Title: Comprehensive Review Phase 2a Consultation on Feed in Tariffs for solar PV	Impact Assessment (IA)
	Date: 9th February 2012
IA No: DECC0081	**Stage:** Draft
	Source of intervention: Domestic
	Type of measure: Secondary legislation
Lead department or agency: DECC **Other departments or agencies:**	**Contact for enquiries: Jackie Honey**
Summary: Intervention and Options	**RPC:** RPC Opinion Status

Cost of Preferred (or more likely) Option				
Total Net Present Value	**Business Net Present Value**	**Net cost to business per year**	**In scope of One-In, One-Out?**	**Measure qualifies as**
£2,200m	£m	£m	No	In/Out/Zero Net Cost

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

Feed in Tariffs for small scale generation technologies were introduced in April 2010. Recent evidence shows that uptake of solar PV has been much faster than originally anticipated, triggered by a substantial fall in PV costs. Current tariffs are out of step with the cost of PV, providing excessively high returns on investment and posing a serious risk to the feed-in tariff budget. Intervention is necessary to correct tariffs, reduce rents and provide value for money for consumers.

What are the policy objectives and the intended effects?

The policy objectives are to encourage the take up of small scale generation as part of the portfolio approach to meeting the 2020 renewables target. The intended effects are to enable householders and smaller scale investors to engage directly in the transition to a low carbon economy and to develop the supply chain. These need to be done in a way that is cost-effective and can be achieved within current spending limits.

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

3 options have been considered:

(i) Do nothing – leaves current policy unchanged

(ii) Degress tariffs after 1 July 2012 – three separate tariff options are set out for tariff changes in July depending on deployment during March and April 2012

(iii) Apply further modifications to tariffs in addition to (ii) including shortening the tariff lifetime and changing the export tariff.

The options considered are in addition to the tariff changes proposed in Phase 1 of the Comprehensive review, including the requirement that new installations from April 2012 have an Energy Performance Certification at level D or above.

Will the policy be reviewed? It will be reviewed. **If applicable, set review date:** ongoing						
Does implementation go beyond minimum EU requirements?			**Yes / No / N/A**			
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.	**Micro Yes**	**< 20 Yes**	**Small Yes**	**Medium Yes**	**Large Yes**	
What is the CO2 equivalent change in greenhouse gas emissions? (Million tonnes CO2 equivalent)			**Traded: 85**	**Non-traded:**		

I have read the Impact  Date: 09/02/2012

Summary: Analysis & Evidence

Policy Option 1

Description: Chosen Option- Lower Feed in Tariffs from July 2012 onwards for installations with further degression at 6 monthly intervals.

FULL ECONOMIC ASSESSMENT

Price Base Year 2011	PV Base Year 2011	Time Period Years 35	Net Benefit (Present Value (PV)) (£m)		
			Low: 1,600	High: 2,700	Best Estimate: 2,200

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant	Total Cost (Present Value)
Low				1,900
High				3,500
Best Estimate				2,400

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

The monetised cost is the value of EUA purchases in the UK power sector. In this instance these is lower PV deployment than under the no change scenario, and therefore a lower value of carbon benefits. The high estimate is based on Option 2A above, the central on Option 2B and the low on Option 2C.

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

Costs for investors of demonstrating that property meets energy efficiency requirement e.g. cost of obtaining EPC certificate, time costs associated with doing EPC assessment. Sunk costs e.g. deposits. of investors who are not able to complete their installations and submit their application for accreditation before 12 December or any subsequent date when tariffs are reduced. System balancing costs are not included.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant	Total Benefit (Present Value)
Low				**3,500**
High				**6,200**
Best Estimate				**4,700**

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

The benefits of this option relate to the lower resource costs associated with PV as a result of lower deployment under reduced tariffs compared with the option of continuing with existing tariff policy.

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

By reducing the costs of PV under the FITs scheme, this policy will ensure that FITs can continue to support a portfolio of small scale low-carbon generation technologies going forward. Lower PV deployment will also avoid incurring some variable scheme administration costs. The policy could also help develop a supply chain that offers households a wide range of cost effective measures to lower their energy use and carbon emissions and incentivise additional uptake of energy efficiency measures and associated carbon savings

Key assumptions/sensitivities/risks **Discount rate** 3.5

Significant uncertainty as to costs and uptake of PV going forward, demonstrated through using sensitivity analysis on different deployment scenarios and costs of PV. There is also uncertainty of the impact of the energy efficiency requirement for eligibility of higher tariffs, which is assumed to dampen demand in the first two years of the new tariffs. Other key assumptions are PV module and installation costs and fossil fuel prices and carbon prices going forwards.

BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m:			In scope of	Measure qualifies
Costs:	Benefits:	Net:	No	In/Out/Zero Net

Evidence Base

A: Strategic overview

1. A new system of feed-in tariffs (FITs) was introduced in Great Britain on 1 April 2010 to incentivise small scale (up to 5MW), low carbon electricity generation. This small scale FITs scheme works alongside the Renewables Obligation (RO), which is the primary mechanism to incentivise deployment of large-scale renewable electricity generation. These, together with the Renewable Heat Incentive (RHI), Renewable Heat Premium Payment and the Renewable Transport Fuels Obligation are needed to incentivise uptake of renewable energy technologies to meet the UK share of the EU renewable target of 15% renewable energy by 2020.

2. FITs are intended to promote take up of small scale low-carbon technologies by the public and communities as part of a portfolio approach to renewables and in order to:-

    - empower people and give them a direct stake in the transition to a low-carbon economy;

    - help develop a supply chain that offers households a wide range of cost effective measures to lower their energy use and carbon emissions; and

    - assist in public take-up of carbon reduction measures, particularly measures to improve the energy efficiency of buildings.

3. On 7 February 2011, the Secretary of State announced the start of the first comprehensive review of the FITs scheme. In doing so, he confirmed that the review would assess all aspects of the scheme including tariff levels, administration and eligibility of technologies, and would be completed by the end of the year, with tariffs remaining unchanged until April 2012, unless the review reveals a need for greater urgency.

4. As part of the comprehensive review, the Government gave fast-track consideration to large-scale (over 50kW) and standalone solar PV tariffs (as well as farm-scale anaerobic digestion) in response to evidence of a significant fall in PV costs and unanticipated uptake at this scale.

5. On 31 October 2011 as part of Phase 1 of the review it was announced that the review would incorporate a further consideration of solar PV tariffs in response to evidence of a significant fall in solar PV costs at all scales and higher than anticipated uptake, with a view to making any changes to tariffs on 1 April 2012. It was proposed that installations with an eligibility date between 12 December 2011 and 31 March 2012 would receive current tariffs in that period, and new tariffs thereafter. It was also announced that the review would consider an energy efficiency eligibility requirement for installations attached to or wired to provide electricity to a building, as well as a new tariff for multiple (‘aggregated’) installations that would apply to any solar PV installation where the FIT generator or nominated recipient already owns or receives FITs payments from one or more other PV installations, located on different sites.

Table 1: Proposed solar PV tariffs resulting from the fast-track review and Phase 1 comprehensive review

Table 1: *Current and proposed generation tariffs for solar PV* **Band (kW)**	**Current generation tariff (p/kWh)**	**Proposed individual generation tariff (p/kWh)**	**Proposed multi-installation generation tariff (p/kWh)**
4kW or less (new build)	37.8	21.0	16.8
4kW or less(retrofit)	43.3	21.0	16.8
>4-10kW	37.8	16.8	13.4
>10-50kW	32.9	15.2	12.2
>50-100kW	19	12.9	10.3
>100-150kW	19	12.9	10.3
>150-250kW	15	12.9	10.3
>250kW-5MW	8.5 [1]	8.5[1]	8.5[1]
stand alone	8.5 [1]	8.5[1]	8.5[1]

6. Following the announcement of the consultation, the rate of PV deployment increased very rapidly, with over 380 MW of small scale (up to 50kW) PV registered on the MCS database over the 6 weeks to 12 December – more than was installed in the preceding 18 months of the scheme (375 MW). This greatly exceeded the scenario modelled in our original Impact Assessment (115 MW). In addition, it has become apparent that capital costs for PV have fallen more quickly than anticipated (see paragraph 14 below), meaning that there is a risk of investor overcompensation even at the tariffs proposed in the consultation. The combination of the surge in uptake prior to 12 December, and the prospect of continued strong uptake even at substantially reduced tariffs will result in increased pressure on the FITs budget.

7. A Judicial Review was filed against the proposal to reduce tariffs for installations with an eligibility date after a reference date, originally proposed to be 12 December. The High Court ruled in December that this approach would be unlawful, and the Court of Appeal upheld this ruling on 23 January. As a precautionary measure, on 19 January the Government laid before Parliament regulations that would reduce the tariffs from 1 April 2012 for solar PV installations with an eligibility date on or after 3 March 2012 to the rates set out in the table above. The Government is seeking permission to appeal to the Supreme Court against the Court of Appeal's ruling, in which case future legislation could be introduced to apply the new tariffs to installations that became eligible for FITs between 12 December 2011 and 2 March 2012, but for the purposes of the analysis in this Impact Assessment we have assumed that the Court of Appeal ruling stands, and that all installations with eligibility dates before 3 March will receive the current (higher) tariffs.

8. As a consequence, this Impact Assessment bases its cost benefit analysis on the assumption that tariffs in Table 1 will apply to installations with an eligibility date on or after

[1] These figures will be up rated in line with inflation by OFGEM.

3 March 2012, who meet the band D energy efficiency requirement. It also estimates the impact of a proposed degression mechanism from 1 July 2012. The Phase 1 Impact Assessment published alongside this one sets out cost benefit analysis for changes to tariffs from 1st April 2012, for installations after 3rd March only.

B: Problem under consideration

9. It is clear (see paragraph 14 below) that costs of PV have fallen much more rapidly than was predicted at the start of the scheme. This has led to much stronger take-up than was envisaged, risking the affordability of the entire FITs scheme. The issue is what are the appropriate new levels of the PV tariffs in future, and what are the likely implications of these on costs to consumers and the economy, impact on investors and the PV market, and on DECC budgets and affordability assessments. This impact assessment considers these issues.

