CARDIFF COUNCIL
CYNGOR CAERDYDD

CABINET MEETING: 14 JUNE 2018

LAMBY WAY SOLAR FARM

CLEAN STREETS, RECYCLING & ENVIRONMENT (COUNCILLOR MICHAEL MICHAEL)

AGENDA ITEM: 5

The Appendices of this report are exempt from publication because they contain information of the kind described in paragraphs 14 and 21 of parts 4 and 5 of Schedule 12A of the Local Government Act 1972

Reason for this Report

1. To present a detailed business case for the delivery of a Solar Farm at the Lamby Way capped landfill site and to seek approval to proceed with the scheme as described in the report.

Background

2. The capped landfill site at Lamby Way has for some time been considered to be a suitable location for a large scale solar farm which could:

- provide a substantial amount of clean, renewable energy to supply the local electricity grid and connected Council buildings,
- make a positive contribution to national and local renewable energy generation and carbon reduction targets,
- provide a localised economic activity and long-term productive use for a site that would be otherwise difficult to develop, and
- contribute to the new WG directive for the Council and all public sector organisations in Wales to be "carbon neutral" by 2030.

3. The Council's recently approved Capital Programme includes provision for the development of the Lamby Way Solar Farm using Invest to Save funds. This provision is subject to the approval of a detailed business case for the scheme which is the subject of this report. The Council has accessed industry experts to help develop this detailed business case, with support from Welsh Government through its Green Growth Wales agenda.

4. As well as delivering on the Council's ambitions and obligations for renewable energy and carbon reduction the production of the business plan has also identified that the proposal will:

- based on the Business Case projections, provide an acceptable and attractive return on the Council's Invest to Save commitment;
- make full use of Council funds already expended on Grid connection in the area;
- provide clean renewable energy to a major neighbouring utility site; and
- open opportunities for further innovation, carbon reduction and air quality management by, for example, providing a potential new and renewable energy source for the Council's Low Emission Transport plans.

5. The Economic Green Paper launched in November 2017 identified the East of the city as the focal point for industry, lower density economic uses that provide options for a different range and choice of both employment and business opportunities. The different options and choices that can be established by providing lower density employment opportunities will help those whose skills or experience may not match those found in a service focussed city-centre, including proposals such as Lamby Way Solar Farm.

Issues

Site History

6. In July 2014 Cabinet approved a proposal to publicly offer a land lease opportunity for the development of a Solar Farm at the site. This was to be funded and delivered by a third party developer, with the Council collecting a small ground rent on the long-term lease. To facilitate the arrangement, and to secure the longer term opportunity, the Council also funded a grid connection to the site at this time.

7. Despite significant negotiation with four separate developers, none of the proposals received by the Council reached a satisfactory position from which proceed.

8. In summary, the reasons for this were:

- The removal of the Government Incentives for Solar Farms shortly after the Cabinet decision,
- The consequential reduction in institutional investment funders' appetite for risk on solar farms nationally, and
- The inability of scheme developers to reach a satisfactory pricing level on the sale of energy on the open market to cover the lost government support element.

9. This outcome was not unique to Cardiff and many proposed schemes in the UK stalled at this time. This led Welsh Government to focus attention on the issue, seeking to understand the current barriers to, and solutions for the delivery of Welsh public sector led renewables schemes in the post-Government Incentives landscape.

Welsh Government Support and Policy Changes for Renewables

10. As part of its Green Growth Wales agenda Welsh Government undertook an audit of all of the stalled, public sector led renewables schemes in Wales and identified the Lamby Way solar farm as one with the highest potential to deliver. This was because of the ready availability of the site, its good solar radiation characteristics on an incline facing south, and the pre-existing grid connection on site.

11. During this period Welsh Government also strengthened its own policy context around renewables, most notably publicising targets for:

- 100% green energy consumption in Welsh Public Sector from 2017;
- 70% of all energy consumed in Wales to be generated by Welsh based renewable sources by 2030;
- at least 1 Giga Watt of this generation to be locally owned; and
- for all public sector organisations in Wales to be "Carbon Neutral" by 2030

12. Together, these policy changes have provided a significant drive for both the Council and WG to pursue the Solar Farm and other local renewable energy schemes.

