

SOLAR PHOTOVOLTAIC FIELDS

1 Purpose

- 1.1 To advise Members on a proposal for the Council to install two solar photovoltaic (PV) field arrays on land adjoining HM Prison Grendon (HMP). The solar arrays would be owned by the Council whilst the land would remain in the ownership of HMP Service.

2 Recommendation

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| 2.1 Members are asked to highlight comments for the attention of the Director and the Cabinet Member for Environment & Health. |
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3 Executive Summary

- 3.1 The report sets out a proposal to lease land from HMP Grendon for a period of around 25 years. This land then to be utilised for the generation of electrical energy from two fields of solar photovoltaic (PV) cells arranged in rows and facing south. The project provides energy security and savings to the prison and a reduction in the amount of carbon they need to account for; as well as work experience for inmates. It provides partnership working between local government and ministry of justice and a means by which both entities can invest in clean technology providing sustainability gains. The size of the project is aimed at providing all of the daytime energy demands of the two prisons.
- 3.2 The report indicates the nature and scale of the project, the work that will be needed prior to proceeding with the development and details the financial implications of our involvement and potential benefits that could accrue to this authority.

4 Supporting information

- 4.1 Aylesbury Vale DC has recognised the potential for a large solar PV array at two unused secure field sites adjacent HMP Grendon. Having discussed the potential with the Governor of HMP Springhill, it was agreed that a proposal be put together. HMP have reluctantly discounted the option initially put forward of a 50:50 partnership (shared capital and benefits) approach.
- 4.2 The Report sets out the case for the lease of land and contract to supply energy to Her Majesty's Prison (HMP) Grendon and Springhill through the installation of a ground mounted (up to) 3.85MWp Solar Photovoltaic (PV) array consisting of (up to) 12,830 ground based solar panels installed on aluminium frames temporarily (25 years) inserted into the ground. The final 5 years would permit funding to ensure adequate decommissioning if that were the preferred route. Fields are being reassessed for shading at point of submission but it is likely we will reduce array to 2.9MWp in order to optimise the energy yields.
- 4.3 The solar field would be located on the two fields to the north and east of HMP Grendon. Fields are enclosed by an 18ft high security steel perimeter fence with coiled barbed wire to top and further bounded by dense hedgerow. The area of land to be utilised amounts to a little over 6 hectares (60,000m²). The fields are bounded by HMP Grendon to their south and west and by agricultural land beyond. (see images appendix A)
- 4.4 The development would comprise the installation of panels arranged in rows in an east-west alignment to allow them to face south. This in order to achieve optimal solar coverage. The panels would terminate short of the fenced boundaries as shown in appendix A so as to reduce effects of solar shading and to allow for access around the site and a limited perimeter corridor for wildlife.

- 4.5 It would be expected that this would be a temporary structure with an active life of 20-25 years. Cells would be expected to continue to generate electricity at an 80% yield at 25 year when compared to their yield at installation date. A decision regarding when to stop charging HMP for energy generated post 20 years would need to be made.
- 4.6 The array is currently being optimised to provide the greatest amount of energy generation for the field available whilst taking into account shading, particularly during winter months. The annual energy demand for the combined Springhill and Grendon site is 2,287,000kWh/year (2011 figures). Naturally, a solar array by its nature can only provide energy during the hours of daylight. As such the array will not be able to provide total power to the prison during the hours of darkness or at surge demand (e.g. periods when all the kettles are switched on) and consequently this will need to be factored into a legal contract. Both prisons have generators which would assist for periods of peak demand and AVDC are advising the prisons on how to better make use of these so as to provide HMP with additional revenue benefits.
- 4.7 Consequently, assumptions have been made based on a years worth of the Prison's data for daytime/night-time use and this has been factored into calculations for expected energy to sell to prisons and what can be sold to grid.
- 4.8 Parish Clerks at Grendon and Calvert have been notified of our interest in pursuing this project and if agreement were forthcoming, a public awareness event could be hosted and talks offered to these parish councils.
- 4.9 **Government Incentives**
- 4.10 The current incentive situation for projects of this type provides for the choice of Renewable Obligation Certificates (ROCs) or Feed in Tariff (FIT) payments. These are incentive payments from Government to support the renewables industry in a similar way to subsidies to the Nuclear and Gas sectors in the past. Without these payment, certain technologies are not yet sufficiently advanced to stand alone. More detail on these incentives is available at appendix B.
- 4.11 It is likely that the project will be funded through FIT payments as these are index linked to RPI inflation for 20 years and therefore less open to fluctuation when compared with ROC payments (which are market led).
- 4.12 Current payment from the FIT is as follows:
 All energy generated pays £0.071/kWh + RPI inflation for 20 years
 All energy sold to HMP pays at a rate to be agreed between AVDC and HMP.
 All remaining energy exported to grid pays at £0.045/kWh+ RPI inflation for 20 years
 A spreadsheet setting out the financial detail is attached as appendix C along with details of the planned digressions to Government incentive (FIT) support. This document is subject to commercial sensitivity.
- 4.13 **Advantages of the Project are as follows:**
- Of sufficient size to allow up to 13,000 solar panels which is sufficient to more than service the daytime energy demand of the two prisons.
 - Fields are secured by 18' high security galvanised steel wire fencing with barbed wire and CCTV cameras installed and monitored.
 - Limited visual impact.
 - Site already houses two 11kV electrical sub stations meaning that private wire connection and connection to grid should be relatively easily connectable on site.

