

EXECUTIVE COUNCIL

PUBLIC

Title: Sand Bay Wind Farm-Phase 3

Paper Number: 168-23

Date: 27th November 2023

Responsible Director: Director Public Works

Report Author: Power Station Manager

Portfolio Holder: MLA Peter Biggs

Reason for paper: This paper is submitted to Executive Council:
For policy decision (including budgetary policy)

Publication: Yes – with redaction of the financial information, estimated costs and commercially confidential

Reason for Redactions:

Under Executive Council Standing Order 23(2), Executive Council must have regard to the categories of exempt information in Schedule 3 to the Committees (Public Access) Ordinance when determining if information should be withheld

The categories which are potentially relevant to this paper are:

Previous papers: Paragraph 10: Information about relevant contracts and negotiations

List of Documents: Annex 01- Payment Schedule and Quotation from Enercon UK for E70 Wind Turbine - redacted
Annex 02 - Presentation by Enercon Gmhb delivered to MLAs November 2023 - redacted

1. Recommendations

Honourable Members are recommended to approve:

- a) In principle support to the Sand Bay Phase 3 Renewables Project, utilising an engineering led approach as outlined as the preferred option in this report.
- b) Adding this project into the Islands Plan Delivery Plan and the FIG capital programme, with a potentially delivery timeframe in 2024 and 2025.
- c) Granting a dispensation from Financial Instructions to allow the single-source procurement with Enercon, Innoven and ABB, which this report proposes.
- d) Acknowledging that this could potentially become an offset project for the private sector should a mutually suitable commercial agreement be identified and to authorise the Chief Executive to explore private sector capital funding and associated commercial structures and report back to Executive Council.

e) **REDACTED**

f) **REDACTED**

g) **REDACTED.**

- h) Requiring the Chief Executive to bring a report back to Executive Council on the full project in March/April 2024.

Executive Council resolved to approve the recommendations as amended:

Approved with amendments to recommendations:

- a) In principle support to the Sand Bay Phase 3 Renewables Project, utilising an engineering led approach.
- b) Adding this project into the Islands Plan Delivery Plan.
- c) Review the FIG capital programme, to ensure a potentially delivery timeframe for the wind turbines in 2024 and 2025.
- d) Granting a dispensation from Financial Instructions to allow the single-source procurement of the E70 turbines with Enercon Gmhb.
- e) Acknowledging that this could potentially become an offset project for the private sector should a mutually suitable commercial agreement be identified and to authorise the Chief Executive to explore private sector capital funding and associated commercial structures and report back to Executive Council.

f) **REDACTED**

g) **REDACTED.**

h) **REDACTED.**

- i) Requiring the Chief Executive to bring a report back to Executive Council on the full project including a revised Capital programme in March/April 2024.

2. Additional Budgetary Implications

	2023/24	2024/25	Total Project
REDACTED	REDACTED	REDACTED	REDACTED
REDACTED	REDACTED	REDACTED	REDACTED

2.1 REDACTED.

- 2.2 REDACTED. However, this is offset by estimated net savings to FIG of £20 million over the life of the turbines, after the project costs have been considered (see section 6 of the report and based on two turbines). The deposit is non-refundable. As the project development matures over the next few months the whole life maintenance costs will also need consideration.

- 2.3 The private sector has shown interest in participating in this project to partially offset their GHG emissions. The structure of a commercial agreement to enable the private sector investment has not yet been explored, but will need to be investigated further should the participation of the private sector in the project be approved in principle.

3. Executive Summary

- 3.1 Sand Bay Renewables has been a multi phased project:

- Phase 1 (completed August 2007): Three x 335 kW Enercon wind turbines.
- Phase 2 (completed February 2010): Three x 335 kW Enercon wind turbines

These turbines will be at end of life in 2027 and 2030 for phase one and two respectively.

- 3.2 Together with Mare Harbour the project has generated 100,000,000 kWh of energy. These phases have meant that for an equivalent of 6 of last 16 years energy generation in Stanley has been net zero.

