future trajectory of PV cost reduction, high and low estimates for learning rates feed into the high and low uptake sensitivities set out in section 8C.

40. No information was received to suggest that the capital cost reduction trajectory for building-mounted installations was different to large scale ground-mounted installations. The ROCs required analysis in Table 4 below assumes the same trajectory for both building-mounted and ground-mounted installations.

[14] See http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/renewable-energy/5381-solar-pv-cost-update.pdf
[15] See http://www.decc.gov.uk/en/content/cms/consultations/fits_rev_ph2a/fits_rev_ph2a.aspx
[16] Asset management cost: costs incurred in updating investors on the performance of the asset.
[17] For a more detailed breakdown of cost categories included in our revised assumption for capex and opex please see table 17 in Annex A
[18] Bloomberg New Energy Finance, February 2012, 'Q1 2012 PV Market Outlook: Grid Parity, no Party'

Load factor

Large Scale Ground Mount

41. Stakeholder evidence suggests that the load factor assumption used in the consultation IA (850kWh/kW/yr, or 9.7%) was an underestimate for southern areas of the UK where the bulk of large-scale PV deployment would take place. Stakeholders also indicated that DECC modelling should factor in panel degradation rather than assume constant panel performance across the lifetime of the technology.

42. In light of this evidence we have revised the load factor assumption for ground-mounted installations upwards (to 975kWh/kW/yr) and have applied a degradation factor of 0.5% per year.

43. There is significant uncertainty around load factors for large-scale solar, given the lack of UK projects to date, and irradiation rates which vary from one part of the country to another. Given this variability, and the importance load factor plays in determining project returns, we have used our high and low estimates of load factor for ground-mounted installations (starting at 1050kWh/kW/yr (12.0%) and 900kWh/kW/yr (10.3%) respectively with 0.5% per year degradation) in the sensitivity analysis presented in section 8C.

Large Scale Building Mount

44. Information gathered through the Consultation suggest that building-mounted installations have a lower load factor than ground-mounted installations because they are constrained by the architecture and orientation of the building, meaning that panel tilt and orientation cannot be optimised to maximize output. The heterogeneity of commercial and industrial premises means there is a good deal of uncertainty around what the assumed load factor for building-mounted should be: one respondent provided an indicative range of 775-875kWh/kW/yr.

45. The assumed load factor under FITs which we use in uptake modelling (850kWh/kW/yr) falls within this range. In the ROCs required analysis in table 5 below we assume that building-mounted installations have the same starting load factor as assumed under FITs (850kWh/kW/yr) to which a 0.5% degradation rate is then applied.

Large Scale Technical Deployment Potential

46. Technical deployment potential represents the maximum amount of large-scale ground-mounted deployment that might occur during the period covered by this IA without taking into account financial constraints. Annual technical deployment potential equates to 100% of the large-scale ground-mounted supply curve in each year. It is therefore a key driver of the deployment and costs of large-scale PV as it determines the level of deployment associated with each point on the supply curve (20, 40, 60, 80, 100%).

47. The Arup data provided for the RO Banding Review consultation[19] showed a potential deployment trajectory for large scale solar PV (high scenario) of around 115MW by 2017. Feedback to the RO Banding Review consultation indicated that this deployment trajectory was considered an underestimate. Analysis in the Solar PV Consultation IA brought forward the Arup deployment trajectory, drawing on evidence from deployment under larger FITs tariff bands and Germany. The revised technical deployment potential was 720MW by 2017.

48. Responses to the solar PV consultation indicated that 720MW remained too low an estimate of technical deployment potential for large-scale ground-mounted solar PV. However there was considerable variability in the estimates that consultees provided: the lowest estimate provided was 1.2GW, the highest was 50GW. On the basis that 720MW by 2017 is outside the wide range provided by stakeholders, the estimate of technical potential has been revised upwards[20].

[19] http://www.decc.gov.uk/assets/decc/11/consultation/ro-banding/3237-cons-ro-banding-arup-report.pdf
[20] For more details on the methodology , see Annex C

49. The revised numbers represent an estimate of the total capacity of greater than 5MW ground-mounted solar PV that could be delivered by 31 March 2017. The estimate of technical deployment potential has been calculated further to new modelling which considers the impacts of solar PV on Great Britain's transmission system operation for the year 2020 undertaken by National Grid. The modelling explores the physical constraint of solar PV on our current UK electricity grid network. For more information see Annex C.

Table 4. Deployment potential for large-scale (>5MW) solar PV to 2016/17 (commissioning years)

	2012/13	2013/14	2014/15	2015/16	2016/17
Annual	512	1,024	1,024	1,024	1,024
Cumulative	512	1,536	2,559	3,583	4,606

Source: DECC in-house analysis
Note: 2012-13 potential is for October 2012 onwards, hence it is half that of other years

Financial Parameters (hurdle rates, haircuts on ROC/ electricity prices)

50. The Consultation gathered a range of views on the project finance of solar PV project finance but there was general agreement that broader assumptions (i.e. hurdle rates, Power Purchase Agreement (PPA) terms) as used in the Consultation were appropriate. These assumptions have therefore been left unchanged and are summarised in Annex D.

Technology lifetime

51. In the consultation IA technology lifetime had been modelled at 35 years. However, evidence gathered during the consultation suggest that planning permission obtained for solar PV projects is for 25 years and that the investor horizon period for solar PV projects is not longer than 25 years.

52. In light of the new evidence, DECC has revised its assumption for technology lifetime to 25 years for ground mounted projects. The ROCs required analysis for building mounted projects in table 5 below also assumes a 25 year lifetime, although modelling of building-mounted deployment assumes a lifetime of 35 years in keeping with FITs assumptions.

B) Modelling approach

Building-mounted solar PV

53. Building-mounted and ground-mounted solar PV are distinct in some important respects. For example, building-mounted installations tend to have lower load factors and use a significant amount of electricity generated on-site, whereas ground-mounted installations will export all the electricity they produce to the grid. To ensure that the different characteristics of PV are fully reflected in modelling, DECC's in-house FITs model has been adapted and used for building-mounted installations.

54. DECC's FITs model covers solar PV up to 5MW. This is appropriate for modelling building-mounted solar under the RO, since evidence received through the consultation has indicated that building-mounted installations are unlikely to be larger than 5MW in size. The FITs model uses the assumptions developed by PB for the Government response to the FITs 2A consultation to give projections of deployment for both building-mounted and ground-mounted under the revised support rates.