C: Rationale for intervention

10. From its establishment in April 2010, the FITs scheme was intended to encourage deployment of additional small scale low carbon electricity generation, particularly by individuals, householders, organisations, businesses and communities who have not traditionally engaged in the electricity market. For these investors, delivering a mechanism which is easier to understand and more predictable than the Renewables Obligation, as well as delivering additional support required to incentivise smaller scale and more expensive technologies, were the main drivers behind the development of this policy.

11. In choosing the range of technologies supported by FITs, the focus was on small-scale low-carbon electricity with the primary intention of supporting the widespread deployment of proven technologies now and up to 2020, rather than to support development of unproven technologies. PV was seen as a well developed technology that could be deployed at scale in domestic, community and small business settings. While it was a relatively high cost technology, it has broad public acceptance, can be easily incorporated into the built environment and generally does not require expensive grid connection or reinforcement costs. Whilst at the time PV was a higher cost technology in meeting the RES targets, it was also seen as having the potential to drive consumer and small business engagement in renewable technologies. Another desirable impact was for FITs to drive down costs in the UK supply chain of Solar PV technologies. Because carbon prices are not high enough to incentivise solar PV in the short and medium term, government intervention is necessary to incentivise the private sector to invest in this technology in the timescales needed to meet the 2020 Renewables target. In the light of new evidence on costs and uptake, this IA assesses the latest evidence on the appropriate levels of tariffs in July 2012 needed to meet the objectives of the scheme, whilst meeting budgetary constraints as set out in DECCs levy control envelope. This IA also looks at additional FITs mechanisms including tariff degression mechanisms and shortening of tariff lives.

Analysis

Background on costs and deployment

12. Since the introduction of FITs, all evidence shows that costs of solar PV have fallen far more rapidly than originally projected, and uptake has consequently been far higher. At the time the consultation was launched (31 October 2011), the number of new small scale (up to 50kW) PV installations each month was growing by around 25%, and total PV installed capacity was almost 350 MW (end September figures, the latest available at the time). This

was 2.5 times greater than the original estimate of 140 MW in the first two years of the scheme. Between the launch of the consultation and the proposed 12 December reference date, the installation rate increased very rapidly, with over 380 MW of new small scale (up to 50kW) installations being registered on the MCS database, taking the total to nearly 900 MW and exceeding the projections for total deployment by 2014. Table 2 below sets out deployment to date based on latest available data.

Table 2: Estimates of PV deployment to 29th January 2012

Solar PV Installations to 29th January 2012[2]		
Band	Deployment (MW)	Number of installations
<4kW	640	230,000
4-10kW	40	5,000
10-50kW	90	3,000
50kW+	160	3,000
Total	940	240,000

Note: Totals may not sum owing to rounding.

13. Research carried out for DECC by PB / CEPA in September 2011 and published alongside the consultation on 31 October 2011 suggested that PV installation costs had fallen by at least 30% between the launch of the scheme and Autumn 2011. This meant that current tariffs were leading to typical rates of return for investors well in excess of the 5% the tariffs were intended to deliver. Additional evidence received by DECC during the consultation period, and updated research by PB for DECC in January 2012 suggests that PV installation costs have in fact fallen by an even greater extent, with a typical domestic installation costing 45% less to install in 2011 compared with originally estimated in 2009. There have also been significant falls in larger scale PV, with latest cost estimates putting a 350kW installation 70% cheaper than original Element estimates.

14.

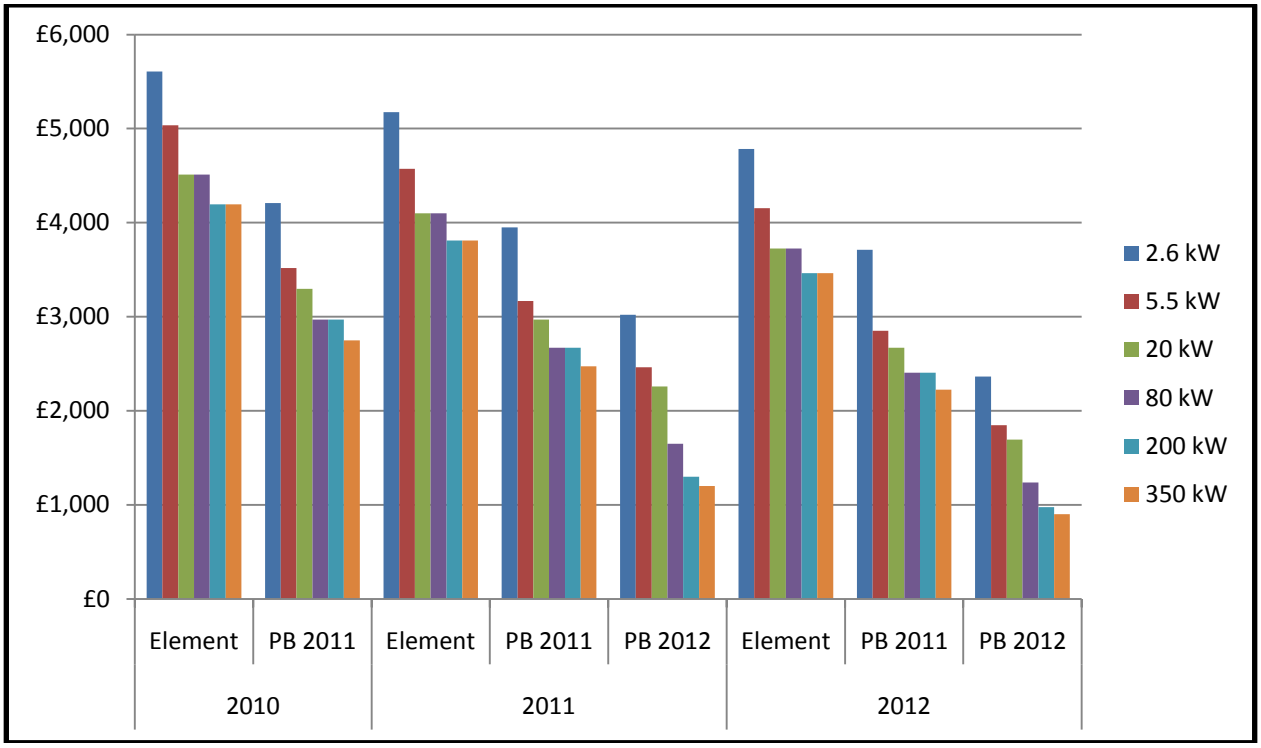
Table 3: Comparison of central estimates of total capital costs of PV installations: Element Energy 2009, PB September 2011 and PB January 2012

Type of installation	Size of installation (kW)	Capital cost of PV installation in 2012 prices (£k)							
		Element 2009			PB September 2011			PB January 2012	
		2010	**2011**	**2012**	**2010**	**2011**	**2012**	**2011**	**2012**
Building Mounted	2.6	£15	£13	£12	£11	£10	£10	£8	£6
	5.5	£28	£25	£23	£19	£17	£16	£14	£10
	20	£90	£82	£74	£66	£59	£53	£45	£34
	80	£361	£328	£298	£237	£214	£192	£132	£99
	200	£839	£762	£693	£594	£534	£481	£260	£195
	350	£1,468	£1,334	£1,212	£962	£866	£779	£420	£315
Standalone	200	£839	£762	£693	£550	£495	£445	£240	£180

Source : January 2012 PB PV report and DECC analysis

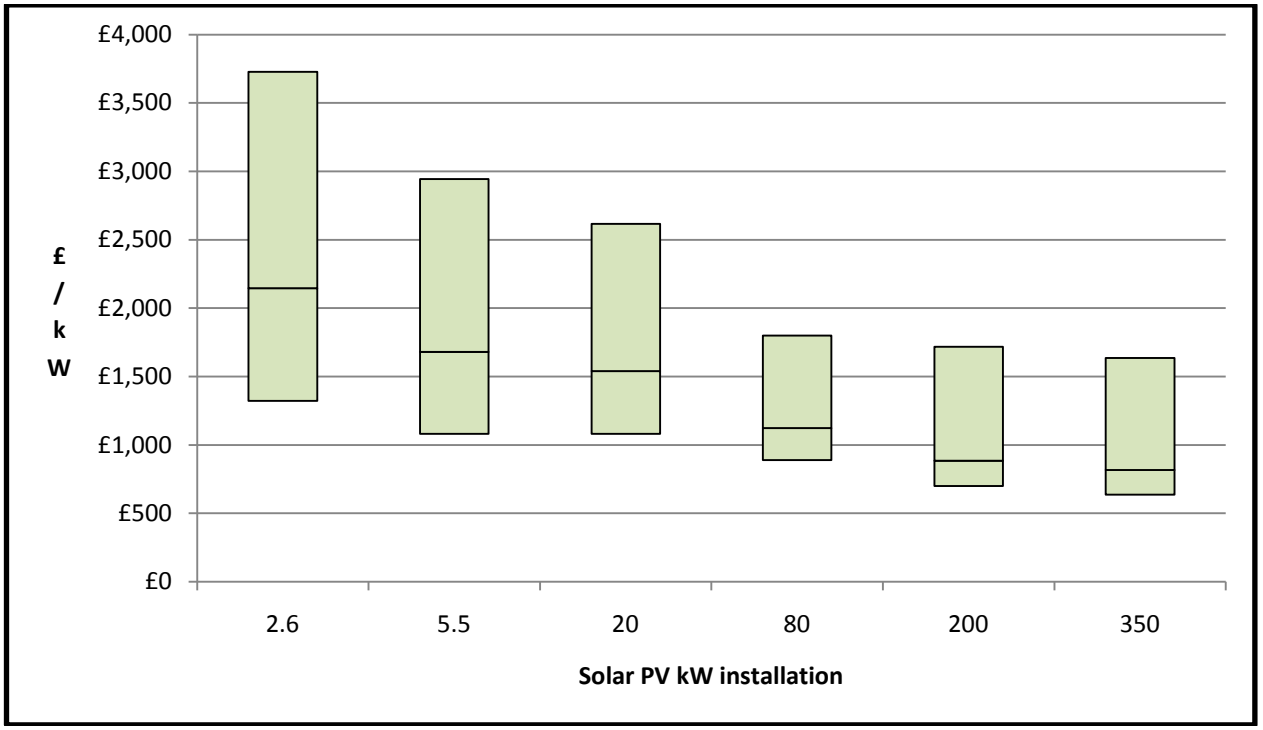
[2] Solar PV installations receiving FITs payments are registered OFGEMs Central FITs Register (CFR). In addition, data for <50kW installation only are available directly from the Microgeneration Certification Scheme (MCS) database. An installation will appear on the MCS before it appears on the CFR, and so MCS data are used to get the best estimate of deployment to date for <50kW installations. The total PV capacity registered on the MCS database was 780 MW on 29th January. However, evidence suggests that 10% of installations registered on the MCS database are never transferred to the CFR, and therefore do not become eligible for FITs. When estimating the costs of the scheme, we therefore reduce the capacity of installations registered on the MCS by 10%.

