Report to Housing Scrutiny Panel

Date of meeting: 25th October 2011

Portfolio: Housing – Cllr M. McEwen

Subject: Solar PV to Council Housing

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Recommendations:

That the Housing Scrutiny Panel reports to the Cabinet on the proposed approach to a programme for the installation of Solar PV in a similar form to this report, with any amendments agreed by the Scrutiny Panel, and considers whether to make the following recommendations to the Cabinet and/or any other recommendations:

1. **That the Council agrees in principle to the installation of Solar PV for its housing stock;**

2. **That any future Solar PV programme be based on the following mix:**

    a. **Sheltered accommodation blocks, to be fully funded by the Council with any free electricity being generated used to power communal services, and the Council to receive the "Feed In Tariff"**

    b. **Flat blocks and maisonettes, to be installed by third party companies with their own private finance based on a "Rent a Roof" scheme, with the landlord's communal services as well as individual residents benefiting from free electricity generated; and**

    c. **That houses and bungalows , to be installed by third party companies with their own private finance based on a "Rent a Roof" scheme, with individual residents benefiting from free electricity generated, subject to the tenants requesting the installation following a promotion scheme.**

3. **That the Capital Strategy, Housing Capital Programme and the HRA Financial Plan take into account the £2.25m funding needs for the installation of Solar PV;**

4. **That any income from the "Rent a Roof" scheme be used to top up the energy efficiency programme for the benefit of those properties that are not suitable for Solar PV;**

5. **That a further report be considered by the Cabinet on the proposed detailed arrangements for the Rent a Roof scheme including the selection of the provider.**

Executive Summary:

The Government, as part of a wider commitment to encourage more building owners to make use of alternative renewable energy, have introduced a grant known as the "Feed-In Tariff", which is fixed for 25 years (index linked), to help offset the high one-off capital cost of installing Solar PV to generate electricity. Any electricity that is generated is then free to use, and any unused electricity can then be exported, making up the three strands of the financial benefit to installing Solar PV.

There are a number of factors that have an effect on the benefits of Solar PV, including orientation of the roof in relation to the sun, roof area and the lifestyle of those living in the properties (i.e. those using electricity during the day). This report explores these opportunities as well as the funding options.

Reasons for Proposed Decision:

To help offset high (and rising) costs of electricity for residents, particularly those that are in Fuel Poverty, and at the same time, generate a revenue based income for the Council to recycle back into improving the energy efficiency of those homes that cannot benefit from Solar PV

Other Options for Action:

(1) Not to install Solar PV to any of the Council's housing stock.
(2) To install Solar PV to all of the Council's housing stock (where suitable) based on private finance, whereby residents benefit from free electricity and the Council to benefit only from a roof rental.
(3) To install Solar PV to all of the Council's housing stock (where suitable) based on self financing at a cost of around £50m, whereby residents benefit from free electricity and the Council benefit from the Feed-in Tariff, estimated to provide a return of £155m over the 25-year life of the Feed-in Tariff scheme (based on current FIT rates).
(4) To install Solar PV to all of the Council's housing stock, either through self finance or private finance. However, not allowing residents to benefit from any free electricity, but to export all of the electricity and claim it for the Council's benefit.

Introduction and Background

1. The Climate Change Act 2008 has been established as a long-term national framework to tackle climate change. The Act aims to reduce carbon emissions of at least 34% by 2020 and at least 80% by 2050 (based on 1990 emission levels), with local authorities and housing associations seen as having a vital role to play in reducing carbon dioxide (CO^2) emissions.

2. Reducing carbon emissions is inextricably linked to a reduction in energy consumption and consequently a reduction in individuals' energy costs. According to Government statistics, one in six people are currently believed to be in fuel poverty. This, in time, will only increase, as according to USwitch, energy prices are likely to increase 4-fold by 2020.

3. One way of tackling the rise in energy costs is to generate free to use electricity, using renewable energy, such as harnessing energy generated by the sun, through Solar Photovoltaic (Solar PV) panels fixed to roofs. However this is relatively new technology, and therefore at the moment the cost of equipment and materials is still quite high and qualified installers are relatively small in number.

4. In order to offset this premium, and in order to encourage the use of renewable technology, the Government have introduced a grant linked directly to the amount of electricity that is generated. This grant is payable through a scheme known as the "Feed-in Tariff" or FIT.