- 3.3 Phase Three has the objectives of:

- Increase the annual renewable contribution to over 50% for Stanley, including periods with 100% renewable energy provision until the mid-2040s
- Achieve significant savings for FIG over the life of Phase 3 through reduced reliance on diesel-powered generation
- Achieve significant CO₂ savings over the life of Phase 3 through reduced reliance on diesel-powered generation
- Provide a platform for potential expansion into Phase 4 in the future

- 3.4 The full project plan is in development and is taking shape, already with a degree of cost certainty on the two major elements the wind turbines and the battery units. Enercon are adding the E70 to the lengthy list of wind turbines no longer manufactured. The last production run is 2024. The time constraint is that after November 2023 the opportunity to purchase these wind turbines is lost. This paper requests that Members agree to fund

the deposit necessary to secure the future complete purchase of two E70 Wind Energy Converters from Enercon GmbH.

- 3.5 These wind turbines are one element of the Phase 3 proposed expansion of Sand Bay Wind Farm. Sand Bay Wind Farm-Phase 3 is not in the current Capital Programme. This Assembly has put the environment at the heart of its administration. While the emphasis of the last few years has been the new Power Station Project, adding Phase 3 of the Sand Bay Wind Farm to the capital programme and bringing forward both projects in parallel matches this Assembly's commitment to environmental sustainability.
- 3.6 As this project had not previously been incorporated in the financial plans of FIG there is an opportunity for REDACTED to be a key enabler of this project and for it to be calculated against the carbon offset requirements of their Environmental Impact Assessment.
- 3.7 At their briefing on the 6th November Members asked for consideration of the purchase and installation of a third E70 Wind Energy Converter to ensure resilience and to provide a platform for phase four of the Sand Bay Wind Farm. As a result, this report seeks a contract deposit payment for up to three turbines.

4. Background [and Links to Islands Plan and Directorate Business Plan/s]

- 4.1 Sand Bay Wind Farm has been operating since August 2007. The crucial inhouse technical breakthrough, dates to March 2005.
- 4.2 Sand Bay Renewables has been a multi phased project:
- Phase 1 (completed August 2007): Three x 335 kW Enercon wind turbines
 - Phase 2(completed February 2010): Three x 335 kW Enercon wind turbines.
- These turbines will be at end of life in 2027 and 2030 for phase one and two respectively.
- 4.3 Together with Mare Harbour the project has generated 100,000,000 kWh of energy. These phases have meant that for an equivalent of 6 of last 16 years of energy generation in Stanley has been net zero.
- 4.4 It is FIG's Power and Electrical Team's assessment that only Enercon wind turbines offer the opportunity for the close control of the power output allowing high wind power penetration and resilience for our small, isolated power network.
- 4.5 Mare Harbour Wind Farm was constructed and came online in December 2014. Mare Harbour Wind Farm-Phase 2, an initiative by Enercon GmbH, was not advanced in February 2018.
- 4.6 Proposals by the Power Station Manager for Sand Bay Wind Farm-Phase 3 were not taken forward in October 2020. The original design included two E44 Wind Energy Converters, five 1MWh battery units and a synchronous condenser unit.
- 4.7 A draft Energy Road Map for the Falkland Islands was produced at the end of 2022, which is now being incorporated into an Energy Strategy.

