Title: 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: 11/09/2012
IA No: DECC0103	**Stage:** Consultation
Lead department or agency:	**Source of intervention:** Domestic
Department of Energy and Climate Change (DECC)	**Type of measure:** Secondary Legislation
Other departments or agencies:	**Contact for enquiries:**
Ofgem	Andrew.Jones1@decc.gsi.gov.uk

Summary: Intervention and Options

RPC Opinion: N/A

Cost of Preferred (or more likely) Option

Total Net Present Value	Business Net Present Value	Net cost to business per year (EANCB on 2009 prices)	In scope of One-In, One-Out?	Measure qualifies as
£210-230m	N/A	N/A	No	N/A

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

Renewable energy technologies are more expensive than fossil fuel alternatives, which makes government intervention necessary to incentivise sufficient investment in renewable electricity generation to help the UK to meet its EU 2020 renewable energy targets. The Renewables Obligation (RO) is currently the UK's principal mechanism to incentivise growth in large scale renewable electricity generation, with small scale generation largely incentivised under the Feed in Tariff scheme (FITs). Evidence from the FITs Comprehensive Review suggests that solar PV costs have fallen significantly since RO support levels were proposed in the RO Banding Review Consultation published in October 2011. The Government Response to the RO Banding Review, published in July 2012, set support bands for various renewable technologies for the period 2013-17 and confirmed that a further consultation would be held on support bands for solar PV. The absence of further review of solar PV support rates could lead to RO support levels which 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 the period 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, whilst cost control measures help prevent scheme costs from going beyond budgetary constraints as set under the Levy Control Framework. The analysis in this Impact Assessment (IA) 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 during the period 1st April 2013 to 31st March 2017.

(ii) Option 2: Revised bands – reduce solar PV bands for new installations during the period 1st April 2013 to 31st March 2017.

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

Will the policy be reviewed? This is the last scheduled review. However, DECC will continue to monitor costs and deployment in the usual way, and may review solar PV bands if necessary to ensure costs are controlled.

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 CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)			**Traded: 4.6 – 4.9**	**Non-traded:**	

I have read the Impact Assessment and I am satisfied that (a) it represents a fair and reasonable view of the expected costs, benefits and impact of the policy, and (b) that the benefits justify the costs.

Signed by the responsible Minister: Edward Davey ..... Date: 11/09/12

Summary: Analysis & Evidence Policy Option 2 Revised 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)		
2010/11	2012/13	Years 37	Low*: £100m	High*: £180m	Best Estimate**: £210-230m

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low				60
High				70
Best Estimate				140-150

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 scenario.

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

Wider macroeconomic impacts of a reduction in solar deployment compared to counterfactual (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				160
High				250
Best Estimate				350-380

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 scenario.

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. Security of supply benefits of having less intermittent renewable generation.

Key assumptions/sensitivities/risks **Discount rate (%)** 3.5%

There are significant uncertainties around the cost and performance characteristics of large-scale solar PV. Cost and technology assumptions are taken from the Parsons Brinckerhoff (PB) report used in the recent FITs solar PV consultation. An investor hurdle rate of 7.5% is consistent with assumption used in original RO banding review consultation. The price received by investors for exported electricity is assumed to be 87% of the wholesale price reflecting prices in Power Purchase Agreements (PPAs), consistent with assumptions for the RO banding review consultation. The estimate of maximum technical potential for solar PV was derived from the Arup report for the RO Banding Review (>5MW) and Parsons Brinckerhoff report for the FITs review (<5MW). Key sensitivity analysis is estimated by varying capital costs 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 low Net Benefit estimate relates to the "High uptake" scenario and is derived from low costs and low benefits. The high Net Benefit estimate relates to the "Low uptake" scenario and is derived from high costs and high benefits (see Section 8.C for more details of the uptake scenarios).

** The 'Best Estimate' of costs and benefits relates to the central uptake scenario. Best estimate net benefits fall outside the low/high range because: a) the reduction in solar PV deployment under the central scenario of the lead option (Option 2) compared to do nothing (Option 1) is greater than in the high uptake scenario; and, b) solar PV is assumed to be lower cost in the High uptake scenario so the benefit of reduced levels of deployment is less (see Section 8 C for further details).

Evidence Base (for summary sheets)

The evidence base is set out as follows

1. Executive summary

1. The Consultation on proposals for the levels of banded support for solar photovoltaic (PV) under the Renewables Obligation (RO) that accompanies this Impact Assessment (IA) proposes:

    - reduced 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; and,
    - additional cost control conditions for total RO spend for solar PV during this period.

2. This IA analyzes two options for new solar PV installation eligible for support under the RO:

    - **Option 1- Do Nothing:** RO bands remain at current levels (i.e. 2 ROCs/MWh of renewable electricity supplied in 2013-14, 2014/15, 2015/16 and 2016/17)
    - **Option 2- Revised Bands:** RO bands are set so that they are broadly equivalent to the expected tariffs for the greater than 250kW to 5MW band under the FITs scheme

3. The monetised impacts of revised solar PV bands on deployment (estimated capacity and generation) and associated resource costs are considered for all sizes of solar PV installations. The cost control measures are described in this IA but the potential impacts are not monetised.