Feed-In Tariff

5. The FIT is available to anyone that owns a renewable electricity system and is payable for every kilowatt hour that is generated. That means individual households, businesses and, indeed, virtually any property owner is eligible for the FIT.

6. The FIT is based on a sliding scale that began in 2010 and runs over an 11 year period, which is intended to reflect the expected costs associated with the design, materials and installation. The table below illustrates the current FIT over that 11-year period, with the rate being applied at the time the installation is commissioned and registered, not at the point the contract is drawn up. The first line represents smaller individual installations, whereas the second line represents slightly larger installations, which may be applicable on the sheltered accommodation blocks

	Rates equate to "Pence per kW/hr". The rates have been taken from the current Feed In Tariff table dated August 2011.										
Description	2010/11	11/12	12/13	13/14	14/15	14/16	16/17	17/18	18/19	19/20	20/21
Solar Photovoltaic with a total installed capacity of 4kW or less, where attached to or wired to provide electricity to a building that is already occupied	43.3	43.3	39.6	36.3	33.2	30.2	27.5	25.0	22.7	20.7	18.8
Solar Photovoltaic (other than stand-alone) with a total installed capacity greater than 4kW but not exceeding 10kW	37.8	37.8	34.6	31.6	29.0	26.4	24.0	21.8	19.9	18.1	16.4

7. Since this is relatively new technology, and the availability of materials and the pool of qualified installers is relatively small, the initial capital cost of installing a solar PV system is high. However, over time, as more installers become qualified and materials are more readily available, there will be more competition and therefore costs will reduce. This is reflected in the amount of FIT that is payable to the system owner over time, which is illustrated in the table above extracted from appendix A.

8. Whilst the FIT will reduce over time, the rate is applicable at the time the system is installed and registered, and that rate is locked for a 25-year period, but then index-linked to RPI.

9. The intention is that these tariffs should cover the initial capital cost of installation and, according to the Government, earn a return to the system owner up to 8% p.a. In practice that means the Council should earn back the initial capital cost at least two to three times over the duration of the 25-year tariff if the Council was to fund the full cost of the installation itself.

10. This approach fits well with the current Capital Strategy, which encourages capital expenditure where it draws a revenue income.

11. As can be seen from the table above, the current tariff is 43.3p/kWhr. However, the current published FIT levels tails off in future years. Whatever rate is available at the time of installation and the system being registered is fixed for the 25-year term. The table above is an extract of the full table, which can be found at appendix A. These

are currently under review by the Government and may change.

12. The electricity that is generated is then free to use by the occupiers of the property. However, a solar PV system does not store electricity, so any electricity generated that is not used is exported back into the National "Grid" for which an additional 3p/kWhr is earned. Therefore, there are three strands of income:

    a. The Feed-in Tariff for every kilowatt hour that is generated, whether it is then used or not;
    b. The export rate for every kilowatt hour that is put back into the grid; and
    c. The reduced cost of the occupants electricity bill as a result of the "free" electricity that is generated and used, rather than purchasing it from the Grid.

Orientation & Suitability

13. The orientation of a building is an important factor when considering the merits of Solar PV, as not all buildings are suitable. In addition, roof size, roof shape, and shading from adjacent buildings and trees are an important factor when considering suitability.

14. Since Solar PV relies on direct sunlight to generate electricity, a south facing roof will clearly be the most efficient, since it will soak-up more direct sunlight and therefore generate the most electricity. East and west facing roofs will be slightly less efficient, since the movement of the sun during the day will limit the times when the solar panels will be facing the sun and therefore generate less electricity for use (or export) and consequently a lower amount of income from the FIT, ultimately resulting in a longer pay-back period.

15. Another factor that is important to take into account is the economy of scale relating to an installation. Each installed system will require an access scaffold for the safe installation of the solar panels on the roof. In addition, each installed system will require a set of equipment, meters and controls. This is irrespective of the number of solar panels that are to be installed. Therefore, the greater the roof space, the greater the number of solar panels. With only one set of equipment, meter and controls needed, installation on large roof spaces will be far more cost effective as not only will the installation cost be proportionally lower, but over time more electricity will be generated and consequently the pay-back period will be much quicker.