13. On this basis WG offered the Council free access to consultancy expertise to help develop an options appraisal and detailed business case to examine the viability of the scheme. This assistance has been in place since summer 2017 and has been provided by a solar expert who has helped to develop the business case. Their output, in turn, has been peer reviewed by energy staff at Local Partnerships who have been contracted by WG to support the Green Growth Wales Agenda.

Other Changes in the Market

14. Along with the policy changes mentioned above three key changes have happened which have affected the overall viability of the Solar Farm proposal at Lamby Way.

15. **Firstly**, the cost of required hardware for the scheme has continued to reduce over the period. Prices for installed ground mounted solar PV are reported to have fallen by around 75% between 2010 and 2016 and global prices for solar components continue to reduce as efficiencies and economies of scale increase.

16. **Secondly**, the Council has had extensive dialogue with an organisation based near to the site with regard to a private wire connection between

the proposed Solar Farm and their operation. This dialogue, conducted under the terms of a signed non-disclosure agreement, has been very positive and has settled on an outline deal for the organisation to take 4.5MW of generation capacity at the Solar Farm over a 20 year period.

17. The energy sale rate negotiated is significantly higher than rates otherwise available to the scheme through the usual sale-to-grid route. This is made possible because the purchaser of the energy avoids the "non-commodity" costs associated with buying energy from the grid (including various charges for grid maintenance and balancing, and other taxation elements). Private wire purchasers can therefore pay a higher rate for the "wholesale" energy and still achieve a saving on the final unit cost compared to direct purchase from the grid. This new rate for the sale of energy has been modelled for the first 20 years of the scheme's operation and has significantly increased its income generation capacity.

18. An MoU has been signed between the Council and the organisation to capture the key commercial features of this negotiation. This settles on an energy sale price index linked to RPI for a supply period of 20 years. The deal is considered to be a low risk, high gain option given the partner organisation's published aim to secure 100% renewable energy supplies for their operations and the significant overall saving they will achieve on electricity bills as a result. In turn, it also enhances the Council's ability to increase the income generation capacity of the scheme by securing a higher unit selling price through a large term off-take arrangement with a partner organisation with a very strong financial covenant.

19. **Thirdly**, and as a direct result of the private wire arrangement discussed above, there is now an opportunity to develop a slightly larger solar farm than was originally envisaged. The maximum capacity of the installed grid connection at the site is 5MW and previous iterations of the scheme were based around this constraint. With 4.5MW of the farm's generating capacity now proposed to be diverted away from the grid via the private wire, the size constraints for the solar farm are altered. We have therefore examined a scenario that looks at the relative costs and benefits of a 7.5MW scheme. The site could easily accommodate this increased coverage.

20. This increased capacity also has the potential to open up further strategic opportunities for the Council. For example, there is a particular opportunity to explore on-site use of energy to link directly to our strategy for Low Emission Transport Fuels. Energy storage options may also exist, which could contribute to grid balancing in the area and further boost the scheme's business case. We are exploring these opportunities but none are included in the business case presented here which assumes that all energy surplus to the private wire requirement will go to grid.

Business Case Summary

21. The appendix to this report contains the detailed business case for the Lamby Way Solar Farm. The proposal is based on a solar farm of 7.5MW capacity.

22. For information, the clean, renewable energy generated by a solar farm of this size would offset the equivalent electricity needed to power 2,300 typical homes, or about 15% of the Council's total electricity consumption across all its buildings and street-lighting.

23. The proposal depends on 4.5MW of the generating capacity being supplied through a private wire to a single customer near to the site, and the residual 3MW supplied to the national grid through the connection at the site.

24. The business case looks at the total development costs and total income capacity of the scheme across a 35 year lifespan. This is a reasonable economic life-time assumption for solar schemes provided that routine maintenance and component upgrade occurs across this period. The period for the "Invest to Save" capital financing loan would be 30 years.