- 4.8 After internal discussions on the draft Energy Road Map in February 2023, the Chief Executive requested that the Power Station Manager revisit his proposal for Phase 3. Given that the originally suggested E44 wind turbine is no longer available, Phase 3 would require redesign. The Chief Executive requested for an updated engineering led solution that considers the context and constraints of delivering the project successfully in the Falkland Islands.
- 4.9 The Power Station Manager has sought to develop a solution that will work over the long term whilst delivering value for money for the Falkland Islands Government. The proposed solution has been informed by the Power Station Manager's 25 years of experience of working in wind energy in the Falkland Islands and delivering three significant wind turbine projects over that period. Both Enercon Ghmb and ABB visited the Islands in October and November 2023 to workshop the project with the Power Station Manager to ensure we get the right solution for the Falkland Islands, maximising its value to the Falkland Islands Government.
- 4.10 If agreed, this project will need to be added to the Islands Plan Delivery Plan and the Capital Programme. It is acknowledged that this will likely result in other capital works being deprioritized and/or for this to become private sector offset project. The interface with the New Power Station Project will need to be developed during the next stage of detailed project design ensuring among other things that control levels are correct and timescales are aligned as far as possible.

5. The Engineering Case for the Project

- 5.1 The Power Station Manager produced an initial engineering solution of two E70 wind turbines able to produce 2.3 MW of power each and eight battery units of 1 MWh each to enable much better renewable utilisation for Stanley. Further work with ABB, has led to a solution with the same storage capacity but arranged in three larger units. The designed storage capacity of 8 MWh was validated by ABB programmes using actual power station data showing a required dynamic capacity at times of 7.49 MWh.
- 5.2 The original proposal of separation into eight units was to avoid losing too much capacity at any one time due to Battery Energy Storage System (BESS) fault situations. However, ABB have now been to Sand Bay and witnessed firsthand how we maintain similar inverter technology found in the Enercon wind turbines and are confident of our abilities to rapidly restore their units back into service after a failure, meaning fewer larger units will be sufficient.
- 5.3 Analysis of power generation of Phase 1 and Phase 2 demonstrates that current renewable energy utilisation is at 38%. Modelling by the Power Station Manager and ABB shows that Phase 3 will deliver up to 81% utilisation and penetration (the amount of available wind captured by the turbines) will rise from 21% to up to 86%.
- 5.4 A copy of the original engineering design for Phase 3 has been operating for over a year on the Faroes Islands. Data for the month of October 2023 in the Faroes shows renewables contributing 84% of all power and included two weeks at 100% renewable. This work undertaken elsewhere, helps validate our original design and concepts.

- 5.5 The Enercon turbine is a direct drive, ac/dc/ac, generator. It is the only turbine that offers the level of control intercept that we presently enjoy, capable of receiving at times 1886 kW of power with a variation of ± 10 kW. (To illustrate that this is an outstanding level of control, consider that it is possible to purchase an 11-kW electric shower.) We will have no similar control over any other make of turbine.
- 5.6 Wind turbines will fail for two reasons, fatigues caused by high average wind speeds or wind shear breakage from violent gusts. The Enercon turbine is a Wind Class 1 turbine. This means it can withstand average wind speeds of 10 m/s and gusts of 150 mph. Sand Bay average is 10.7 m/s and the highest measured gust to date is 112 mph.
- 5.7 The Enercon wind turbine is rated at 2.3 MW. Similar sized turbines, such as Vestas 2 MW, are described to be suitable for “light and medium winds”. Vestas group turbines capable of operating in “turbulent” winds begin at 5.0-7.0 MW.
- 5.8 The main factor for end of life for our turbines is fatigue to the steel towers. The movement in the top sections is at times extreme due to the forces at play. It is akin to being on a boat or on a plane. Motion sickness has been experienced by maintenance staff on several occasions. At a distance, the towers will appear to simply stand and face the winds, in reality, there is an enormous amount of movement. The Enercon E33 has withstood all our climate has thrown at them for over 16 years. This is a major reason why it is not recommended that we would risk the introduction of an untested turbine manufacturer.
- 5.9 Enercon is not only the best turbine for us, its price is competitive too. The below are given for benchmarking purposes.

Manufacturer	Rating MW	Cost	Wind Class
REDACTED	REDACTED	REDACTED	Wind Class 1
			Stable Low to Medium wind conditions ¹
REDACTED	REDACTED	REDACTED	Medium wind conditions ²

- 1) From Vestas online pricing catalogue. The V90 Wind Class 1 turbine has been discontinued.
- 2) Siemens Gamesa SG 2.1 to 2.7. Siemens negotiating a German Government rescue package following faults with its latest turbines.

