Bowman Power Group Limited

Innovation Fund Business Case

Productionisation and Commercialisation of a new generation of ETC systems on a new site at the Solent Enterprise Zone.

Document Date: 3rd June 2016

Our awards

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PURPOSE OF THIS DOCUMENT

This document is the Full Business Case (FBC) in support of the commercialisation of a new generation of innovative Electric Turbo Compounding (ETC) systems by Bowman Power in a new facility at the Solent Enterprise Zone. Already recognised globally as a ground breaking innovator Bowman Power was recently recognised in the prestigious Global Cleantech 100 top clean technology companies in the world. To date Bowman's products have generated 390GWh of free electricity, and saved 131,521 tonnes of CO_2 emissions globally. They have the potential over the next 5 years to save a further 500,000 tonnes of CO_2, and generate over 1,200GWh of free energy, enough to power almost every one of the 500,000+ households in the entire Solent region for a full year (and offset the associated emissions) whilst creating 190 new high value jobs and boosting the region's productivity and GVA per head significantly.

The new generation of products have been designed to significantly increase the addressable market for the technology and reduce its cost. They have been developed in collaboration with global players Rolls-Royce plc. and Cummins Inc. To produce the products in volume, investment is required in new automated test equipment, production facilities and tooling to replace existing facilities which are inadequate and at the end of their economic life. The development will protect an existing 60 permanent high value jobs and create a further 190 over 5 years, over half of Bowman employees are graduates and nearly all staff have higher education qualifications in engineering, manufacturing, operations and administrations disciplines. This investment will leverage significant other skills investments in the Solent region, accelerating realisation of their benefits.

This case outlines the context, both national and local, against which the proposal has been planned and details the key drivers for change and therefore the objectives and benefits that the proposal will deliver. It confirms the affordability of the proposal for the development both in capital and revenue terms. Importantly, the case demonstrates the essential role that Solent LEP funding will play in accelerating this innovative and ambitious project that is ready to proceed immediately with LEP investment.

Whilst the company grew its turnover by 70% last year the pace of delivery is important. Commercialisation of these new products is essential for the company to survive and grow and work must commence in the second half of 2016. Project delay will result in a high probability that the new products will be delayed and further private sector investment is not received resulting in the loss of jobs and a major opportunity for a global, low carbon technology, advanced manufacturing company bringing its innovative technology to market will be lost.

This FBC has been prepared using the agreed standard and format for business cases using the Five Case Model, which comprises the following key components:

- The **strategic case** section. This sets out the strategic context and the case for change, together with the supporting investment objectives for the scheme and how they contribute to the Solent LEP plan
- The **economic case** section. This demonstrates that the organisation has selected the choice for investment which best meets the existing and future needs of the service and optimises value for money (VFM)
- The **commercial case** section. This outlines the content and structure of the proposed project
- The **financial case** section. This confirms funding arrangements and affordability and explains any impact on the balance sheet of the organisation
- The **management case** section. This demonstrates that the scheme is achievable

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1. Executive Summary

1.1. Introduction

This business case is prepared as part of the call for Full Business Cases to apply for funding from the Innovation Capital Fund 2016/2017 established by the Solent LEP, for projects in autumn 2016 with a start date on site commencing no later than December 2016.

Bowman Power Group Ltd has a globally important ground breaking low carbon technology recognised recently in the prestigious Global Cleantech top 100 companies worldwide. To drive adoption of its ground breaking technology in the current economic climate it has been essential for the company to develop a new generation of products that offer enhanced benefits but at half the cost of the current generation of technology. With the prototype technology largely complete the company must now productionise (i.e. create a volume manufacturing environment) and commercialise these highly innovative products to enable it to survive and thrive.

The vision of the Board and management team is to drive wide scale adoption of Electric Turbo Compounding systems on reciprocating engines in a Power Generation setting initially, and then into adjacent markets of Marine, Rail and Electrified Vehicles. The company is already working with major corporate customers including Wärtsilä, Cummins Inc.,., Rolls-Royce plc., Mitsubishi Heavy Industries and others who cannot be disclosed for confidentiality reasons. The immediate goal of the team is to build a £50m turnover company within the next 5 years, in the fullness of time there is no reason why the company could not grow to be a similar size to a company such as Cummins Turbocharger Technologies who employ over a 1000 people at a site in Huddersfield.

LEP funding of £3m is essential to support the company completing these activities as part of an £8.9m project to create a volume manufacturing environment, which includes moving to a new site at the Solent Enterprise Zone, as the current facility infrastructure is inadequate and at the end of its economic life. The products, test facilities and assembly environment will be world class national assets that demonstrate the Solent region's ability to sustain and grow high productivity, low carbon technology companies which can also drive export growth for the local and wider economy.

Bowman has a strong investor base, most recently including Ombu Group who specialise in investing in advanced engineering companies and are led by Sir John Parker (Former President of the Royal Academy of Engineering, Chairman of Anglo American and a Director of Carnival Group, Ex-Chair of Babcock, Director of EADS and Chancellor of the University of Southampton) and special advisor Sir John Rose (Ex CEO of Rolls-Royce plc., Deputy Chairman of Rothschild's and former Chair of The Prince's Trust.).

The business is led Dr Toby King, who has transformed the business since joining in late 2011, using his experience in bringing high quality, innovative, technical products to market both in the medical and cleantech sectors. Toby is fully supportive of this business case and its aims based on his knowledge of the goals of the LEP and the Solent region as a whole.

This business case reflects the requirements of the LEP Assurance Framework and contributes significantly to the Solent LEP strategic plan aims. This business case presents our bid for funding within the five cases model – Strategic, Economic, Commercial, Financial and Management. Each case outlines the context, both national and local, against which the proposal has been planned and details the key drivers for change and therefore the objectives and benefits that the proposal will deliver. It confirms the affordability of the proposal for the development both in capital and revenue terms.

1.2. Strategic Case

Bowman Power Group's Electric Turbo Compounding (ETC) solution recovers waste energy from the exhaust of reciprocating generator sets (gensets) and converts it to free, grid quality electricity, significantly improving the energy efficiency of the genset without increasing its footprint or maintenance requirements. This reduces fuel consumption or provides around 10% additional free power, as well as cutting CO_2 emissions by an equivalent amount.

The company's innovative technology is proven in the field, with over 700 systems deployed worldwide, which, to date, have accumulated over 13,000,000 running hours, generated over 390GWh of free energy and prevented over 130,000 tonnes of CO_2 emissions. ETC technology has been adopted by leading engine OEMs, power rental companies and independent power providers (IPPs), with customers including Cummins and Wärtsilä.

The vast majority of the Bowman market place (est. at £12bn in Power Generation alone) is overseas.

As part of the company strategic plan developed in 2013/2014 when the development of the new generation of products was initiated, the company planned to continue to fund the commercialisation of the new products from the funds generated by the current generation of the technology. The productionisation, that is the creation of the volume manufacturing capability, was also to be completed initially at the current Bowman Power site at Ocean Quay in Southampton ahead of a move to a new site in the medium term.