Chart 1: Comparison of central estimates of capital costs of PV installations 2009 to 2011, £/kW



15. As well as providing new central estimates, PB have increased the range of their low and high estimates, reflecting both the heterogeneity in PV costs in the market and greater uncertainty at this time. Chart 2 compares high, medium and low £/kW assumptions for Solar PV installations in December 2012. Each green bar represents the range of variable costs, with the black line showing the medium estimate.

Chart 2 PB assumptions for £/kW of Solar PV installations comparing high, medium and low[3]:



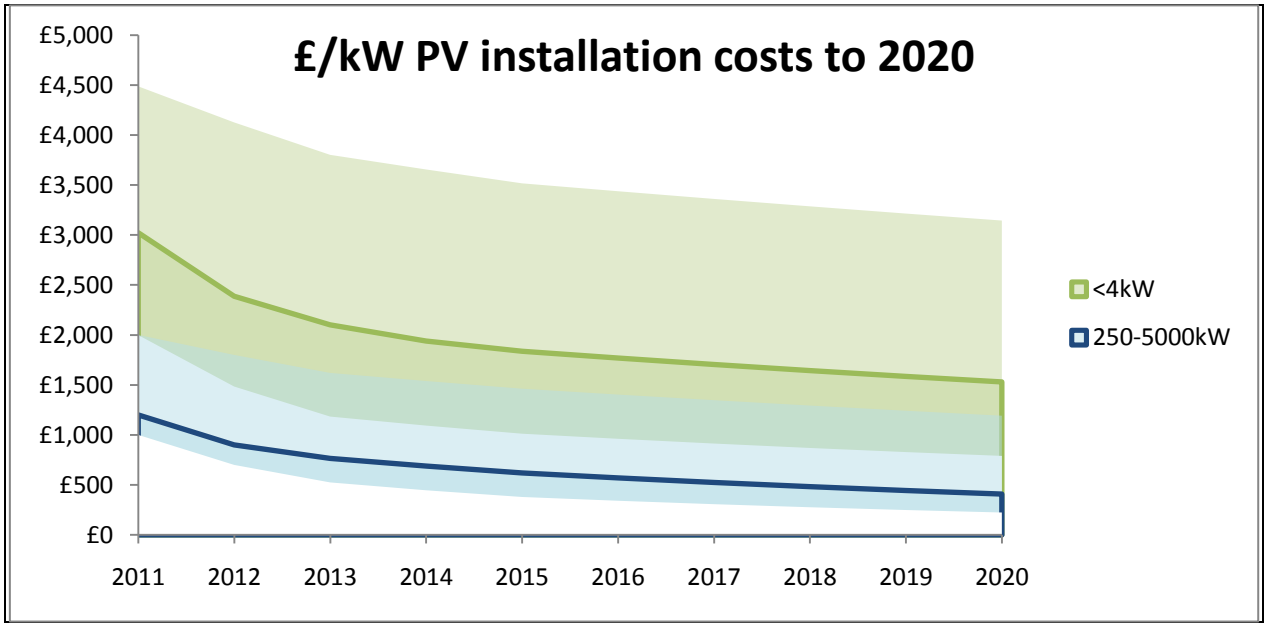
16. The PB power January 2012 report states that PV costs are expected to continue falling over the coming year, but there exists significant uncertainty over how rapid this will be. The largest single contributor to installation costs are the PV panels, whose price reflects global developments, particularly in China. The latest PB update therefore models three scenarios for future cost reductions, with cost reductions in 2012 of 30%, 25%, and 10% under the low, central, and high scenarios respectively. Table 4 below sets out the variable cost reduction assumptions for a <4kW installation in the Low, Medium and High scenarios. Chart 3 shows these costs over time, and includes the fixed element for a <4kW installation, assuming a 2.6kW installation.

Table 4: Learning rates on variable costs of PV installations to 2020 from January 2012 PB report.

£2012 prices		Jan - 2012 £/kW	% real reduction in PV installation costs									Dec-2020 £/kW
			2012	2013	2014	2015	2016	2017	2018	2019	2020	
<4kW[3]	Low	£1,716	30%	25%	10%	10%	7%	7%	7%	7%	7%	£508
	Medium	£2,542	25%	15%	10%	7%	5%	5%	5%	5%	5%	£1,050
	High	£3,606	10%	10%	5%	5%	3%	3%	3%	3%	3%	£2,264
250-5000kW	Low	£1,000	30%	25%	15%	15%	10%	10%	10%	10%	10%	£224
	Medium	£1,200	25%	15%	10%	10%	8%	8%	8%	8%	8%	£408
	High	£2,000	10%	10%	5%	5%	4%	4%	4%	4%	4%	£1,192

[3] This table and chart includes the variable £/kW element of <4kW installation costs only. Costs of <4kW installations include a fixed element of cost. The fixed element is relatively minor in total costs compared to the variable element. 4kW + installations have variable cost elements only. These assumptions are fully set out in the January 2012 PB PV update report published alongside this IA.

Chart 3: Variable costs of <4kW and 250-5000kW installations to 2020[4]



Budget Considerations

17. The 2010 Spending Review set an overall cap for all of DECC's tax and spending through policies that entail levy-funded spending (currently FITs, RO and WHD). This cap is managed though the levy control framework (LCF).

18. DECC is expected to set policy such that the central forecast for DECC levy-funded spending is equal to or less than the agreed cap. However, recognising the inherent difficulty of managing demand-led levy-funded policies, the Treasury have agreed at the outset a range of acceptable headroom above the cap, initially set at 20% of the total levies cap, which will represent the level of permissible variation before DECC has to develop urgently plans for bringing policies back into line with the cap. DECC is able under the LCF to maintain the levy-funded spending within the acceptable headroom so long as the additional spend is not the result of intended policy changes and an agreed plan for addressing the overspend is in place.

19. Where spend exceeds or is projected to exceed the range of acceptable headroom, DECC must rapidly agree with the Treasury a plan for bringing spending back down to the agreed profile. This plan will set out the adjustments that DECC proposes to make to its policies to reduce their spend, and the impact by year of taking action. The absence of an effective plan in this situation could ultimately result in the Treasury refusing DECC permission to retain all or part of the tax income received above the agreed cap, which would leave DECC to fund all or part of the spending gap from within its Departmental Expenditure Limit.

20. Based on projections developed at the time of the Comprehensive Spending Review, the overall LCF cap was split between FITs, the Renewables Obligation, and the Warm Home Discount as shown in the table below. DECC has to manage these policies so as to meet the overall levy control envelope as described above, but has flexibility to adjust the budgets for each policy within the overall cap, subject to continuing to meet policy objectives and value for money considerations.

[4] Table 4 contains the variable element of £/kW costs only. In chart 3, to get an accurate impression of marginal installation costs of PV installations, the fixed element is applied to variable costs assuming a reference installation size of 2.6kW.

Table 5: Feed in Tariffs budget for Spending Review period

Budget (nominal, undiscounted, £m)	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**CSR period**
Feed in tariffs – all technologies	94	196	328	446	1,064
RO Spending Review Envelope[5]	1,750	2,156	2,556	3,114	9,576
Warm Home discount	250	275	300	310	1,135
Total levies control envelope	2,094	2,627	3,184	3,870	11,775

21. DECC has developed a model that estimates the costs incurred by installations installed during 2011-12 (using a combination of data from Ofgem and the MCS register). This impact assessment considers data including PV installations to 8 January 2012, and in order to make an estimate of costs for the full year, makes assumptions about additional deployment that will occur to the end of March 2012. This is subject to considerable uncertainty and depends how the market develops in the light of the final outcome of the Judicial proceedings, continuing cost reductions, and proposed new tariffs to apply to installations from 3 March. To take account of the continued state of flux, we have developed 3 scenarios for possible uptake in the period January-March 2012. These are shown below:

Table 6: Actual / potential PV deployment per month Oct 2011 to March 2012 (MW)[6]

Deployment per month, MW	**Oct 2011**	**Nov 2011**	**Dec 2011**	**Jan 2012**	**Feb 2012**	**Mar 2012**	**Total capacity end Mar 2012**
	Actual			Projections			
Central	60	165	175	25	250	125	1,300
High				25	350	175	1,400
Low				15	160	70	1,100

22. These scenarios would lead to the following subsidy costs for PV installations over the Spending Review period (2011/12 to 2014/15). The table shows that projected costs just for installations to end of March 2012 would exceed the FITs budget in almost all years of the Spending Review period. Any overspends, and budget for any new deployment beyond March 2012, relies on underspends being available or generated from other schemes that fall within the LCF (the RO and WHD) *and accessing, as a last resort and with the agreement of the Treasury, the headroom facility that has already been agreed in principal with HMT.*

[5] The FITs and RO budget lines have been adjusted from those published at the time of the spending review to account for overlap between the two schemes, where generating stations below 5MW can choose to accredit against the RO or FITs. This is purely a technical adjustment in order to provide a more accurate picture of the spending limits for each policy, and has no impact on the total amount of subsidy available for these levies schemes. It should also be noted that the size of this overlap is not fixed, as it depends on how generators choose to accredit; the calculation may therefore be revisited in future.