4. The analysis in this IA uses DECC's in-house models: the ROCs model for measuring impacts on installations above 5MW and the FITs model for measuring impacts on installations upto 5MW. These model costs and revenues over the lifetime of the technology to estimate what proportion of potential investors could be incentivized in different years at particular RO support rates.

5. Solar PV cost and performance data for all installation size bands are from the Parsons Brinckerhoff's (PB's) report for the Government response to the FITs Consultation 2a: solar PV cost control[1] (i.e. installations greater than 5MW are assumed to have the same cost and performance data as those in the 250kW-5MW band under FITs). Other assumptions e.g. hurdle rates, price received for exported electricity are taken from the RO banding review consultation[2] for greater than 5MW installations and from FITs modelling for up to 5MW installations.

6. Sensitivity analysis is carried out on capital costs and load factors to present central, high and low deployment or "Uptake" scenarios. Summary costs and benefits of the preferred option (Option 2) to the do nothing counterfactual (Option 1) for each scenario are presented in Table 1 below.

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

	Scenario		
Item	Low Uptake	Central Uptake	High Uptake[3]
Avoided resource costs (benefits)	-250	-350 to -380	-160
Additional EUA costs	70	140 to 150	60
Net Present Value (NPV)	180	210 to 230	100

Source: DECC in-house modelling

7. Option 2 is the preferred option. It offers greater value for money to electricity consumers who pay for the RO through their electricity bills and more certainty that the scheme will stay within its spending envelope as set under the Levy Control Framework.

[1] See http://www.decc.gov.uk/en/content/cms/consultations/fits_rev_ph2a/fits_rev_ph2a.aspx

[2] See http://www.decc.gov.uk/assets/decc/11/consultation/ro-banding/5945-renewables-obligation-government-response-impact-a.pdf

[3] It can be observed that Option 2 has a higher NPV under the central uptake scenario than under the high uptake scenario, so that the best estimate of NPV falls outside the low-high range. NPV is relatively low in the High uptake scenario for 2 reasons: (a) uptake in the Do Nothing scenario is constrained by the maximum technical potential available, reducing the scope for reductions in deployment under the RO in Option 2, and (b) solar PV is assumed to be lower cost in the High uptake scenario so the benefit of reduced levels of deployment is less.

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 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 deployment potential.

10. The Government response to the Consultation on the Renewables Obligation 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[4]. The response also set out the Government's intention to re-consult on RO bands for new solar PV installations over this period[5]. This decision reflects the evidence produced for the FITs consultation 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 Consultation on solar PV support rates that accompanies this Impact Assessment (IA) proposes:
    - reduced ROC support for all sizes of solar PV generating station which accredit or add additional capacity on or after 1st April 2013 and up to 31st March 2017; and,
    - additional cost control conditions for total RO spend for solar PV during this period.

12. There may be a separate consultation considering proposals to exclude new solar PV installations at or below 5MW from the RO and to support them through the FITs scheme only. This IA considers the impacts of reduced RO support rates on all sizes of solar PV installation, and does not exclude sub-5MW installations from the analysis. Option 2 in this IA proposes RO support levels for solar PV at all scales with reference to tariffs for the largest band under FITs (greater than 250kW to 5MW), which would make FITs tariffs higher than RO support levels for all but the largest FITs band.

3. Problem under consideration

13. Costs associated with the deployment of small scale (i.e. up to 5MW) solar PV installations have come down substantially since the RO Banding Review consultation was published in October 2011. The information available on the UK potential for solar PV installations greater than 5MW of capacity is limited, as at the time of writing there were no such projects that have been installed in the UK. However, it is likely that deployment costs for larger-scale solar PV installations of greater than 5MW will have fallen similarly to those of the larger installations sizes in the less than 5MW capacity range.

14. As a result of falling solar PV costs and subsequent reductions in FITs tariffs in response to this, RO support levels for solar PV are now above those for the largest tariff band (greater than 250kW to 5MW) under FITs. In the event of FITs tariff degression, this would be the case with some smaller tariff bands also. This raises the prospect that RO support levels for solar PV do not reflect the actual underlying technology costs, leading to overcompensation of investors and poor value for money for

[4] http://www.decc.gov.uk/assets/decc/11/consultation/ro-banding/5936-renewables-obligation-consultation-the-government.pdf

[5] http://www.decc.gov.uk/assets/decc/11/consultation/ro-banding/6338-consultation-on-proposals-for-the-levels-of-banded.pdf

consumers. In addition, the availability of higher support under the RO may encourage more deployment through that scheme and pose a risk to the RO budget.

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 and medium 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 RO banding review consultation risk overcompensating generators.

5. Policy Objective

17. The proposal is to set solar PV RO support rates that are broadly equivalent to the rates under the FITs scheme for greater than 250kW to 5MW installations, if tariff degression takes place in line with the FITs central scenario as set out in the IA accompanying the Government Response to the FITs consultation Phase 2A[6] (the proposed RO support rates are set out in section 6 of this IA). This should help to ensure consistency between the two schemes, avoid overcompensation of investors and create greater value for money for the consumer.

18. The consultation also sets 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 and put pressure on the RO budget.

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 Consultation on proposals for the levels of banded support for new solar PV generating stations, which accredit or

6 http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/renewable-energy/5391-impact-assessment-government-response-to-consulta.pdf

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).

