Title: Changes to Feed-in Tariffs (FITs) degression mechanism to support midscale building-mounted solar photovoltaic ('solar PV')	**Impact Assessment (IA)**
IA No: DECC0165	**Date:** 13/05/2014
Lead department or agency: DECC	**Stage:** Development/Options
	Source of intervention: Domestic
	Type of measure: Secondary legislation
Other departments or agencies:	**Contact for enquiries:** Andrew Jones, Andrew.Jones1@decc.gsi.gov.uk

Summary: Intervention and Options

RPC Opinion: Not Applicable

Cost of Preferred (or more likely) Option				
Total Net Present Value	**Business Net Present Value**	**Net cost to business per year** (EANCB on 2009 prices)	**In scope of One-In, Two-Out?**	**Measure qualifies as**
-£200m - -£50m	N/A	N/A	No	In/Out/zero net cost

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

Commercial and industrial building mounted/other than stand-alone solar PV deployment has been lower than expected. The sector currently shares a degression band with stand-alone/ground mounted installations under FITs. Current levels of stand-alone deployment at all sizes are higher than expected. There is therefore a risk that stand-alone/ground mounted deployment could trigger degressions for 50kW+ building mounted/other than stand-alone solar which are not reflective of deployment in the other than stand-alone/building mounted sector.

What are the policy objectives and the intended effects?

Separate degression bands for 50kW+ building mounted/other than stand-alone and ground mounted/ stand-alone installations will signal Government's intention to support the building-mounted/other than stand-alone sector by reducing the risk of degressions caused largely by ground mounted/ stand-alone deployment. A more stable environment for the building mounted/other than stand-alone sector will allow the UK to realise the benefits associated with building-mounted/other than stand-alone solar PV deployment (greater energy efficiency/ avoidance of system losses, development of building-integrated solar PV (BIPV) sector, support for more jobs per MW of deployment than ground-mounted/ stand-alone).

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

Do Nothing- Current single degression band for 50kW+ building mounted/other than stand-alone and ground mounted/ stand-alone installations is maintained.

Lead Option- Separate degression bands created for 1) 50kW+ building-mounted/other than stand-alone and 2) ground mounted/stand-alone PV. Thresholds for the 50kW+ building-mounted/other than stand-alone band are 75% of those for current 50kW+ building-mounted/other than stand-alone and ground mounted/stand-alone band; thresholds for ground mounted/stand-alone band are 25% of those for current band.

Will the policy be reviewed? It will be reviewed. **If applicable, set review date:** 2015

Does implementation go beyond minimum EU requirements?			No		
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.	**Micro** No	**< 20** No	**Small** No	**Medium** No	**Large** No
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)			**Traded: -0.2 - +1.3**	**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: Michael Fallon Date: 1st May 2014

Summary: Analysis & Evidence

Policy Option 1

Description: Create separate degression bands for 1) 50kW+ building mounted/ other than stand-alone and 2) ground mounted/ stand-alone installations

FULL ECONOMIC ASSESSMENT

Price Base Year 2012	PV Base Year 2014	Time Period Years 40	Net Benefit (Present Value (PV)) (£m)		
			Low: -£200m	**High:** -£50m	**Best Estimate:** N/A

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	N/A		N/A	**N/A**
High	N/A		N/A	**N/A**
Best Estimate	N/A		N/A	**N/A**

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

Based on current trends in deployment, this option will tend to have higher resource costs associated with the FITs scheme due to higher deployment of more expensive building mounted/other than stand-alone PV under FITs, and less deployment of more cost-effective ground mounted/stand-alone PV. The UK faces the cost of increased EU ETS permit purchases in some scenarios where overall solar PV deployment is reduced.

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

No additional costs from this policy have been considered on a qualitative basis.

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

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

The UK benefits from reduced EU ETS permit purchases in scenarios where overall solar deployment is increased.

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

More building mounted/other than stand-alone solar PV deployment leads to higher on-site electricity use, reducing pressure on electricity grid and avoiding transmission losses. More building mounted/other than stand-alone deployment could foster the development of the building-integrated solar sector (BIPV) in the UK, encouraging investment in the UK supply chain and greater exports. Based on research by NSC for Part 2 of DECC's Solar Strategy, higher levels of building mounted/other than stand-alone deployment could support more UK jobs than ground mounted/stand-alone deployment, including skilled jobs in manufacturing and R&D.

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

Future deployment of solar PV very uncertain, as is split between ground mounted/stand-alone and building mounted/other than other than stand-alone due to (for example) Government's proposals to address potential barriers to deployment for building mounted/other than stand-alone deployment outlined in the Solar Strategy. The impacts of split degression bands are therefore very uncertain: this IA develops indicative scenarios to cover a range of possible impacts.