Since 2013/2014 two key changes have impacted this plan:

Firstly, the economic case to buy Bowman's current technology has deteriorated due to a collapse in the oil price. The payback for the end user of Bowman's technology is driven by the value of the fuel saved or additional electricity generated in continuous use. At the end of 2014 the fuel price was $110 per barrel and by the end of 2015 it was below $30 a barrel, a 70% fall.

The new generation of products halves the cost of the technology and will combat this problem. Existing customers Wärtsilä (who have made the technology standard fit on applicable engines) and Cummins together with new customers (Not Disclosed due to confidentiality) and Energy Developments Limited are clear commercialisation paths once the new products are productionised (the subject of this business case).

Secondly, following deeper feasibility studies, and continued deterioration in existing infrastructure, there is now a very significant risk that the current Ocean Quay site cannot meet the operational requirements of the business to commercialise the products. The issues include inadequate local utilities infrastructure and capacity, decline in condition of the existing site fabric, failure to meet new HSE guidance and potentially legislation. Currently the company uses a site at Cranfield University to test its new products and we have recently been informed that it will no longer be available after the current tests in 2016.

The proposal is to develop a new site on the Solent Enterprise Zone at Daedalus where the new products will be productionised for volume manufacture to existing customer relationships in Wärtsilä, Cummins Inc., and EDL Pty amongst others. Funding will be leveraged from Bowman shareholders, Fareham Borough Council and its private sector customers. As an exporter with a number of non-UK shareholders the proposal will generate significant Foreign Direct Investment.

The project will deliver on key objectives of the Solent LEP economic plan:

- Bowman's technology has been globally recognised as highly innovative and the technology has been developed with the support of DECC, Innovate UK and corporate clients such as Wärtsilä, Cummins and Rolls-Royce.
- The company supports High Value job creation. Of the Current 60 permanent employees the majority have a higher education qualification, over half hold degrees, 10 are chartered engineers and 4 hold PhDs. In the period up to 2020 Bowman expects to create a further 190 jobs.
- With the benefit of this project a highly scalable world class level of productivity can be achieved and the company would contribute 7% of the Solent LEP plan for GVA growth and with an expected £200k of GVA per job, enhance productivity in line with the plan to drive the Solent region more towards the national average.
- As a world recognised SME, the project will ensure the company survives and continues to grow.
- The move to the Solent Enterprise site will give the company excellent access to skills investment at the CEMAST centre and leverage the investments already made.
- Bowman's technology is globally recognised as being a major potential reducer of carbon emissions, the systems sold to date alone have been equivalent to taking nearly 30,000 cars off the roads for a year. The impact of Bowman's success is consistent with the Future South objectives to grow a low carbon based economy.
- The majority of the Bowman market is overseas and therefore the company will drive significant export growth and inward investment into the region.
- 41% of Bowman's supply base is local, including a key supplier on the Isle of Wight, and there will be extensive wider economic benefits

The objective of the investment will be to create a c30k sq. ft site at the Solent Enterprise Zone, Expandable to 50k sq. ft. within which a volume test environment will be created for the company's new generation of products based around the XTG/KTG and QTG systems currently being developed.

1.3. Economic Case

As part of its review the management team have considered 4 options in relation to the project:

a. Do nothing case.
b. Invest at the current site – refurbish Ocean Quay.
c. Invest in a dual site – Find and operate a new test site and retain Ocean Quay for all other activities
d. Invest in a new site.

The do nothing option has been discounted on the basis that it is clear that mass adoption of the technology will not be achieved in the absence of the company being able to produce the new products. The investment in the current site option is not preferred as the company will have to move in the medium term due to the limitations of the current site, and the cost of a full refurbishment of the site is escalating due to the life expired utilities. Investment in a dual site, i.e. a separate test site and the existing site, is not preferred due to the productivity impacts and cost.

The Solent Enterprise Zone is the preferred site as it leverages existing utilities and skills investment, gives the company future expandability options and will maximise productivity in the long term. From an operational and commercial development point of view the timings of the investment are more optimal, as they aid customer engagement and completion of a key investment before the business becomes operationally stressed by further significant volume growth.

The investment is expected to unlock the following economic impacts:

- During the construction phase, up to 25 workers will be employed, generating around £0.25m of local economic value.
- The wider supply chain impact of this project will support significant amounts of local jobs, generating over £22m of economic value between 2016-2026.
- Direct job creation by Bowman will generate around £318m of economic value between 2016-2026, with highly skilled jobs generating very high GVA per job ratio.
- The size of the market for this technology and the projected increased energy demands worldwide, combined with the existing customer base and engagement with other large corporate OEMs means that by 2026 we are projecting revenues of around £100m per annum.
- The commercialisation of the new product range will further enhance and strengthen Bowman's reputation and standing as a world leader in waste energy recovery. The company will be able to capitalise on this by being able to attract more direct inward investment from the private sector and business, and extend the application of its technology into adjacent and complementary markets, potentially unlocking £35m of business investment into the Solent region.
- We have not attempted to attribute a value to the huge environmental savings that can be made from the technology. The savings in CO_2 emissions by the use of Bowman technology has a material environmental value.

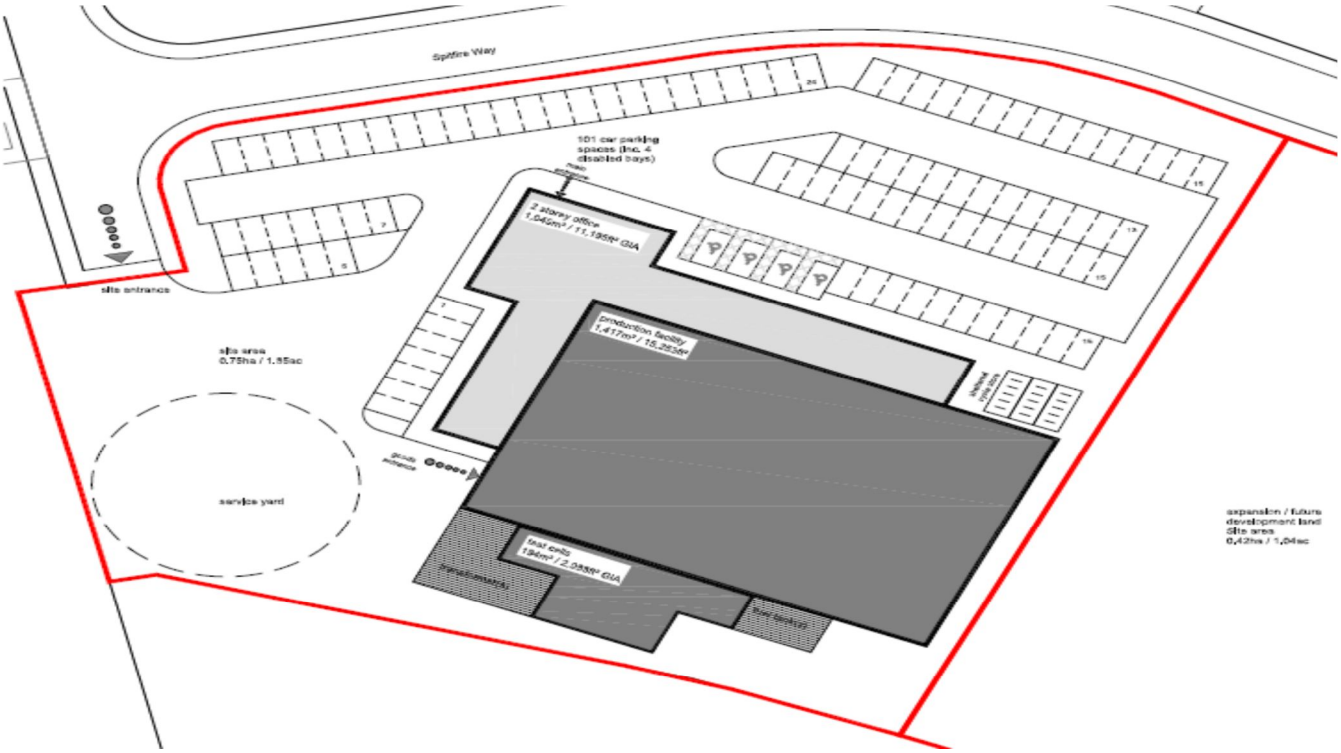
The table below summarises the key outputs from the economic appraisal and shows that the project offers excellent value for money and a significant return on investment from 2016 to 2027.