Option 2 – Revised bands

22. RO bands for new solar PV installations are reduced to take account of latest available evidence and analysis and additional cost control measures are put in place:

- **Solar PV RO Bands:** RO support rates for new solar PV are set so that they are broadly equivalent to the expected tariffs for the largest (greater than 250kW to 5MW) band under the FITs scheme under the central deployment scenario from the IA accompanying the Government response to the FITs 2a consultation. Unlike in the FITs scheme, there are no proposals to create different solar PV bands for different sizes of generating station.

  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).

- **Solar PV cost control:** FIT tariffs could degress faster or slower than projected in the FITs central deployment scenario. Higher degression rates would imply more rapid cost reductions for solar PV projects. Such cost reductions could result in excessive returns for RO developers and unexpected calls on the RO budget from solar PV. DECC therefore proposes to monitor the solar PV industry closely, considering evidence on industry costs, on levels of deployment within both the RO and the FITs scheme compared to predicted levels and on significant divergence of support levels between the FITs and the RO. DECC will consider holding a review of RO support levels for large scale solar PV if the evidence warrants it.

23. Table 2 below shows the banding level for solar PV in each year of the review period under the two options considered in this IA.

Table 2. RO bands for new build solar PV installations from 2013-17 (ROCs/MWh of renewable electricity supplied)

	2013/14	2014/15	2015/16	2016/17
Option 1: Do nothing	2.0	2.0	2.0	2.0
Option 2: Revised bands	1.5	1.3	1.1	0.9

Source: DECC in-house analysis

24. 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.

25. Faster tariff degression under FITs than assumed under the central scenario as set out in the IA accompanying the Government Response to the FITs consultation Phase 2a could lead to a divergence between FITs tariffs and RO support. The potential impacts of such a divergence between FITs tariffs and proposed RO support rates under Option 2 are not quantified in this IA. Whilst this divergence could lead to more uptake under the RO at lower value for money to the consumer, the impact is likely to be limited by factors including: proposed cost control measures; restrictions on how fast solar PV installations can be deployed to take advantage of such a divergence; and, the ease of operating within the FITs scheme for smaller scale solar PV investors.

7. Analytical approach

A) Evidence base

26. The original solar PV cost assumptions for the RO Banding Review were taken from the Arup report commissioned for the review and published in October 2011[7]. This evidence, while relating to solar PV installations over 5MW, is now out of date given the rapid pace of change in the PV industry.

27. Evidence gathered during the process of the FITs consultation indicated that the costs of solar PV particularly medium-large scale installations greater than 250kW to 5MW, have come down substantially since the RO Banding Review consultation was published in October 2011. It is likely that these costs have fallen significantly for larger-scale solar PV installations of greater than 5MW also, although evidence specific to costs associated with these installations is limited.

28. The analysis in this IA is in part based on evidence arising from the recent FITs Consultation 2A: solar PV cost control ('FITs consultation 2A'). This consists of:

- The evidence submitted to the FITs consultation 2A and summarised in the Government's response to that consultation, published May 2012[8]; and
- The solar PV cost update undertaken in May 2012 by PB, which was used in DECC's modelling for the Government response to FITs consultation 2A[9]. This took account of evidence submitted as part of the consultation as well as additional research.

29. The analysis supporting this IA uses the cost and performance assumptions for the largest tariff band under FITs (greater than 250kW to 5MW) developed by PB to support the FITs consultation 2A Government response. Assumptions for the largest solar PV tariff band are identical to the assumptions for the separate band for standalone installations which are not connected to a property[10]. Assumptions not directly relating to cost and performance e.g. investor hurdle rates, price received for exported electricity are taken from FITs modelling (for upto 5MW installations) and RO Banding Review analysis[11] (for greater than 5MW installations).

30. Whilst all evidence and assumptions have been scrutinised, they are subject to uncertainty. How costs vary over time is uncertain and to a large extent will depend on global deployment and the rate at which economies of scale are achieved, technological developments and supply chain market dynamics. 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.

31. The key modelling assumptions underpinning PB's central cost reduction scenario used for the above ROCs required analysis and best estimate case in this IA are summarised in Table 5 below:

Table 5. Central modelling assumptions

Variable	Unit	Value
Capital cost (capex) of 2013-14 installation	£/kW, 2012 prices	1053
Annual O&M cost of 2013-14 installation	£/kW, 2012 prices	22

[7] See http://www.decc.gov.uk/assets/decc/11/consultation/ro-banding/3237-cons-ro-banding-arup-report.pdf

[8] See http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/renewable-energy/5386-government-response-to-consultation-on-comprehensi.pdf

[9] See http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/renewable-energy/5381-solar-pv-cost-update.pdf

[10] All other references in this IA to cost and performance assumptions and tariffs for 250-5000kW should therefore also be taken to refer to assumptions for standalone installations.

[11] See http://www.decc.gov.uk/assets/decc/11/consultation/ro-banding/5945-renewables-obligation-government-response-impact-a.pdf.

Load Factor	kWh/kW/yr	850
Technology Lifetime	Yrs	35
Capex learning rate out to 2016-17	Approx %	4
Hurdle rate	%	7.5*

Source: Parsons Brinckerhoff; *DECC in-house assumption, based on Arup(2011), Oxera(2011) and Redpoint(2010).