BUSINESS ASSESSMENT (Option 1)

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

Evidence Base

Problem under consideration

1. The UK Government is keen to support the deployment of other than stand-alone/ building mounted and building integrated solar PV ('building mounted PV'[1]) for several reasons:
    a. Energy losses in the UK electricity system are significant: according to the Digest of UK Energy Statistics (DUKES) losses comprised 7.7% of energy demand (28.9TWh) in 2012[2]. Building mounted PV has a greater potential for the energy generated to be used on site, so minimising energy losses and reducing pressure on the grid. Savings are significant even compared to other renewable technologies which feed into the distribution network rather than the transmission network (e.g. stand-alone PV)[3].
    b. According to preliminary analysis carried out for the Government's recently-published Solar Strategy, building mounted PV supports significantly more jobs per 1MWP than (ground mounted) solar farms[4].
    c. As set out in the Solar Strategy[5], Building Integrated PV (BIPV) represents a new industrial supply chain with UK companies currently strongly represented. The market for BIPV includes new build and the refurbishment of existing buildings, and some BIPV products can incorporate insulation, thereby improving energy efficiency. The UK already contains world leaders in the building integrated field e.g. Romag, Kingspan, who have developed innovative products such as the hybrid solar solution. There is therefore the potential for further development and investment in the UK supply chain and UK academia, research and development, as well as leading to greater exports of technology and services.
2. The Feed in Tariffs scheme (FITs) forms part of the Levy Control Framework (LCF), which imposes an annual cap on costs to energy consumers resulting from DECC's levy-funded policies[6] out to 2020/21. A central feature of FITs policy is the degression mechanism, under which higher levels of deployment lead to higher reductions in tariffs ('degressions'). The FITs degression mechanism is the principal means by which costs are controlled and value for money ensured for the consumers who meet the costs of FITs through their bills. There are currently three separate degression bands for solar PV covering installations of different sizes (1) 0-10kW, 2) 10-50kW, 3) 50kW+ and standalone) with associated triggers based on quarterly deployment[7].The three degression bands were intended to represent distinct market segments and installations, with installations in each band considered likely to experience similar trends in installation costs.
3. However, within the 50-5000kW and stand-alone degression band, deployment of stand-alone and other than stand-alone installations has been occurring at markedly different rates. Deployment of 50kW+ other than stand-alone (building mounted) solar PV has been below

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[1] There is no express definition of a building mounted solar PV installation under the FIT. The 'other than stand alone' description is considered to most closely equate to the building mounted and building integrated part of the solar sector. We are seeking views on this approach through the consultation process. From paragraph 2 onwards, this Impact Assessment follows FITs definitions and uses the terms 'other than stand-alone' and 'stand-alone', which it can be assumed closely equate to 'building mounted' and 'ground mounted' PV respectively.

[2] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/279546/DUKES_2013_Chapter_5.pdf

[3] In 2012, distribution network losses accounted for 73% (21.1TWh) of total system losses.

[4] Solar Strategy, April 2014, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/302049/uk_solar_pv_strategy_part_2.pdf. See p56: the non-stand-alone/ building mounted and stand-alone/ solar farms sectors are currently seeing around 500MW of deployment a year, with approximately 10,500 jobs supported in the non-stand-alone sector, and 3,500 jobs by stand-alone deployment.

[5] Solar Strategy

[6] More details on the LCF can be found at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/223654/emr_consultation_annex_d.pdf.

[7] For more detail on FITs degression policy for solar, see Government response to FITs Comprehensive Review: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/43085/5386-government-response-to-consultation-on-comprehensi.pdf.

expectations. For example, DECC modelling for the FITs Comprehensive Review in 2012 projected deployment of 250-5000kW building mounted PV to reach approximately 170MW by March 2014, but actual deployment in this bandhas only reached around 80MW[8]. Recent deployment in this band has been particularly slow, with only 5MW total deployment in 2013[9].

4. While 50kW+ other than stand-alone deployment has been slow, deployment of stand-alone has been higher, with around 40MW deploying in the FITs stand-alone tariff band in January to March 2014 alone. In addition, latest data now shows that some 545MW of solar PV projects have already accredited under the RO by the end of March 2014, virtually all of which are stand-alone. We expect a further 1.2GW to accredit over the next few months, on the basis of known projects that have applied for full RO accreditation and are awaiting a decision from Ofgem. Given that tariffs are the same for the 250-5000kW and stand-alone tariff bands, this suggests different costs between the other than stand-alone and stand-alone sectors and/or the existence of barriers to deployment for other than stand-alone projects. Indeed, in the Solar Strategy, potential non-financial barriers to deployment specific to 50kW+ other than stand-alone installations are outlined: these include planning processes, lease conditions and time taken to submit FITs applications through the ROO-FiT process[10]. Deployment statistics and the identification of specific non-financial barriers to deployment for 50kW+ other than stand-alone installations suggest that 50kW+ other than stand-alone and stand-alone in fact form separate sectors rather than a single one.
5. Given different deployment patterns for 50kW+ other than stand-alone and stand-alone outlined above, there is a risk that under current FITs degression policy high levels of stand-alone deployment may trigger degressions for both stand-alone and 50kW+ other than stand-alone, even though this may not reflect deployment levels in the other than stand-alone sector. In fact, this is what has occurred in January to March 2014: 40MW of stand-alone deployment has driven 50kW+ other than stand-alone and stand-alone deployment above 50MW, meaning that there will be a 3.5% degression in July 2014. Table 1 sets out deployment in the latest quarter versus the relevant degression trigger[11]:

Table 1: Additional monthly actual and expected deployment in current Jan-March 2014 degression quarter by tariff band (determining tariffs in July 2014)

Additional monthly capacity, kW	2014			Jan-March total	3.5% degression trigger
	January	February	March		
50-100kW	484	583	992	2,060	50,000
100-150kW	599	2,050	2,056	4,706	
150-250kW	1,190	3,556	4,691	9,437	
250-5000kW	69	100	2,741	2,910	
Standalone	8,733	21,130	10,674	40,536	
Total	**11,075**	**27,419**	**21,154**	**59,649**	

Note: Deployment figures include both full accreditation and preaccreditation as both count towards degression triggers.