16. Since the electricity that is generated is free to use, but cannot be stored, should the Council decide to allow tenants to make use of the free electricity, those that are at home during the day would benefit the most. This would need to be taken into account when considering the property types that the Council may wish to install Solar PV systems.

Procurement Options

17. As explained above, the FIT is only available to the owner of the Solar PV installation, which does not necessarily have to be the building owner. This opens up a number of procurement options as follows:

    a. The Council pays for, and therefore owns, the installation outright;
    b. A third party installs the systems onto the roofs of Council properties and "rents" the roof space, meaning the Council does not have to pay for the installation, but neither does it own the installation or receive the FIT; or
    c. A shared arrangement whereby the Council and a third party jointly fund, and therefore jointly own, the systems installed onto the roofs of Council properties.

Outright Purchase

18. Should the Council fund the entire installation, then the Council will benefit from 100% of the FIT. Any electricity that is generated is then available for use free of charge, either by the tenant / leaseholder or the Council (such as for communal supplies i.e. lighting) or the Council may wish to export all of the electricity generated to maximise its income.

19. The main drawback to this option is the relatively high capital outlay for the installation in the first instance, along with the ongoing maintenance liability. However, the benefit is the opportunity of generating a guaranteed revenue income over the 25-year life of the FIT contract period, which should earn back much more than the initial installation cost.

Third Party Installation

20. This option is more commonly known as a "Rent-a-Roof", as private companies are willing to install solar PV systems on property owners' roofs for free, pay a rental to the property owner for the opportunity of using their roof to install Solar panels and allow the property owner to use the free electricity generated. However, the FIT is payable to the owner of the solar PV system and not the property owner.

21. This option means that the Council will not have to make available any capital outlay to pay for the installation, but tenants or the Council could still benefit from free electricity, albeit without the longer term revenue income opportunity.

Joint Ownership

22. A joint ownership scheme is a combination of each of the two options above, with the costs, risks and benefits shared equally or proportionally according to each party's investment.

23. A joint ownership scheme would mean the Council would not have to fund the whole capital outlay for the initial installation, and would still benefit from some of the revenue income over the 25-year life of the FIT contract period.

Other factors

24. "Right to Buy" sales where Solar PV may be installed will need to be taken into account, as will leaseholders' liabilities towards future maintenance of roofs, which may have higher maintenance costs in the future as a result of the solar panels installed on the roof.

25. Another consideration is the possibility of planning permission and Building Regulation Approval being required, particularly where properties are within a Conservation Area or are Listed.

26. Not everyone likes the aesthetic appearance of solar panels on roofs. If the Council was to proceed with an installation programme, it may be appropriate to consult tenants and leaseholders on the option of whether they would like to benefit from a Solar PV installation or not.

Initial Feasibility Study

27. The Council has commissioned Climate Consultancy Ltd to undertake an initial feasibility study into the opportunities available to the Council in relation to Solar PV.

The Executive Summary of that report can be found at appendix B. The following are headlines from that report:

a. Of the 6,500 Council dwellings, around 5,250 properties could benefit from Solar PV. In percentage terms, around 19% of all Council properties would not benefit from some free electricity (the other 81% could benefit from some free electricity).
b. If all 5,250 properties were to have Solar PV, the capital outlay needed to install the systems would be in the region of £50 million.
c. If all 5,250 properties were to have Solar PV, collectively over 10,500 MWhr of electricity could be generated, which over a 25-year period (at the current level of FIT) could qualify for £155 million in FIT, based on the current rates (representing a pay back of around 3 times the initial capital outlay for the installation costs)
d. In addition to the FIT, £26 million worth of free electricity could be generated, and could be available for use either by the tenants and leaseholders or the Council.
e. If the Council was to allow the tenants and leaseholders to use the free electricity generated, and rely only on the FIT and the export of unused electricity, then the pay-back period for the initial capital outlay is estimated to be around 9-years.
f. The rate of return is greater for flats and maisonettes, than for houses or bungalows due to the larger roof areas.

Option Appraisal

28. Taking into account the above factors, should the Council wish to proceed with the principle of installing Solar PV on its housing stock, the Council would first have to consider whether to install systems our self, allow a third party to install or jointly fund installations. Then the Council would have to consider;

    a. Which property types to install Solar PV and in what priority order;
    b. Who should benefit from the free electricity that is generated (Council or occupants);

29. Taking into account these two latter considerations, below are the four main groups of properties that make up the Council's housing stock:

30. *Sheltered Accommodation* – The sheltered accommodation blocks generally have larger uninterrupted roofs, which could benefit from a greater number of solar panels and therefore generate a greater amount of electricity. These blocks are generally occupied throughout the day, therefore electricity is being consumed at the time it is being generated. This could maximise the use of the free electricity.