32. In addition to this technology specific information, key modelling assumptions employed in generating the best estimate case in this IA are below (see Annex A for further details):

    - Wholesale electricity prices modelled by Pöyry consultants as part of the RO Banding Review consultation and Government response;
    - Carbon prices are consistent with DECC guidance[12];
    - New solar PV installations with less than 5MW of installed capacity were assumed to be supported under feed-in tariffs (FiTs) rather than the RO;
    - Full implementation of the Electricity Market Reform (EMR) has been assumed so that:
        I. 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).
        II. All new renewables stations eligible for the RO and commissioning in 2016/17 will be supported under the new FiT with CfD scheme, rather than the RO.

B) Modelling approach

33. Different modelling approaches were used to estimate impacts on installations up to 5MW and greater than 5MW levels.

34. To measure impacts on solar PV installations up to 5MW, DECC's in-house FITs model was used. Do nothing RO support levels were run through the model to estimate uptake (in the largest bands of greater than 250kW to 5MW and standalone) where this was greater than that modelled for the IA supporting the FITs consultation 2A Government response. This additional deployment is incentivised under the Do Nothing option as a result of the divergence between FITs and RO support rates in the larger installation bands. Costs and benefits were estimated for these additional installations under the counterfactual (do nothing option), against which Option 2 deployment impacts were measured. This analysis does not take into consideration any transaction costs faced by investors when deciding to take up support under the RO rather than FITs.

35. To analyse the impact of the options set out in this IA on greater than 5MW solar PV installations, it was necessary to estimate the technical potential for large-scale solar PV in the UK. However, projections of future solar PV uptake 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 projects at over 5MW and ongoing developments in global supply and demand. In addition, the absence of large-scale solar PV projects in the UK means there is a lack of evidence of the performance characteristics of installations greater than 5MW.

36. The Arup data provided for the RO Banding Review consultation[13] showed a potential deployment

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

[13] http://www.decc.gov.uk/assets/decc/11/consultation/ro-banding/3237-cons-ro-banding-arup-report.pdf

trajectory for greater than 5MW solar PV (high scenario) of around by 2017. Consultation responses received stated that this deployment trajectory was considered an underestimate.

37. On the basis that the Arup based deployment trajectory was considered too low, and there is evidence to support a higher trajectory potential[14], the deployment levels from Arup have been brought forward (see Table 3 below) to account for the potential underestimate[15]. These revised numbers represent an estimate of the total capacity of greater than 5MW solar PV that could be delivered by 31 March 2016/17, assuming no limit to the level of subsidy. It is therefore considered to be the maximum amount of deployment that might occur during the period covered by this IA.

Table 3. Deployment potential for large-scale (>5MW) solar PV to 2016/17 (commissioning years)

Deployment	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
Annual	0	63	95	187	200	175
Accumulated total	0	63	158	345	545	720

Source: DECC update of Arup (2011) estimates

38. This updated estimate of technical potential was combined with different cost scenarios in the PB report, used to support the FITs consultation 2A Government response, to derive a supply curve for large-scale solar PV for each year of analysis. This was then used to estimate uptake, ie what proportion of the total deployment potential would be incentivized each year, at different levels of support.

39. DECC employed an in-house discounted cashflow model 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 costs at the ROC support rates in question.

40. Table 4 below shows DECC's estimate of the levels of ROC support that would be required to bring on the different sections of the large-scale PV supply curve in each year to 2016/17. There is considerable uncertainty surrounding the solar PV costs data underlying this analysis.

Table 4. ROCs required to incentivize segments of large-scale solar PV supply curve

	ROCs required per MWh in…			
Point on 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

Source: DECC in-house analysis

41. According to this analysis, and on the basis of the average assumptions, the proposed tariffs will not be sufficient to incentivize 20% of the supply curve in any year out to 2016/17. It is not possible to say with certainty how much less than 20% would be incentivized: the actual deployment at proposed tariff levels is highly uncertain as it is unclear what proportion of projects have low capital costs/hurdle rates and high load factors. In recognition of this uncertainty of the exact shape of the

[14] For example, there are currently around 30MW of >5MW solar PV projects in the UK with unconditional planning consent, and 90MW with conditional consent.

[15] For more details on this approach, see Annex C

supply curve, we therefore express deployment projections below as a range e.g. 1.5 ROCs in 2013/14 will incentivize 0-20% of the supply curve.

42. Costs and benefits relating to installations commissioning in 2012-13 are not considered in this Impact Assessment, as RO support levels are identical under both the Do Nothing and lead options until April 2013.

43. The FITs equivalent RO support rates are based on the average annual (financial year) FITs tariffs for the largest FITs tariff band (greater than 250kW to 5MW) under the central scenario of quarterly degression set out in the Impact Assessment supporting FITs consultation 2A[16]. The RO support rate for a given year is calculated by dividing the average annual FITs tariff by the value of a ROC, which we assume to be the ROC buyout price plus 10% to account for RO headroom. The calculations and assumptions underlying the proposed ROC support rates are set out in Annex B.