[8] Source: DECC, Monthly small-scale renewable deployment, https://www.gov.uk/government/publications/monthly-small-scale-renewable-deployment.
[9] Source: https://www.gov.uk/government/statistical-data-sets/monthly-mcs-and-roofit-statistics.
[10] Solar Strategy
[11] Source: https://www.gov.uk/government/statistical-data-sets/monthly-mcs-and-roofit-statistics.

Rationale for intervention

6. In order to fully realise the benefits associated with other than stand-alone PV set out in paragraph 1 above, it is necessary for the Government to signal its support for the sector in order to attract investors. The policy proposals in this IA are intended to remove the risk of high levels of stand-alone deployment triggering degressions for the other than stand-alone sector which are not reflective of falls in other than stand-alone costs or the removal of other barriers to deployment. This in turn reduces the risk that the constrained Feed-in Tariff budget is allocated to the stand-alone as opposed to other than stand-alone sector.

Policy objective

7. The measures assessed in this Impact Assessment are intended to acknowledge the differences between the 50kW+ other than stand-alone and stand-alone sectors, and signal Government support for the other than stand-alone sector by creating a separate degression band for stand-alone installations. This will increase investor confidence and reduce the risk of high levels of stand-alone deployment triggering degressions for 50kW+ other than stand-alone PV that are not reflective of falls in costs or the removal of the non-financial barriers outlined in paragraph 2 above.

Descriptions of options considered

<u>Do Nothing</u>

8. Under the Do Nothing option, FITs degression policy for the 50kW+ other than stand-alone and stand-alone sector would remain unchanged and tariffs would continue to degress according to current rules (these are set out in Table 2 below[12]) ie a single set of degression thresholds would continue to apply to both 50kW+ other than stand-alone and stand-alone installations.

<u>Lead Policy Option</u>

9. Under this option we propose to split the current 50kW+ and stand-alone degression band into two separate bands for 1) 50kW+ other than stand-alone and 2) stand-alone. The new degression bands are introduced in January 2015, ie tariffs start to degress according to the new policy from July 2015.

10. LCF budgetary constraints and the consequent need to control FITs scheme costs mean that it is not proposed to add any new capacity into the degression mechanism: the sum of degression thresholds in the two new bands is equal to the thresholds in the current, single band.

11. Proposed thresholds in the 50kW+ other than stand-alone band are 75% of those in the old band, while those for stand-alone are 25% of the old band. There is a great deal of uncertainty about what the future split of deployment between 50kW+ other than stand-alone and stand-alone will be. Stand-alone comprised approximately 70% of actual deployment in the current 50kW+ other than stand-alone and stand-alone degression band in January-March 2014[13], and makes up approximately 55% of combined 50kW+ other than stand-alone and stand-alone deployment since the FITs scheme began[14]. However DECC modelling projects more other than stand-alone PV than stand-alone deployment under FITs in the years ahead, such that by 2020, other than stand-alone PV makes up around 90% of combined 50kW+ other than stand-alone and stand-

[12] For more detail on FITs degression policy for solar, see Government response to FITs Comprehensive Review: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/43085/5386-government-response-to-consultation-on-comprehensi.pdf.

[13] Source: Monthly MCS and ROOFIT statistics, https://www.gov.uk/government/statistical-data-sets/monthly-mcs-and-roofit-statistics

[14] Source: Monthly small-scale renewable deployment, https://www.gov.uk/government/publications/monthly-small-scale-renewable-deployment. Includes deployment up to end March 2014.

alone deployment. It is considered that the difference between projections and actual deployment is likely to be due to the existence of other than tariff-related barriers to deployment specific to 50kW+ other than stand-alone installations which are not accounted for in DECC modelling which are set out in the Solar Strategy, and briefly outlined in paragraph 2 above.

12. The Solar Strategy sets out proposals to identify and act on potential barriers to deployment in the commercial and industrial building mounted sector[15] which could further influence how the other than stand-alone/stand-alone split develops in future. The 75%/25% other than stand-alone/stand-alone split which DECC proposes recognises uncertainties around how the sector will develop: it is calculated based on the projected split between 50kW+ other than stand-alone and stand-alone in April 2016, meaning it reflects both stand-alone installations' higher share of actual deployment, and other than stand-alone's higher share of future deployment out to 2020 in DECC projections. This split is intended to protect the other than stand-alone sector from degressions triggered by stand-alone deployment, thus allowing the realisation of the benefits of other than stand-alone solar PV outlined in paragraph 1 above, while allowing moderate growth in the stand-alone sector.