[6] These figures differ slightly from those recently published in the Governments response to question 1of the FIT's consultation comprehensive review phase 1 due to updated population data since publication.

Table 7: Estimated subsidy costs associated with PV installations to end March 2012[6]

£m	£m, nominal, undiscounted					£m, real, discounted
	2011/12	2012/13	2013/14	2014/15	CSR	Lifetime
Central	£140	£455	£470	£485	£1,550	£7,000
High	£145	£505	£520	£540	£1,710	£7,700
Low	£135	£400	£415	£430	£1,385	£6,200

23. The Phase 1 impact assessment ([DECC0073) sets out the costs for installations that could come forward after March 2012 under the new tariffs proposed in April 2012. This impact assessment analyses the impact of options for further degressing tariffs beyond April 2012 as proposed in the Phase 2 consultation.

D. Options under consideration

24. Options considered here are:

(i) **Option 1: 'Do nothing'** – which attempts to set out what would have happened in the absence of any review. It is assumed that tariffs for solar PV would have degressed by around 9% from 1 April 2012 as originally planned. This is needed to compare against the 'change' options below. *This does not include the changes proposed in Phase 1 IA (see paragraph 27 below).*

(ii) **Option 2(a-c):** The Phase 1 IA sets out tariffs for the 1st April 2012, and analyses the effects of this change in isolation. This Phase 2a IA includes these changes and looks at further changes from 1st July onwards, including energy efficiency requirements and multi-installation tariffs applied as set out in the Phase I Impact Assessment, plus further tariff degression from July 2012 and an automatic and contingent degression mechanism thereafter.

(iii) **Option 3:** As option 2 but with the tariff lifetime shortened from 25 to 20 years.

Methodology

25. In order to estimate the impact of tariff changes, the modelling has been carried out using a two stage approach:
    - PV deployment to 31 March 2012 is estimated drawing on experience of deployment to date, in particular around the proposed 12 December reference date. Three scenarios for deployment and costs to 31 March are set out in Tables 5 and 6 above.
    - To this starting point we apply annual rates of growth for solar PV uptake and costs from April 2012 onwards that are projected by the DECC FITs model. The model estimates uptake and costs under the proposed and 'do nothing' tariff structures. The FITs model has been updated with the latest estimates from PB Power for PV installation costs going forward.

(i) Option 1: Do Nothing

26. This IA is assessed against the same 'No change' baseline as set out in the Final IA for Comprehensive Review Phase 1 (DECC0073). This is because that IA considered tariffs at

April 2012 only, holding them constant going forwards. That IA is therefore an interim assessment only, focussing on the April 2012 change, and not a suitable baseline to assess the further tariff options presented here. In addition, given the IAs are being published concurrently, it was thought that presenting one baseline would be less confusing to readers.

27. In order to compare the costs and benefits of setting lower tariffs, we need an estimate of what would have happened in the absence of intervention at this stage. This is difficult to assess with any certainty because it is trying to construct a situation that Government already moved away from through the publication of the phase 1 consultation on FITs for PV on 31 October 2011.

28. Following the methodology set out above, the 'do nothing' scenario has been estimated in 2 stages. The first stage was to estimate the level and costs of PV deployment that would have taken place to end March 2012 if tariffs had remained unchanged. In April 2012, under existing policy and given that a comprehensive review would not have taken place, the Government would have reduced tariffs in line with available cost information. This in itself may have lead to a rush like that observed in December 2011. In the four months to October 2011, installed PV capacity was growing by around 20% per month. However, it is likely that the installation rate would have increased in the run up to April 2012, given market expectations that tariffs would be reduced from that point. As a central scenario we have therefore assumed that installed capacity would continue growing by 20% per month until January, increasing to 50% in February and March; the high scenario assumed that growth rates would be 50% a month in January, February and March. Deployment and the costs for installations until the end of March 2012 assumed under the no change scenarios is given in tables 8 and 9 below.

Table 8: PV deployment per month Oct 2011 to March 2012 (projected) MW – No Change Scenario

Deployment per month, MW	Oct 2011	Nov 2011	Dec 2011	Jan 2012	Feb 2012	Mar 2012	Total capacity end Mar 2012
	Actual	Projections					
Central	60	70	80	100	290	440	1,510
High				240	370	550	1,840
Low				100	210	280	1,260

Table 9: Estimated subsidy costs associated with PV installations to end March 2012 – no Change scenario

£m	£m, nominal, undiscounted					£m, real, discounted
	2011/12	2012/13	2013/14	2014/15	CSR	Lifetime
Central	£ 140	£ 580	£ 600	£ 620	£1,940	£8,900
High	£ 150	£ 710	£ 740	£ 760	£2,370	£10,900
Low	£ 130	£ 480	£ 500	£ 520	£1,630	£7,400

29. The Feed in tariff model was used to model the growth in PV costs and deployment levels for the no change scenario post March 2012, assuming tariffs remained unchanged until 1

April 2012, and then degressed by around 9% a year. Table 9 below sets out the return on investment (RoI) estimated to result from original tariffs, assuming PB power central capital and operating cost assumptions from January 2012. These rates of return are much higher than the returns envisaged at the start of the scheme, with smaller installations achieving a return on investment of over 20% under the low CapEx scenario. These high RoIs due to lower than expected costs explain why uptake is higher than was previously envisaged. The Feed in Tariff model, which now includes these lower costs, results in much higher assumed PV take up than was initially estimated.

Table 10: Estimated Return on Investment (ROI) of current tariffs, under new PB power PV cost estimates

ROI with January 2012 PB assumptions, current tariffs, April 2012 installation				
Band	Tariff (p)	Low CapEx	Medium CapEx	High CapEx
4kW or less(retrofit)	43	23%	15%	8%
>4-10kW	38	24%	16%	9%
>10-50kW	33	21%	15%	9%
>50-100kW	19	17%	13%	9%
>100-150kW	19	17%	13%	9%
>150-250kW	15	18%	14%	7%
>250kW-5MW	9	13%	10%	4%
stand alone	9	8%	6%	1%

30. The levels of deployment (Table 11) and costs and benefits (Table 12) of Option 1 'Do nothing' under these assumptions are set out below. These relate to all installations we might have expected during this period. Costs and benefits are in 2011 prices and are discounted. ***Please note that as subsidy costs are in real discounted terms they cannot be directly compared to the levy control framework budget, which is in nominal undiscounted terms. Nominal undiscounted estimates are set out in Annex A attached.***

Table 11: Deployment assumed under Option 1: 'Do Nothing' – all PV installation

	2011-12	2012-13	2013-14	2014-15	2020-21
Central Deployment Scenario					
Installed capacity (MW)	1,500	3,000	4,900	7,600	39,000
Generation in year (GWh)	340	2,000	3,600	5,600	31,000
Number of installations (from April 2012)		368,000	830,000	1,430,000	7,739,000
High Deployment Scenario					
Installed capacity (MW)	1,800	3,600	6,000	9,300	47,000
Generation in year (GWh)	380	2,500	4,300	6,900	38,000

Number of installations (from April 2012)		449,000	1,012,000	1,744,000	9,433,000
Low Deployment Scenario					
Installed capacity (MW)	1,300	2,500	4,100	6,400	32,000
Generation in year (GWh)	330	1,680	2,960	4,700	26,000
Number of installations (from April 2012)		307,000	692,000	1,192,000	6,452,000

Table 12: Costs and Benefits of Option 1: 'Do Nothing' – all PV installations

(a) Central Deployment Scenario

Financial Year (£m, 2011 prices, discounted to 2011)	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2020-21**	**Lifetime**
Resource costs	130	290	340	370	260	6,200
Value of Carbon Benefits	0	10	20	30	270	5,700
NPV Cost(-), benefit (+)	- 130	- 280	- 320	- 340	0	- 500
Cost to consumers	140	760	1,190	1,670	4,970	96,000

(b) High Deployment Scenario

Financial Year (£m, 2011 prices, discounted to 2011)	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2020-21**	**Lifetime**
Resource costs	150	350	420	460	320	7,600
Value of Carbon Benefits	0	10	20	40	320	7,000
NPV Cost(-), benefit (+)	- 150	- 340	- 390	- 410	0	- 600
Cost to consumers	150	930	1,500	2,000	6,100	118,300

(c) Low Deployment Scenario

Financial Year (£m, 2011 prices, discounted to 2011)	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2020-21**	**Lifetime**
Resource costs	100	240	290	310	220	5,200
Value of Carbon Benefits	0	10	20	30	220	4,800
NPV Cost(-), benefit (+)	- 100	- 230	- 270	- 280	0	- 400
Cost to consumers	130	600	920	1,280	3,820	74,100

31. Under this option there is strong growth of PV to 2020 - under the central scenario deployment is estimated to grow to 7 to 8 million additional (post March 2012) installations by 2020. The lower capital and operating costs of PV over time are reflected in the falling resource costs.[7] After 2012 resource costs fall quickly, leading to a positive NPV for PV in the later years. However, over the policy lifetime, costs are still higher than benefits..

32. This option maintains the current Feed in Tariff regime, despite the lower resource costs. Thus subsidy costs also grow rapidly, with extremely high subsidy costs (the costs of the tariff) over the lifetime of the policy. This shows that under current tariffs the FIT scheme would be highly inefficient (with subsidy costs well in excess of resource costs), and give extremely high rents to recipients of the scheme.

[7] Resource cost are defined as the cost of generating PV in comparison with cost of fossil fuel generation (estimated by the wholesale price of electricity – using UEP October 2011).

(ii) Option 2: Introduce new tariffs from July 2010 with automatic degression and an energy efficiency requirement

33. The proposed tariffs set out in the Comprehensive review Phase I consultation document aimed to provide an approximate 5% real[8] rate of return for well located installations, the target return for FITs when the scheme started.[9] The one exception is the tariff for installations up to 4kW, the scale most commonly used for domestic PV installations. The proposed tariff for this band was intended to deliver an approximate 4.5% rate of return for a well located domestic PV installation. The Parsons Brinckerhoff (PB) study (2012), supplemented by anecdotal evidence and discussions with the industry, has confirmed that costs have come down faster than anticipated last October, and they are expected to continue to do so, meaning that actual returns from tariffs proposed in October 2011 are already higher than anticipated and are likely to continue increasing in view of likely continued cost reductions during 2012.