8. Summary of costs and benefits

44. This IA sets out the impact on deployment of solar PV installations, and the costs and benefits of changes to solar PV RO bands, against the counterfactual of continuing with current banding levels. 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

45. Table 6 and 7 below summarise projected deployed capacity and generation over the 2013/14 to 2016/17 period under each option. These estimates incorporate large scale (greater than 5MW) solar PV installations, based on modelling of the proportion of the maximum technical potential that is incentivized each year, and uptake in smaller scale (up to 5MW) solar PV installations over and above FITs uptake (as estimated in IA supporting FITs consultation 2A Government response). The latter is incentivised under the Do Nothing option by the divergence between FITs and RO support rates.

46. As discussed above in section 7 B), 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. This implies that the RO bandings will influence build over the first three years of the banding review period, which is presented in the tables below (though in reality it may be that some new build still occurs under the RO in 2016/17 and some build modelled as being under the RO before that is actually supported by the FiT with CfD).

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	80 - 100	350 - 410	780 - 840	n.a.
Option 2 – revised bands	0 - 20	0 - 60	0 - 100	n.a.

Source: DECC in-house modelling; results rounded to two significant figures.

*Notes: Figures for UK solar installations supported under the RO, ie >5MW installations plus sub-5MW uptake additional to that

16 http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/renewable-energy/5391-impact-assessment-government-response-to-consulta.pdf

modelled in IA supporting FITs consultation 2A Government response.
Range represents uncertainty over proportion of marginal segment of the large-scale supply curve that will be built, e.g. under Option 2, between 0-20% of the large-scale 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	30 - 40	170 - 210	460 - 510	660 - 710
Option 2 – revised bands	0 - 10	0 - 30	0 - 60	0 - 80

Source: DECC in-house modelling; results rounded to two significant figures.
*Notes: a. Figures for solar PV installations (>5MW and supported under the RO) in the UK**;** b. Installations assumed to operate at 50% of full year annual output in first year of operation

47. Projected uptake under Option 2 is substantially lower than under Option 1, due to the lower level of ROCs made available to new installations. In terms of capacity and generation:

    - New build solar PV capacity supported under the RO is estimated at between 0-100MW by 2016/17 under Option 2, compared with 780-840MW under Option 1 (do nothing).
    - New build solar PV generation supported under the RO is estimated at between 0-80GWh/year by 2016/17 under Option 2, compared with 660-710 GWh/year under Option 1.

48. These capacity and generation projections are presented as a range owing to the uncertainty over the proportion of the marginal segment of the supply curve that will be incentivised. The range under Option 2 represents a projection that between 0-20% of the supply curve is built in each year, and that under Option 1 represents a projection that 40-60% of the supply curve will be built in 2013/14, 80-100% in 2014/15, and 100% in 2015/16 with 2 ROCs/MWh.

B) Monetised impacts

49. 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 (ie capital costs, operating costs, fuel costs relative to the Combined Cycle Gas Turbine (CCGT) counterfactual), avoided emissions and lifetime EUA costs than under Option 1. Costs are the resource costs associated with a lower level of solar PV, and do not assume that the reduction in PV is displaced by an alternative renewable technology. Since solar PV deployment under the RO by 2016/17 is projected to be relatively small compared to the overall total of renewable electricity required to deliver the UK's 2020 target, reduced deployment will not materially affect the UK's ability to meet that target. Specific impacts can be summarised as follows:

    - Lower levels of relatively more expensive solar PV deployment leads to lifetime resource costs of £0-80m 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 lower avoided grid CO_2 emissions of around 0-0.6Mt to 2050 under Option 2.
    - The emissions reductions (offset by increases elsewhere in the EU[17]) under Option 2 are valued at the DECC central traded carbon appraisal values[18] and amount to around £0-20m of EUA purchase cost savings, compared to savings of £150-160m under Option 1.
    - The present value of monetised impacts ranges from £-60 to £0m under Option 2, compared with a much lower range of £-270 to £-230m under Option 1.

[17] 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.
[18] 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

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

Item	Option 1	Option 2
Lifetime resource costs, £m, 2010/11 prices	380 - 430	0 - 80
Avoided emissions, MtCO2	4.9 - 5.2	0 - 0.6
Avoided lifetime EUA costs, £m, 2010/11 prices	150 - 160	0 - 20
Present Value (PV) £m, 2010/11 prices	-230 - -270	0 - -60

Source: DECC in-house analysis

Notes: Figures for solar PV installations >5MW in the UK. Solar PV installations <5MW are assumed to be supported under the FiTs; Installations assumed to operate at 50% of full year annual output in first year of operation.
Figures may not sum due to rounding

50. The monetised impacts presented above are shown as ranges owing to the uncertainty over the proportion of the marginal segment of the supply curve that will be incentivised under both Option 1 and Option 2. For instance, the range presented for Option 2 represents a projection that between 0-20% of the supply curve is incentivised.

C) Sensitivity analysis

51. There is a high level of uncertainty around the underlying cost and technology performance assumptions for solar PV, especially for large-scale projects. There are many factors influencing the installed costs of PV systems at all sizes, 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. Furthermore, there is a lack of direct UK experience regarding solar PV projects larger than 5MW.