13. Table 2 summarizes the changes to degression bands under the Lead Option compared to current policy:

Table 2: Degression thresholds under Do Nothing and Lead Option

Levels of quarterly deployment (MW) necessary to trigger degression for current degression band	**Proposed levels of quarterly deployment (MW) necessary to trigger degression for new degression bands**		**Degression triggered**
>50kW and all Stand-Slone	**Stand-Alone (MW)**	**Other than stand-alone, above 50kW (MW)**	
Not more than 50MW	Not more than 12.5	Not more than 37.5	0%
More than 50MW but not more than 100MW	More than 12.5MW but not more than 25.MW	More than 37.5 but not more than 75MW	3.5%
More than 100MW but not more than 150MW	More than 25MW but not more than 37.5MW	More than 75MW but not more than 112.5MW	7%
More than 150MW but not more than 200MW	More than 37.5MW but not more than 50MW	More than 112.5MW but not more than 150MW	14%
More than 200MW	More than 50MW	More than 150MW	28%

14. If higher than expected stand-alone deployment results in further non-automatic degressions being triggered, DECC will consider bringing forward the implementation date of the new degression band. Under this scenario, the new triggers would operate from 1 October 2014, with the intention that non-automatic degression is not triggered for other than stand-alone before cost

[15] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/302049/uk_solar_pv_strategy_part_2.pdf

savings can be made by this segment of the market, with degressions determined under the new policy taking place from March 2015. **The impacts of this alternative start date have not been monetised**, as deployment/costs relative to the Do Nothing scenario will not differ significantly from the scenarios that are costed in this IA in the longer term.

Methodology for assessing costs and benefits

15. There is considerable uncertainty about the impact of split degression bands on tariffs and deployment. The future level of solar PV deployment at all sizes is inherently uncertain, due to PV module costs that change rapidly in response to global market conditions, and the speed with which solar PV can be deployed in response to reductions in cost. Within the 50kW+ other than stand-alone and stand-alone sector in the UK, there is additional uncertainty around stand-alone and other than stand-alone's respective shares of future deployment. For a given amount of total deployment, degression under the Lead Option can vary depending on the split between other than stand-alone and stand-alone capacity.

16. To reflect this uncertainty, DECC has developed 4 **indicative** scenarios to assess the potential range of impacts under the Lead Policy Option versus Do Nothing. **These scenarios are designed to illustrate a range of potential outcomes with split degression bands given levels of deployment observed so far under FITs, rather than a new 'central' projection of deployment.** The scenarios make different assumptions about future growth of the sector, and how deployment is split between other than stand-alone and stand-alone as follows:

    a. **Slow growth, current splits**: 'slow growth' scenarios assume that degressions have a large effect in reducing deployment- assumptions for how degression affects deployment are set out in Table 3 below. 'Currrent splits' scenarios assume 50kW+ other than stand-alone and stand-alone additional quarterly deployment in January to March 2015 (ie in quarter immediately after the policy is introduced) equals deployment in January-March 2014 (see Table 1 above), both in terms of total capacity and the split of capacity between tariff bands, ie around 70% of deployment is stand-alone and 30% other than stand-alone.
    b. **Slow growth, 60% other than stand-alone/40% stand-alone splits**; in this scenario total deployment of 60MW is assumed in the quarter after policy is introduced, with 60% of total deployment (36MW) other than stand-alone and 40% of total deployment (24MW) stand-aloneother than stand-alone.
    c. **Fast growth, current splits**: 'fast growth' scenarios assume that degressions have less effect on reducing deployment- see Table 3 below for assumptions.
    d. Fast growth, 60% other than stand-alone/ 40% stand-alone split

Table 3: Assumed responses of quarterly deployment to degression, slow growth and fast growth scenarios

	Deployment in current quarter, as % of previous quarter following degression	
Degression	**Slow Growth**	**Fast Growth**
0%	105%	120%
3.50%	80%	102%
7%	40%	60%
14%	20%	30%
28%	0%	10%

17. The following paragraphs discuss the assumptions behind these scenarios in more detail.

18. In all scenarios, deployment in the second quarter after the policy is introduced (April-June 2015) equals deployment in January to March 2015. Assumed deployment in January to March 2015

and April to June 2015 is summarised in Table 4 below for both current split and 60% other than stand-alone/40% stand-alone scenarios:

Table 4: Assumed deployment after introduction of split degression bands, current split and 60% other than stand-alone/ 40% stand-alone

Additional capacity per quarter, MW	**Current Splits (ie 30% non-standalone/ 70% stand-alone)**		**60% other than stand-alone/ 40% stand-alone**	
	Jan-Mar 2015	Apr-June 2015	Jan-Mar 2015	Apr-June 2015
50-100kW	2.1	2.1	9.0	9.0
100-150kW	4.7	4.7	9.0	9.0
150-250kW	9.4	9.4	9.0	9.0
250-5000kW	2.9	2.9	9.0	9.0
Standalone	40.5	40.5	24.0	24.0
Total per quarter	**59.6**	**59.6**	**60.0**	**60.0**

Note: current splits capacity as per Table 1, expressed in MW terms. Deployment in April to June 2015 assumed to equal deployment in January to March 2015.