Present value of benefits (PVB)	£584m
Present value of costs (PVC)	£138m
Net present value (NPV)	£446m
Benefit: Cost Ratio (BCR)	4.2

1.4. Commercial Case

The proposed development is for a c30k sq. ft single site in the Fareham East section of the Enterprise Zone. An outline of the facility has been created by the architects Boyle and Summers and is shown in figure 1 over the page:

Figure 1. Outline of new Bowman Facility



Land adjacent to the phase 1 site would be reserved for the next 5 years for a further expansion development.

As part of the project a significant investment will be made in assembly and test equipment to provide a world class operations environment to drive productivity, items will include:

- Industrial compressors to drive Hot Gas Stands.
- Specialist test control and monitoring system for the Hot Gas Stand measurements.
- Build fixtures for new products, including fully automated assembly fixtures and driven linear slides for component fitting. Designed to allow production at a rate of 600 units per year from a single operator.
- Specialist lifting devices to aid single operator working:
  - Bespoke error proofed lifting frames to avoid component damage.
  - Zero balance devices to aid single operator working.
- Line side storage of heavy items to allow simple and clean unloading.
- Automatic torque control tooling to maximise throughput and quality and traceability.
- Pressure test rig for leak detection.
- Heating fixture to reduce heating time and accurately control temperature in build process.
- Inspection fixture to allow repeatable accurate measurement of parts.
- Contactless Laser Scanning for complicated aero surfaces, cutting edge accuracy and speed.
- Laser Etching for quick and efficient marking of components and label creation for system identification.
- Large Capacity Balancing Machine for balancing capability up to 25kg allowing assembled rotors and wheels to be balanced.

- Automated Stock Control.
- Digital Process Screens and Software

The key project timelines are summarised below:

Milestone	Planned completion date
LEP Approval	End of July 2016
Bowman Board Approval	End of July 2016
Fareham BC Approval	End of July 2016
Planning Application	End of August 2016
Detailed Design Complete	End of September 2016
Planning Consent	End of November 2016
Works Start	Beginning of December 2016
Test Cells Complete	31st March 2017
Productionisation Equipment Procured	31st March 2017
Factory Build Complete	End of June 2017
Fit out of facility	End of September 2017
Site Move Complete	End of December 2017

1.5. Financial Case

Table 1 : Summary of Financial Appraisal.

	2016 Q3	2016 Q4	2017 Q1	2017 Q2	2017 Q3	2017 Q4	Total
Capital expenditure	1,426,977	2,301,246	2,886,288	1,455,000	-	802,643	8,872,154
Other capital projects	100,000	100,000	112,500	112,500	112,500	112,500	650,000
Total	1,526,977	2,401,246	2,998,788	1,567,500	112,500	915,143	9,522,154
Funded by:							
Bowman funding	100,000	100,000	1,027,010	667,500	112,500	915,143	2,922,153
Fareham Borough Council	900,000	900,000	900,000	900,000	-	-	3,600,000
LEP funding	526,977	1,401,246	1,071,778	-	-	-	3,000,000
	1,526,977	2,401,246	2,998,788	1,567,500	112,500	915,143	9,522,153

*Note calendar year basis.

Bowman have funding available for the project from a funding round recently completed and retain strong shareholder support (£28m invested to date). Terms are in process of negotiation with Fareham Borough Council through Finance Director, Andy Wannell, who is supportive.

1.6. Management Case

The project is critical to the company's success and will be managed under the full guidance of the Bowman's main Board led by Chairman Peter Ward (ex Rolls-Royce, Cunard) who have over 200 years combined senior management experience.

Bowman has considerable experience of project management of complex developments as part of its core business delivering to corporate customers.

Nils Jolliffe Operations Director will be the lead executive sponsor; Nils has project managed a similar size development and his previous role was Head of Operations and Plant Manager at the large Eaton Aerospace Plant in Segensworth.

The company will use its already existing project control and risk management processes to deliver the project. The company holds ISO 9001, 14001 and OHSAS 18001 certification and manages to those standards.

1.7. Recommendation

The Bowman Power management team are ambitious and passionate about our vision to create a world class clean technology company and see the highly innovative Electric Turbo Compounding technology adopted on a broad scale across the globe, creating high value jobs and inward investment in the Solent region for the long term and delivering very significant reductions in carbon emissions.

A key milestone in delivery of this vision will be the move to the Enterprise Zone and the creation of a volume manufacturing and test facility for its ground breaking second generation of products and is therefore recommended by the Bowman Executive team to the LEP for consideration as part of the innovation funds objectives.

2. Strategic Case

2.1. Introduction and background

Bowman Power Group's Electric Turbo Compounding (ETC) solution recovers waste energy from the exhaust of reciprocating generator sets (gensets) and converts it to free, grid quality electricity, significantly improving the energy efficiency of the genset without increasing its footprint or maintenance requirements. This reduces fuel consumption or provides around 10% additional free power, as well as cutting CO_2 emissions by an equivalent amount.

The company's innovative technology is proven in the field, with over 700 systems deployed worldwide, which, to date, have accumulated over 13,000,000 running hours, generated over 390GWh of free energy and prevented over 130,000 tonnes of CO_2 emissions. ETC technology is being adopted by leading engine OEMs, power rental companies and independent power providers (IPPs), with customers including Cummins and Wärtsilä.

For the first time, Bowman has been named in the 2015 Global Cleantech 100 list. This year, the Cleantech Group announced that a record number of nominations were received, totalling 6,900 companies from 60 countries. Short-listed nominees were reviewed by Cleantech Group's expert panel, resulting in a finalised list of 100 companies from 17 countries.

With a typical genset, 30% of the fuel energy ends up in the exhaust pipe to atmosphere. Manufacturers of diesel and gas engine and generator sets (gensets) have spent millions of pounds over the last few decades to make incremental improvements to the energy efficiency of their products. Our Electric Turbo Compounding (ETC) energy recovery technology delivers a step change in efficiency and can cut fuel consumption and CO_2 emissions by 4-7%, or generate up to 10% extra power.