55. Small scale (sub-5MW) solar PV uptake under FITs are set out in the IA accompanying the Government response to the FITs comprehensive review phase 2A consultation. Modelling in this IA accounts for additional sub-5MW uptake, over and above published FITs projections, that might occur under the RO under the new support rates..

56. The RO and FITs schemes vary in some key respects and these difference are reflected in how the FITS model is adapted to the RO. Evidence from the consultation has highlighted the different risk profiles of FITs and RO. Whereas FITs provides a guaranteed, inflation proofed payment for electricity generated across the lifetime of the scheme, the electricity price and price of a ROC can vary over time. In addition, while investors under FITs receive the full value of the generation tariff, investors under the RO tend to receive less than the full value of a ROC under the terms of their Power Purchase Agreements (PPAs). In modelling RO support rates through the FITs model, it is therefore necessary to ensure that these differences are reflected in order to give as accurate an estimate as possible of sub-5MW deployment that will occur under the RO.

57. DECC's modelling for the consultation assumes a 'haircut' of 10% on the ROC price, i.e. investors only receive 90% of the full value of a ROC. In response to the consultation stakeholders indicated that this was an appropriate estimate. Our modelling therefore reduces RO support rates by 10% before they are input into the FITs model. This implies that RO support rates would have to be 10% higher than projected FITs tariffs in order for additional sub-5MW uptake over and above that modelled under FITs to occur. This is likely to be a conservative estimate: it only accounts for the 10% haircut that ROC investors face under the terms of their PPAs, and not for the wider differences in risk profile outlined in paragraph 56 above.

58. We assume that uptake under the RO in addition to that accounted for in FITs modelling could occur for any size of installation eligible for the RO (i.e. above 50kW). Again, this is a cautious assumption: administration costs and additional complexity of the RO are likely to discourage investors in smaller projects. In addition, the costs of installations below 250kW are significantly higher than for the 250kW-5MW band[21] meaning that uptake of projects below 250kW is likely to be limited relative to the 250kW-5MW band.

59. Estimates of sub-5MW RO uptake are extremely uncertain, as are the deployment rates under the FITs tariff. They are highly sensitive to changes in relative levels of FITs and RO support, but these are difficult to foresee as future FITs tariffs are very uncertain (due to degression).

Ground-mounted solar PV

60. The impacts of policy options on ground-mounted solar PV (typically >5MW) installations are measured through DECC's in-house ROCs model. This model applies a range of assumptions based on information gathered through the RO Banding review and the solar PV consultation.

61. It is important to note that assumptions around the cost, performance and technical potential of large scale ground-mounted solar are extremely uncertain. There are numerous factors which will affect the pricing of solar PV systems in the future including support levels, the price of raw materials and the resultant equipment costs through the supply chain, the nascent market in the UK to deliver large-scale ground-mounted projects and ongoing developments in global supply and demand. In addition, the absence of large-scale ground-mounted solar PV projects in the UK means there is a lack of 'real time' evidence of the performance characteristics of installations greater than 5MW.

62. DECC's updated estimate of the deployment potential has been combined with updated cost assumptions derived from evidence gathered during the consultation to derive a supply curve for large-scale ground-mounted solar PV for each year of analysis in the DECC ROCs model. The model uses discounted cashflow modelling to determine the range of ROCs required to bring on different segments of the solar PV supply curve for each year until 2015/16. This was then used to estimate deployment levels, generation and subsidy costs at the ROC support rates in Options 1 and 2.

ROCs required analysis

63. Table 5 below shows DECC's estimate of the levels of ROC support that would be required to

[21] PB estimate the capital costs of a 150-250kW installation in 2012-13 to be £1535/kW, as opposed to £1170/kW for a 250-5000kW installation.

bring on the different sections of the ground-mounted and building-mounted solar PV supply curves[22] in each year to 2016/17. There is considerable uncertainty surrounding the solar PV costs data underlying this analysis, especially for the building mounted sector where only a limited amount of data was received through the consultation. The analysis from the consultation is included for reference. The analysis for building-mounted installations has been used to inform the setting of the new building-mounted band but does not feed into uptake and cost modelling, which is done through the DECC FITs model (for more detail see section 7B).

64. ROCs required to incentivise different sections of the large-scale ground-mounted supply curve are significantly lower than in the consultation IA for 2013/14. This reflects the fact that although current capex costs (used to set support rates for 2013/14) are very similar to the PB values used in the consultation analysis (see paragraph 35 above), the load factor has increased (see paragraph 41 above). In future years, ROCs required are equal to, or slightly lower than, those estimated in the consultation. This is because slower capex reduction (compared to the reduction rate assumed in the consultation IA) is offset by an increased load factor.

65. ROCs required to incentivise different sections of the building-mounted supply curve are greater than those for building-mounted installations. This reflects the different characteristics of building mounted installations, particularly their lower load factor relative to ground mounted installations.

Table 5 . ROCs required to incentivise different sections of solar PV supply curve

ROCs required for new installations in…				
	Consultation			
Proportion of supply curve	**2013-14**	**2014-15**	**2015-16**	**2016-17**
20%	1.9	1.6	1.5	1.4
40%	2.0	1.7	1.6	1.5
60%	2.1	1.8	1.7	1.6
80%	2.3	2.0	1.9	1.7
100%	2.5	2.1	2.0	1.9
	Government response - large scale ground mounted			
Proportion of supply curve	**2013-14**	**2014-15**	**2015-16**	**2016-17**
20%	1.6	1.5	1.4	1.3
40%	1.7	1.7	1.6	1.4
60%	1.9	1.8	1.7	1.5
80%	2.0	1.9	1.8	1.7
100%	2.2	2.1	1.9	1.8
	Government response - larger building mounted			
Proportion of supply curve	**2013-14**	**2014-15**	**2015-16**	**2016-17**
20%	1.8	1.7	1.6	1.5
40%	1.9	1.9	1.7	1.6
60%	2.1	2.0	1.9	1.7
80%	2.3	2.2	2.0	1.9
100%	2.4	2.3	2.2	2.0

Source: DECC in-house analysis

66. According to this analysis, and on the basis of the revised assumptions, the proposed tariffs will be

[22] Building-mounted solar PV supply curve was modelled using limited number of building-mounted data and then assumed the wider distribution to be similar to ground-mounted solar PV.

sufficient to incentivise around 20% of the ground-mounted supply curve in 2013/14. For the remaining period (i.e. 2014/15 to 2016/17) the analysis suggests that the proposed support rate will incentivise 0-20% of the supply curve. It is not possible to say with certainty how much less than 20% would be incentivised during this period, due to lack of granular information about the pipeline of cost-effective projects. In recognition of this uncertainty deployment projections in 2014/15 and beyond are expressed as a range (e.g. 1.4 ROCs in 2014/15 will incentivise 0-20% of the large scale ground-mounted supply curve).