52. Further sensitivity analysis has therefore been conducted around two of the key factors affecting the attractiveness of PV projects from an investment perspective, namely capital costs and load factor. These factors are subject to a large degree of variability, reflecting the wide variety of solar panels on offer and the heterogeneity of potential sites for PV installations.

53. Impacts have been estimated under a low and high uptake scenario. The main assumptions driving these scenarios are as follows for large-scale solar PV:

- In the **low uptake** scenario, capital costs are taken from the high cost scenario in PB's report for the FITs 2a Consultation. Load factors are assumed to be the same as PB's estimate: the PB estimate applies to all scales of installations, and it is unlikely that large-scale commercial installations will be located in places with lower load factors than typical domestic PV installations. As a result, resource costs per MW of solar PV deployment are higher than in the central scenario.
- In the **high uptake** scenario, capital costs are taken from the low cost scenario in PB's report for the FITs 2a Consultation, and load factors are assumed to be 10% higher, to reflect the possibility of large-scale projects tending to locate in well-positioned sites in areas of the country with high irradiation. As a result, resource costs per MW of solar PV deployment are lower than in the central scenario.

54. Sensitivity assumptions for uptake of installations up to 5MW follow those in the 'Low' and 'High' sensitivities in the FITs 2A IA[19]. As in the central scenario, uptake in addition to that estimated in the

[19] 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

FITs IA is accounted for here.

55. The monetised impacts under these low and high uptake scenarios are summarised in tables 9 and 10 below.

Table 9: Costs and Benefits associated with Options 1 and 2, **low uptake** scenario

Item	**Option 1**	**Option 2**
Lifetime resource costs, £m, 2010/11 prices	250	0
Cumulative deployment to 2015/16, MW	370	0
Avoided emissions, MtCO2	2.3	0
Avoided lifetime EUA costs, £m, 2010/11 prices	70	0
Present Value (PV), £m, 2010/11 prices	-180	0

Source: DECC in-house analysis
Note: Totals may not sum due to rounding

Table 10: Costs and Benefits associated with Options 1 and 2, **high uptake** scenario

Item	**Option 1**	**Option 2**
Lifetime resource costs, £m, 2010/11 prices	470	310
Cumulative deployment to 2015/16, MW	1230	1000
Avoided emissions, MtCO2	7.8	6.2
Avoided lifetime EUA costs, £m, 2010/11 prices	240	180
Present Value (PV), £m, 2010/11 prices	-230	-130

Source: DECC in-house analysis.
Note: Totals may not sum due to rounding

56. Under the low scenario there is no uptake of solar PV at the proposed support rates, and relatively limited uptake at current support rates. Under the high scenario there is significantly higher uptake than under the central scenario for both the policy options. Much of this relates to smaller scale installations (i.e. sub-5MW), where deployment is incentivized by significant differences between RO support levels and FITs tariffs caused by faster FITs degression.

57. The difference in present value (PV) between Option 1 and Option 2 (ie the net benefit) is lower under the high uptake scenario than it is under the low uptake or central uptake scenarios (see table 8 for figures relating to the central uptake scenario).

58. The net benefit under the high uptake scenario is lower than the central uptake scenario. In the high uptake scenario, solar PV deployment approaches the maximum technical potential under the (do nothing) Option 1, which restricts the total increase in deployment under this scenario. This leads to a smaller reduction in solar PV deployment under Option 2 compared to Option 1 in the high uptake scenario than in the central scenario, and makes the benefits correspondingly less.

59. The high uptake scenario net benefit is lower than under the low uptake scenario despite a greater reduction in solar PV deployment in Option 2 relative to Option 1. This is because under the high uptake scenario, the capital costs of solar PV are assumed to be lower than in the low uptake scenario, and the load factor higher, such that the resource cost savings from a given amount of

uptake scenario uses the ‘Fast Cost Reduction’ scenario.

reduction in solar PV deployment are less.

D) Non-monetised impacts

60. 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

61. The Do Nothing option would help reduce reliance on imported fossil fuels relative to Option 2, but would also increase the amount of intermittent generation. Any extra intermittent generation would need to be accommodated on the grid with an increase in other kinds of balancing services – back-up generation, interconnection, storage and/or demand-side response.

Risk of missing 2020 renewables target

62. 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. However, at the RO support levels for solar PV proposed in this consultation, PV deployment that does occur could provide a relatively cost-effective contribution to meeting the UK's targets.

Macroeconomic impacts

63. Other important impacts which are not monetised include the wider macroeconomic impacts of changes in retail electricity prices. Electricity bills may be slightly lower under Option 2: this would mean lower costs to industry and more real income for consumers. However, the change in bills from these proposals are expected to be very small.

64. 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

65. 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.

66. Table 11 below shows how Option 2 reduces the level of RO support costs for solar PV installations greater than 5MW, owing to the reduction in potential investor overcompensation by reducing bands, which reduces overall deployment and incentivises only the most cost-effective solar PV technologies. Lifetime RO support costs are £500-600m less (2011/12 prices, undiscounted) under Option 2 compared to Option 1.