The primary market focus is currently the Power Generation sector where the ETC system is used by engine and genset manufacturers, power rental companies, and independent power producers (IPPs) to enhance competitive advantage and provide greater value to their customers, through improved genset energy efficiency. Use less fuel. Cut CO_2. Produce more power. The addressable market for the technology was recently valued by Menzies at over £12bn. Future markets identified by a Ricardo study includes Rail, Marine, Niche Electrified Vehicles and Oil and Gas.

The demand for power is increasing: The EIA International Energy Outlook Report, published in 2015, predicts that energy demand will rise by 70% globally by 2040. This increase is even higher in developing economies, where power infrastructure is often unreliable and not mature. These developing markets are predominantly where our customers operate, and reliance on fossil fuels remains high.

At Bowman, we believe there is an economic and environmental imperative to ensure that, where fossil fuels are still essential for the power generation industry, we use them as efficiently as possible.

The company faces a classic technology adoption challenge, its' first generation of products proved the technology works and can deliver significant economic benefits but those products address a small part of the market and are expensive. To truly address the preferred markets (identified through studies by Ricardo plc. KPMG and Menzies) the company must introduce a set of products with larger power output at significantly lower cost, this is particularly relevant in a period of low oil prices and a depressed global economic environment

To replace its current 30kW and 60kW output systems with associated electronics the company over the last 3 years has developed 2 new systems, one with 270kW of output (developed with the support of Wärtsilä) and one with 110kW of output (developed with the support of Cummins Inc. and the Department for Energy and Climate Change). A further system is in development with Rolls-Royce plc. as part of an Innovate UK grant to develop a system for land and marine markets.

As part of developing these products Bowman completed a £8.4m funding round last year which has been shortlisted for the Solent Deal of the Year in local business awards. This includes a new major shareholder Ombu Group who are led by Sir John Parker (ex-Chairman of National Grid plc. and Babcock, and currently Chairman of Anglo-American) and special advisor Sir John Rose (ex-CEO of Rolls-Royce plc.).

As part of the company strategic plan developed in 2013/2014, when the development of the new generation of products was initiated, the company planned to continue to fund the commercialisation of the new products from the funds generated by the current generation of the technology. The productionisation, that is the creation of the volume manufacturing capability, was also to be completed initially at the current Bowman Power site at Ocean Quay in Southampton ahead of a move to a new site in the medium term.

Since 2013/2014 two key changes have impacted this plan:

Firstly, the economic case to buy Bowman's current technology has deteriorated due to a collapse in the oil price. The payback for the end user of Bowman's technology is driven by the value of the fuel saved or additional electricity generated in continuous use. At the end of 2014 the fuel price was $110 per barrel and only just recently has recovered back near to $50 per barrel, still a greater than 50% fall.

The new generation of products halves the cost of the technology and will combat this problem. Existing customers Wärtsilä (who have made the technology standard fit on applicable engines) and Cummins together with new customers SES, Energy Developments Limited and others are clear commercialisation paths once the new products are productionised (the subject of this business case).

Secondly, following deeper feasibility studies, and continued deterioration in existing infrastructure, there is now a very significant risk that the current Ocean Quay site cannot meet the operational requirements of the business to commercialise the products. The issues include inadequate local utilities infrastructure and capacity, decline in condition of the existing site fabric, failure to meet new HSE guidance and potentially legislation. Currently the company uses a site at Cranfield University to test its new products and we have been informed that it will no longer be available after the current tests in 2016.

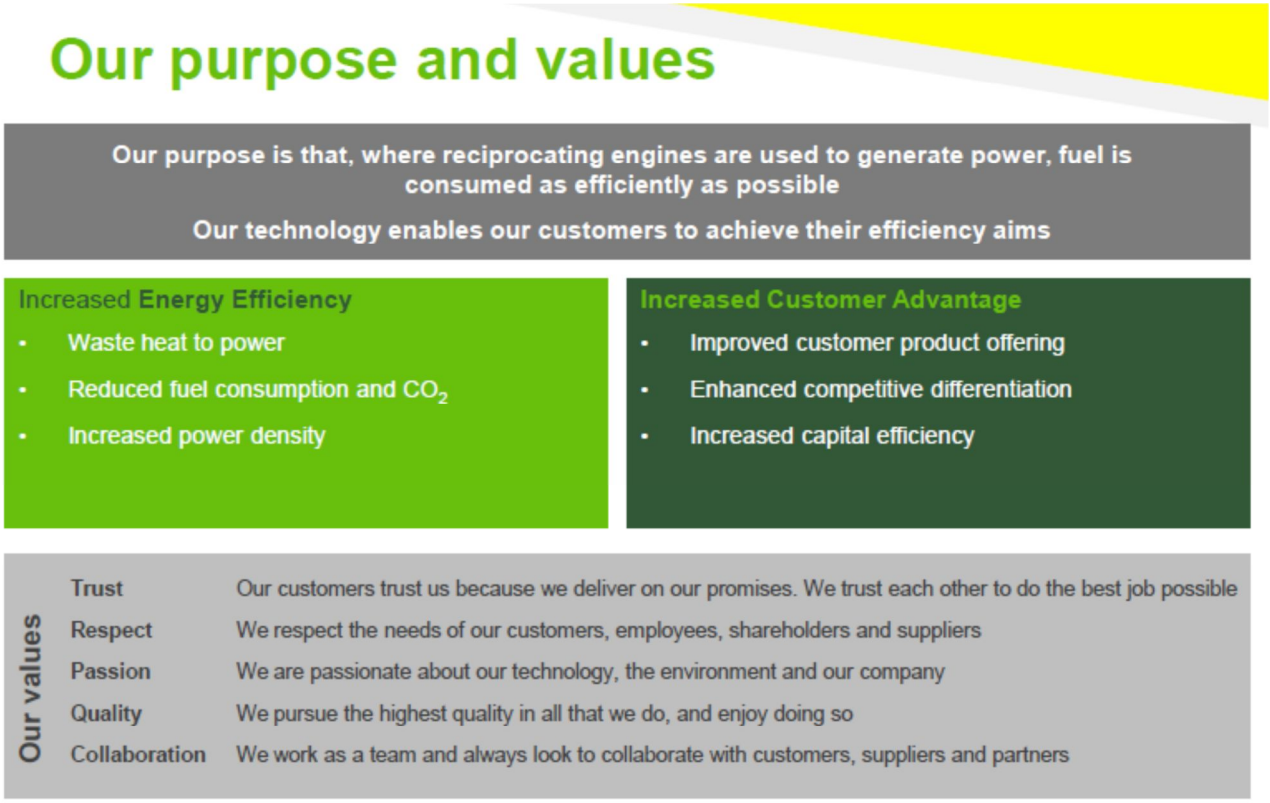
The proposal is to develop a new site on the Solent Enterprise Zone at Daedalus where the new products will be productionised for volume manufacture to existing customer relationships in Wärtsilä, Cummins Inc., and EDL Pty amongst others. Funding will be leveraged from Bowman shareholders, Fareham Borough Council and its private sector customers. As an exporter with a number of non-UK shareholders the proposal will generate significant Foreign Direct Investment.