67. Similarly we estimate that 0-20% of the building-mounted supply curve would be incentivised in each year. As explained in paragraph 61, the results for building mounted installations are indicative and do not feed into uptake modelling. However a comparison of the ROCs required and the proposed support rates would indicate that only the most cost effective larger building mounted projects will be incentivised.

Interaction with EMR

68. It has been assumed that large-scale (>5MW) solar PV installations from 2016/17 onwards will choose to deploy under the system of Feed in Tariffs with Contracts for Difference (FITs with CfDs), which form part of DECC's Electricity Market Reform Package (see Annex D for more details). In reality it may be that some new large-scale build still occurs under the RO in 2016/17 and some new large-scale build modelled as being under the RO before 2016/17 may be actually supported by the FiT with CfD. Small-scale solar PV installations (which will not be eligible for FITs with CfDs) continue to deploy in 2016/17.

Counterfactual

69. The costs and benefits of solar PV under Options 1 and 2 are assessed against a Combined Cycle Gas Turbine (CCGT) counterfactual, in line with the consultation IA. This represents a cautious approach: since CCGT is the cheapest generation technology, using it as the counterfactual provides an upper bound on the costs of a particular level of PV deployment. However, it is important to note that there is considerable uncertainty over which technology would be displaced by solar PV deployment.

8. Summary of costs and benefits

70. This section of the IA sets out the impact of Options 1 and 2 on deployment of solar PV installations, and the additional costs and benefits of changes to the level of support given to solar PV under the RO. This section is sub-divided into the following areas of analysis:

    A) Solar PV electricity deployment
    B) Monetised impacts
    C) Sensitivity analysis
    D) Non-monetised impacts
    E) Distributional impacts

A) Solar PV electricity deployment

71. Tables 6 and 7 below summarise projected deployed capacity and generation over the period 2013/14 to 2016/17 under each option. These estimates incorporate large-scale (ground mount) installations, as well as small-scale (building-mounted and ground mount) uptake over and above that estimated in FITs analysis (see paragraphs 51-56 above).

72. New installations of above 5MW capacity are assumed to come on under the new FITs with CfD

scheme rather than the RO in 2016/17[23]. All new uptake in 2016/17 is therefore small-scale solar PV.

Table 6. New build solar PV capacity supported under the RO, MW (cumulative from 2013/14)

Options	2013/14	2014/15	2015/16	2016/17
Option 1 – do nothing	870	1,830 to 2,040	3,100 to 3,310	3,560 to 3,760
Option 2 – revised bands	210	240 to 440	310 to 720	450 to 860

Source: DECC in-house modelling; results have been rounded.
Notes: a. Figures for UK solar PV installations supported under the RO, i.e. >5MW installations plus sub-5MW uptake additional to that modelled in IA supporting FITs consultation 2A Government response; b. Range represents uncertainty over proportion of marginal segment of the large scale solar PV supply curve that will be built, e.g. under the lead option in 2014/15, between 0-20% of the large scale solar PV supply curve is projected to be built.

Table 7. Modelled generation from new build solar PV capacity supported under the RO, GWh per year

Options	2013/14	2014/15	2015/16	2016/17
Option 1 – do nothing	420	1300 to 1400	2370 to 2570	3160 to 3360
Option 2 – revised bands	100	210 to 310	260 to 560	350 to 750

Source: DECC in-house modelling; results have been rounded.
Note: Installations assumed to operate at 50% of full year annual output in first year of operation

73. Projected uptake under Option 2 is substantially lower than under Option 1 (do nothing), due to the lower level of ROC support made available to new installations. New build capacity incentivised under both options is higher than the level stated in the consultation IA. This is largely a result of the revised deployment potential assumption for large scale PV as explained in section 7A.

74. In terms of capacity and generation:

- New build solar PV capacity supported under the RO is estimated at between 450-860MW by 2016/17 under Option 2, compared with 3560-3760MW under Option 1 (do nothing).
- New build solar PV generation supported under the RO is estimated at between 350-750GWh/year by 2016/17 under Option 2, compared with 3160-3360GWh/year under Option 1.

75. These capacity and generation projections are presented as a range owing to the uncertainty over the proportion of the marginal segment of the large-scale supply curve that will be incentivised. While we estimate that around 20% of the supply curve will be incentivised in 2013/14, the modelling projects that between 0-20% of the supply curve will be built in 2014/15 and 2015/16. Projections from 2014/15 onwards are therefore expressed as a range. Similarly there is a range under Option 1 for 2014/15 onwards as the modelling projects that between 80-100% of the supply curve will be incentivised in that year.

B) Monetised impacts

76. The monetised costs and benefits associated with Options 1 and 2 are presented in Table 8 below. In summary, Option 2 leads to much lower resource costs (i.e. capital costs and operating costs relative to the CCGT counterfactual), avoided emissions and lifetime EUA costs than under Option 1. Costs are the additional resource costs associated with a particular level of solar PV deployment relative to the CCGT counterfactual. Specific impacts can be summarised as follows:

- Lower levels of relatively more expensive solar PV deployment lead to lifetime resource costs of £150-450m under Option 2, which are significantly lower than under Option 1.
- Lower levels of solar PV deployment, and its assumed substitution with CCGT plant, leads to

[23] For further detail see Annex D

lower avoided grid CO_2 emissions of around 1.7-3.3Mt under Option 2.

- The emissions reductions (offset by increases elsewhere in the EU[24]) under Option 2 are valued at the DECC central traded carbon appraisal values[25] and amount to around £30-70m of EUA purchase cost savings, compared to savings of £240-260m under Option 1.
- The present value of monetised impacts range from £-120 to £-390m under Option 2, compared with a much lower value of £-1840m to -£1980m under Option 1.

Table 8. Costs and benefits associated with Options 1 and 2

	Option 1 - do nothing	Option 2 - revised band
Lifetime resource costs, £m, 2010/11 prices	2080 to 2240	150 to 450
Avoided lifetime emissions, MtCO2	15.1 to 16	1.7 to 3.3
Avoided lifetime EUA costs, £m, 2010/11 prices	240 to 260	30 to 70
Present Value (PV), £m, 2010/11 prices	-1840 to -1980	-120 to -390

Source: DECC in-house analysis; results have been rounded.