Table 11: RO support costs for greater than 5MW installations to 2016/17 (2011/12 prices, £m, undiscounted)- central scenario

Option	2013/14	2014/15	2015/16	2016/17
Option 1 Do nothing	1 - 2	8 - 11	21 - 25	28 - 32

Option 2 Revised Bands	0 - 1	0 - 3	0 - 6	0 - 7

Source: DECC in-house analysis

67. Consumer cost impacts for sub-5MW 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 that are projected to come forward at FITs tariffs will do when faced with a level of RO support that is equivalent to FITs tariffs (as under Option 2) or greater than FITs tariffs (as under Option 1). Some indicative analysis to estimate the potential scale of impacts on costs to consumers for sub-5MW uptake under the RO is outlined below.

68. Under Option 2, it is assumed that there is no switching between FITs and RO when support levels are equivalent. Therefore, there are no costs to consumers additional to projections in the FITs 2A Government response IA. For Option 1, potential additional costs to consumers against which the impact of Option 2 is measured is estimated by dividing sub-5MW uptake into 2 groups:

    - **'Switchers' from FITs:** these are installations projected in the FITs 2A IA that could instead occur under the RO due to the higher RO support levels under Option 1. The additional cost per MWh of these installations is valued at 2 ROCs minus the FITs tariffs these installations are projected to receive.
    - **New uptake:** this is uptake that is not projected to occur at projected FITs tariffs, but would occur under Option 1 at higher RO support rates. The additional cost per MWh of these installations is valued at 2 ROCs.

69. Table 12 below shows how Option 2 reduces the level of RO support costs for solar PV installations less than 5MW when potential switching from FITs to RO and new uptake under the RO is taken into account. These amounts are additional to those presented in table 11.

Table 12: RO support costs for sub-5MW installations to 2016/17 (2011/12 prices, £m, undiscounted)- central scenario

	2013/14	2014/15	2015/16	2016/17	Lifetime
FITs 'Switchers'	1	5	11	15	300
New Uptake	2	8	20	28	550
Total	3	13	31	43	850

Source: DECC in-house analysis

70. The net impact on consumers (including wholesale costs of electricity savings and balancing costs) relative to current bands have not been quantified. Similarly, bill impacts in terms of the change in average annual bills have not been quantified. However, both of these impacts are likely to be very small owing to the relatively small proportion of total RO spend and its impact on consumers accounted for by solar PV.

9. Wider impacts

Equality

71. 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

72. The proposed 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.

73. 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

74. 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.

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

Sustainable Development

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

Competition

77. The proposals will have no material impact on the competitive functioning of the electricity market.

Small Firms

78. 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 – particularly - larger industrial users with heavy electricity requirements.

79. 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.

10. Summary and preferred option

80. The preferred option is Option 2 (Revised bands). The revised rates under Option 2 are broadly equivalent to the tariffs for the largest solar PV band (greater than 250kW to 5MW) under the revised FITs scheme and it increases 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 only 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.

81. 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.

82. 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[20]
Avoided resource costs	-250	-350 to -380	-160
Additional EUA costs	70	140 to 150	60
NPV	180	210 to 230	100

Source: DECC in-house modelling

83. The preferred Option 2 is more affordable to consumers compared to Option 1 (Current bands). These bands, together with the ability to hold an early review if the conditions set out in article 33 of the RO Order are met, should help the RO to stay within its Levy Control Framework budget up to 31 March 2015.

Implementation

84. 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.

85. 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.

[20] It can be observed that the NPV estimate for the High uptake scenario is lower than for the Central and Low uptake scenarios, meaning the central 'Best Estimate' of NPV falls outside the Low/High range. The reasons for the relatively low NPV in the High uptake scenario are as follows: (a) uptake in the Do Nothing scenario is constrained by the maximum technical potential available, reducing the scope for reductions in deployment under the RO support levels in Option 2, and (b) solar PV is assumed to be lower cost in the High uptake scenario, meaning the benefit of reduced levels of deployment is less.

Annex A - Details of key assumptions

A) Key modelling assumptions

Fossil fuel prices

86. The analysis uses the latest available finalised DECC fossil fuel price projections published in October 2011[21].

Wholesale price income

87. 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 13: Wholesale electricity prices, GB (£2011/12)

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

88. Our modelling assumes an investor hurdle rate of 7.5% for large-scale solar PV, in line with assumptions for the RO Banding Review.

[21] Available at: http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/en_emis_projs/en_emis_projs.aspx

Electricity Market Reform

89. 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;[22]
    iii. Carbon Price Floor; and
    iv. A system of feed-in tariffs with contract for difference[23] (FiT with CfD) to support low carbon technologies, including solar PV.

90. After the introduction of the new FiT with CfD (the first contracts are expected in 2014), new renewables developers 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:

    i. 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).
    ii. All new renewables stations eligible for the RO and commissioning in 2016/17 will be supported under the new FiT with CfD scheme, rather than the RO.

91. 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).

[22] Assumed to be implemented if capacity margins are expected drop below 10%.

[23] For full details, see the Energy Bill (2012), available at: http://www.decc.gov.uk/en/content/cms/legislation/energybill2012/energybill2012.aspx

Annex B - Calculation of proposed ROC support rates

92. The average annual FITs tariffs for the 250kW-5MW band for the central deployment scenario from the IA supporting the Government response to consultation 2a are set out in the table below:

Table 14: FITs annual average tariffs (p/kWh, 2010/11 prices) from 2013/14 to 2015/16

FITs tariffs	p/kWh
2013-14 average	6.1
2014-15 average	5.3
2015-16 average	4.5

Source: DECC in-house analysis

93. The value of a ROC is assumed to be £36.99 (2010/11 buyout price[24]). With an additional 10% to account for RO headroom, this gives a value of £40.69 (2010/11 prices) which equates to 4.07p/kWh. The figures in the table above are then divided by 4.07 to give the proposed ROC rates.