However negotiation is taking place with the Distribution Network Operator (UK Power Networks) to address cabling and costs.

- There are no obstructions to placing these panels with an optimal South facing orientation.
- There is potential for labour from HM Prison Springhill in the form of category D prisoners to be used to assist in the movement of panels and frames across the site, and providing valuable work experience in an industry with great current and future potential.
- On-going basic maintenance (amounting to annual wipe-down of panels) could also be conducted by these same workforce.
- Continuity of sheep grazing can take place to keep the ground flora levels in check and provide animal husbandry skills to prisoners.
- Allowance of area around the arrays for wildlife will provide a conservation gain in terms of biodiversity.
- Provide energy security for the two Prisons and permit a level of financial security for both AVDC and HMP Service at a time when the public sector is under threat from recessionary pressures.
- Demonstrate a lead by example from the Council and Prisons services to deliver energy generation at viable sites for direct energy use this allowing grid energy to be conserved for other purposes.
- Provide a significant carbon saving (up to 1,494 tonnes per annum) to assist the meeting of the government's Climate Change Act targets of 34% by 2020 and 50% by 2050 on 1990 levels and assist HMP in its Carbon Reduction Commitment (CRC) carbon and financial obligations.
- Assist the government towards energy security and energy mix needs.
- The site is remote, well secured and shielded by existing fence and hedgerows.
- In terms of direct benefit. The proposal would make the two prisons self sufficient for daytime electricity. This is in keeping with HM Government proposals to make prisons self sufficient.

4.14 **Disadvantages:**

- The site has some issues regards access and temporary road structures will need to be rolled out to permit access for vehicles to deliver frameworks, inverters and panels and for maintenance, future install or second generation inverters.
- The fencing in place will have some but limited detrimental effect through shading in the summertime (which is when the maximum energy production will be generated).
- Findings of the Landscape and Visual Impact Assessment and indeed planning consultation are as yet unknown.

4.15 **Risks and Concerns**

4.16 Negotiations continue with the Distribution Network Operators (DNOs) that own the cable infrastructure for the region regarding both cost and time frame to connect. A Contract offer is awaited from the (DNO) in this case UK Power Networks to connect the Field array to the local prison sites sub station. A budget estimate of £1,122,500 has been provided by UK Power Networks.

4.17 The timeframe to deliver the project needs to factor for the quarterly FIT payment digression points and aim for install before 1 May 2013.