Notes: Figures presented above are for both large and small scale solar PV installations in the UK. Installations assumed to operate at 50% of full year annual output in first year of operation;

C) Sensitivity analysis

77. There is a high level of uncertainty around present and future costs of solar PV. and how these will evolve in the future. There are many factors influencing the installed costs of PV systems for all sizes and types of project, including the level of Government support, the price of raw materials and resultant equipment costs through the supply chain and ongoing developments in global supply and demand. Stakeholder evidence has strengthened our view that it is extremely difficult to forecast the solar PV cost trajectory. While historical trends show a downward cost path, with especially rapid reductions in the recent past, it is unclear if this is expected to continue and if so, the rate at which it is expected to take place.

78. There is also considerable uncertainty around the load factor of solar PV. Load factor is subject to a high degree of variability depending on the geographical location of PV sites, and the lack of large-scale ground-mounted projects in the UK means there is a lack of evidence upon which to base load factor estimates

79. Given this, further sensitivity analysis has therefore been conducted around two of the key factors affecting the attractiveness of large-scale ground-mounted solar PV projects from an investment perspective, namely capex learning rate (i.e. reduction in capex costs over time) and load factor. The low and high learning rate sensitivity was calculated as ±2% of the central annual learning rate which was derived from a Bloomberg cost reduction projection as explained in Annex A[26]. The low and high load factor was calculated as central load factor ±75 KWh/KW/yr. Annual degradation was assumed to occur at the same rate as under the central case (0.5% per year) (for details see Annex A).

80. No sensitivity has been carried out on our estimates of *current* capex. This was not required due to the low level of variability in the values for capex we received from stakeholders through the consultation[27].

[24] 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.

[25] 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

[26] Bloomberg New Energy Finance, February 2012, 'Q1 2012 PV Market Outlook: Grid Parity, no Party'

[27] In the dataset for capex, the mean was £1180/kW and the standard deviation was £82/kW. The low value for standard deviation indicates the low degree of variability in the sample.

81. In the **low uptake** scenario, the low capex learning rate and the low load factor have been used, ie large-scale ground-mounted solar costs more, and yields less output than in the central scenario. In the **high uptake** scenario, the high capex learning rate and the high load factor have been used, ie large-scale solar costs less, and yields more output than in the central scenario. Sensitivity assumptions for small-scale uptake follow those in the 'Low' and 'High' sensitivities in the FITs 2A IA[28]. As in the central scenario, small scale uptake in addition to that estimated in the FITs IA is accounted for here.

82. Deployment and monetised impacts under these low and high uptake scenarios are summarised in table 9 and table 10 below. For the low uptake scenario deployment and monetised impacts are provided as a range. This is because in the low uptake scenario the proposed ROC rate will bring on 0-20% of the ground-mounted supply curve in each year out to 2016/17. In the high uptake scenario the proposed ROC rate will bring on around 60% of the ground-mounted supply curve in 2013/14 and 2015/16, and around 40% in 2014/15. Therefore there is no range in the deployment and monetised impacts for the high uptake scenario provided in table 10 below as we estimate that deployment will be close to a particular point on the supply curve in each year.

Table 9. Costs and benefits associated with Options 1 and 2, low uptake scenario

	Option 1 - do nothing	**Option 2 - revised band**
Lifetime resource costs, £m, 2010/11 prices	960 to 1320	0 to 550
Cumulative deployment to 2016/17, MW	1400 to 1810	30 to 640
Avoided lifetime emissions, MtCO2	5.1 to 6.6	0.1 to 2.4
Avoided lifetime EUA costs, £m, 2010/11 prices	100 to 130	0 to 40
Present Value (PV), £m, 2010/11 prices	-860 to -1190	0 to -500

Source: DECC in-house analysis
Note: Totals may not sum due to rounding; deployment figures provided for both large scale and small scale solar PV.

Table 10. Costs and benefits associated with Options 1 and 2, high uptake scenario

	Option 1 - do nothing	**Option 2 - revised band**
Lifetime resource costs, £m, 2010/11 prices	2080	1080
Cumulative deployment to 2016/17, MW	5410	2620
Avoided lifetime emissions, MtCO2	21.7	10.2
Avoided lifetime EUA costs, £m, 2010/11 prices	330	200
Present Value (PV), £m, 2010/11 prices	-1750	-880

Source: DECC in-house analysis.
Note: Totals may not sum due to rounding; deployment figures provided for both large scale and small scale solar PV.

83. Even though Option 2 uptake under the low scenario is less than in the central scenario at the upper end of the range, resource costs are higher, and Present Value more negative. This reflects the higher cost of solar PV per unit of electricity produced under the low uptake scenario. Under

[28] See http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/renewable-energy/5391-impact-assessment-government-response-to-consulta.pdf. The low uptake scenario in the FITs IA uses the 'Slow Cost reduction' scenario for future PV costs developed by PB, while the high uptake scenario uses the 'Fast Cost Reduction' scenario.

Option 1, both uptake and resource costs and significantly lower under the low scenario than under the central scenario.

84. In the high scenario, uptake is higher under Options 1 and 2 than in the central scenario, but resource costs are similar, reflecting the lower cost of solar PV per unit under the high scenario.

85. The difference in present value (PV) between Option 1 and Option 2 (i.e. the net benefit) is much higher under the central uptake scenario than it is under the low uptake or high uptake scenarios. This is because:

    - The additional large-scale uptake incentivised under Option 1 compared to Option 2 is highest in the Central scenario.
    - The unit cost of solar PV is higher in the central uptake scenario relative to the high uptake scenario leading to a higher benefit in the central uptake scenario as a result of a fall in solar PV deployment .

86. In the Central scenario, under Option 2 up to 20% of large-scale technical deployment potential is incentivised in each year, while under Option 1 80% of potential is incentivised in 2013/14, 80-100% in 2014/15 and 100% in 2015/16. In the High scenario, under Option 2 around 60% of potential is incentivised in 2013/14 and 2015/16 and around 40% in 2014/15 but under Option 1 deployment remains at 100% of potential (a significantly smaller increase than under the central scenario).

D) Non-monetised impacts

87. It should be noted that the monetised costs and benefits above do not include several potentially significant impacts, principally those relating to security of supply, the UK meeting its environmental targets, and potential macroeconomic effects. These are covered below, however it should be noted that given the level of solar PV deployment projected in this IA, these impacts are likely to be small.