- 5.10 Similarly, for the BESS it is the Power Station Manager’s firm belief that ABB give us the best solution whilst providing good value for money. Other systems have been researched including Tesla’s grid forming and grid following modes which has an equivalent Battery Energy Storage System REDACTED. Siemens Batteries have a similar price to ABB but it is not clear if they provide the same Grid Forming function which is key to what we need. Most inverters are not as clever as the one offered by ABB, which has the functions we need for Phase 3.
- 5.11 The founder and creator of Enercon desired a full range of wind turbine sizes. His vision of “energy for the world” was evidenced for many years through being the one

manufacturer that offered smaller and modular solutions, resisting the commercial direction of increasingly larger units. However, Enercon are now strategically aligned to the commercial markets and focusing on manufacturing larger turbines. There are a number of financial pressures in the wind turbine market. Producing fewer models requires less tooling, factory space and staffing levels. However, this shift in focus does not make any of the turbines they stop manufacturing any less desirable to the end user. A former Enercon director told the Power Station Manager at a meeting in July 2023 that the E70 was the best wind turbine he ever designed.

- 5.12 As part of Enercon's shift to larger wind turbines, the E70 wind turbine will no longer be manufactured after 2024 and orders need to be placed no later than November 2023. While Enercon will no longer manufacture the E70 wind turbine, Enercon will continue to support all turbines including the manufacturing of parts in accordance with the statutory and contractual requirements enabling maintenance for a period of at least twenty years.
- 5.13 Sand Bay Phase 1 reaches end of life in August 2027 and Phase 2 follows in February 2030. Enercon advised the Power Station Manager at a meeting in Germany at the end of July 2023 that they can provide E70s for Sand Bay Phase 3 but that the last production run for this turbine will be in 2024.
- 5.14 This development means rather than simply seeking to formally include Phase 3 in our strategic plans it is necessary to decide now whether or not to advance the project. If no decision is made at this time, this project will effectively be lost and will likely take several years to re-emerge.
- 5.15 Phase 1 and Phase 2 have been an engineering success. Basing both projects on solid engineering principles has resulted in environmental gains, as well as political and financial benefits. Supporting Phase 3 ensures continuation of wind power at Sand Bay well into the 2040s. Further, we estimate that Phase 3 will deliver over 50% of Stanley's energy needs if the preferred option is chosen, making the contribution of renewable power to Stanley power in excess of 50% until the mid-2040s.
- 5.16 Delivering Phase 3 has a further time imperative based on the end of life of Phase 1 and Phase 2. While remedial repairs beyond these dates may be possible, planning to go beyond the end of life dates comes with significant risk to the Falkland Islands' power generation, finances and reputation.

6 The Spend to Save Business Case

- 6.1 **REDACTED**. In this option Enercon GmbH would have responsibility for the manufacture of the wind turbines, their installation, shipping and transportation. A breakdown of estimated costs is as follows.

Project Element	Cost £million	
Wind Turbines	REDACTED	Quoted
Turbine Installation	REDACTED	Estimate
Battery Units (installed)	REDACTED	Quoted
Buildings	REDACTED	Estimate
MV Cable Link	REDACTED	Estimate

Shipping and Transportation	REDACTED	Estimate
Others (including civils, rental plant and equipment, project management)	REDACTED	Estimate
Contingency	REDACTED	12%
Total	REDACTED	

6.2 For three turbines the costs of the project are estimated at:

Project Element	Cost £million	
Wind Turbines	REDACTED	Quoted
Turbine Installation	REDACTED	Estimate
Battery Units (installed)	REDACTED	Quoted
Buildings	REDACTED	Estimate
MV Cable Link	REDACTED	Estimate
Shipping and transportation	REDACTED	Estimate
Others (including civils, rental plant and equipment, project management)	REDACTED	Estimate
Contingency	REDACTED	12%
Total	REDACTED	

*based on chartering a single vessel as per the cost for two turbines, currently investigating if a third turbine could fit on a single charter.