31. At sheltered accommodation sites, in addition to the individual tenants, the Council itself is also using a lot of electricity to power essential communal services such as the communal lighting, emergency lighting, heating, hot water, fire alarms, security locks on the main entrances, CCTV and lifts. The amount of electricity generated would not be sufficient to power all of these elements. However, it could contribute towards the running costs, and therefore reduce the Council's energy bills. This would then be reflected in a lower Service Charge paid by each of the residents. There are also no leaseholders in sheltered accommodation.

32. *Flat Blocks and Maisonettes* – Like sheltered accommodation, flat blocks and maisonettes generally have larger uninterrupted roofs than houses, which could benefit from a greater number of solar panels and therefore generate a greater amount of electricity. Unlike sheltered accommodation, these properties are not

necessarily occupied during the day, and the Council does not generally provide as many communal services that require electricity. It is possible that a surplus of electricity generated would be available once items such as communal lighting and door entry security are taken into account. This surplus could either be exported, or made available to the individual occupiers to reduce their electricity bills. The latter would mean a higher installation cost at the outset, as each individual property would need to have its own set of panels, equipment, controls and meter.

33. It would also be necessary to consider the interests of leaseholders when deciding on whether to install Solar PV on flat blocks.

34. *Houses and Bungalows* – As with flat blocks and maisonettes, these are not necessarily occupied during the day. However, the smaller roof areas and the individual nature of each installation would mean higher initial installation costs per kWhr of electricity generated. Since this category of property is constrained in terms of electricity use, the Council would not benefit from any reduced energy consumption. However, tenants would, particularly those at home during the day.

35. *Rural Communities* – Properties located within the rural communities are a specific group of properties that should be considered separately. According to Government statistics, residents living in rural communities are 29% more likely to fall into fuel poverty, mainly due to the lack of mains gas servicing these parts of the district. In addition, properties located outside of built-up areas tend to be more exposed, requiring more energy to heat them. In recognition of this, the Council's Repairs and Maintenance Business Plan and its Housing Energy Efficiency Strategy both identify this group of properties to be the focus of any developments in renewable energy opportunities. In the main, properties within rural communities tend to be either houses or bungalows.

<u>Proposed Way Forward</u>

36. It is clear that those properties that will benefit the most are those with the largest roof area, that are orientated south and where electricity is being consumed during the day as well as in the evening. On that basis, installing a Solar PV system onto sheltered housing blocks will have the greatest benefit and see the greatest return. It is therefore recommended that the Council installs Solar PV itself to all suitable sheltered housing blocks, receives the FIT and uses any electricity that is generated to power the communal services, thereby reducing service charges for residents.

37. The funding for such an installation programme, estimated to be in the region of £2.25m based on the initial feasibility study undertaken by Climate Consulting Ltd, will need to be taken into account as part of the Council's Capital Strategy and Housing Capital Programme. It would also need to be taken into account within the Council's HRA Business Plan.

38. Whilst flat blocks and maisonettes have larger roof areas and therefore would generate the largest amount of electricity, these blocks have a mixture of tenure type, with leaseholders potentially benefiting from the installations and having an interest in the long-term maintenance costs of their block. With only a small amount of electricity to power the communal services it is suggested that any financial benefit of Solar PV should be split equally between the individual residents and the Council, so that everyone can benefit from the electricity generated. In order to finance this category of installation, where all leaseholders are in favour (similar to the criteria for installing a door entry system), it is recommended that flat and maisonette blocks benefit from a "Rent a Roof" scheme, where the installations are provided and maintained by the system owner and the Council receives an income from the roof rental.

39. Similar to the flat and maisonette blocks, it is recommended that individual houses and bungalows also benefit from a “Rent a Roof” scheme, where the installations are provided and maintained by the system owner, tenants benefit from the free electricity and the Council receives an income from the roof rental. Since some residents may not like to have Solar PV panels installed on their roof, this scheme could be on a request basis.

40. A report will be presented to the Cabinet at a future date, with more detailed arrangements for a “Rent a Roof” scheme.