19. For each subsequent quarter from July-September 2015 out to January-March 2021, degression is calculated based on deployment two quarters ago[16], and deployment is estimated based on the stylised assumptions about how deployment reacts to degression summarised in Table 3. Generation tariffs are estimated for installations deploying in each quarter based on degression that has occurred. Generation is calculated using the load factor assumption used in FITs modelling for the Comprehensive Review (850kWh/kW/yr) and is used to calculate costs to consumers out to 2020/21.
20. As stated in paragraph 13 above, there is considerable uncertainty about the future split between stand-alone and other than stand-alone deployment. Although in the last quarter around 70% of deployment in the largest degression band is stand-alone, such a high share is a recent development: over 2013, stand-alone's share of deployment was around 55%[17]. In addition, the Solar Strategy outlines proposals to address removing some of the potential non-tariff-related barriers to other than stand-alone deployment: it is uncertain what impact this will have on future deployment. The 60% other than stand-alone/ 40% stand-alone split scenarios accounts for the possibility of other than stand-alone installations making up an increased share of deployment following the removal of some of these barriers.
21. In addition, under 60% other than stand-alone/40% stand-alone scenarios initial degressions will be less steep under the Lead Option than under Do Nothing for other than stand-alone. This is because under this scenario, there will be no degression in the new other than stand-alone degression band in July 2015 following the introduction of the policy in January 2015 (quarterly other than stand-alone deployment is initially 36MW, and the trigger for a 3.5% degression is 37.5MW) whereas there would be a 3.5% degression under Do Nothing (since combined other than stand-alone and stand-alone deployment is initially 60MW/quarter). Degression for stand-alone will be 3.5% under Do Nothing and the Lead Option. Under the current splits scenarios, there is steeper degression for stand-alone under the Lead Option in July 2015 (40.5MW triggers a 14% degression) but no degression for other than stand-alone since deployment of 19.1MW/quarter is below the 37.5MW threshold for a 3.5% degression.
22. The current split and 60% other than stand-alone/ 40% stand-alone split scenarios therefore represent a suitable range of deployment scenarios which reflect uncertainty in the future split of deployment between the stand-alone and other than stand-alone sectors, and will lead to a range

[16] E.g. degression in Q3 is determined by deployment in Q1

[17] See https://www.gov.uk/government/statistical-data-sets/monthly-mcs-and-roofit-statistics

of degression outcomes once the policy is introduced. They therefore reflect uncertainty about the impact splitting the degression bands will have on deployment and costs.

23. Resource costs and carbon savings (tCO2 and monetised) are calculated based on estimates of generation over the assumed lifetime of PV installations under DECC FITs assumptions[18]. Assumptions underlying these calculations are set out in 'Description of impacts' below.

Description of impacts

Deployment

24. Cumulative deployment under the different policy options and deployment scenarios is set out in Table 5 below, with comparisons between Do Nothing and the Lead Option for each of the scenarios:

Table 5: Cumulative deployment (50kW+ other than stand-alone, and stand-alone) under Do Nothing and Lead Policy Option under different deployment scenarios out to 2020/21 (figures rounded)

Cumulative capacity, MW	Scenario	2020/21
Do Nothing	Slow Growth, current splits	**720**
	Slow growth, 60% other than stand-alone/ 40% stand-alone split	**720**
	Fast Growth, current splits	**1810**
	Fast growth, 60% other than stand-alone/ 40% stand-alone split	**1830**
Lead Option	Slow Growth, current splits	**400**
	Difference with Do Nothing	***-320***
	Slow growth, 60% other than stand-alone/ 40% stand-alone split	**750**
	Difference with Do Nothing	***20***
	Fast Growth, current splits	**1400**
	Difference with Do Nothing	***-420***
	Fast growth, 60% other than stand-alone/ 40% stand-alone split	**1870**
	Difference with Do Nothing	***50***

Note: deployment estimates rounded to nearest 10MW. Estimates of difference between Lead Option and Do Nothing are calculated on the underlying, unrounded figures and may not correspond exactly to the rounded figures in these tables.

25. Under the current split scenarios, deployment is significantly lower under the Lead Option. This is because when the policy is introduced, stand-alone deployment makes up a larger proportion of deployment than the 25% on which the new degression bands are based: degressions under the new stand-alone band are therefore steeper than under Do Nothing, and stand-alone deployment is reduced. Deployment of 50kW+ other than stand-alone PV is higher under the Lead Option than under Do Nothing in current splits scenarios as it faces less degression, however given that stand-alone initially comprises the bulk of deployment in the sector, the falls in stand-alone deployment outweigh the increases in other than stand-alone deployment and overall deployment is reduced.

[18] 35 years, see https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/42835/3365-updates-to-fits-model-doc.pdf. Given that the analysis assumes new deployment up to 2020/21, costs up to 2054/55 are incorporated.

26. Under the 60% other than stand-alone /40% stand-alone split scenarios, overall deployment increases by a small amount under the Lead Option. The increase in deployment is small because initial deployment is more equally split than in the current splits scenario: there is increased other than stand-alone deployment due to less degression under the Lead Option, but this is largely balanced out by less stand-alone deployment due to more degression.
27. Tables 6 and 7 show deployment disaggregated into 50kW+ other than stand-alone and stand-alone. **These show that under all scenarios, the Lead Option incentivises more other than stand-alone deployment.** This is consistent with the way the degression triggers have been set under the Lead Option: new triggers for other than stand-alone are 75% of triggers for the old, single band, but other than stand-alone's maximum assumed share of deployment under the scenarios is 60%, meaning the new triggers are 'generous' (ie other than stand-alone's share of the degression trigger is greater than its initial share of deployment) to other than stand-alone. Conversely, deployment of stand-alone deployment is less under all scenarios: new triggers for stand-alone are set at 25% of current triggers, but stand-alone's minimum assumed share of deployment when the policy is introduced is 40%.