34. Given this evidence as well as our experience of the unanticipated huge surge leading up to mid-December and the impact this had on the LCF budget, the consultation document sets out proposals for a further reduction in tariffs in July 2012, followed by an additional 5% reduction in tariffs in October 2012, and degression of 10% every 6 months thereafter.

35. We have modelled the three potential options for tariffs from 1 July 2012, as proposed in the consultation document. In all cases, tariffs would be degressed by 5% in October 2012 and 10% every 6 months thereafter.

- **Option A** targets average rates of return under PB's central cost scenario of around 5 to 8%, with around 5% for domestic installations. This produces a tariff of **13.6p** for ≤4kW installations, which gives a return on investment (ROI) ranging from 0.5% under the "high" end of PB's predicted costs, and 10% if costs fall to the "low" end of their predicted range. This option would be our preference if deployment during March and April 2012 exceeds 200 MW.
- **Option B** reduces tariffs by around 25% from the 1 April levels by 1 July, and yields average ROIs of between 5-8% for most bands under PB's central cost scenario (it leads to modelled ROIs higher than 8% for the largest two bands). This produces a tariff of **15.7p** for ≤4kW installations, with a mid-range ROI of 6% (ranging from 1% to 11%). This option would be our preference if deployment during March and April 2012 is between 150 and 200 MW.
- **Option C** is based on a cut of around 21% from April. This produces a tariff of **16.5p** for ≤4kW installations, with a mid-range ROI of 6%. This option would be our preference if deployment during March and April 2012 is less than 150 MW.

36. Option B and C move away from the previous ROI approach given the wide distribution of costs, and the heterogeneity in the market. Instead, these options propose a tariff schedule that will continue to support PV as costs continue to fall whilst still aiming to ensure the scheme provides value for money and not providing excessive incentives.

[8] A real rate of return is one that takes account of inflation.

[9] The Impact Assessment supporting the introduction of the FITs scheme (published in February 2010) stated that, "PV tariff levels provide an approx 5% ROI given that PV is easier to deploy than other technologies and carries less risk to the investor since it is a tried and tested technology. In setting a 5% ROI for PV, the relatively high generation cost of PV (measured through a £/MWh cost-effectiveness metric) and the potential impact of this on overall scheme costs and hence energy bills has also been taken into account."

37. Table 13 below shows what the estimated ROIs would be for a typical domestic installation for the different tariff options under PB's low and high capex scenarios. The aggregator tariff will be a pro-rata percentage of these which reflects the cost advantage of its model. The November document reflected then that 80% was appropriate but we continue to gather evidence on this.

Table 13: Range of ROIs for low, medium and high capex assumptions from January 2012 PB assumptions for July 2012 proposed tariffs and July 2012 installation

		Option A		Option B		Option C	
Band		Tariff	ROI	Tariff	ROI	Tariff	ROI
<4kW	low	13.6	10%	15.7	11%	16.5	12%
	med	13.6	5%	15.7	6%	16.5	6%
	high	13.6	1%	15.7	1%	16.5	1%
4 - 10kW	low	10.9	10%	12.6	11%	13.2	11%
	med	10.9	5%	12.6	6%	13.2	6%
	high	10.9	1%	12.6	2%	13.2	2%
10 - 50kW	low	9.9	9%	11.4	10%	11.9	10%
	med	9.9	5%	11.4	6%	11.9	6%
	high	9.9	1%	11.4	2%	11.9	2%
50-150kW	low	7.7	10%	9.7	11%	10.1	12%
	med	7.7	7%	9.7	8%	10.1	9%
	high	7.7	3%	9.7	4%	10.1	4%
150-250kW	low	5.8	11%	8.0	14%	10.1	15%
	med	5.8	8%	8.0	10%	10.1	12%
	high	5.8	3%	8.0	4%	10.1	5%
250 - 5000kW	low	4.7	11%	6.8	13%	7.1	13%
	med	4.7	8%	6.8	10%	7.1	10%
	high	4.7	2%	6.8	4%	7.1	4%
Standalone	low	6.8	7%	6.8	8%	7.1	8%
	med	6.8	5%	6.8	5%	7.1	5%
	high	6.8	0%	6.8	0%	7.1	0%

Energy Efficiency Requirement

38. The Government response to the Phase 1 consultation sets out that to receive the standard tariffs, the building(s) to which a PV installation is attached or wired to provide electricity must meet an energy efficiency requirement set at EPC level 'D' or above should apply. The estimates of the impact of options 2 and 3 are assessed on the basis of this assumption.

39. The impact of introducing this requirement on deployment and costs is estimated on the same basis as in the Phase 1 impact assessment – namely, that demand will be dampened by 40% in 2012/13, 25% in 2013/14 and none in 2015/16. The dampening effect is assumed to fall steeply over this period reflecting the fact that level D is relatively easy to meet, and that FITs should encourage take-up of the required energy efficiency measures.

40. This IA only considers the costs of electricity generated under the FITs scheme. The additional costs of meeting the energy efficiency requirement e.g. cost of obtaining an EPC certificate (both in terms of time and money) are not considered here. In addition, we do not

quantify the benefits of any reduction in the variable administration costs of the FITs scheme linked to a change in solar PV uptake, or the benefits to households of reduced electricity bills and carbon savings through the installation of energy efficiency measures.

Option 2 : Cost Benefit Analysis and Deployment

41. Tables 14 and 15 below give the estimated impact on deployment from the different tariff options set out in Table 13 above, and from the proposed baseline tariff degression after July (5% in October and 10% every 6 months thereafter). Option A tariffs would be applied if PV deployment was in our high range, Option C tariffs correspond with low deployment, and Option B tariffs would be applied if deployment was in the mid range, These are therefore the starting points used in the analysis. The results show that, whilst Option A presents the lowest tariffs, they give the highest deployment because these would be applied should deployment reach the high level set out above. Similarly, Option C has the highest tariffs but is associated with the lowest take-up, and could represent a situation where deployment is lower either because costs are higher than we anticipate or that there are other barriers inhibiting take-up.

42. Estimates use the central cost projections from PB. Table 14 below gives total deployment from all installations under the 3 options, Table 15 gives the additional level of deployment estimated to occur after the 1st April 2012.

Table 14: Estimated *cumulative* PV deployment and generation for tariff Options A to C

	2011-12	2012-13	2013-14	2014-15	2020-21
Tariff Option A					
MW	1,400	1,950	2,900	4,500	24,000
GWh	360	1,500	2,200	3,400	19,000
Tariff Option B					
MW	1,300	1,800	2,700	4,300	22,000
GWh	300	1,400	2,000	3,100	18,000
Tariff Option C					
MW	1,100	1,600	2,400	3,800	20,000
GWh	340	1,200	1,800	2,800	16,000

Table 15 Estimated *additional* PV deployment from 1 April 2012 for tariff Options A to C

	2012-13	2013-14	2014-15
Tariff Option A			
MW	540	1,500	3,100
Installations	120,000	320,000	630,000
Tariff Option B			
MW	520	1,440	3,030
Installations	120,000	310,000	620,000
Tariff Option C			
MW	500	1,300	2,700
Installations	110,000	280,000	560,000

43. The difference in deployment levels between options is hard to interpret, since we are comparing the difference between an option with a lower tariff and a higher deployment rate

(option A) and an option with a higher tariff and a lower deployment rate (option C). Under option A the rate of increase in deployment is lower than in option C (65% in 2012/13, 55% 2013/14 and 45% in 2015/16 – compared to 70%/60%/50% under option C), but when applied to a higher overall level of deployment, the level of growth is higher.

44. The proposed tariffs have a significant impact on deployment compared to the no change scenario. Under option B, installations reach 3.3million in 2020 compared to 7.7million in the central no change scenario.

45. The tables below set out the cost-benefit analysis of options 1 to 3. All estimates in this table are in real, discounted terms. Annex A below give the costs also in nominal undiscounted terms – to compare against the LCF figures in table 5 above – both for all installations, and for installations post April 2012.

Table 15: Total Costs and Benefits Options A to C

(a) Option A

Financial Year (£m, 2011 prices, discounted to 2011)	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2020-21**	**Lifetime**
Resource costs	120	240	250	250	20	1,400
Value of Carbon Benefits	0	10	10	20	160	3,500
NPV Cost(-), benefit (+)	-120	-230	-240	-230	140	2,100
Cost to consumers	150	500	540	580	610	13,200

(b) Option B

Financial Year (£m, 2011 prices, discounted to 2011)	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2020-21**	**Lifetime**
Resource costs	110	220	230	230	40	1,600
Value of Carbon Benefits	0	10	10	20	150	3,300
NPV Cost(-), benefit (+)	-100	- 210	- 220	- 210	110	1,700
Cost to consumers	140	450	500	550	650	13,900

(a) Option C

Financial Year (£m, 2011 prices, discounted to 2011)	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2020-21**	**Lifetime**
Resource costs	90	190	200	220	50	1,700
Value of Carbon Benefits	0	10	10	20	130	2,800
NPV Cost(-), benefit (+)	-90	-190	-190	-200	90	1,100
Cost to consumers	140	420	470	530	640	13,800

46. Comparing the results in Tables (a) to (c) above illustrate the impact of the different tariff setting options on resource and subsidy costs. Clearly compared with the 'Do nothing' scenario, the Phase 2 tariffs proposals limit the costs of the FITs, improve the overall cost effectiveness (NPV), and reduce the excessive subsidy levels. These options have a positive NPV over the lifetime – as a result of assumed reductions in PV costs over time, and higher carbon benefits as the cost of carbon rises. The cost estimates in later years are extremely uncertain, given uncertainty over future costs; however it is clear that all the

options considered will considerably reduce the cost to consumers of new installations compared with the 'Do nothing' scenario.

47. A key uncertainty inherent in this analysis is how capital costs will develop over time. As shown above, under the central case assumptions, generation from PV becomes competitive with fossil fuel generation by 2020-21. However, under the PB high capex scenario this is not the case, and solar PV continues to have a net social cost over the lifetime of £5.7bn. In the lower capex case, there is a higher social benefit than the one presented above as costs continue to fall more steeply. These sensitivities are presented in Table 19 below.