6.3 It should be noted the option for three turbines has much less reliable estimates as these estimates have been calculated using increases on the two turbines option on a pro rata basis but some of those costs will not have that linear relationship. As mentioned earlier the three turbines option has been included at the request of Members after a meeting on the 6th November 2023.

6.4 Analysing our current fuel use in the power station and then, through workshopping, modelling our future use with phase 3 (two E70s), gives the following results.
REDACTED

6.5 As can be seen it is forecasted that after the costs of phase 3 (two turbines), a further £20 million is saved over the life of the turbines, equivalent to a benefit of £1 million each year. The whole life maintenance costs of the turbines will need to be calculated and factored in during the next stage of project development, though this will be partially offset by the new cap on the 10% fuel discount.

7 Financial Instructions

7.1 Under FIG Financial Instructions (FI 42), a major project is one with a cost in excess of £1million. No work is to begin on any procurement without policy approval from Executive Council. This report seeks that approval.

- 7.2 If Financial Instructions are not to be followed, a dispensation will be required, normally from the Financial Secretary (FI 43). In order to waive Financial Instructions, the Financial Secretary would ordinarily need to be satisfied that:

- 43.2.1 *The subject matter of the contract is urgently required and loss, injury or damage would be entailed by delay; or*
- 43.2.2 *The subject matter of the contract is so specialised that there would be no advantage in inviting competitive tenders; or*
- 43.2.3 *There is no effective competition for the subject matter of the contract because payment is fixed under statutory authority or because the subject matter is a patented or proprietary article or is available from only one source; or*
- 43.2.4 *There is a clear benefit to be gained from maintaining continuity with a supplier from an earlier project. However, in such cases there must be a full written explanation from the Accounting Officer to demonstrate that the benefits of such continuity must outweigh any potential financial advantage to be gained by competitive tendering;*

- 7.3 In this case, Executive Council is asked to agree that Financial Instructions will not be followed for the reasons explained in this report, why a single-source procurement, from a current/former supplier, is preferred.
- 7.4 Financial Instructions also provide that all contracts must be in writing in a form approved by the Attorney General.

8 Options and Reasons for Recommending Relevant Option

- 8.1 Option 1 (Recommended Option) - Approval of the deposit payment to secure the E70 wind turbines and enabling the Phase 3 proposal to fully mature for final approval or not.
- 8.2 Sand Bay Wind Farm has been a major success, delivering over 30% of Stanley's energy requirements. The Phase 3 design is no longer a concept, it has been validated and used elsewhere.
- 8.3 The Power Station Manager is clear that the Enercon E70 is the only viable wind turbine for Sand Bay. Our winds require Wind Class 1 turbines. This standard eliminates most manufacturers. Those that remain, Vestas and Siemens (though it should be noted that the size of their turbines rated for high winds are too big for our purposes), do not offer the control over the power output that we require.
- 8.4 Securing the re-engagement of Enercon is very significant as Enercon lost a lot of confidence in FIG after previous projects were not taken forward. Approving this recommendation and then Phase 3 ensures the wind farm continues into the 2040s which is a considerable reason for doing the project.
- 8.5 Option 2 (Not Recommended) - Seek an external agency to produce a project design against a brief and specification (the brief and specification would also need to be commissioned from an external party). Tender that design through a full open procurement process. Appoint an external contractor to deliver the project. This option will push the project into the future, potentially by 18 to 36 months. It would mean we miss the opportunity to purchase the E70 wind turbine and there is no evidence the resulting specification could offer any improvement over the existing proposal developed

by the Power Station Manager based on significant local experience and consultation with manufacturers. Further, would very likely result in the loss of good will from Enercon and ABB.