Security of supply impacts

88. The Do Nothing option would marginally help 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: these 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.

Risk of missing 2020 renewables target

89. 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. Projections of uptake in this IA suggest that solar PV under the RO plays a small part in the cost-effective mix for reaching the 2020 target.

Macroeconomic impacts

90. Growth in the solar PV sector may be lower under Option 2. However, resources will be redeployed into other sectors, meaning the net impact on GDP is unclear.

E) Distributional impacts

Cost to consumers

91. Changing RO bands can change levels of renewables deployment, and hence the levels of RO costs falling on consumers; wholesale prices (impacting on retail prices) can change when more solar PV is on the system; and system balancing costs increase with more intermittent generation.

92. Table 11 below shows how Option 2 reduces the level of RO support costs associated with solar PV installations owing to the reduction in potential investor overcompensation by reducing bands, which reduces overall deployment and incentivises the most cost-effective solar PV technologies.

93. Consumer cost impacts for small-scale uptake under the RO over and above those that have been estimated in the IA supporting the FITs consultation 2A Government response are very uncertain. This is because it is very hard to anticipate what installations are projected to come forward under the FITs scheme when faced with a higher level of RO support; even if RO support is higher, investors may still prefer the greater simplicity and certainty of FITs.

94. There are two ways in which sub-5MW uptake under the RO could lead to costs to consumers in addition to those accounted for in FITs IA 2a:

- **Uptake projected to come on under FITs instead comes on under RO ('Switchers from FITs'):** The additional cost here would be the generation projected under FITs valued at the ROC support rate minus projected FITs tariffs.
- **New uptake:** this is uptake that is not projected to occur at projected FITs tariffs, but would occur at higher RO support rates. The additional cost per MWh of these installations is valued at the ROC support rate.

95. Table 11 below sets out the potential costs associated with switchers from FITs and new uptake for Options 1 and 2 for individual years to 2016-17 and for the lifetime of the RO subsidy (20 years). In the 'low end' estimates, costs associated with new small scale uptake are included. In the 'high end' estimates, costs for new uptake plus switchers from FITs is included. This range for small-scale uptake reflects uncertainties around how FITs investors will react to a higher RO support rate. The table also shows combined costs to consumers for large-scale and small-scale PV uptake. Combined large scale and small scale lifetime RO support costs are £5100-5550m less under Option 2 compared to Option 1.

Table 11. RO support costs for Options 1 and 2 out to 2016/17 (2011/12 prices, £m, undiscounted)- central

Spending £m	**2013/14**	**2014/15**	**2015/16**	**2016/17**	**Lifetime**
Option 1 - Do nothing (low end of the central scenario)	35	110	200	270	500
Option 1 - Do nothing (high end of the central scenario)	35	130	230	310	1150
Option 2 - Revised bands (low end of the central scenario)	5	15	15	25	5600
Option 2 - Revised bands (high end of the central scenario)	5	25	40	55	6700

Source: DECC in-house analysis, figures are rounded to the nearest £10m and may not sum due to rounding.
Note: 'Low end' of central scenario is the bottom end of the range for large scale uptake plus new small-scale uptake. 'High end' is top end of the range for large scale uptake plus new small-scale uptake and switchers from FITs.

Bill impacts

96. Since the level of the Obligation has been set for 2013/14 there will be no impact on bills in that particular year. For the period from 2014/15 to 2016/17 there will be a beneficial impact on bills as a result of a change in the costs to consumers under Option 2 compared to Option 1. The 'low end' and 'high end' estimates are consistent with those for costs to consumers in Table 11 above.

97. The estimated rounded net impact on consumers of changes to support costs relative to current bands is presented below. This does not include any impacts on wholesale electricity costs or balancing costs relative to current bands, but these are expected to be small.

Table 12. Bill impacts, £/household/yr, 2012 prices, for households as a result of RO support costs for solar PV

BEFORE POLICIES	2014	2015	2016	2017
Option 1 - Do nothing (low scenario)	1.0	3.0	4.0	5.0
Option 1 - Do nothing (high scenario)	2.0	3.0	5.0	5.0
Option 2 - Revised bands (low scenario)	< £0.50	< £0.50	< £0.50	< £0.50
Option 2 - Revised bands (high scenario)	< £0.50	1.0	1.0	1.0
Difference between Option 1 and Option 2 (low scenario)	-1.0	-3.0	-3.0	-4.0
Difference between Option 1 and Option 2 (high scenario)	-1.0	-2.0	-3.0	-3.0

AFTER POLICIES	2014	2015	2016	2017
Option 1 - Do nothing (low scenario)	1.0	2.0	3.0	3.0
Option 1 - Do nothing (high scenario)	1.0	2.0	3.0	4.0
Option 2 - Revised bands (low scenario)	< £0.5	< £0.5	< £0.5	< £0.5
Option 2 - Revised bands (high scenario)	< £0.5	< £0.5	1.0	1.0
Difference between Option 1 and Option 2 (low scenario)	-1.0	-2.0	-3.0	-3.0
Difference between Option 1 and Option 2 (high scenario)	-1.0	-2.0	-3.0	-3.0

Source: DECC in-house analysis; figures have been rounded.

98. This policy has no significant bearing on protected characteristics, including age, disability, gender reassignment, pregnancy and maternity, race, religion or belief, sex and sexual orientation.

Environmental Issues

99. The revised solar PV banding options 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 within the capped EU-ETS traded emissions sector. There will therefore be no net impact on greenhouse gas emissions.

100. Any future deployment of solar PV will be subject to all relevant environmental legislation and controls, and aims to contribute to government policy objectives that enhance the natural environment .

Rural proofing

101. Whilst there has been no separate or explicit assessment of the needs of rural areas, separate planning legislation exists to ensure that the environmental and social impacts of solar PV

developments, and the views of those living near to installations, are fully taken into account.

102. Development of RO policy will take account of business interests within the renewables sector and consumer interests, including in rural areas.

Sustainable Development

103. The policy will have no material impact on the UK's move away from fossil fuel dependency.

Competition

104. The policy will have no material impact on the competitive functioning of the electricity market.

Small Firms

105. Option 2 will result in slightly lower electricity costs relative to Option 1. Electricity is likely to represent a larger proportion of income for smaller companies, as they are less likely to have their own generation compared to, in particular, large industrial users with heavy electricity requirements.