41. Clearly, some properties are not suitable for Solar PV for a variety of reasons, which means the tenants of those properties will not benefit from the free electricity. Therefore, it is recommended that in principle, any income generated from the “Rent a Roof” scheme be set aside and re-invested for energy efficiency measures for those properties that cannot benefit from Solar PV.

42. It should be emphasised that the FIT rate payable is set at the point the installation is commissioned and registered. As can be seen from the sliding scale in the FIT tariff at appendix A, it is in the Council’s interest to develop the programme and commence the installation programme as quickly as possible to benefit from the higher FIT rates. However, it should be pointed out that achieving the 2012 deadline is not possible.

43. Where a tenant of a house or bungalow exercises their “Right to Buy”, a covenant will need to be incorporated into the sale agreement, which will transfer any agreement terms between the private installation company and the Council to the new owner of the property. In principle, that will mean the equipment owner will retain the equipment and the FIT, the new owner will continue to benefit from the electricity that is generated, but the Council will lose the income from the roof rental. There will be no change for flat sales.

Resource Implications:

Capital:

Estimated at around £2.25m for works and fees

Revenue

Revenue income from the Feed-in Tariff and the roof rental – The amount will be subject to tender and to timescales (linked to the sliding scale of the Government’s Feed-in Tariff)

Legal and Governance Implications:

The Climate Change Act 2008
Housing Act 1985

Safer, Cleaner and Greener Implications:

Generation of renewable energy

Consultation Undertaken:

None

Background Papers:

Initial feasibility study prepared by Climate Consulting Ltd on behalf of the Council

Impact Assessments:

Risk Management

(1) It is a risk that the Council embarks on the design and installation programme and then the Government reviews and perhaps withdraws or reduces the "Feed-in Tariff" part way through the programme.
(2) It is a risk that the amount of electricity that is generated does not reach the predicted levels and as such does not provide the rate of return forecast at the outset.
(3) It is a risk that any private finance company may withdraw or reduce its rental payments part way through the programme as a result of the scheme not meeting expected levels of income.

Equality and Diversity:

Did the initial assessment of the proposals contained in this report for relevance to the Council's general equality duties, reveal any potentially adverse equality implications?	Yes
Where equality implications were identified through the initial assessment process, has a formal Equality Impact Assessment been undertaken?	No.

What equality implications were identified through the Equality Impact Assessment process?

That not all properties (and therefore the residents occupying the property) are suitable for Solar PV.

How have the equality implications identified through the Equality Impact Assessment been addressed in this report in order to avoid discrimination against any particular group?

The recommendations within the report take account of those properties (and therefore the residents occupying the property) that cannot benefit from Solar PV benefiting from other energy efficiency measures as a direct result of others.

FIT Payment Rate Table with Retail Price Index adjustments & Fast Track Review amendments – Tariff rates are effective from 1 August 2011

Description	*FIT Year in which the Eligibility Date of an Eligible Installation falls*										
	FIT Year 1 2010/11	*FIT Year 2 2011/12*	*FIT Year 3 2012/13*	*FIT Year 4 2013/14*	*FIT Year 5 2014/15*	*FIT Year 6 2015/16*	*FIT Year 7 2016/17*	*FIT Year 8 2017/18*	*FIT Year 9 2018/19*	*FIT Year 10 2019/20*	*FIT Year 11 2020/21*
Anaerobic digestion with total installed capacity of 250kW or less	12.1	Where the conditional date described in note 4* applies and Eligibility Date is before that date OR where the conditional date does not apply 12.1 Where the conditional date described in note 4* applies and Eligibility Date is on or after that date 14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Anaerobic digestion with total installed capacity greater than 250kW but not exceeding 500kW	12.1	Where the conditional date described in note 4* applies and Eligibility Date is before that date OR where the conditional date does not apply 12.1 Where the conditional date described in note 4* applies and Eligibility Date is on or after that date 13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Anaerobic digestion with total installed capacity greater than 500kW	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4
Hydro generating station with total installed capacity of 15kW or less	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9

* Annex 2, Note 4 of the Modifications to the Standard Conditions of Electricity Supply Licences