- 4.18 Naturally HMP Service and Ministry of Justice need to agree to any offer we make concerning lease of land and purchase of energy over a 20 year period.
- 4.19 **Requirements**
- 4.20 A request under the requirements of the EIA Regulations 2011 Paragraph 5(2), for a Request for screening opinions of the local planning authority on whether or not the proposal outlined below would require an Environmental Impact Assessment (EIA) await a response but we understand this is unlikely. It was not a requirement of the 1.4MWp site at Westcott.
- 4.21 A planning application is required at a cost of £17,656 (Council to Council) and must be submitted with a Landscape and Visual Impact Assessment at a cost to the Council of £6,000.
- 4.22 A surface water drainage and/or SUDs plan may be required and we are seeking advice on this from planners. Quotes suggest that this would cost upto £2,500.
- 4.23 Through a Land Registry search, the fields are shown to be the property of the prison and as such an agreement to lease or purchase this land needs to be brokered with the Prison and Ministry of Justice because HMP Grendon Springhill have stated that they cannot put forward capital to support this venture as a partnership. The on site sub stations are on land leased with an expiry at December 2021. External private legal advise needs to be sought to draw up a contract whereby the prison purchase all energy generated by AVDC where practicable as their primary source of energy purchase.
- 4.24 **Legal and Procurement, Operation and Maintenance**
- 4.25 Various frameworks exist for installations of this type. Officers are looking at the most viable for this project. This to provide an EPC (legally responsible) contractor to carry out design, supply and install and for a limited period operation and maintenance of the site. On site project management also needs to be sought.
- 4.26 Officers are approaching legal firms regarding agreement over specific legal, technical and accounting facilities.
- 4.27 **Power Purchase Agreement (PPA)**
- 4.28 Discussions have taken place with Good Energy and Inenco who would broker markets for the energy we generated that was not used by HMP Grendon so as to ensure optimal market value.
- 4.29 **Summary**
- 4.30 Site layout (see appendix A) sets out and excludes areas likely to be adversely affected by shade in summer. Combined fields provide in the region of 61,000m² or 6.1ha. Expectation would therefore be to install up to 3.847MWp of solar panels on this site. This would equate to roughly 12,830 solar panels.
- 4.31 The energy generated from the solar farm would likely exceed the amount of daytime energy demanded on site by the two prisons with the remainder sold to the grid. Due to the intermittent provision of solar through daytime sunlight, a grid connected base-load must be maintained.
- 4.32 The project capital and revenue costs, anticipated return on investments, payback periods and assumptions can be found on appendix B.

5 Alternative Options

- 5.1 It was agreed by Government on 2 October 2012 that despite an initial proposal to limit ROC payments to projects larger than 5MW, this will not now happen. As such a choice between FIT and ROC payments remains open to the Council. Unlike the FIT,

ROCS are paid at the market rate (currently around £40/MW or £0.40/kW). Different technologies are rewarded according to their need for subsidy. As such, PV which is now seen to be very much proven, is likely to reduce from 2 ROCS/MW to perhaps 1.7 or 1.5. However, it remains unclear (subject of consultation paper that closed on 19 October) whether ROCs will be reduced in value from 2 to 1.5 on 31 March 2013.

- 5.2 Such a diminution would diminish the value of incentives from this source. The benefit of FIT payments is that they are index linked to RPI inflation so once commissioned, income is guaranteed for 20 years. ROCs are subject to National energy activity across the renewables sector and so more subject to risk.

6 Financial Implications

- 6.1 The estimated cost of construction of the scheme is £4.4 million based on the 12,830 solar panels. This cost includes fees and the cost of connection to the main power grid. Elements of the costs still need to be refined and it is hoped that these may reduce.
- 6.2 If the problem of shading can be resolved then it may be possible to increase the number of solar panels and reduce the payback on the scheme. For this reason a maximum permission of £4.9 million is sought but on the basis that the higher investment would need to demonstrate an improved return and payback on the scheme.
- 6.3 The financial model is attached as Appendix B to this report which shows the costs, income streams and shows an estimated return on the proposed scheme.
- 6.4 The model assumes that there is a 6% annual inflationary increase in the cost of electricity and if this assumption is met then the income from the sale of electricity together with the feed in tariff is expected to exceed the annual debt repayments costs in year 7. Until this point there will be a revenue deficit which will need to be factored into the Council's annual revenue budget. Thereafter, it is expected that the scheme will return a surplus and that payback will be achieved by year 14 out of 20.
- 6.5 There are some significant assumptions in this model, particularly in relation to the expected increases in the prices of electricity, but also around the guaranteed Feed in Tariff Rate which will apply to the scheme. Feed in Tariffs rates are being reduced by the Government at quarterly points depending on the amount of additional supply being created nationally from PV schemes. The greater the increase in supply then the greater the reduction in Feed in Tariff rates.
- 6.6 The Feed in Tariff which will apply to the scheme will only be known once the scheme is completed and certified. Before this happens there is the minimum of one but possibly two quarter points at which the Government might reduce the rate. The model assumes one reduction of 3.5% in the tariff rate based upon best indications of the amount of new supply being developed nationally at present. If this number is understated then the payback date might be further extended.
- 6.7 The other principle risk is the rate at which electricity prices increase. The faster they increase then the better the return for the Council. The model assumes an annual increase of 6% whilst in practice prices have risen faster than this rate in recent years. This therefore appears to be a safe assumption but this is a 20 year model and there is only limited certainty that prices will continue to increase at this rate over that timeframe.
- 6.8 The price of electricity sold to the prison is also still to be negotiated and the model attached sets out two options that the prison might consider. If neither of these options is acceptable then this will have a direct impact on the value of this investment proposition.