Option 3: Apply further modifications to tariffs

48. Option 3 is a variant on options 2 a to c above. The option would be to set tariffs in line with table 13, degressing in the same way as under Option 2, but to pay the tariff for a 20 year period, rather than a 25 year period, as currently. The 5 years less tariff revenue would reduce the effective return on investment for PV. To illustrate the impact of changing to a 20 year tariff we have used Option B as an example. Table 16 below gives the difference in the rate of return for different lifetimes under Option B tariffs:

Table 16: Comparison of Rate of Return under a 25 year and 20 year lifetime

		25 year tariff	20 year tariff
Jul-2012 installation	Tariffs	ROI %	ROI %
<4kW	15.7	5.8%	5.2%
4 - 10kW	12.6	5.9%	5.4%
10 – 50kW	11.4	6.2%	5.7%
50 - 150kW	9.7	8.4%	8.0%
150 - 250kW	8.0	9.8%	9.5%
250 - 5000kW	6.8	9.7%	9.5%
Standalone	6.8	4.9%	4.7%

49. The costs and benefits for this option are set out in Table 17 below. It has only a small impact on PV deployment and therefore costs in the short term, but significantly reduces the lifetime costs to consumers, by around £400m and improves the cost effectiveness, increasing the NPV from £1.7bn to £1.9bn – as the impact of the reduced lifetime takes most effect over the long term.

Table 17: Costs and Benefits for Option B assuming a 20 year tariff lifetime

Financial Year (£m, 2011 prices, discounted to 2011)	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2020-21**	**Lifetime**
Resource costs	100	220	220	230	20	1,300
Value of Carbon Benefits	0	10	10	20	150	3,200
NPV	0	- 200	- 200	- 200	130	1,900
Cost to consumers	140	450	490	540	630	13,500
Deployment GWh	350	1,400	2,000	3,100	17,500	

50. The consultation is seeking views on whether the current level of export tariffs continue to reflect the real value of the exported electricity. Preliminary analysis suggests that the underlying value of the exported electricity to suppliers is greater than the current export tariff of 3.1p/kWh. If this is confirmed through further analysis the export tariff will be increased accordingly. Raising the export tariff would lead to a higher rate of return for generators, so the generation tariffs may be reduced proportionally to broadly maintain the rates of return. We are also proposing that any change in the level of export tariffs will apply only to new entrants to the FITs scheme, not to existing generators.

Risks and Assumptions

51. The estimates of costs and deployment above are based on a number of key assumptions: PV costs (based on estimates of PV costs from CEPA/Parsons Brinkerhoff[10]); DECC's energy price projections; and assumptions as to how fast the PV industry can grow, both to the end of March 2012, and beyond. PV uptake post April 2012 has used the FITs model, projections from which are based on PV costs and market growth assumptions from CEPA/Parsons Brinkerhoff[11] . It is assumed that the rates of growth seen in the period to 12 December 2011 (and potentially to end March 2012) were exceptionally high due to the announcement of the comprehensive review of tariffs in April, and that rates of growth post April 2012 will be slower reflecting the recalibration of tariffs to installation costs.

52. There is considerable uncertainty surrounding many of the underlying assumptions, given how quickly the PV market is changing at the moment – there is particular uncertainty around the costs PV. The analysis in Table 18, 18a and 19 shows how total costs of the policy change and cumulative deployment varies as underlying PV cost assumptions vary. The high and low capex scenarios below are modelled using the growth rates derived from the FITs model under high and low assumptions for future capital and operating costs (from PB Power's projections).

53. In all cases the sensitivities are run on option B tariffs degressing according to the automatic degression mechanism set out in the consultation document (5% in October 2012 and 10% every 6 months thereafter). The modelling illustrates the effect on deployment and scheme costs of the ROIs that would result from Option B tariffs under the different installation costs scenarios.

Table 18: Estimated cumulative total PV deployment (cumulative) for Option B tariffs, under different capex and opex assumptions

	2011-12	2012-13	2013-14	2014-15	2020-21
Option B – low capex, central deployment to end March					
MW	1,300	2,000	3,200	5,500	31,000
GWh	350	1,500	2,300	3,900	25,000
Option B – high capex, central deployment to end March					
MW	1,300	1,300	1,300	1,300	1,400
GWh	350	1,200	1,200	1,200	1,200

[10] **CEPA/PB, ibid**
[11] **CEPA/PB, ibid.**

Table 18a Estimated new PV deployment from March 2012 (cumulative) for Option B tariffs, under different capex and opex assumptions

	2012-13	2013-14	2014-15
Option B – low capex, central deployment to end March			
MW	700	2,000	4,200
Installations	190,000	480,000	990,000
Option B – high capex, central deployment to end March			
MW	40	70	80
Installations	10,000	20,000	20,000

Table 19: Sensitivity analysis of costs and benefits of Option B for Feed in Tariffs in July 2012

(a) Scheme costs associated with Option B tariffs, under high capex assumptions

Financial Year (£m, 2011 prices, discounted to 2011)	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2020-21**	**Lifetime**
Resource costs	170	340	330	320	260	6,000
Value of Carbon Benefits	0	10	10	10	10	300
NPV Cost(+), benefit (-)	-170	-330	-320	-310	-250	-5,700
Cost to consumers	140	430	420	410	340	7,600

(b) Costs associated with Options B, under low capex assumptions

Financial Year (£m, 2011 prices, discounted to 2011)	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2020-21**	**Lifetime**
Resource costs	70	130	120	80	- 680	-11,900
Value of Carbon Benefits	0	10	10	20	220	4,600
NPV Cost(+), benefit (-)	- 70	- 120	- 110	- 60	900	16,600
Cost to consumers	140	470	540	620	870	18,200

54. These results illustrate the large range of uncertainty behind the estimates above, with lifetime costs to consumers ranging between £7bn and £18bn. This is not the full extent of the range of uncertainty – but gives an illustration of how costs change according to different assumptions.

- There is considerable uncertainty surrounding PV costs and learning rates, and any changes to assumptions regarding PV cost trajectories will affect scheme costs significantly. If capital costs are higher than projected and tariffs are not changed, then PV will be achieving a lower RoI than expected, and growth of PV will be lower than expected. Therefore the cost to consumers will be lower. However the higher capex results in higher resource costs, so the NPV of the scheme is a ***net cost of £5.7bn***.
- If capital and operating costs are lower than expected, and that tariffs are not adjusted to reflect the lower costs, there will be strong uptake of PV, resulting in high costs to consumers. However, the lower capital costs will result in lower

resource costs – with resource costs being negative by 2020 (i.e solar PV is cost-effective against the fossil fuel alternative. The lifetime NPV under low capex is a ***net benefit of £16.6bn***.

55. The difference in results between the high and low capex sensitivities highlights the size of the uncertainty over the future uptake and costs of the scheme. The central scenario modelled in this Impact Assessment assumes significant cost reductions over time. If these are not realised, then even though less PV will be deployed, the resource costs will be higher and the net present value will be lower. We will need to monitor PV costs and deployment in order to assess the validity of these uncertain assumptions.

Summary – Comparison with a 'do nothing' scenario

56. Table 15 presents the total cost of the 3 policy options, showing total PV resource and subsidy costs as compared with not intervening in the electricity market and meeting electricity demands under fossil fuel generation. The table below compares these options against the costs of no change (current tariffs) in table 12 above. The High in the table is the option A, which is the option under a high deployment scenario , option B is the central, as it is the option under the central deployment scenario, similarly the low scenario in the table is option C, since that is based on the low deployment scenario. The final columns of the table compare these costs with the respective high medium and low 'no change' costs.

Table 20: Comparison of Option 1 and Option 2 (A) to (C)

Lifetime, (£m, 2011 prices, discounted to 2011	Option 1 – no change			Option 2			Option 2 compared to no change		
	High	Medium	Low	High (A)	Medium (B)	Low (C)	High (A)	Medium (B)	Low (C)
Resource Costs	7,600	6,200	5,200	1,400	1,600	1,700	-6,200	-4,700	-3,500
Carbon Benefits	7,000	5,700	4,800	3,500	3,300	2,800	-3,500	-2,400	-1,900
NPV Cost(+), benefit (-)	-600	-500	-400	2,100	1,700	1,100	2,700	2,200	1,600

57. The preferred option has a positive net present value (a net benefit) under each of the deployment scenarios. The preferred option is estimated to have a net benefit of around £2.2bn (real 2011 prices, discounted), compared to the do nothing option of no change to PV tariffs in the central case.