Description	*FIT Year in which the Eligibility Date of an Eligible Installation falls*										
	FIT Year 1 2010/11	*FIT Year 2* 2011/12	*FIT Year 3* 2012/13	*FIT Year 4* 2013/14	*FIT Year 5* 2014/15	*FIT Year 6* 2015/16	*FIT Year 7* 2016/17	*FIT Year 8* 2017/18	*FIT Year 9* 2018/19	*FIT Year 10* 2019/20	*FIT Year 11* 2020/21
Hydro generating station with total installed capacity greater than 15kW but not exceeding 100kW	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.7
Hydro generating station with total installed capacity greater than 100kW but not exceeding 2MW	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
Hydro generating station with total installed capacity greater than 2MW	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
Combined Heat and Power with total installed electrical capacity of 2kW or less (Tariff available only for 30,000 units)	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5
Solar photovoltaic with total installed capacity of 4kW or less, where attached to or wired to provide electricity to a new building before first occupation	37.8	37.8	34.6	31.6	29.0	26.4	24.0	21.8	19.9	18.1	16.4
Solar photovoltaic with total installed capacity of 4kW or less, where attached to or wired to provide electricity to a building which is already occupied	43.3	43.3	39.6	36.3	33.2	30.2	27.5	25.0	22.7	20.7	18.8
Solar photovoltaic (other than stand-alone) with total installed capacity greater than 4kW but not exceeding 10kW	37.8	37.8	34.6	31.6	29.0	26.4	24.0	21.8	19.9	18.1	16.4
Solar photovoltaic (other than stand-alone) with total installed capacity greater than 10kW but not exceeding 50kW	32.9	32.9	30.1	27.5	25.2	22.9	20.9	19.0	17.3	15.7	14.3
Solar photovoltaic (other than stand-alone) with total installed capacity greater than 50kW but not exceeding 100kW	32.9	If Eligibility Date is before 1st August 2011 32.9 If Eligibility Date is on or after 1st August 2011 19	17.4	15.9	14.6	13.2	12.1	11.0	10.0	9.1	8.5
Solar photovoltaic (other than stand-alone) with total installed capacity greater than 100kW but not exceeding 150kW	30.7	If Eligibility Date is before 1st August 2011 30.7 If Eligibility Date is on or after 1st August 2011 19	17.4	15.9	14.6	13.2	12.1	11.0	10.0	9.1	8.5

* Annex 2, Note 4 of the Modifications to the Standard Conditions of Electricity Supply Licences

Description	*FIT Year in which the Eligibility Date of an Eligible Installation falls*										
	FIT Year 1 2010/11	*FIT Year 2 2011/12*	*FIT Year 3 2012/13*	*FIT Year 4 2013/14*	*FIT Year 5 2014/15*	*FIT Year 6 2015/16*	*FIT Year 7 2016/17*	*FIT Year 8 2017/18*	*FIT Year 9 2018/19*	*FIT Year 10 2019/20*	*FIT Year 11 2020/21*
Solar photovoltaic (other than stand-alone) with total installed capacity greater than 150kW but not exceeding 250kW	30.7	If Eligibility Date is before 1st August 2011 30.7 If Eligibility Date is on or after 1st August 2011 15	13.7	12.6	11.5	10.5	9.5	8.7	8.5	8.5	8.5
Solar photovoltaic (other than stand-alone) with total installed capacity greater than 250kW	30.7	If Eligibility Date is before 1st August 2011 30.7 If Eligibility Date is on or after 1st August 2011 8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
Stand-alone (autonomous) solar photovoltaic (not attached to a building and not wired to provide electricity to an occupied building)	30.7	If Eligibility Date is before 1st August 2011 30.7 If Eligibility Date is on or after 1st August 2011 8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
Wind with total installed capacity of 1.5kW or less	36.2	36.2	34.2	32.3	30.5	28.9	27.3	25.8	24.4	23.0	21.8
Wind with total installed capacity greater than 1.5kW but not exceeding 15 kW	28	28	26.7	25.5	24.4	23.3	22.2	21.2	20.3	19.4	18.5
Wind with total installed capacity greater than 15kW but not exceeding 100kW	25.3	25.3	24.2	23.1	22.0	21.0	20.1	19.2	18.3	17.5	16.7
Wind with total installed capacity greater than 100kW but not exceeding 500kW	19.7	19.7	19.7	19.7	19.7	19.7	19.7	19.7	19.7	19.7	19.7
Wind with total installed capacity greater than 500kW but not exceeding 1.5MW	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9
Wind with total installed capacity greater than 1.5MW	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
Eligible Installations with a declared net capacity of 50kW or less Commissioned on or before 14th July 2009 and accredited under the ROO on or before 31st March 2010.	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4
EXPORT TARIFF	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1