106. The majority of smaller businesses 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.

9. Summary and preferred option

107. The preferred option is Option 2 (Revised bands). The revised rates encourage the deployment of the most economically sound solar PV projects under the RO and increase the efficiency of the RO, delivering a lower average cost per MWh of solar PV for the electricity consumers who bear the cost of the RO. It does this by incentivising the most cost effective projects and reducing potential investor overcompensation. This is achieved through reducing support for solar PV installations eligible for support under the RO from 2013-2017, and creating separate bands for building-mounted and ground-mounted installations, reflecting their different characteristics.

108. The Government's expectation is that renewables support will reduce as the costs of renewable technologies fall. The proposed RO banding for solar PV is reduced over the review period to reflect these cost adjustments.

109. Table 13 below summarises the costs and benefits of Option 2 (Revised bands) compared to Option 1 (Current bands).

Table 13. Summary costs and benefits (Option 2 relative to Option 1, £m 2010/11 prices, discounted)

	Scenario		
Item	Low uptake	Central uptake	High uptake
Change in resource cost	-780 to -960	-1790 to -1930	-1000
Change in carbon saving benefit (avoided lifetime EUA costs)	-90 to -100	-190 to -210	-130
NPV	690 to 860	1590 to 1720	870

Source: DECC in-house modelling; figures have been rounded.

110. Option 2 is more affordable to consumers compared to Option 1 (Current bands). In addition the

Government proposes to continue to use those powers that already exist under the RO to ensure that support levels for solar PV remain sustainable. Taken together, this approach will help DECC to stay within its Levy Control Framework budget out to 2020.

Implementation

111. 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.

112. 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.

Annex A - Derivation of Cost Assumptions

Current Capex

113. During the consultation DECC received data from 23 stakeholders in total out of which 22 stakeholders provided evidence on the capital costs associated with the development and construction of solar PV projects in the UK. Nearly all respondents provided a breakdown of total capex. Table 18 on page 27 shows the cost categories that have been included in the final capex value used in the analysis for this IA.

114. A total capex value for each respondent was calculated by adding their estimate of the cost for each category included in table 18. The distribution of data points provided an initial range. To provide more certainty that the distribution excluded extreme values, the range was narrowed so that the bottom of the range was the 10th percentile and the upper end of the range was the 90th percentile, consistent with the methodology used in Banding Review analysis. This final range was then used to generate the cost estimates associated with the 5 sections of the solar PV supply curve used in DECC's in-house ROCs model for both large scale and larger building-mounted projects. The lower and upper ends of the range are associated with the 20% and 100% points of the supply curve respectively, while the median of the dataset represents the central value (associated with the 60% point of the supply curve). Costs associated with each section of the supply curve (for current installations) are set out in the table below for large scale and larger building-mounted projects:

Table 14. Capital cost associated with each section of the supply curve

	Point on supply curve (%)				
	20	40	60	80	100
Capex, £/kW, 2012 prices (for projects commissioned in 2012/13), large scale ground-mounted	1078	1129	1180	1234	1287
Capex, £/kW, 2012 prices (for projects commissioned in 2012/13), larger building-mounted	974	1024	1075	1127	1179

115. Capex data received from stakeholders was scrutinized and quality assured. The distribution of costs as received from stakeholders was relatively narrow i.e. the difference between the highest and the lowest capex was not large. Further investigation into the distribution of costs revealed that the data at the lower end of the distribution consisted primarily of costs relating to engineering, procurement and construction while the data at the upper end included broader costs (e.g. costs relating to asset management).

Future Capex Reductions

116. Responses to the consultation generally felt that the learning rates estimated by PB for FITs were too steep, especially in the assumption that costs would fall by 10% from 2012-13 to 2013-14. As justification for this, respondents pointed to ongoing consolidation among solar PV panel manufacturers, unsustainable below-cost panel prices, and an ongoing trade dispute regarding the import of Chinese solar PV panels into the EU.

117. DECC has therefore moved to a learning rate trajectory that is significantly less steep in the near-

term. This trajectory is based on analysis of solar PV system costs by Bloomberg[29].

118. However, future cost reductions are extremely uncertain, and any projection of future costs must be approached with caution, especially while the global solar PV market remains in a state of flux as it is at present. As part of the sensitivity analysis presented in this IA, we have therefore constructed slower and faster future cost reduction scenarios to feed into our low and high uptake scenarios respectively by varying the central learning rate trajectory by ±2%.

119. Our 3 future capex reduction scenarios are set out in the table below, together with the cost reduction scenario assumed in the consultation IA for reference:

Table 15. Reduction in capex compared to previous year

		2013-14	2014-15	2015-16	2016-17
PB	Consultation	-10%	-4%	-4%	-4%
High	Government response	-9%	-8%	-7%	-7%
Central		-7%	-6%	-5%	-5%
Low		-5%	-4%	-3%	-3%

Note: Government response figures have been derived from Bloomberg[30]; figures have been rounded to the nearest percentage.

120. The table below shows our central estimate for the future trajectory of capital costs for the period 2012/13 to 2016/17 for both the consultation and the Government response document with the learning rate assumptions from table 15. Capital cost data as received from stakeholders is slightly higher than that assumed in the consultation IA.

Table 16. Capex (central estimate) (£/kW, 2012 prices)

	2012-13	2013-14	2014-15	2015-16	2016-17
Consultation (PB)	1170	1053	1007	964	924
Government Response-Ground-mounted	1180	1140	1071	1020	970
Government Response-Building-mounted	1075	1039	976	930	884

Note: Government response figures have been derived from data provided by stakeholders during consultation. Cost reduction from 2012-13 to 2013-14 is 50% of that in Table 15 to account for consultation data being gathered in October (halfway through fiscal year)

Opex

121. During the consultation DECC received data from 23 stakeholders out of which 20 stakeholders provided evidence on operational costs of large-scale solar PV installations in the UK. However 1 data point was considered an outlier, since it was significantly lower than the mean value in the dataset and only provided an estimate for narrow operation and maintenance costs, rather than the wider categories of cost outlined in table 18 below, and was therefore excluded.

122. A majority of the respondents provided a breakdown of total opex. Similar to the methodology used to derive a capex distribution as explained in paragraph 111 above a similar exercise was carried out for opex.

123. Table 18 below shows the cost categories included in the final opex values for larger building-mounted and large scale installations shown in table 17. These final values exclude land lease

[29] Bloomberg New Energy Finance, February 2012, 'Q1 2012 PV Market Outlook: Grid Parity, no Party'
[30] Bloomberg New Energy Finance, February 2012, 'Q1 2012 PV Market Outlook: Grid Parity, no Party'

costs (in line with treatment of other technologies under the RO).