25. The model is based on a range of prudent cost assumptions derived from recent market research undertaken by the solar expert advising this project and described in the appendix. This appendix is exempt from publication as noted above. Total costs include some already spent, notably on establishing the grid connection at site. The cost assumptions also include the projected costs of ongoing project management, production of a planning application, ecological management, detailed procurement specification, operation and maintenance contracts for the full life of the scheme, legal fees and the facilitation of the private wire arrangement described above. The business case has been subject to a series of reviews by relevant officers at the Council's Investment Review Board.

26. The table below gives headline costs and benefits.

Business Case Summary	£,000
Total Costs (Including initial development costs, Operation and Maintenance, and Loan interest)	**£14,9m**
Total Income (Private wire (20 years) + Direct grid sale (residual for 20 years, 100% for remaining life))	**£21,2m**
Internal Rate of Return	**6.63%**

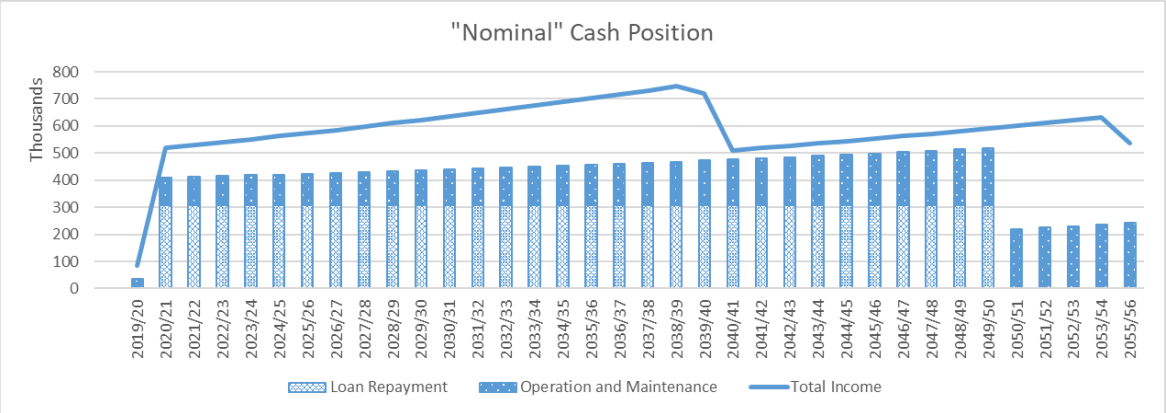
27. The construction costs have been derived with reference to recent known solar farm development costs across the UK but with a significant uplift included in the model. This is a prudent assumption made in recognition of the characteristics of the capped landfill site which will require a specific and non-standard installation method.

28. Total costs also include a generous provision for ongoing maintenance and operational costs. It is proposed that a specialist contractor would be procured to carry out the operation and maintenance function which will be funded directly from income generated.

29. Both the construction and operating cost assumptions in the model have been set at rates that exceed those observed for similar schemes in the UK. This is to ensure that the business model is prudent and robust. We would expect a competitive procurement process for these two contracts to deliver lower rates than those modelled.

30. Total income includes two separate income streams for the sale of energy, one from the private wire and one from sale-to-grid. The former rate is already subject to a signed Memorandum of Understanding with the energy customer and the latter rate is based on current known averages nationally.

31. The graph below summarises the nominal cash position (i.e. including projected inflation) over the anticipated lifetime of the project. It shows that income clearly covers the cost of loan repayment, operation and maintenance with some additional headroom. The dip in income towards the latter years of the model reflects the end of the 20 year private wire arrangement. There would clearly be scope to renegotiate and extend this at the appropriate time though this opportunity is not modelled here.