2.2. Vision and ambition

The ambition of the company is to grow to £50m of turnover within the next 5 years, generating and establishing wide adoption. Our plans do not end there with an addressable market in excess of £12bn in Power Generation alone, and adjacent markets in Marine, Rail and On and Off Road vehicles of potentially equal size, the company is expected to grow beyond this with every potential of becoming a £1bn turnover company in the fullness of time as many engine component manufacturers are.

With a hugely capable team with over half the workforce having degrees including 4 PhDs, there are a number of other potential applications of Bowman's core skills in the fullness of time some of which are already being explored with potential stakeholders. These include an electric machine study for Cummins Inc., Concentrated solar application in Australia, flare gas application in North America, power storage applications, a number of which tie with University departments.

The company vision, mission and values are shown below:



The vision of this project is to create a world class advanced manufacturing and test facility for the production of our ground breaking technology in volume at the Solent Enterprise Zone. This will leverage existing skills investments in the Solent region, have significant benefits in growing local suppliers, create a local high speed turbine machine testing facility and create a globally recognised Clean technology that saves in excess of 100,000 tonnes of CO_2 emissions per annum

2.3. National and Global context

Amongst a number of awards, in 2014 Bowman was listed in the stock exchange '1000 companies to inspire Britain', in 2015 won two categories of the Rushlight Awards and in Jan 2016 was listed in the Top 100 Global Clean technology companies. Bowman Power is the world leader in recovering waste energy from reciprocating engines. There are similar technologies developing in Formula 1, and using Organic Rankine Cycles there is a competing technology but which can also be complementary. Bowman already has installed more systems globally (12 countries on 4 continents) than all other competing technologies combined. As an advanced manufacturer using Formula 1, aerospace and defence technologies and materials, coupled with the emissions it saves, and as a predominantly export product, Bowman represents a SME that sits clearly within Central Government's strategy to grow.

2.4. Local context

Further to the national context the success of Bowman has a number of local drivers

- 41% of Bowman's supply chain is based locally within the local region including Doncaster's Trucast on the Isle of Wight. Bowman's success will lead to corresponding success with those suppliers who are already envisaged as long term suppliers and are engaged in the production of the prototype new products already. With the investment in skills in the region and advanced manufacturing further sourcing of the supply chain is entirely possible.
- Bowman is a high skill job supplier. Of 60 current permanent employees over half have degree, 4 are PhDs, over 10 are chartered engineers and the vast majority have been through higher education. This mix will not change as the company grows with another 190 permanent jobs anticipated in the next 5 years and in the fullness of time many more are possible. In a similar industry Cummins Turbocharger Technologies employ in excess of 1,000 people at their site in Huddersfield.
- The investments already made at the Daedalus site can be leveraged and benefits accelerated. Bowman is a natural employer to the apprentices coming out of CEMAST and we would see that as a key benefit. Of the 250 staff envisaged 140 would be relevant positions for CEMAST students.
- Currently to test product we use a facility at Cranfield University which will no longer be available after 2016. We have the opportunity to create a world class rotating machinery and power Electrics test facility that can be used by Southampton University as well as Bowman and many other academic and commercial institutions
- Bowman has been recognised as one of the top 100 Clean technology companies in the world because of its potential to reduce harmful emissions. The carbon offset to the region's carbon consumption will in 5 years' time total over half a million tonnes. This is around 500 times more than the carbon footprint of the company itself. Achieving an equivalent saving of CO_2 would require every single household in the Solent region (about 500,000 families) to switch off its entire electricity supply for a year, The company would make a major contribution to the Future Solent strategy.
- The government is prioritising investment in low carbon technologies, success of the project will demonstrate the Solent's ability to attract and build such technologies which should help the region to continue to attract good funding.

2.5. Solent LEP Strategic Economic Plan

The project will strongly support strongly the Solent LEP economic plan on a number of levels

2.5.1. Innovation

The very nature of what Bowman does is highly innovative and globally recognised, the work being done in collaboration with global leaders in advanced engineering and manufacturing such as Rolls-Royce plc. The potential for the technology would allow a company to flourish in the Solent region that has world class engineering and manufacturing expertise, building on the investments made in those strategic priority areas.

2.5.2. New High Value Jobs

Bowman currently has 60 Permanent employees and 16 Fixed term or temporary employees, 76 in total on a Full Time Equivalent Basis. 25 are employed in Specialist Engineering disciplines, 17 in Sales, Marketing and Administration, and 21 in Supply chain, Quality and Operations disciplines, 13 in Production.

Over half the employees have degrees, 4 have PhDs, 10 are chartered engineers and well over half the staff have higher education qualifications, including around half with university degrees.

The average employee salary is.

Over the course of the next 5 years the company expects to grow its permanent headcount from the current 60 to 250 with a broadly similar average salary and workforce split. In the fullness of time the company could well double this workforce and similar companies such as Cummins Turbochargers in Huddersfield employ over 1,000 staff.

In addition because of the high percentage of Bowman's supply base being local there will be a multiplier effect of job creation in similar advanced manufacturing technology companies.

2.5.3. GVA growth

A key objective of the Solent LEP plan is to achieve GVA growth of 3% by 2020 which is equivalent to £750m. Bowman's ambitious plans would enable 7% of that target to be achieved (£50m) and with multiplier effects potentially far more.

2.5.4. Productivity

Improving the region's productivity by increasing the GVA per job by an additional £6,879 from £38,000 to £44,879 and moving the average GVA per head closer to the national average of £21,030 from £18,820 are also key goals. Through the scalability of Bowman's business model, the high value nature of its equipment (price per unit from £15,000 up to £200,000), and the benefits of investing in advanced manufacturing and test equipment we expect to deliver £50,000,000 of turnover from 250 jobs by 2020, equivalent to £200,000 per job.

2.5.5. Business Survival

Increasing the business survival rate from 61.4% to 62.5% is a further goal of the Solent Economic Plan. To survive and flourish Bowman must commercialise the new generation of products to replace the current products which are now uneconomic to sell in most markets.

2.5.6. SME support

Supporting new business, enterprise and ensuring SME survival and growth. Without this investment the prospects for Bowman achieving its long term goals are materially worse.

2.5.7. Leverage skills investment and grow education attainment rates

Increasing the proportion of the population with Level 4[3] and above skills to 36% of the working age population from the current 32%.

Bowman would create high value jobs in disciplines for which the existing CEMAST centre has been created - we employee Electrical Engineers, Mechanical Engineers, Software Engineers, Manufacturing Engineers, Test Engineers, as well as assembly staff with HND and HNC qualifications. We utilise materials from the aerospace, automotive and defence industries. The fit is strong and therefore attractive to both parties as a means of translating skills investments made into long term stable Solent employment that demonstrate significant gains in productivity.

2.5.8. Increase foreign inward investment

Bowman has a home market but the vast majority of its technology will be sold and deployed overseas. In addition around a third of shareholder investment in Bowman Power is from overseas sources. Success of the project will lead to significant export growth consistent with helping the Solent LEP goal to increase inward investment into the Solent region.