124. Opex data received from stakeholders was scrutinized and quality assured. The distribution of costs as received from stakeholders was relatively wide i.e. the difference between the highest and the lowest opex was large. Respondents suggested that there was a negative correlation between opex of a solar PV project and the quality of raw materials and manufactured products used. The wide distribution of opex could be a result of this difference in raw materials or manufactured products opted for by various developers.

Table 17. Opex (central estimate) (£/kW, 2012 prices)

	Annual O&M cost of 2013-14 installation
Consultation (PB)	22
Government Response - Large scale ground-mounted	23
Government Response - Larger building-mounted	27

Table 18 .Cost categories included in the assumptions for capex and opex

Cost categories included in..	
Capex	**Opex**
Pre-development and planning	Operation and maintenance
Construction and raw materials	Insurance
Grid connection	Asset management
Financing, administration and legal	Administration and business rates

Annex B - Derivation of Load Factor assumptions

Ground-mounted

125. In the consultation document we assumed a load factor of 850 kWh/kW/yr (9.7%), the central load factor assumed in FITs modelling. During the consultation exercise, many indicated that for large scale projects this load factor was low and not a true reflection of likely yields. Those that provided information reflected a load factor between 850 – 1250 kWh/kW/yr (9.7-14.3%), with the majority of respondents suggesting a load factor of 960kWh/kW/yr (11%) or more. The Government has reviewed the evidence and agrees that the assumed load factor for large-scale projects should be increased.

126. We have increased the load factor assumption from a value equivalent to a building-mounted project in the northern regions of the UK to something more consistent with a ground mounted project in the southern regions of the UK . This is consistent with our approach to bring on the most economically sound solar PV projects under the RO. Evidence suggests that in the southern regions of the UK levels of irradiation are considerably higher[31] than in the northern regions and therefore the load factors available to large scale installations are likely to be significantly greater. Developments that employ optimisation techniques are likely to be able to obtain even greater load factors.

127. Further to the consultation the Government has decided to increase the load factor assumption to 975kWh/kW (11.2%) (under central assumptions) to reflect the higher load factors that can be expected from ground mounted installations that are, or likely to be located mainly in, southern parts of the UK. The degradation of solar PV panels over time was not something that was included within our original modelling. The revised load factor assumption now includes an annual 0.5% rate of panel degradation which is consistent with the warranties available from manufacturers.

128. Sensitivity analysis has been carried out on load factor assumptions by varying the central load factor by ±75 kWh/kWp. This is described in further detail in section 8C.

Larger Building Mount

129. Stakeholders indicated that larger building mounted installations will typically be tilted at a less steep angle than the optimal degree of elevation, and that the majority of buildings are not oriented facing due south (the optimal orientation to maximize panel output). As a result output is in the region of 10% less than for ground-mounted installations, although this will vary from project to project.

130. In modelling uptake of building-mounted installations through the FITs model, we are seeking to account for uptake over and above that projected under FITs in the Phase 2a Government response IA, which means using the same modelling assumptions as were used for the FITs work. We have therefore used the FITs assumption that load factor will be 850kWh/kW/yr. This is slightly more than 10% below our central estimate for the load factor of large-scale ground-mounted solar. However, FITs modelling assumes no panel degradation, ie load factor remains at 850kWh/kW/yr throughout a project's operational lifetime, which means this remains a cautious approach in terms of modelling uptake.

131. For the ROCs required analysis in section 7B we have assumed that load factors start at 850kWh/kW/yr and then decrease by 0.5% per year, in keeping with assumptions around panel degradation for ground-mounted projects.

[31] http://re.jrc.ec.europa.eu/pvgis/cmaps/eur.htm#GB

Table 19. Load Factor (kWh/kW/yr) for large-scale ground-mounted installations in Operational Year

		1	2	3	4	5	6	7	8	9	10	25
PB	Consultation	850	850	850	850	850	850	850	850	850	850	850
High*	Government response	1050	1045	1040	1034	1029	1024	1019	1014	1009	1004	931
Central*		975	970	965	960	956	951	946	941	937	932	864
Low*		900	896	891	887	882	878	873	869	865	860	798

*Load factor in Year 2 onwards uses a 0.5% degradation

Annex C – Assessment of large-scale ground-mounted solar PV technical deployment potential

132. Projections of future solar PV uptake are very uncertain. There are numerous factors which will affect the pricing of solar PV systems in the future including support levels, the price of raw materials and the resultant equipment costs through the supply chain, the nascent market in the UK to deliver ground-mounted projects at over 5MW and ongoing developments in global supply and demand.

133. Trajectories developed by Arup for the RO Banding Review consultation[32] showed a potential deployment trajectory for large scale solar PV (high scenario) for around 115MW of installed capacity for >5MW projects by 2017. This was consequently revised prior to the launch of the consultation with proposed support rates for solar PV under the RO. Further analysis carried out at the time included investigation of the historical growth curve of large scale solar PV in Germany which supported the premise that there could be potential for a greater level of uptake in the UK than previously thought. In addition to this some high level analysis was carried out in-house which showed that there were several projects in the pipeline in the UK. As a result of this the original Arup scenario was revised to account for the underestimation. Table 20 below shows the level of deployment potential published in the consultation IA.

134. Many that responded to the consultation considered that our assessment of the deployment potential for large scale solar PV in the UK, out to 31 March 2017 (720MW) to be far too low. We have subsequently reviewed our methodology and believe that the best approach is to estimate the potential deployment by understanding the physical constraint of solar PV on our current UK electricity grid network.

135. The system operator, National Grid, have undertaken new modelling which considers the impacts of solar PV on Great Britain's transmission system operation for the year 2020. National Grid's initial estimate shows that deployment over 10GW of solar PV would make balancing the existing grid infrastructure significantly more challenging in its current form[33].

136. Although about 22 GW of solar PV could theoretically be accommodated on the system it is dependent on a number of conditions (including interconnection and export capacity, the availability of electricity storage, the amount of on-site usage, the range of possible changes to the generation mix, the level and nature of demand and necessary infrastructure modifications for transmission and distribution networks). We have however reduced this maximum by 10% due to the uncertainty associated with the underlying conditions and the ability to forecast this limit out to 2020. We therefore consider 20 GW of solar PV (both large- and small-scale) to be the theoretical technical maximum that can be accommodated on the grid by 2020 (subject to the potential conditions set out above).