Table 6: Cumulative 50kW+ other than stand-alone deployment under different scenarios (figures rounded)

Cumulative other than stand-alone capacity, MW	Scenario	2020/21
Do Nothing	Slow Growth, current splits	**230**
	Slow growth, 60% other than stand-alone/ 40% stand-alone split	**430**
	Fast Growth, current splits	**580**
	Fast growth, 60% other than stand-alone/ 40% stand-alone split	**1100**
Lead Option	Slow Growth, current splits	**320**
	Difference with Do Nothing	***90***
	Slow growth, 60% other than stand-alone/ 40% stand-alone split	**530**
	Difference with Do Nothing	***90***
	Fast Growth, current splits	**1050**
	Difference with Do Nothing	***470***
	Fast growth, 60% other than stand-alone/ 40% stand-alone split	**1460**
	Difference with Do Nothing	***370***

Table 7: Cumulative Stand-alone deployment under different scenarios (figures rounded)

Cumulative stand-alone capacity, MW	Scenario	2020/21
Do Nothing	Slow Growth, current splits	**490**
	Slow growth, 60% other than stand-alone/ 40% stand-alone split	**290**
	Fast Growth, current splits	**1230**
	Fast growth, 60% other than stand-alone/ 40% stand-alone split	**730**
Lead Option	Slow Growth, current splits	**80**
	Difference with Do Nothing	***-410***
	Slow growth, 60% other than stand-alone/ 40% stand-alone split	**220**
	Difference with Do Nothing	***-70***
	Fast Growth, current splits	**340**
	Difference with Do Nothing	***-890***
	Fast growth, 60% other than stand-alone/ 40% stand-alone split	**410**
	Difference with Do Nothing	***-320***

Costs to consumers

28. Costs to consumers[19] under each scenario in 2020/21 are set out table below: These are based on cumulative deployment out to 2020/21 in each of the FITs tariff bands in Table 1 above, the tariffs received by deployment in each quarter given degression, and the central FITs annual load factor assumption (9.7%)[20]. Costs to consumers represent the gross costs of generation tariff payments under each scenario; net costs to consumers (Lead Option versus Do Nothing) are also presented for each scenario:

[19] Costs to consumers are based on our estimate of generation tariff payments. The export tariff payable to investors for electricity not used on site and exported back to the grid does not count as subsidy, since the export tariff is set to reflect the value of exported electricity from small-scale, embedded installations.

[20] So Costs to Consumers = Capacity * Tariff * Load Factor

Table 8: Total costs to consumers in 2020/21, 2011/12 prices, undiscounted, for cumulative deployment out to 2020/21 (figures rounded)

£m, 2011/12 prices	Scenario	2020/21
Do Nothing	Slow Growth, current splits	**30**
	Slow growth, 60% other than stand-alone/ 40% stand-alone split	**30**
	Fast Growth, current splits	**60**
	Fast growth, 60% other than stand-alone/ 40% stand-alone split	**60**
Lead Option	Slow Growth, current splits	**20**
	Difference with Do Nothing	***-10***
	Slow growth, 60% other than stand-alone/ 40% stand-alone split	**40**
	Difference with Do Nothing	***0***
	Fast Growth, current splits	**50**
	Difference with Do Nothing	***0***
	Fast growth, 60% other than stand-alone/ 40% stand-alone split	**70**
	Difference with Do Nothing	***10***

Note: costs to consumers rounded to nearest £10m. Estimates of difference between Lead Option and Do Nothing are calculated on the underlying, unrounded figures and may not correspond exactly to the rounded figures in these tables.

29. Costs to consumers under the different scenarios reflect deployment and generation. In current splits scenarios, the lead option is cheaper than Do Nothing, reflecting lower levels of overall deployment due to reduced stand-alone deployment[21]. In 60% other than stand-alone/ 40% stand-alone split scenarios costs to consumers are higher under the Lead Option than Do Nothing reflecting higher levels of other than stand-alone deployment[22].

Resource Costs

30. The resource costs[23] of solar PV deployment are assessed against a counterfactual of the long-run variable cost (LRVC) of electricity supplied to the commercial sector (central scenario) from supplementary Green Book guidance[24] over solar PV's technology lifetime[25]. Solar costs are based on cost and performance assumptions developed for the FITs Comprehensive Review in 2012[26]. Lifetime resource cost estimates[27] are set out in Table 9 below:

[21] Under fast growth scenario, saving is small and rounds to zero

[22] Again, under the slow growth scenario, saving is small and rounds to zero

[23] Resource costs are costs related to building and running an installation, as opposed to costs to consumers which are based on subsidies (generation tariff) paid out to investors.

[24] See Table 9 at https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal.

[25] Assumed to be 35 years in line with DECC technology assumptions for small-scale solar PV, see https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/42835/3365-updates-to-fits-model-doc.pdf

[26] For more details, see https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/43083/5381-solar-pv-cost-update.pdf, and https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/42835/3365-updates-to-fits-model-doc.pdf.

[27] Lifetime resource costs cover the period from 2015 (when the policy would be introduced) to 2054 (when installations deploying in 2020/21 decommission based on the 35 year assumed technology lifetime of solar PV)

Table 9: Lifetime resource costs of solar PV deployment out to 2020/21 under different deployment scenarios, 2012 prices, discounted to 2014 at 3.5% (figures rounded)

Resource Costs, £m, 2012 prices, discounted to 2014	Scenario	Lifetime
Do Nothing	Slow Growth, current splits	**240**
	Slow growth, 60% other than stand-alone/ 40% standalone split	**330**
	Fast Growth, current splits	**490**
	Fast growth, 60% other than stand-alone/ 40% standalone split	**690**
Lead Option	Slow Growth, current splits	**230**
	Difference with Do Nothing	***-20***
	Slow growth, 60% other than stand-alone/ 40% standalone split	**380**
	Difference with Do Nothing	***50***
	Fast Growth, current splits	**610**
	Difference with Do Nothing	***120***
	Fast growth, 60% other than stand-alone/ 40% standalone split	**850**
	Difference with Do Nothing	***170***

Note: resource costs rounded to nearest £10m. Estimates of difference between Lead Option and Do Nothing are calculated on the underlying, unrounded figures and may not correspond exactly to the rounded figures in these tables.