2.5.9. Wider economic impacts

Success of the project is expected to achieve a number of wider economic impacts:

- Multiplier effect on current and potentially new suppliers.
- Leverage investments and make further success at the Solent Enterprise Zone.
- Increase the attractiveness of the region to further investment:
    - By demonstrating the success of a low carbon technology company
    - By providing a clear example to foreign investors of the viability of the region for successfully growing SME high technology companies.
    - In the fullness of time Bowman expects to move into the marine and automotive sectors further playing to the Solent region's strengths.

2.5.10. Social and Environmental.

The success of the project has significant environmental benefits for the region. The Future Solent / Future South strategy drives towards a carbon reduction goal of 8% (from the current level of 7.9 tonnes per capita per annum. As a major global reducer of carbon emissions Bowman is expected to contribute 150,000 tonnes per annum by 2020, equivalent to a 1.5% reduction for the entire Solent region, or around a fifth of the entire carbon reduction goal.

In the course of assembly and test of its products Bowman's operations do have some environmental impacts including noise and emissions from its testing facilities. Whilst within industrial use limits, and managed as part of the company being ISO 14001 certified, the inner city location of the current Bowman site is less than ideal and in the future there is a risk of falling foul of regulation change. Moving to the Solent Enterprise Zone, with similar companies, is much more suitable and removes the carbon generated by our business from a congested inner city area. Southampton being in the top 10 most polluted cities in the UK and planning to become a Clean Zone.

Bowman is pro-active at encouraging sustainable use of transport by its staff and was a Sustrans award winner in 2015. Presently some 25% of the workforce cycle to work.

2.6. Investment objectives

The objectives of the investment are as follows:

At a new site on the Solent Enterprise Zone create a productionised assembly and test environment to allow Bowman to scale up commercialisation of its new innovative second generation of products and grow to a £50m turnover company by 2020. There are 2 phases to the plan:

Firstly

1. Create an assembly environment by investment in appropriate inspection, assembly equipment to product its new XTG/KTG/MK5 and future QTG development.
2. Invest in automated control and test equipment to maximise throughput and productivity from the facility.
3. Fit out the new facility to accommodate staff in an environment to continue to attract new customers, employees and investment in the company within a 25-30k sq. ft site.
4. Put in place arrangements to leverage the skills development at the Enterprise Zone to allow Bowman to grow its skilled workforce.

Secondly, within 5 years, expand the site to 50k sq. ft facility with expanded assembly and test facilities.

The first phase will enable the company to grow to £30m turnover, the second phase to £50m turnover and beyond creating 190 new high value jobs.

2.7. Existing facilities and capability

The current Bowman facilities and capabilities are life expired and require considerable investment to maintain and there is a significant risk they will not continue to be upgradable within legislative requirements.

The current key issues are as follows:

- The current assembly facilities are designed for products of up to approx. 110kg in weight, the new significantly higher power products require 300kg (and more for QTG) to be managed.
- The current bespoke test cells are both end of life, with 50% downtime last year, and cannot test our new products.
- Currently testing is carried out at Cranfield University and that test environment will no longer be available after the current tests end in late 2016.
- The current Ocean Quay internal utilities infrastructure is end of life
    - The high pressure gas infrastructure is life expired and kerosene fuel can now only be used for testing.
    - The electrical transformer and associated infrastructure is over 50 years old and cannot be upgraded.
    - The local electricity infrastructure is at near capacity and is of old standard which limits our potential to utilise.

- Whilst upgraded as far as possible, the look and feel of the site remains poor. To succeed Bowman has to qualify as a supplier to Corporate entities who must be convinced that the company can meet their scalability and quality requirements, the state of the site and need for investment is a barrier to success. We are a qualified supplier to Wärtsilä, Cummins and others but the current site is often a problem area. We are currently in discussions with Asian manufacturers such as Hyundai and Weichai of China who have truly world class facilities that provide a clear comparison when visiting.
- The state of the buildings is poor, leaks are frequent and with poor ventilation, space layout impacts on productivity are apparent.

Figure 1 Current Site Frontage

Figure 2 Current Rear Aspect and main production facility

Figure 3 Current rear to Test Cell Environment

2.8. Project Scope

The scope of the first phase of the project is to:

- complete a new build of a 25k-30k sq. ft facility at the Solent Enterprise zone in 2016 and 2017 for the company to relocate testing in early 2017 and all operations by late 2017.
- complete in investment of productionisation and test equipment to allow the company to scale.

The second phase of the project would be to expand the site to 50-60k sq. ft which would be privately funded from the success of phase 1.

2.9. Consultation and preparation:

Following involvement and guidance from Jeff Channing of the LEP discussions commenced in late April with Fareham Borough Council and the other commercial developer's operating at the Solent Enterprise Zone to look at potential sites at Daedalus. Based on those discussions the preferred solution would be at the Fareham East site due to the suitability of the plots available and utilities infrastructure.

Outline plans have been reviewed for the site based on work completed by Boyle and Summers architects. Construction firms working with Fareham Borough Council are already on site and about to finish a similar facility in late June and ready to move to another contract.

The productionisation requirements for new products have advanced and detailed plans.

An environmental aspects consultant is engaged on advising the company with respect to the test cells.

A project manager has been appointed and subject to finalisation of commercial terms planning applications will commence in August for a planned construction start in Q4 2016.

2.10. Key risks

Risk	Mitigation
Project Delivery	
Planning Issues	The requirements for the new site are generally not bespoke and similar to existing sites that are already planned at the Solent Enterprise Zone The most complex area is the test cells but the requirements are not greater than general industrial use and not more than those normally experienced at an airfield. Nevertheless an environmental aspects consultant is already engaged.
Change of Scope	The scope of requirements for the productionisation of the new products is advanced and well defined as the prototypes are already built or in process. The requirements for the new site are subject to more detailed planning but are not highly unusual or bespoke and therefore the risk is low. The project will be managed through a defined gate review process to prevent scope creep.
Delays to delivery	To succeed Bowman needs to launch the new products as soon as possible and meet timeline commitments to customers and collaboration partners which creates a strong imperative. A project team is already established in respect of the test requirements.
Company does not resource the project properly	As this project is critical to the success of the company the project team has already been established in Operations and the company is continually monitoring its resourcing. The Operations Director and team will sponsor the delivery.
Project is not well managed	The company has a long experience of delivery of large scale project developments as part of its core business, examples being the current projects with Wärtsilä, DECC and Innovate UK. The project will be run through a controlled gate review process with a dedicated project team. The Operations Director will sponsor the project with support from the Finance Director. Both have direct experience in the delivery of similar projects in previous companies. In respect of Governance the project will be reviewed by the company's Main Board who has over 200 years of accumulated corporate experience collectively in organisations such as Rolls-Royce, Cunard and others. A stakeholder group will also be established to engage all relevant parties.