- 8.6 Option 3 (Not Recommended) - Do nothing. Not acting means we miss the opportunity to purchase the E70 wind turbine. The wind farm potentially closes in February 2030 when Phase 1 and Phase 2 reach their end of life.

9 Consultation

- 9.1 The Power Station Manager has consulted with Enercon, Innoven and ABB Battery Storage. Communication has included the FIG Environment Department. Some MLAs have been briefed at Gilbert House and three MLAs have been given a full Phase 3 concept presentation at the Power Station including the outline idea for Phase 4. Five MLAs and the Chief Executive received a presentation from ABB. 7 MLAs and the Chief Executive received a presentation from Enercon Gmhb in November 2023.

10 Resource Implications

10.1 Financial Implications

REDACTED

10.2 Human Resource Implications

- 10.2.1 If approved, a full-time officer would be needed to project manage implementation of Phase 3. It is suggested that this would be performed most effectively by the Power Station Manager on a full-time basis, whilst he would still be able to advise on and be involved in the New Power Station Project, in this case, FIG will need to back fill his post.

10.3 Other Resource Implications

- 10.3.1 If the project goes ahead there will be stone and concrete requirements alongside other large projects (waste, port, power station), haulage contractors and civils contractors. These all could impact other projects and these implications need working through during the next project development phase.

11 Legal and Legislative Implications

- 11.1 There will need to be contracts entered into with Enercon, Innoven and ABB to ensure that the parties' commitments to one another are documented. The terms of these contracts will determine the extent of the parties' obligations to one another and to the risks which each will be accepting.

12 Equalities and Human Rights Implications

- 12.1 None

13 Environmental & Sustainability Implications

- 13.1 Supporting the recommendation demonstrates the ambition of approval in full of Phase 3 and is consistent with the Islands Plan and Environment Strategy commitments to advance renewable energy to transition away from fossil fuels. It is expected that Sand Bay Phase 3 will result in a significant reduction in CO₂ as well as pollutants generated by combustion of fossil fuels which can negatively impact on human health and the environment. Should the private sector participation be achieved, the private sector company shall be able to attribute the reduction of CO₂ emissions achieved from this development in their carbon offset accounting. Not taking this limited opportunity to secure the identified wind turbines means a likely eventual return to full diesel sourced power generation in 2030 when Phase 1 and Phase 2 reach their end of life.

14 Camp Implications

- 14.1 None

15 Significant Risks

- 15.1 The risks of not proceeding are given throughout this report, the risk of agreeing to the recommendations are that should the whole Phase 3 project not be approved, sunk costs of **REDACTED** will be incurred.

16 Publicity

- 16.1 The Communications and Media Office will release a formal Press Statement following the decision from ExCo. Should the paper be approved, local media will be offered interview opportunities with the Chief Executive and the Power Station Manager. Opportunities for interview with the relevant MLA will also be offered.
- 16.2 As the project progresses an appropriate communications plan will be developed and will include the regularity of updates on the project to the public and local media.

17 Reasons for Recommending Preferred Option

- 17.1 Sand Bay Wind Farm has been a major success, delivering over 30% of Stanley's energy requirements. The Phase 3 design is no longer a concept, it has been validated and used elsewhere and will deliver over 50% of Stanley's energy requirements. Moreover, there are exploratory discussions ongoing with the private sector relating to their potential participation in the project to partially offset their carbon emissions.
- 17.2 The Power Station Manager is clear that the Enercon E70 is the only viable wind turbine for Sand Bay. Our winds require Wind Class 1 turbines. This standard eliminates most manufacturers. Those that remain are Vestas and Siemens. Though it should be noted that the size of their turbines rated for high winds are too big for our purposes and additionally they do not offer the control over the power output that we require.
- 17.3 Approving this recommendation and then Phase 3 ensures the wind farm continues into the 2040s which is consistent with the commitments to renewable energy and environmental protection made by this Assembly.