31. Lifetime resource costs are higher under the Lead Option than under Do Nothing in most scenarios, reflecting lower levels of more cost-effective stand-alone deployment and higher levels of other than stand-alone deployment under the Lead Option. Under the slow growth, current splits scenario, resource costs are lower under the Lead Option: this reflects that overall capacity under the Lead Option (stand-alone and other than stand-alone) only 55% of capacity under Do Nothing by 2020 (720MW under Do Nothing and 400MW under Lead Option).

Carbon Savings

32. Lifetime carbon savings have been calculated based on the long-run marginal grid emissions factor (generation based) from supplementary Green Book guidance[28] for valuing greenhouse gas emissions in appraisal. These are then valued using the central scenario for the traded sector carbon price (also from supplementary Green book guidance). Carbon savings are set out in Table 10 below, and monetised in Table 11. Carbon savings in each scenario reflect capacity and generation, ie greater solar PV deployment leads to greater carbon savings and *vice versa.* However, it is important to note that this methodology does not take into account the energy efficiency benefits of other than stand-alone PV with its higher levels of on-site electricity use compared to stand-alone PV[29].

Table 10: Lifetime Carbon savings under different deployment scenarios from solar deployment out to 2020/21, mtCO2

[28] See https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal

[29] Electricity generated by non-stand-alone installations and consumed on-site is not subject to losses in the transmission and distribution systems. 1 MWh of electricity generated and used on-site there displaces more than 1MWh of electricity bought from elsewhere (which will be subject to system losses). Displacing more electricity means greater carbon savings (assuming the displaced electricity is not zero-carbon).

Carbon Savings, mTCO2	Scenario	Lifetime
Do Nothing	Slow Growth, current splits	**2.3**
	Slow growth, 60% other than stand-alone/ 40% standalone split	**2.3**
	Fast Growth, current splits	**5.6**
	Fast growth, 60% other than stand-alone/ 40% standalone split	**5.6**
Lead Option	Slow Growth, current splits	**1.3**
	Difference with Do Nothing	***-1.0***
	Slow growth, 60% other than stand-alone/ 40% standalone split	**2.4**
	Difference with Do Nothing	***0.1***
	Fast Growth, current splits	**4.2**
	Difference with Do Nothing	***-1.3***
	Fast growth, 60% other than stand-alone/ 40% standalone split	**5.8**
	Difference with Do Nothing	***0.2***

Note: Carbon savings have been rounded to the nearest 0.1mTCO2. Estimates of difference between Lead Option and Do Nothing are calculated on the underlying, unrounded figures and may not correspond exactly to the rounded figures in these tables.

Table 11: Lifetime monetised carbon savings from solar deployment out to 2020/21, £m, discounted, (lifetime totals rounded)

Carbon Savings, £m, 2012 prices, discounted to 2014	Scenario	Lifetime
Do Nothing	Slow Growth, current splits	**130**
	Slow growth, 60% other than stand-alone/ 40% standalone split	**130**
	Fast Growth, current splits	**330**
	Fast growth, 60% other than stand-alone/ 40% standalone split	**330**
Lead Option	Slow Growth, current splits	**70**
	Difference with Do Nothing	***-60***
	Slow growth, 60% other than stand-alone/ 40% standalone split	**130**
	Difference with Do Nothing	***0***
	Fast Growth, current splits	**250**
	Difference with Do Nothing	***-80***
	Fast growth, 60% other than stand-alone/ 40% standalone split	**340**
	Difference with Do Nothing	***10***

Note: monetised carbon savings are rounded to nearest £10m. Estimates of difference between Lead Option and Do Nothing are calculated on the underlying, unrounded figures and may not correspond exactly to the rounded figures in these tables.

Net Cost

33. The net social cost of each option/scenario is calculated by subtracting lifetime carbon savings from lifetime resource costs. These are presented (for lifetime costs only) in Table 12:

Table 12: Net cost (resource cost minus carbon savings) of policy options under different scenarios

Net Cost, £m, 2012 prices, discounted to 2014	Scenario	Lifetime
Do Nothing	Slow Growth, current splits	110
	Slow growth, 60% other than stand-alone/ 40% standalone split	200
	Fast Growth, current splits	160
	Fast growth, 60% other than stand-alone/ 40% standalone split	360
Lead Option	Slow Growth, current splits	160
	Difference with Do Nothing	*50*
	Slow growth, 60% other than stand-alone/ 40% standalone split	250
	Difference with Do Nothing	*50*
	Fast Growth, current splits	360
	Difference with Do Nothing	*200*
	Fast growth, 60% other than stand-alone/ 40% standalone split	510
	Difference with Do Nothing	*150*

Note: Net costs have been rounded to the nearest £10m. Estimates of difference between Lead Option and Do Nothing are calculated on the underlying, unrounded figures and may not correspond exactly to the rounded figures in these tables.

34. The range for the net benefit of the lead option is therefore **-£200m** to **-£50m**. The bottom end of the range is largely driven by high levels of more cost-effective stand-alone deployment under Do Nothing under the current splits scenarios. It is important to note that this analysis does not monetise the wider benefits associated with higher levels of other than stand-alone/building mounted PV deployment outlined in paragraph 1 above.