Other Issues

Contingent Degression

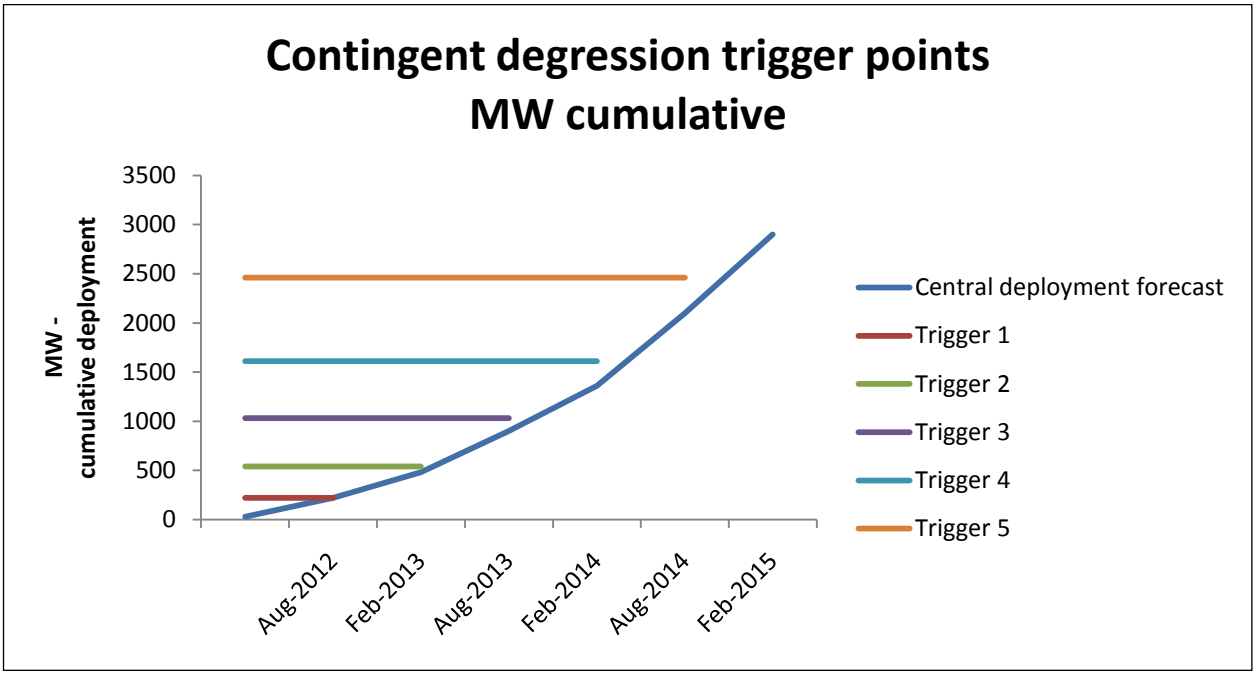
58. This consultation proposes that tariffs will automatically degress by a fixed percentage every 6 months. It is further proposed that a contingent degression mechanism is applied on top of this. Under this system, if a pre-announced level of deployment is exceeded (referred to as a trigger point), the automatic tariff degression will be brought forwards. The reference date for new installations to receive the degressed tariff will be 2 months after the trigger point is reached.

59. Trigger points will be set relative to the central deployment scenario. It is proposed that the trigger points should be set at 25% above the central scenario under automatic degression. Table 21 below sets out the central deployment scenario and the trigger points under the proposed system.

Table 21: Central Deployment and illustrative Trigger Points

Cumulative MW	Trigger 1	Trigger 2	Trigger 3	Trigger 4	Trigger 5
Central deployment	170	430	830	1,280	1,970
Contingent trigger point	220	540	1,000	1,600	2,460

Chart 4: Contingent degression trigger points MW cumulative



60. Each time a contingent trigger point is reached, another tariff degression will occur. A second triggered degression may occur in the 2 month window between a first degression being triggered and the reference date to which this degression will apply.

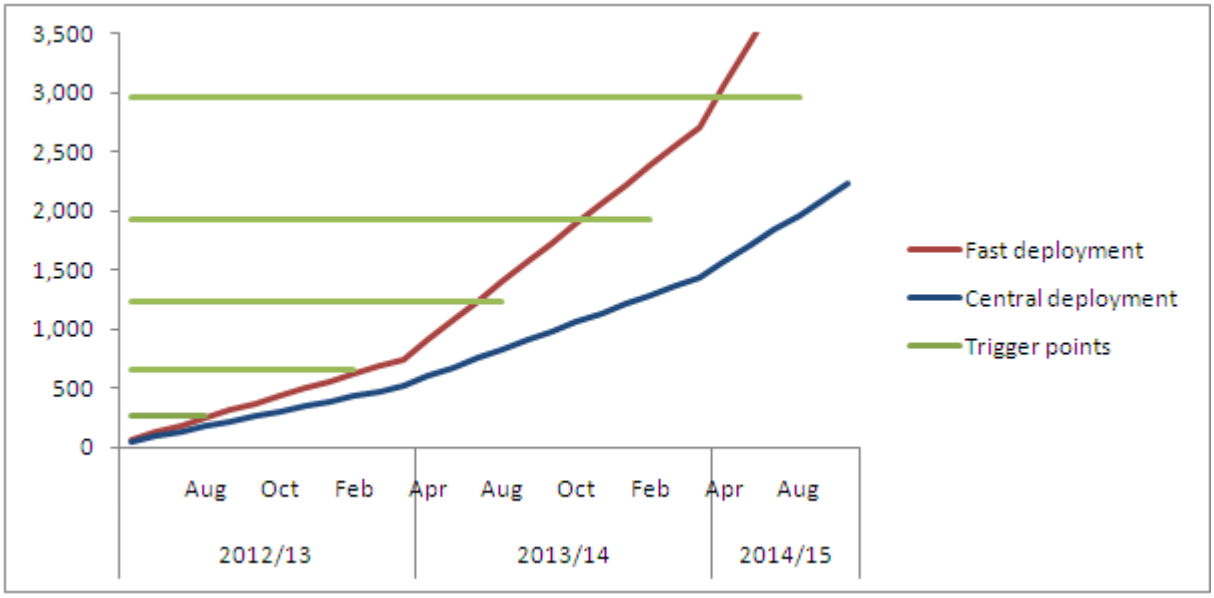
61. The system will help to control tariffs and rates of return in the future in a transparent and predictable way, in the event that installation costs reduce or deployment increases faster than modelled. It will help to prevent excessively high rates of return being offered if installation costs were to dramatically fall again in the future, and limit the resulting impact on energy bills.

62. It is not possible to estimate expected savings from the introduction of a contingent degression mechanism as by design it only comes in to effect if deployment exceeds the central deployment forecast. Therefore, it is only possible to discuss potential savings under illustrative higher deployment scenarios.

63. A contingent degression mechanism will lead to both *static* and *behavioural* potential cost savings. The earlier application of lower tariffs as a result of reaching a trigger will lead to lower subsidy costs for each installation ('static'), and also lower levels of deployment ('behavioural') due to less attractive returns than would otherwise be the case.

64. The analysis below outlines the effect on tariffs and *static* costs only under an illustrative higher deployment scenario – that is, it assumes that earlier degression has no impact on deployment levels.

Chart 5: Chart to show fast deployment vs central deployment and trigger points



65. In the chart above, the blue line shows cumulative deployment in the central case. The green line shows the trigger points 25% above this deployment level. The red line is an illustrative 'fast' deployment scenario. At each point that the red line crosses a green line, a trigger is reached. The first trigger is reached in July 2013, at 1,400MW, a contingent degression takes place in September 2013, 1 month before the automatic degression in October. Further triggers are then reached in November 2013 and April 2014.
66. In this static case, cost savings from lower tariffs alone are expected to be around £40m in 2014/15.

67. Deployment levels are likely to respond to lower levels of tariffs. This would lead to lower levels of deployment and greater cost savings.

Further costs and benefit considerations for solar PV

68. In view of high potential cost impact of solar PV and the associated risk that this could absorb a high proportion of funding from the FITs scheme as a whole, it is important to consider whether there are wider policy justifications for including support for these installations in the FITs scheme. The FITs scheme is designed to promote take up of small-scale low-carbon electricity technologies by the public and communities as part of a portfolio approach to meeting the UK's renewable energy target that must be affordable in the context of the control framework for DECC levy-funded spending and provide value for money to consumers.

69. The FITs scheme is also intended to contribute to other low carbon goals. These wider aims are central considerations in justifying any level of subsidy that is above the cost per unit of energy generated considered necessary to meet the renewable energy target cost-effectively. These objectives are:

    a) Use decentralised energy to empower people and give them a direct stake in the transition to a low-carbon economy;

    b) Help develop a supply chain that offers households a wide range of cost effective measures to lower their energy use and carbon emissions;

    c) Assist in public take-up of carbon reduction measures, particularly measures to improve the energy efficiency of buildings

70. In relation to a) engagement with energy generation could lead to behaviour change by individuals and communities in relation to energy use which will further reduce carbon emissions in addition to the reductions brought about by installing PV.

71. With respect.to b), by allowing future solar PV uptake at an affordable level, while still providing attractive rates of return in the current investment climate, FITs will ensure that businesses installing domestic solar PV remain viable at a time when there is spare capacity in the economy which cannot readily be redeployed.

72. In relation to c) by making the higher FITs tariff conditional on an energy efficiency requirement could incentivise households to take up energy efficiency measures sooner than they would otherwise have done so, which will lead to greater levels of cost-effective emissions reductions.

Wider Impacts

Equality Assessment

73. The policy proposals have been screened for equality impacts. We consider that a decision on the options would not have a positive or negative effect on any particular protected characteristic. (or “equality strand”). We have therefore not undertaken a detailed Equality Impact Assessment.

Environmental Impacts

74. Under the central growth scenario, the ‘no change’ scenario is expected to deliver 195MtC02 savings over the lifetime of the measure. Under ‘option 2B’ this falls to 110MtCO2. Therefore the net impact of the measure is to lead to an additional 85MtC02 over the policy lifetime. However, carbon saved under the FIT scheme is in the traded sector and is capped by the EUETS.

75. Linking the Feed in tariff for solar PV with an energy efficiency commitment could encourage households to take up more energy efficiency measures, with associated carbon savings. The estimates of overall impact in this assessment do not quantify the benefits of any increase energy efficiency due to the scheme, as this is too uncertain to model accurately.

Sustainable Development

76. The Feed in Tariff is aimed at increasing the deployment of small-scale renewable electricity generation in order to move the UK away from fossil fuel dependency towards a low carbon economy in preparation for a future when supplies of gas and oil will become tighter and more expensive. The option presented here could have a negative impact on sustainable development because it leads to lower deployment than under a 'no change' option.

Distributional Impacts

77. Changing the level of the feed in tariff affects the overall subsidy levels needed to support generation, and hence the cost of that support to consumers through the electricity bill. Tables 15 above gives the subsidy costs of the different options A to C, and Table 12 gives the subsidy costs of the no change option. Tables 22 and 23 below gives the estimate of the impact on domestic and non domestic electricity bills of the cost of solar PV Feed-in Tariffs, under the no change option, and under options 2A to 2C under central deployment scenarios, based on the subsidy costs above. These impacts have been measured against a 'no feed in tariff scenario'.

78. Under the no change option, the cost to domestic bills of solar PV would have been around £25 p.a. in 2015, and £60 p.a. in 2020 (2010 prices, undiscounted). Option 2B would reduce this cost by around 80%, equivalent to £20 in 2015 and £50 in 2020.