Risk	Mitigation
Commercial Delivery	
New Products are not a success	Bowman is advanced in commercial discussions and relationships. The new XTG product is the subject of an exclusive supply agreement with Wärtsilä who are now putting the product as standard fit on certain engines where 100 units were sold per annum recently. With a price of between £100k and £200k depending on scope the commercial path is well defined and presents a £10m+ per annum opportunity. The new KTG development (in collaboration with Cummins) is advanced and test partner commercial discussions are advanced with Energy Developments Pty Limited. With a total fleet of 5,000 engines from those customers alone the opportunity is for >£100m over the next 5 years. A number of other corporate entities are engaged with the company in programmes including Rolls-Royce plc., Cummins Inc., Mitsubishi Heavy Industries and APR Energy all of which have significant revenue potential.
Financial	
Private funding support	Once the funding gap is bridged, Bowman already has in place the private funding from its round last year and Fareham Borough Council have indicated they are happy in principle to construct and let the facility on a long term lease. Bowman has a strong shareholder base to support it. With the help of this project. Supply Agreements with customers Wärtsilä and Cummins and a Development Agreement is in advanced discussions with, there is a clear path to realisation of the commercial benefits of the project
Capital costs increase	Contingencies have been included in the capital costs of the project and a strategic company reserve is held centrally. There are other discretionary capital projects that could be managed to deal with overspends.

2.11. Main benefits

The main benefits to the company and its stakeholders will be as follows:

- Accelerate and de-risk the delivery of a new generation of products which are required to make the company a success.
- Protect 60 current permanent roles and create a further 190.
- Reduce commercial risk that the company does not qualify as a supplier due to constraints of the current site.
- Leverage the skills investment already made at the Solent Enterprise Zone.
- Create a working environment that attracts the best talent to the region.
- Drive significant wider economic benefits through supply chain and other local stakeholders.
- Contribute very materially to the Solent LEP strategic plan and the Future South plan goals.
- Demonstrate to central government the ability of the Solent region to foster and grow world leading low carbon technology companies with major export potential.

2.12. Dependencies

To deliver the project scope and benefits the key dependencies are:

- Commitment from Fareham Borough Council to complete the new site build.
- Receipt of appropriate planning consent.
- Successful completion of the current projects to develop the new products.
- Continued support from Bowman shareholders potentially if commercial progress is delayed.

3. Economic Case

3.1. Introduction

This section of the business case documents the range of options that have been considered in response to the potential scope identified within the strategic case.

3.2. Alternative options

3.2.1. Do Nothing

Bowman's current generation of products were developed during 2004-2009 with collaborative programmes with engine manufacturers, most notably John Deere the US agricultural machinery giant. The products were designed for small scale engines (up to 12 litres) in the vehicle sector. As a result of the financial crisis and the fundamental lack of a retrofit market (due to the physical constraints around an engine in the vehicle sector it is not possible to add the technology to old engines) the company changed tactics to sell the technology in the Power Generation market where there is a mass retrofit opportunity recently sized by Menzies LLP as being in excess of £12bn. The limitations of the current products are: that they only address engines up to 1MW in size, with the vast majority of the market in engines of a greater size, and the current cost of the products in a low oil price setting are uneconomic.

The development of the new products was essential. They have been funded by our clients, shareholders and with the aid of DECC and Innovate UK grants after appropriate due diligence.

Now the products are near developed, and sales of our current products have become uneconomic in most markets, we must invest in new test and productionisation equipment to produce them in volume.

The new products are half the cost of the current technology but double the size and weight and therefore existing facilities are inadequate. Our current test facilities are end of life and cannot test the products to full power. Do nothing would mean the business has no ability to supply product in volume and would be therefore unable to commercialise the technology leading to the company failing.

3.2.2. Invest at current site

The company's current home at Ocean Quay has enough space on site only for the near term plan (i.e. 25-30k sq. ft) but a move in the future has always been required.

The main benefit would be to defer an element of the capital investment to the future but investing in the short term has some major detractions and risks:

- The company needs a 2MW electricity supply expandable to 4MW over time and the local infrastructure is old (1960's est.) and is almost at capacity already.
- The high power gas supply is now end of life and has a high cost of replacement.
- There is doubt that HSE guidance can be fully met to continue testing using liquid fuels due to the inadequacies of the site layout.
- The fabric of the buildings is near end of life. The roof of the main facility and of the stores have frequent leaks giving rise to lost time as a result.
- The overall site is not very presentable generally and detracts from the ability to win and retain customers.
- In feasibility assessment of the new test facilities it has been identified that near half of the investment would be left in the current site upon a future move within 5 years.

3.2.3. Dual site

Due to the scale of the challenges with the utilities on site, an option to use a third party site for testing has been explored which would negate the need for a full move in the near term.

The issues are as follows:

- Because the scale of the utility requirement is significant finding a suitable site on a short term let is unlikely.
- Dividing operations for the long term is undesirable due to significant productivity and cost impacts.
- It's highly likely the site would be outside of the current area and lead to significant operations challenges from transporting equipment to and from site.
- There are clear adverse cultural and environmental impacts from being a dual site organisation.
- It would appear a poor setup to potential and existing customers which may threaten future business.

3.2.4. New Site

The main benefits from moving to a new site are in the company completing a move that is right for the long term and has expandability. Leveraging the utilities investment and skills investments already made at the Solent Enterprise Zone makes it an attractive site. With a break in the current site lease in 2017, the background of completing the investment in the productionisation equipment, and a new site at the same time means savings can be made in project management. From an operational and commercial development point of view the timings of the investment are more optimal, as they aid customer engagement and completion of a key investment before the business becomes operationally stressed by further significant volume growth.

The issues are as follows:

- Brings forward some capital investment.
- Distraction to the whole organisation of the timing of a move.
- Around half of the workforce are Southampton based so a move to a location outside of Southampton carries retention challenges.

3.3. Preferred option

Do Nothing is not an option for the business and an investment has to be made. Investing in the current site is a poor choice for the long term of the business, as a move is required in the longer term, and the risk of issues with delivery of a high productivity environment that maximises GVA per head are significant. Similarly the feasibility and productivity challenges associated with a dual site are significant. The availability of a site with future expandability and the ability to exploit investments already made in utilities and skills, as well as benefit from a favourable business rates environment, make a move the to the Enterprise Zone the preferred choice.

3.4. Value for Money

Bowman currently contributes more than £7.5m GVA per annum and in excess of 75 jobs through its own and its suppliers operations in the Solent region and greater than £10m and 100 jobs in the UK. As a global award winning low carbon technology SME Bowman has the ability to create a significant growth contribution that creates jobs, improves regional productivity and demonstrates the ability of the Solent region to support and grow advanced manufacturing companies that have major export potential.

Through this investment by 2020 Bowman would expect to contribute in excess of £50m per annum and through multipliers with suppliers considerably more. The potential over a 10 year horizon would be to add in excess of £100m GVA per annum.

This investment will:

- Unlock a significant increase in productivity for the Solent with an expect GVA per job of £200k.
- Deliver a significant (>7%) element of the LEP growth plan.
- Secure a globally recognised SME future including 75 current jobs.
- Create a further 190 permanent high value jobs.
- Create indirectly a further 80 jobs.
- Sustain construction jobs working on the Solent Enterprise Zone.
- Leverage and demonstrate the value of investments made at the Solent Enterprise Zone
- Demonstrate that the Solent region has the ability to foster successful low carbon advanced manufacturing technology company to the UK.
- Make a major carbon offset of half a million tonnes of CO2 over the next 5 years, representing almost a fifth of the entire Future South plan.
- Through predominantly export led GVA create significant foreign investment in the Solent region.