- 6.9 If the Council is minded to support this scheme then the capital will need to be funded by an increase in the Council's borrowing requirement. This will require a variation to the Capital Programme and therefore will need to be agreed by a full meeting of Council. The revenue implications will also need to be reflected in the annual budget planning process.
- 6.10 **Financial Risks:**
- 6.11 Inability to meet FIT incentive deadlines - see appendix D for anticipated digressions. Could be greater than this but with Government fears over blackouts by 2015, unlikely they would be actively discouraging this level of clean generation.
- 6.12 Inability to broker acceptable agreement with HM Prison Grendon or Ministry of Justice for land lease/purchase
- 6.13 Inability to broker acceptable agreement with HM Prison Grendon or Ministry of Justice for purchase of energy.
- 6.14 Inability to renegotiate acceptable agreement with DNO for land lease/purchase regards lease of Sub Station which expires 25 12 2021
- 6.15 Inability to broker acceptable agreement with DNO for land lease/purchase regards guarantee of provision of Sub Station for 25 years.

7 Reasons for Recommendation

- 7.1 As set out in section 3 and 4 above.

8 Resource implications

- 8.1 As set out in section 6 above.

9 Response to Key Aims and Outcomes

- 9.1 Plan accords with the Council's Corporate Plan (2008-11), in particular the priority of "Protecting and enhancing the local environment and promoting the sustainable use of resources".

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Background Documents None

Appendix A Site layout – artists impression:



Appendix B FIT and ROC Incentives

In contrast to ROC payments (see section 5) FIT payments are now being reviewed every 3 months and may be digressed based on take up of Solar across the Country

Next planned digressions are due 1 November 2012 and 1 February 2013. Note the digression that took place on 1 November amounted to 0%. A new spreadsheet – appendix B has been calculated and circulated separately based on this. If less than 50 arrays over 50kWp (200 panels plus) are installed in the period May to July, then November rates will remain unchanged. Expected digressions could be 0% or more likely 3.5% per quarter to a maximum 28% dependant on rate of deployment (see appendix D. Given that the next digression (1 Feb 2013) rates will be based on installations taking place between Aug and Oct 2012, we should soon know (at least indicatively what the 1 Feb 2013 digression rate will be.

It is likely that a better alternative to energy sales will be available to us than that set out in appendix B and if this is the case it will be brought to member's attention as soon as possible – likely before 13 November Cabinet meeting.

It should be noted that the rate achieved at commission/connection is the rate that remains (+ RPI inflation in the case of FIT) for the 20 year period of either FIT or ROCs.

Risks: FIT

The Government's digression mechanism is designed so that the tariff will be reduced every 3 months by an amount which corresponds to a certain level of deployment. Furthermore, there is a different digression for the three 'bands' of PV system size (ours is the higher >50kWp band). This leaves some uncertainty over available incentives until install has been commissioned.

Digression will be applied each quarter, but it will be at a rate dependent on PV system deployment in the previous quarter. This means that it is highly unlikely to be 28% each time, as the rate of deployment will have slowed down too much for this to be the case. For best case have assumed a 3.5% digression at next quarter (1 February 2013). With the aim of installing before the following digression at 1 May 2013.

Risks: ROCs

The ROC system is a cost levied on all UK electricity companies to encourage low carbon and renewable energy. The figure for ROCs fluctuates in line with national energy prices and investment in renewable energy. As such it is not guaranteed. For calculation purposes, we had assumed no change in the ROC payment over the 20 year life of the project. However, it may be expected that overall this figure will increase more than it decreases given the mandatory and stringent financial targets placed on the UK to achieve percentage increases in renewable energy. Historic trends for ROCS can be found at <http://www.e-roc.co.uk/trackrecord.htm>

Price ranges from £38.42 to £53.27. At present 2 ROCs are given for every MWh produced for PV. The ROC price used in this assessment was £47.95/MWh which is based on the 2011 average price and will vary. Consequently, at £47.95/MWh (or £0.0479/kWh), with 2 ROCs being available for Solar Photovoltaic projects, the value of this incentive might be up to 2 x £0.0479 or £0.0958/kWh generated. However, 1.5 ROCs have been used in our calculations assuming the government's proposals come into force (which historically has been the case throughout government's previous Solar consultations)