* Annex 2, Note 4 of the Modifications to the Standard Conditions of Electricity Supply Licences

1 Executive Summary

The Feed-in Tariff offers premium rates for renewable electricity generated by small to medium-sized systems capable of generating no more than 5MW at any given time. Epping Forest District Council has hired Climate Consulting to carryout a high level technical and financial feasibility study of their housing stock to determine the potential for installing solar PV panels so that tenants might benefit from free electricity.

Epping Forest District Council owns over 6,500 properties – flats, maisonettes, bungalows and houses – in large urban settlements and small remote village communities. The vast majority of the properties are home to general Council tenants who benefit from being on the gas grid; however, there a small minority who require sheltered housing or do not have access to the nations' gas network. These minorities may benefit more than most from the free renewable electricity the Council could help provide. In addition to appeasing the negative effects of fuel poverty and peak oil, PV panels will offer a local solution to combating climate change, helping to mitigate the District's contribution to global warming by reducing the amount of fossil fuels its communities consume. Moreover, the District's local energy consumers become active and informed producers, empowered and willing to simultaneously increase renewable energy production and lower energy consumption, ultimately helping the area to adapt to the climate change that is already affecting its residents.

This report contains the results and workings of the desk-based review undertaken to broadly assess the District Council's domestic building stock. A random, representative sample of 657 properties (roughly 10% of the total stock) is taken. Satellite imagery is used to locate each property in the sample and examine their roofs to assess roof area, orientation and shading. The results from this sample have been multiplied up proportionately to apply to the whole housing stock. Roughly 5,410 properties are estimated to be technically feasible in the first screening process.

Technically feasible properties were then checked for basic financial viability (which was defined as properties able to achieve a minimum 5.18%[1] internal rate of return to the council to cover the cost of borrowing as a minimum). Following the financial analysis, 5,249 properties were estimated to be both technically and financially feasible. Collectively, these council properties could generate over 10,500 MWh of electricity per year, qualifying for around £155,000,000 from the Feed-in Tariff and Export income over the 25 year lifetime of the PV panels. In addition, the Council's tenants could potentially benefit from over £26,000,000 worth of free electricity over 25 years. By acting locally the Council and its tenants could save over 125,000 tonnes of CO2 from entering into the atmosphere and contributing to global climate change. To enjoy the rich cocktail of economic, social and environmental benefits associated with a PV project on this scale the Council would need to find around £50,000,000 capital.

Investing in PV for the flats/maisonettes would generate the best rate of return (13.78%), followed by houses (11.22%) and bungalows (10.86%). If the Council was to allow their tenants to receive the renewable electricity generated free of charge and rely on the FITs and export income to make a return on their investment it would take less than 9 years to payback the capital cost of the scheme.

As well as isolating the benefits of PV for Council residents living in houses, flats/maisonettes and bungalows, Epping Forest District Council asked Climate Consulting to calculate the potential benefit to those tenant groups thought to be more vulnerable to the negative effects of fuel poverty, peak oil and climate change – the tenants living in the Council's sheltered housing and properties off the gas grid.

For around £2,250,000 the Council could help over 300 tenants in sheltered housing flats, generating just under £8,000,000 from the FIT's and export tariff in 25 years and saving the tenants close to £1,200,000 in electricity bills; that is if the council provided them with free electricity.

[1] This rate was obtained from the Public Works Loan Board during the project and is subject to change.

For just over £3,500,000 the Council could provide PV to 424 Council properties off the gas grid, 72% of the total. Often, where natural gas is not available, tenants use electricity – an altogether more expensive, carbon intensive energy source – to heat their homes. If the Council can isolate this disparate group of properties and provide them with PV they will be able to help those tenants that will be affected most by rising energy bills. In addition, given that these tenants are more than likely reliant on more carbon intensive sources of energy, solar PV will offset a larger amount of carbon per Council tenant than any other group in the District. Just over half of properties off the gas grid are in urban areas (53%) but a greater proportion of the rural properties are off the gas grid (over 20%). Most of the Council's feasible roof space off the gas grid are above Council flats and maisonettes (281), followed by houses (73) and Bungalows (70). Collectively, they have the potential to generate 742 MWh of electricity per annum, saving around 9,000 tonnes of carbon dioxide and the Council's tenants around £1,850,000 in electricity bills.