Project Programme

32. The table below sets out an indicative programme for the delivery of the scheme.

Indicative Programme	
Capital I2S sum approved by Cabinet	Jun-18
Appoint project manager/technical advisor	Jul-18
Procure planning consultants to develop planning application	Jul-18
Commission detailed ecological survey and mitigation plan	Jul-18
Submit planning application	Oct-18
Confirm energy offtake arrangements (private wire and grid)	Oct-18
Planning Consent Granted	Dec/Jan 18
Implement ecological mitigation plan	TBC
Design and Build/Operation and Maintenance tender specification	Oct-Dec 18
Commence procurement of contractors	Jan/Feb 19
Appoint contractors subject to Cabinet approval	Feb/March 19
Commencement on site	April/May 19
Completion and commissioning	Aug/Sept-19

33. The immediate next step would be to prepare a planning application for the development. There have been extensive pre-application discussion on the proposal with key stakeholders, and elements of public consultation have been carried out in respect of the previous private sector led proposals referred to earlier. However, this is a major piece of work that will need to be commissioned and completed over the summer. Costs for this have been included in the business model.

34. One of the more significant challenges for the project relates to the nature conservation value of the site. There are a range of known ecological assets that would need to be treated sensitively prior to, during and after construction. We have already commissioned a “Preliminary Ecological Appraisal” to assess the existing ecological value, identify potential ecological issues associated with the proposed development and make recommendations for general mitigation, compensation and enhancement as appropriate. This has also identified timeframes in the year where regulations prevent survey work, relocation activities and construction works in order to protect various species.

35. This has influenced the delivery timeline given above and also places some urgency to carry out elements of the survey and relocation work early in the summer to ensure that the scheme can progress as planned. The overall ecological mitigation plan for the site will form part of the planning application and its implementation will be controlled by planning condition.

Project Spend Profile

36. The above delivery programme broadly assumes that project development and procurement of a design and build contractor would be carried out during the rest of the current financial year. Construction, and therefore the major spend for the project, would then commence in early 2019/20.

Risks

37. In progressing the business case to its current stage, several of the variables in the model have developed a greater degree of certainty. In particular, the Grid Connection costs are expended and final. Our energy generation performance assumptions are also based on very reliable National sources of solar irradiance data that can predict the performance of the solar panels with some degree of accuracy.

38. The private wire arrangements are also well developed and considered to be a relatively low risk given the internal policy and cost drivers of the partner organisation.

39. Key risks still exist however as outlined below:

- Much of the hardware required for the development of the solar farm will be likely to be supplied form European or American sources. This therefore exposes final costs to fluctuations in international exchange rates. These will be reviewed over the course of the project development and procurement, and the model will be formally reviewed if any major fluctuations occur.

- The modelled lifetime of the project is fairly long at 35 years. Although there is confidence and market evidence that the equipment, with proper maintenance and routine component replacement, will function adequately through this period there may be external changes that could affect overall viability. This could include step changes in costs and technologies for renewable energy or other unknown future regulations being imposed on production. These sorts of risks are more difficult to quantify but it is considered that the private wire arrangement and other potential innovative options for the Council to use the energy on site will provide significant protection for the asset in the longer term.

- The proposal will require a planning consent and there is therefore a risk that this will not be granted. This is considered to be a relatively low risk and one that has already been managed as far as possible through pre-application consultations with major stakeholders.

- The costs for constructing the private wire are based on the best local and market information available to us at the time. However any excavation of this nature comes with risks of encountering other utilities or obstacles beneath ground that may increase costs. We have therefore allowed for a very generous sum in the model for this element. We are also exploring potential synergies with other infrastructure projects in the area that may help to control costs.

Conclusion and Recommendations

40. The modelling exercise described in this report is based on prudent assumptions with known costs included wherever possible. The model has been developed with advice from a solar expert and peer reviewed by Local Partnerships. On this basis the model shows that the proposal is financially viable if final costs are within the general parameters set out, and with the benefit of a formal contractual arrangement for the private wire sale of energy.

41. Strategically, the project meets a series of Council targets and ambitions in generating secure, clean, renewable energy at a site that would be otherwise difficult to develop.

42. It is recommended that Cabinet support the business case outlined in this report and approve the progression of the project to its next phase which will be:

- to prepare and submit a planning application;
- to finalise negotiations on the private wire offtake;
- to commence procurement of a design and build contractor, and operation and maintenance contractor for the scheme.
- to formalise the additional sum required of the 19/20 Capital Programme to facilitate the extended 7.5MW scheme now proposed.