137. We have examined the modelling and trajectory undertaken for the recent small scale FITs review (which includes deployment of building-mounted solar PV) and calculated an approximate glide path to 20GW by 2020 for solar PV (both small and large scale) in order to determine the potential deployment for large scale solar PV at the end of the RO banding review period. We estimate that by the end of March 2017 the maximum possible amount of solar PV on the UK electricity grid, consistent with a theoretical maximum limit of 20GW in 2020, would be 11.3GW. Assuming there would be 6.7GW of small scale solar PV deployment (as projected in the FITs central deployment scenario), then there would be room on the system for up to 4.6GW of large scale ground mounted solar PV. This is shown in table 20 below on both a cumulative and annual basis, assuming a constant increase in the deployment potential of large scale solar PV year on year.

138. In our central scenario for Option 2 we project deployment of sub-5MW installations in additional to

[32] http://www.decc.gov.uk/assets/decc/11/consultation/ro-banding/3237-cons-ro-banding-arup-report.pdf
[33] National Grid, 2012 Solar PV briefing note for DECC.GIVE WEB REFERENCE HERE

that projected in the FITs central scenario, implying that total sub-5MW deployment (under FITs and RO) will be greater than the FITs central scenario. However, the level of this additional sub-5MW deployment is small relative to amount of deployment projected under FITs (240MW in our central scenario by 2016/17, versus 6.7GW under FITs central scenario). In light of general uncertainty around future PV deployment levels, it therefore remains appropriate to use the FITs central scenario to inform our glide path to 2020, and our estimate of how much space there will be on the system for large-scale solar PV

139. This total maximum level (11.3GW) of PV generation on the system is above the 10GW in 2020 threshold, where National Grid predicts the onset of curtailment issues and inflexible generator scheduling problems would start to occur during the summer minima. However National Grid's assumptions are based on 2020 (rather than 2017) levels of build-out of other renewables, and 10GW is not a hard limit. It is therefore possible to assume that with the background generation mix on the electricity system in 2017, the total maximum of 11.3 GW can be accommodated.

140. Potential in 2012/13 is assumed to be 50% of the annual potential for the period 2013/14 to 2016/17 to account for the fact that we were half way through the year 2012/13 at the time of the consultation.

Table 20. Deployment potential for large-scale (>5MW) solar PV to 2016/17 (commissioning years), MW

		2012/13	2013/14	2014/15	2015/16	2016/17
Consultation	Annual	63	95	187	200	175
	Cumulative	63	158	345	545	720
Government response	Annual	512	1024	1024	1024	1024
	Cumulative	512	1536	2559	3583	4606

Annex D - Summary of unchanged assumptions

Wholesale price income

141. The electricity wholesale prices used are those endogenously modelled by Pöyry consultants as part of the RO banding review evidence base. It is assumed that generators will receive the projected wholesale price minus 13% to reflect the typical agreed price in Power Purchase Agreements (PPA's) struck between renewable generators and suppliers. The table below sets out the wholesale prices used in this IA.

Table 21: Wholesale electricity prices, GB (£/MWh, 2011/12 prices)

Year	Central fossil fuel prices
2011/12	60
2012/13	63
2013/14	68
2014/15	73
2015/16	73
2016/17	75
2017/18	73
2018/19	70
2019/20	71
2020/21	72
2021/22	74
2022/23	74
2023/24	75
2024/25	76
2025/26	76
2026/27	73
2027/28	77
2028/29	74
2029/30	74
2030/31	75

Source: Pöyry Consultants

Hurdle rate

142. Our modelling assumes an investor hurdle rate of 7.5% (pre-tax, real) for large-scale solar PV, in line with assumptions for the RO Banding Review. ROCs required analysis for larger building-mounted installations also uses this figure. Uptake modelling for small-scale solar PV uses the assumptions in the DECC FITs model.[34]

Electricity Market Reform

143. Full implementation of the Electricity Market Reform (EMR) has been assumed in modelling the impact of RO band options on the electricity market. This entails the introduction of:

I. An Emissions Performance Standard (EPS)
II. A capacity mechanism[35]
III. Carbon price floor
IV. A system of Feed-in Tariffs with Contract for Difference[36] (FiT with CfD) to support low carbon technologies, including solar PV

[34] For more details see http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/renewable-energy/5391-impact-assessment-government-response-to-consulta.pdf
[35] Assumed to be implemented if capacity margins are expected drop below 10%.
[36] For full details, see the Energy Bill (2012), available at: http://www.decc.gov.uk/en/content/cms/legislation/energybill2012/energybill2012.aspx

144. After the introduction of the new FiT with CfD (the first contracts are expected in 2014), new renewables developers of projects over 5MW will have the choice between support under the RO and support under the FiT with CfD, until the proposed closure of the RO to new stations from 1st April 2017. Investment decisions are likely to be aided by financial investment decision (FID) enabling strategies should these be implemented as part of the EMR package. In view of this, it has been assumed for the purpose of this analysis that:

    - All new renewables stations eligible for the RO and commissioning in 2013/14, 2014/15 and 2015/16 will be supported under the RO (except where they are eligible for small-scale FiTs).
    - All new renewables stations over 5MW eligible for the RO and commissioning in 2016/17 will be supported under the new FiT with CfD scheme, rather than the RO. Sub 5MW renewable stations will continue to accredit under the RO in 2016/17.

145. These are simplifying assumptions and it is not clear at this stage whether individual investors will choose the RO or the FiT with CfD. The switchover point is a modelling simplification. In reality, there is likely to be an overlap period, with some new renewables stations choosing the FiT with CfD in earlier years, and some choosing the RO in 2016/17, if they judge the risk of missing the RO end-date to be insignificant (or if their construction overruns from an intended accreditation date in earlier years).

Carbon prices

146. Carbon prices are consistent with DECC guidance.[37]

Unchanged assumptions

147. The table below shows the modelling assumptions which remain unchanged from the consultation IA.

Table 22. Modelling assumptions which remain unchanged from the consultation IA

Variable	Unit	Value
Hurdle rate for large-scale installations	Pre-tax real	7.50%
Power Purchase Agreement Value	p/KWh	87% of projected electricity wholesale price (Poyry RO series). Equates to around 6p/kWh at 2013-14 projected prices, rises with electricity price
ROC Value	£	ROC buyout price (£36.99, 2010 prices) + 10%, constant over time

[37] See http://www.decc.gov.uk/en/content/cms/about/ec_social_res/iag_guidance/iag_guidance.aspx.