Table 1 – an overview of the technical and financial figures generated from the study

	Houses	Bungalows	Flats/Maisonettes	Total
Average system size (kWp)	2.81	2.79	2.00	*
Number of properties	2,721	787	2,977	6,485
Number of technically feasible roofs	2,600	647	2,163	5,410
Number of financially feasible roofs	2,448	638	2,163	5,249
Installed Capacity (kWp)	7,929	1,814	4,326	14,069
Total predicted annual yield in year 1 (MWh)	5,946	1,361	3,245	10,552
Total CAPEX (£)	27,542,125	6,424,513	15,811,530	49,778,168
FIT income over 25 years (£)	77,644,050	17,716,469	53,147,397	148,507,916
Export income over 25 years (£)	2,699,478	617,627	1,472,907	4,790,012
Electricity bill savings over 25 years (£)	14,922,790	3,414,258	8,142,270	26,479,318
Total savings over 25 years (£)	95,266,319	21,748,353	62,762,574	179,777,246
NPV (£) (including electricity bill savings)*	14,715,616	3,049,109	12,293,153	30,057,878
NPV (£) (excluding electricity bill savings)*	6,974,797	1,405,528	8,373,567	16,753,892
IRR (%) (including electricity bill savings)*	11.22%	10.86%	13.78%	*
IRR (%) (excluding electricity bill savings)*	8.74%	8.38%	11.53%	*
Carbon saving over 25 years (tCo2)	70,487	16,127	38,460	125,074

Table 1 outlines the difference in net present value (NPV) and internal rate of return (IRR) when the financial gain associated with the electricity bill savings is omitted/included. Climate Consulting's reasoning behind making this distinction is that one of the Council's principle motivations behind undertaking a large PV project is to benefit their tenants. Therefore, it is safe to assume that the financial benefit associated with reduced energy bills will be passed directly on to their tenants and cannot be used to determine the rate at which the PV panels will pay for themselves.

The following two tables give a more detailed break-down of the technically and financially feasible roofs. Table 2 gives an overall impression of the technical feasibility of different property types related to system size (kWp). There is only one size of PV system for flat/maisonette roofs due to the fact that the systems have been optimised. Table 6 outlines the internal rate of return (IRR) for the different system sizes. These rates of return were used to determine the financial feasibility of the roofs. Table 3 provides the context the Council needs to interpret which technically feasible properties in Table 2 have the best business case. Together the tables provide a greater insight into where the Council might want to invest first. A more detailed explanation of financial feasibility can be found in Section 6.

Table 2 – An overview of the technically feasible properties in relation to system size

	Feasible House Roofs		Feasible Bungalow Roofs		Flat & Maisonette Roofs	
kWp	Good	Moderate	Good	Moderate	Good	Moderate
0-0.9	0	60	0	10	*	*
1-1.9	20	121	40	10	*	*
2-2.9	383	343	80	189	912	1,251
3-3.9	816	806	119	179	*	*
4-4.9	40	10	10	10	*	*
Total	1,260	1,340	249	398	912	1,251

Table 3 - An outline of the difference in the internal rate of return between good and moderate array systems[2]

WITH BULK DISCOUNT			WITHOUT BULK DISCOUNT		
	IRR (%)			IRR (%)	
kWp	Good	Moderate	kWp	Good	Moderate
0-0.9	4.81%	3.09%	0-0.9	2.72%	1.07%
1-1.9	7.32%	5.46%	1-1.9	5.07%	3.34%
2-2.9	9.59%	7.57%	2-2.9	7.40%	5.59%
3-3.9	10.96%	8.87%	3-3.9	8.44%	6.56%
4-4.9	10.11%	8.09%	4-4.9	7.67%	5.89%

[2] Two sets of figures are presented: the rates with a bulk discount for multiple PV systems (right) and the rates with no bulk discount (left.). It is safe to assume – given the large number of panels that would be needed – that the Council would be able to negotiate a significant discount. Consequently, the rates on the right are the ones used in this study to determine the financial feasibility of each PV system.