Table 22a: Estimated Impact on average Domestic Consumer Bills (central scenario)

Impact on average domestic bill	Do Nothing		Option A		Option B		Option C	
	£/yr	%	£/yr	%	£/yr	%	£/yr	%
2011	**2**	0.3%	**2**	0.3%	**2**	0.3%	**2**	0.3%
2012	**8**	1.3%	**5**	0.8%	**5**	0.8%	**5**	0.8%
2013	**14**	2.2%	**6**	1.0%	**6**	1.0%	**6**	1.0%
2014	**20**	3.3%	**6**	1.1%	**7**	1.1%	**7**	1.2%
2015	**26**	4.4%	**7**	1.1%	**7**	1.3%	**8**	1.3%
2016	**32**	5.6%	**7**	1.2%	**8**	1.4%	**8**	1.4%
2017	**39**	6.9%	**7**	1.2%	**8**	1.5%	**9**	1.5%
2018	**46**	8.6%	**7**	1.3%	**8**	1.6%	**9**	1.7%
2019	**54**	9.9%	**7**	1.3%	**8**	1.6%	**9**	1.7%
2020	**61**	11.3%	**7**	1.2%	**8**	1.5%	**9**	1.6%

Note: £/year impacts in 2010 prices, undiscounted.

Table 22b: Estimated Impact on average Non-Domestic Bills* (central scenario)

Impact on average non domestic bill	Do Nothing		Option A		Option B		Option C	
	£/yr	%	£/yr	%	£/yr	%	£/yr	%
2011	**5,000**	0.4%	**5,000**	0.4%	**5,000**	0.4%	**5,000**	0.4%
2012	**21,000**	1.5%	**13,000**	0.9%	**13,000**	0.9%	**13,000**	1.0%
2013	**38,000**	2.7%	**17,000**	1.2%	**17,000**	1.2%	**17,000**	1.2%
2014	**56,000**	3.9%	**18,000**	1.3%	**19,000**	1.4%	**20,000**	1.4%
2015	**76,000**	5.4%	**20,000**	1.4%	**22,000**	1.5%	**23,000**	1.6%
2016	**98,000**	6.8%	**21,000**	1.5%	**24,000**	1.7%	**25,000**	1.7%
2017	**121,000**	8.4%	**22,000**	1.5%	**26,000**	1.8%	**27,000**	1.9%
2018	**146,000**	10.3%	**22,000**	1.6%	**27,000**	1.9%	**28,000**	2.0%
2019	**173,000**	12.0%	**22,000**	1.5%	**27,000**	1.9%	**29,000**	2.0%
2020	**202,000**	13.6%	**22,000**	1.5%	**27,000**	1.8%	**29,000**	2.0%

*Typical Non-domestic user is assumed to be consuming 11,000MWh before efficiency savings in each year to 2020.
Note: £/year impacts in 2010 prices, undiscounted.

Economic Impacts

79. The Feed in Tariffs scheme has created business and job opportunities in green sectors of the economy (although the impact on net jobs across the economy is unclear). Estimates of the scale of this impact in the future are uncertain because they depend on factors such as how many installations will come forward, installation times and how many associated supply chain jobs are created. In addition, there is a range of methodologies that can and are being used to provide an indication of current solar PV jobs, which lead to various different estimates of jobs. For example, some estimates count any people doing any solar related tasks irrespective of whether this is the main part of their jobs, whilst others use different assumptions on the extent and depth of supply chain activities included.

80. The methodology adopted by DECC is set out in detail at Annex A. This methodology converts the length of time associated with different solar PV tasks to a full-time equivalent basis (FTE). The resulting estimates from this methodology for the tariff option 2B above are shown below. In order to compare the estimates for 2012/13 to 2014/15 we have used the actual deployment for 2011 to estimate the relevant number of FTE jobs using the same methodology.

Table 23: Estimated FTE jobs associated with solar PV for new installations projected between 2012/13 and 2014/15.

	Calendar year 2011	2012/13	2013/14	2014/15	2012-2014
New installations between 2012-2014	205,000	120,000	190,000	310,000	620,000
FTE jobs for all installations between 2012-2014	15,000	10,000	15,000	20-25,000	40,000-50,000

Micro business exemption

81. Feed in tariffs provide subsidy for small scale low carbon electricity generation, and therefore do not count as regulation. The micro-business exemption does not apply.

Annex A - Assessment of PV subsidy costs against Budgets

The table below shows the DECC budget for all FIT technologies

Table 19: FITs budget,

Costs to consumers, £m, nominal undiscounted	2011/12	2012/13	2013/14	2014/15	Total
FITs budget[12]	94	196	328	446	1064

Cost projections against the FITs budget

The FITs budget is presented in nominal, undiscounted terms, and is for all eligible technologies, not just for solar PV. Therefore, we have included estimates for non-PV technologies in the tables below in order to be able to compare against the above table. Estimates for non-PV technologies are taken from the non-PV Phase 2 IA.

Option 1: Do Nothing

Table 20: Do Nothing costs to consumers versus FITs budget for 'Do nothing', central scenario

£m nominal undiscounted	2011/12	2012/13	2013/14	2014/15	Total
FITs budget	90	200	330	450	1,060
Do Nothing costs, central					
PV committed	140	580	600	620	1,940
PV additional	0	250	780	1,440	2,470
PV total	140	830	1,390	2,060	4,420
Non-PV committed	30	40	40	40	150
Non-PV additional	0	10	30	60	110
Non-PV total	30	50	80	100	260
Total 'Do nothing' costs	170	880	1,460	2,160	4,670
Surplus (+) or Deficit (-) against FITs budget	-70	-680	-1,130	-1,720	-3,610

[12] Note this was adjusted from the original published figures to take account of small scale installations that are more likely to come forward under FITs than the RO

Option 2B

Table 22: Costs to consumers versus FITs budget for Option 2B.

Costs to consumers, £m, nominal undiscounted	**2011/12**	**2012/13**	**2013/14**	**2014/15**	**Total**
FITs budget	90	200	330	450	1,060
Option B central					
PV committed	140	450	470	490	1,550
PV additional	0	40	110	200	350
PV total	140	490	580	690	1,900
Non-PV committed	30	40	40	40	150
Non-PV additional	0	10	30	60	110
Non-PV total	30	50	80	100	260
Total	170	540	660	790	2,160
FITs budget (revised) - total	-80	-350	-330	-340	-1,090

Annex B: Methodology in estimating job numbers associated with solar PV installations

It is difficult to accurately estimate, and forecast, numbers of jobs associated with any single technology or sector, such as Solar PV. However, there are a range of methodologies that can, and are, being used to provide an indication, although these inevitably lead to a range of estimates being calculated.

The key differences between the numbers quoted by DECC and other estimates lie within the breadth of the definition and the extent of the depth of the supply chain activities covered, as well as the methodology used.

DECC Estimates

DECC estimates are based on the number of solar PV installations projected in a given period and applying estimates of the time taken for various tasks associated with those installations from industry and independent consultants. They are then converted to a full-time equivalent (FTE) basis. Other estimates such as quoted by BIS have been commissioned from independent consultants, K-Matrix.[13] and those from industry sources, measure employment through all aspects of the supply chain, and is likely to cover a significantly wider range of tasks than those in the DECC estimates. They also estimate people in jobs as reported by the companies, who may have a mixture of full and part-time jobs, and would therefore give a higher estimate than DECC.

Are these gross or net jobs?

These are gross estimates expected to result from FITs incentivising take-up of solar. We also do not take account of potential jobs lost elsewhere in the economy due to substitution of solar power for other forms of power. Because we apply jobs estimates to the projected number of installations, the jobs relate to those installations over a given period of time.

Are they new jobs?

We can't be sure these are new jobs, as a residual amount of uptake could be expected without FITs, particularly as costs come down. Also, these jobs could be undertaken by people already working in the sector, and either reflect that they now are in work longer than they would have been without FITS or, if they are working part-time on solar, it could reflect a greater proportion of their time now spent on FITs.

How certain are they?

The jobs estimates are subject to a great deal of uncertainty. They use estimates from industry on the number of person days needed to install and maintain PV installations, then in some cases adding in jobs through the rest of the supply chain. They are then applied to the trajectory of new installations we expect in a given period. This is subject to a lot of uncertainty because of: uncertainty over take-up and how individuals will respond to the new tariff levels; the impact of the energy efficiency requirement, and how future costs will develop in the future.

[13] http://www.bis.gov.uk/policies/business-sectors/low-carbon-business-opportunities/market-intelligence/market-data

How are the estimates calculated?

The first step is to estimate the number of installations likely to come forward. The consultation document for this IA sets out 3 different tariff proposals, each associated with a different projection of new installations between 2012/13 and 2014/15. These are given in Table 15 above. The estimate for the central option B is 620,000.

We then apply an estimate of the number of man-days to complete an installation. These estimates are based on discussions with industry and solar representatives, although there could be higher or lower estimates depending on which source is used. We then add estimates of related tasks associated with these installations – for example maintenance, administration, project management, finance etc and, because these are uncertain, a range is used. We only have estimates with respect to domestic installations – larger installations will take longer but we have no evidence to base an estimate of these, therefore we have applied the estimates below across all scales.

We might expect that over time, that industry would learn from doing and improve the time involved in these installations. However, we do not have a good basis for estimating this potential improvement in productivity so our man-day estimates are assumed to be constant.

The table below sets out the steps involved:

Table 23: Range of estimates for jobs per PV installation

	Low	High
Installer days per installation	3	4
Maintenance and Indirect supply chain jobs per installation	12.5	13.4
Convert to FTE: divide by 226	226 working days per year	
FTE jobs/installation	0.07	0.08

Applying this range of 0.07 to 0.08 FTE to our estimate of installations gives the following estimates of FTE jobs from the tariff proposals set out under Option 2B above.

Table 24: Estimated FTE jobs associated with solar PV for new installations projected between 2012/13 and 2014/15.

	Calendar year 2011	2012/13	2013/14	2014/15	Total 2012-2014
New installations between 2012-2014	205,000	120,000	190,000	310,000	620,000
FTE jobs for all installations between 2012-2014	15,000	10,000	15,000	20-25,000	40,000-50,000