[24] Source: Ofgem, http://www.ofgem.gov.uk/Sustainability/Environment/RenewablObl/Documents1/Buy-out%20price%20and%20mututalisation%20ceiling%202012_13.pdf.

Annex C – Large-scale (>5MW) solar PV- Potential Deployment

94. Overall, the information available on the UK large-scale (>5MW) solar PV potential for is limited because, at the time of publication, no large-scale projects have been installed in the UK. Projections of future solar PV uptake 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 projects at over 5MW and ongoing developments in global supply and demand.

95. Trajectories developed by Arup for the RO Banding Review consultation[25] showed a potential deployment trajectory for large scale solar PV (high scenario) for around 115MW of installed capacity for >5MW projects by 2017. Several respondents thought the Arup assessment of deployment was too low, whilst only one thought the assessment of >5MW potential was unachievable. This, in combination with a considerable number of other responses noting that costs move quickly in the sector, and that the analysis was already out of date, meant that the estimate of technical potential needed further analysis.

96. Further investigation was undertaken of the historical growth curve of large-scale solar PV in Germany[26]. Data from 2009 to June 2012 was analysed and showed that there has been a significant increase in the deployment of large-scale solar PV in Germany since 2010 with over 2.6GW deployed to June 2012. Taking this data from the German equivalent of Ofgem (B*undesnetzagentur*) shows that as of June 2012 there is a total of 2.6GW of >5MW deployment.

97. However, this level of deployment in Germany is considered to be higher as a result of three key factors: overall higher levels of irradiation (even though of the countries with substantial levels of solar PV deployment, Germany is most closely aligned in latitude with the UK), a fundamentally different structure to their renewables support mechanisms and greater grid flexibility. These levels of deployment may not therefore be directly comparable to the UK. They do however, support the premise that there could be the potential for a greater level of uptake in the UK than previously thought.

98. In addition to this, we have completed some high level analysis of the potential pipeline of >5MW projects in the UK and it shows that several projects are already in the planning process. There are shown to be potentially 30MW of >5MW projects that have received planning permission with no conditions and around 90MW that have received planning permission subject to conditions. As a result, there is already some ambition to deploy more >5MW projects than Arup had first considered.

99. Deployment data from FITs for projects closest to large-scale in size, i.e. 4-5MW, it shows that significant deployment is occurring. According to Ofgem data, in December 2011[27] there were 18 projects sized 4-5MW amounting to 86MW cumulative installed capacity whereas in June 2012, there

[25] http://www.decc.gov.uk/assets/decc/11/consultation/ro-banding/3237-cons-ro-banding-arup-report.pdf

[26] http://www.bundesnetzagentur.de/cln_1932/DE/Sachgebiete/ElektrizitaetGas/ErneuerbareEnergienGesetz/VerguetungssaetzePVAnlagen/VerguetungssaetzePhotovoltaik_Basepage.html?nn=34704#doc149586bodyText2

[27] http://www.ofgem.gov.uk/Pages/MoreInformation.aspx?docid=27&refer=Sustainability/Environment/fits

were 22 projects[28] sized between 4 and 5MW, amounting to approximately 107 MW cumulative installed capacity.

100. On the basis of the evidence to support a higher trajectory potential outlined above, the deployment levels from Arup have been brought forward (as shown in Table 14 below) to account for this potential underestimation. It is an estimate of the total capacity of >5MW solar PV which could be delivered by 31 March 2016/17, assuming no limit to the level of subsidy. It is therefore considered to be the maximum amount of deployment that might occur in the timeframe.

101. The original Arup scenario is set out in columns 1 and 2 of Table 15 below. The final assumptions used in this IA are indicated in column 3. It shows that the original Arup figures have been brought forward from 2020/21 to 2012/13 on the basis that deployment could occur at a much higher level in next few years, with maximum potential in 2015/16. The 187MW/yr maximum build potential has been increased to 200MW/yr as a result of a logical step to further expand the overall potential. This was in line with consultation responses and in recognising the uptake experienced in Germany. In addition, Arup did not provide any evidence to inform a set maximum level and it therefore provided a false ceiling to the data.

Table 15. Original Arup and revised technical potential estimates

	Arup data (High Scenario) (MW/yr)	Arup Data (High Scenario) (Cumulative MW)	Arup data brought forward (MW/yr)	Arup data brought forward (cumulative MW)
2011/12	6	6	0	0
2012/13	8	14	63	63
2013/14	12	26	95	157
2014/15	19	45	187	345
2015/16	28	73	200	545
2016/17	42	115	175	720
2017/18	63	178	-	-
2018/19	95	273	-	-
2019/20	142	415	-	-
2020/21	187	602	-	-
2021/22	175	777	-	-

[28] http://www.ofgem.gov.uk/Pages/MoreInformation.aspx?docid=37&refer=Sustainability/Environment/fits