43. It is also recommended final costings, based on the outcome of the formal procurement process, are brought back to Cabinet for final approval to proceed once known.

Local Member consultation

44. Local members were briefed on the scheme at a meeting on 29th May. They were generally supportive but highlighted the need to consider the local impacts and opportunities arising from the proposal as it progressed through the Planning process. In particular they were keen to maximise the potential for protecting and enhancing local biodiversity and amenity value in the area.

Reason for Recommendations

45. To provide I confirmation to progress with the scheme as outlined in the approved Capital Programme and detailed in this report.

Financial Implications

46. The report summarises a business case for a long term Council investment in the construction and operation of a solar farm. The

financial analysis in the business case, based on projected cost and income streams, indicates that the solar farm would be a viable invest to save project. There are however a number of key assumptions that will determine the success of this project in terms of its financial viability. Proceeding with the project will allow these assumptions to be confirmed, and the financial projections updated, before a final decision to commence the construction of the project is undertaken.

47. Although the business case projections are considered prudent, building the solar farm on a capped landfill site at Lamby Way will present some challenges. Until the project has been market tested, by undertaking a procurement, the risk remains that the final construction costs will exceed the projected costs included in the business case. In addition a significant element of the equipment will be supplied from outside the UK so until contracts are signed the project will be exposed to the volatility of Foreign Exchange market fluctuations. A similar position exists with movements in interest rates which again will not be fixed until the construction contract is confirmed. To test the implications of changes in Project costs by amending these key variables a number of sensitivities have been run to assess the impact on the projected Project finances. The results of this sensitivity analysis confirms that the project continues to generate a positive return both in cash terms and for Net Present Value. The results of the sensitivity analysis are included in the Appendix.

48. At this stage the proposed solar farm has not received planning approval. Given the pre-application work done previously and the proposed size of the facility the Directorate consider that the refusal of planning approval is a low risk. If planning approval was not achieved then the council would be in a position where the cost associated with taking the scheme to planning would be abortive and would need to be written off.

49. The report emphasises the considerable benefits of the private wire arrangement in terms of the price received for the electricity, the stability the 20 year term of the arrangement provides and the financial strength of the partner organisation. Negotiations are continuing with this organisation and have reached the Memorandum of Understanding stage. If however, this arrangement was not concluded the affordability of the solar farm would be detrimentally impacted and the financial projections, including the size of the facility, would need to be reassessed.

50. Following the introduction of the private wire a larger facility is now proposed to maintain the export of electricity to the grid. This is the scenario presented in the business case as although additional upside would be expected from, for example, cost avoidance from electric vehicle charging these proposals are at an early stage of development and are not yet robust enough to include in the business case.

51. The larger facility will require additional capital expenditure. The construction of the facility is programmed for 2019/20 and a bid for additional resources in the 2019/20 Capital Programme as part of the budget setting for 2019/20 will be required. This will remain as an Invest To Save scheme.

Legal Implications

52. The procurement process will need to be in accordance with the Council's Contract Standing Orders and Procurement Rules. The Council has power to sell electricity under section 11 of the Local Government (Miscellaneous Provisions) Act 1976(as amended) provided that the electricity is generated from heat and renewables. The power is subject to the requirements of the Electricity Act 1989 in regard to a distribution or supply licence, which in turn are subject to exceptions under the Electricity (Class Exemptions from the requirement for a Licence) Order 2001

RECOMMENDATIONS

Cabinet is recommended to approve the Business Case and Invest to Save allocation for the scheme and to commence the delivery plan for implementation.

SENIOR RESPONSIBLE OFFICER	**ANDREW GREGORY** **Director Planning, Transport & Environment**
	7 June 2018

The following appendices are attached:

Appendix 1 – Detailed Business Case (confidential)

The following background papers have been taken into account

Green Book 5 Case Business Case Analysis (Confidential)