Uncertainties and Assumptions

35. As explained above, future solar PV deployment is inherently uncertain: the principal driver of system costs is the price of panels, which depend on global market conditions and are highly sensitive to fluctuations in supply and demand. In addition, solar PV can be deployed very quickly, meaning deployment is very sensitive to any changes in cost. Furthermore, there is considerable uncertainty over the future split of 50kW+ deployment under FITs between other

than stand-alone and stand-alone systems, which makes it hard to anticipate what the impact of the new degression bands will be. Estimates of future costs of solar PV, electricity and carbon prices, and grid emissions factors used to calculate the net present value estimates are also inherently uncertain.

36. In addition, the scenarios make assumptions about how the 50kW+ other than stand-alone and stand-alone sectors will react to degressions. Given limited evidence around the effects of degression, there is considerable uncertainty around this: since August 2012, the solar sector as a whole has experienced only automatic degressions every 9 months, with the first non-automatic degression of 3.5% to occur in July 2014 based on deployment between January and March 2014 (see Table 1 above). Under our scenarios, non-automatic degressions also occur, and it is uncertain how the sector would react to the increased risks posed by more frequent, less predictable degression. In addition, it is uncertain how investors in other than stand-alone will react to the creation of a separate other than stand-alone degression band. If they believe this significantly de-risks the sector (by removing the possibility of stand-alone-driven degressions) activity levels in the sector could increase. Furthermore, it is uncertain how investors will react to Government proposals to remove non-financial barriers to deployment as set out in the Solar Strategy.
37. As a result, these scenarios should be treated as **indicative,** andintended to show a range of potential impacts for the policy.
38. These scenarios assume that there is some inflexibility between transferring across from FITs to RO, and that some investors are not able to invest under the RO[30]. If all investors were able to invest under the RO, there would be no deployment under FITs in scenarios where tariffs reduce quickly while the RO remains open, as all investors would seek to invest under the RO as it offers significantly higher returns.

Sensitivities

39. No additional sensitivity analysis has been carried out in addition to the scenarios described above.

Wider Impacts

Bill Impacts

40. The estimated range for costs to consumers in 2020/21 under the Lead Option compared to Do Nothing is -£10m to +£10m (2011/12 prices). The impact of this on domestic bills is likely to be minimal (less than 50p added/removed to the bill of the average household in 2020).

Energy Efficiency

41. As explained in paragraph 1 above, other than stand-alone solar PV has a greater potential for the energy generated to be used on site. This reduces demand for imported energy, thereby minimising energy loss and reducing pressure on the electricity grid.

Employment impacts

42. As set out in paragraph 1 above, initial research for the Solar Strategy suggests that other than stand-alone/ building mounted PV supports significantly more jobs per 1MWP than stand-alone/ solar farms. These include highly skilled jobs in R&D and manufacturing which according to the BRE research the stand-alone sector in the UK does not appear to support.

[30] The RO will remain open to solar PV projects up to and including 5MW until it closes in March 2017.

RO closure

43. The RO is scheduled to close to new installations in March 2017: this means that after that date, solar installations of up to and including 5MW that would previously have sought to accredit under the RO will now have to accredit under FITs, since Contracts for Difference will not be available to plants of this size. Although current deployment of installations of up to 5MW under the RO is low (no new capacity has commissioned since September 2013[31]) previous months have seen high levels of deployment by installations of up to and including 5MW (e.g. 150MW deployed in March 2013) and future deployment is uncertain. Furthermore, it appears that all deployment of installations of up to and including 5MW under the RO since separate ground mount and roof mount bands were created in April 2013 has been stand-alone. There is therefore the possibility that RO closure could lead to significantly higher stand-alone deployment under FITs from 2017/18 onwards. Under current policy, this could lead to substantial degressions for 50kW+ other than stand-alone as well as stand-alone, even though this would not reflect falls in other than stand-alone costs. The Lead Option protects other than stand-alone installations from such tariff reductions in the event of RO closure, by limiting any degressions that did occur as a result to stand-alone installations.

UK environmental targets

44. We have assumed that changes in solar PV deployment resulting from this policy will have no effect on the cost of the UK meeting its 2020 renewables target. This is because the maximum change in solar PV deployment under FITs we have estimated is a reduction of 440MW: the amount of electricity generated by this capacity (<0.5TWh/year) is small in comparison with projected UK total renewable electricity generation in 2020 (109TWh)[32]. Moreover, it is uncertain what the reduction would be in net terms (ie across FITs and RO) because some projects may move across from FITs into the RO.

Conclusion

45. As stated in paragraph 26 above, we have estimated a range for the NPV of the lead option of **-£200m to -£50m, ie the Lead Option has a higher societal cost than Do Nothing**. This range does not reflect the additional benefits to the UK from other than stand-alone PV as outlined above (employment impacts, energy efficiency, industrial impacts, protection for other than stand-alone versus RO closure) which make the UK Government keen to promote greater deployment. In recognition of these wider benefits, **the Lead Option is the recommended option.**

[31] Source: https://www.gov.uk/government/publications/renewables-section-6-energy-trends, Table 6.4

[32] Source: DECC, Electricity Market Reform Delivery Plan, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/268221/181213_2013_EMR_Delivery_Plan_FINAL.pdf