3.5. Economic Impact

This is a project that is essential for the company to be able to supply our projects in volume to blue chip corporates and commercialise the next generation of products. By doing so, this will unlock enormous benefits in terms of job protection and creation both in the company and in the local supply chain, and also have the ability to attract significant future investment into the region.

Without the support of the LEP, the company is unable to unlock the value that is contained within the product.

We have assessed a time period of 2016-2026 which we feel is a relevant period to appraise the benefits. We anticipate the project as having two phases - the first five year phase is driven by the LEP funding and will involve the productionisation and rapid scaling of the business, and the second five years would then require an expansion of the facilities to increase capacity, this second phase being able to be funded by private investment having demonstrated the success of the products in the first five year scaling up period.

The costs of the project represent the initial £9m project capital costs, a secondary capital expansion phase (£5m) and the long term revenue costs of the business (£158m), as without this project investment the company will be unable to grow and unlock the value in its technology and would conceivably ultimately fail as the current product range is now generally uneconomic

Whilst these costs are substantial, over a ten year period the project can deliver significant economic value.

- During the construction phase, up to 25 workers will be employed, generating around £0.25m of local economic value.
- The wider supply chain impact of this project will support significant amounts of local jobs, generating over £22m of economic value between 2016-2026.
- Direct job creation by Bowman will generate around £318m of economic value between 2016-2026, with highly skilled jobs generating very high GVA per job ratio.
- The size of the market for this technology and the projected increased energy demands worldwide, combined with the existing customer base and engagement with other large corporate OEMs means that by 2026 we are projecting revenues of around £100m per annum.
- The commercialisation of the new product range will further enhance and strengthen Bowman's reputation and standing as a world leader in waste energy recovery. The company will be able to capitalise on this by being able to attract more direct inward investment from the private sector and business, and extend the application of its technology into adjacent and complementary markets, potentially unlocking £35m of business investment into the Solent region.
- We have not attempted to attribute a value on the huge environmental savings that can be made from the technology. The savings in CO_2 emissions by the use of Bowman technology has a material environmental value.

Present value of benefits (PVB)	£584m
Present value of costs (PVC)	£138m
Net present value (NPV)	£446m
Benefit: Cost Ratio (BCR)	4.2

3.6. Funding Leveraged

The investment of £3m from Solent LEP will help to unlock further funding from the private sector, and enable the company to proceed with its productionisation plans. This will then unlock significant benefits and enable the company to be in a much stronger position to be able to attract private investment from both UK and foreign business.

3.7. Deadweight

Without the investment in this project from the innovation fund it is likely that the investment would be spread out and the company would seek for customers to help fund parts of the investment. The result of that strategy is the risk to realise the benefits would be far greater in the case that the funding was not forthcoming from customers, the investments in the Solent Enterprise Zone could not be leverage slowing progress and the lack of the volume manufacturing environment may hamper acquiring new customers and shareholder support for the company would wane increasing the risk of the company failing.

4. Commercial Case

4.1. Introduction

This section of the business case outlines the proposed deal in relation to the preferred option outlined in the economic case

4.2. Description of the works

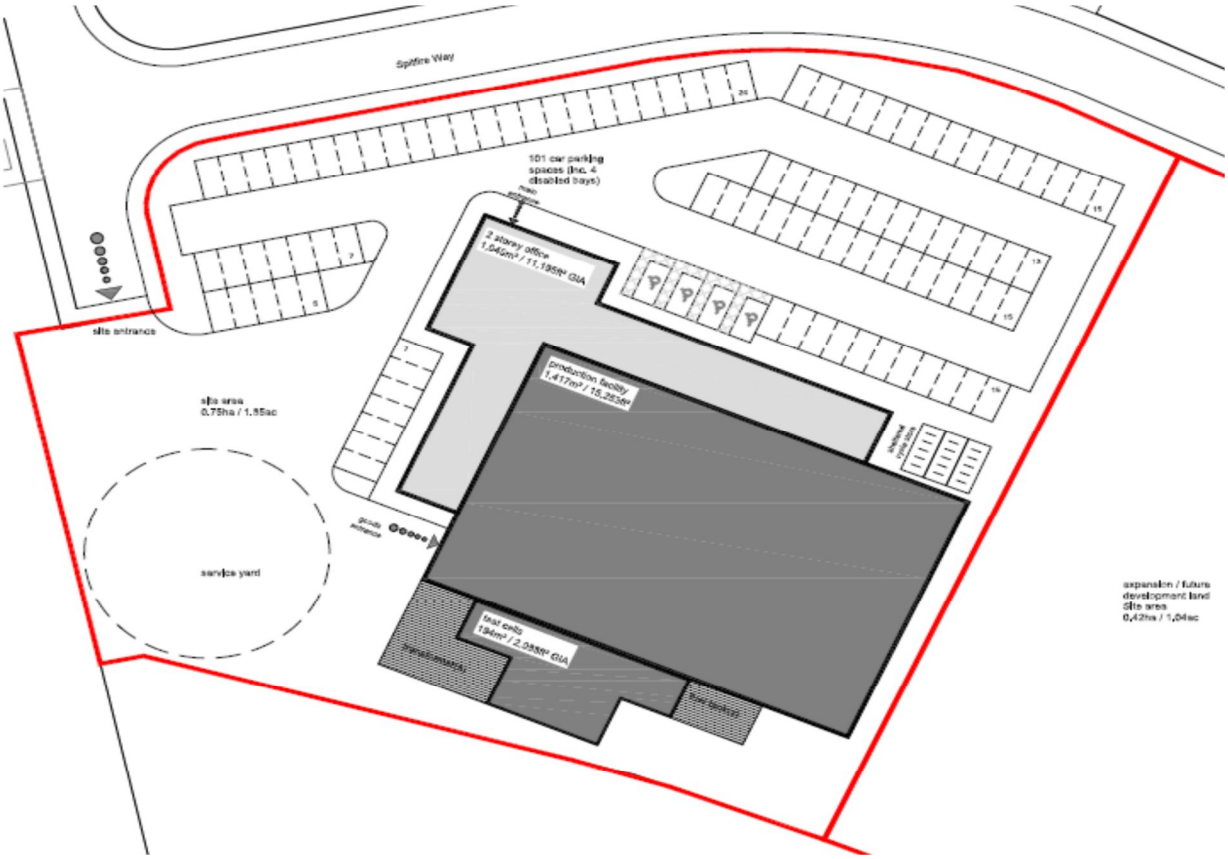
The proposed development is for a c30k sq. ft single site in the Fareham East section of the Enterprise Zone shown in purple below:

Figure 4. Solent Enterprise Zone

The new building will consist of a two storey office block, of 12k sq. ft, a factory space of 15k sq. ft and a test cell environment of 3k sq. ft. A further expansion site alongside the facility will be reserved for 5 years.

An outline of the facility has been created by the architect's Boyle and Summers and is shown in figure 5 over the page:

Figure 5. Outline of new Bowman Facility



Land adjacent to the phase 1 site would be reserved for the next 5 years for a further expansion development.

4.3. Equipment

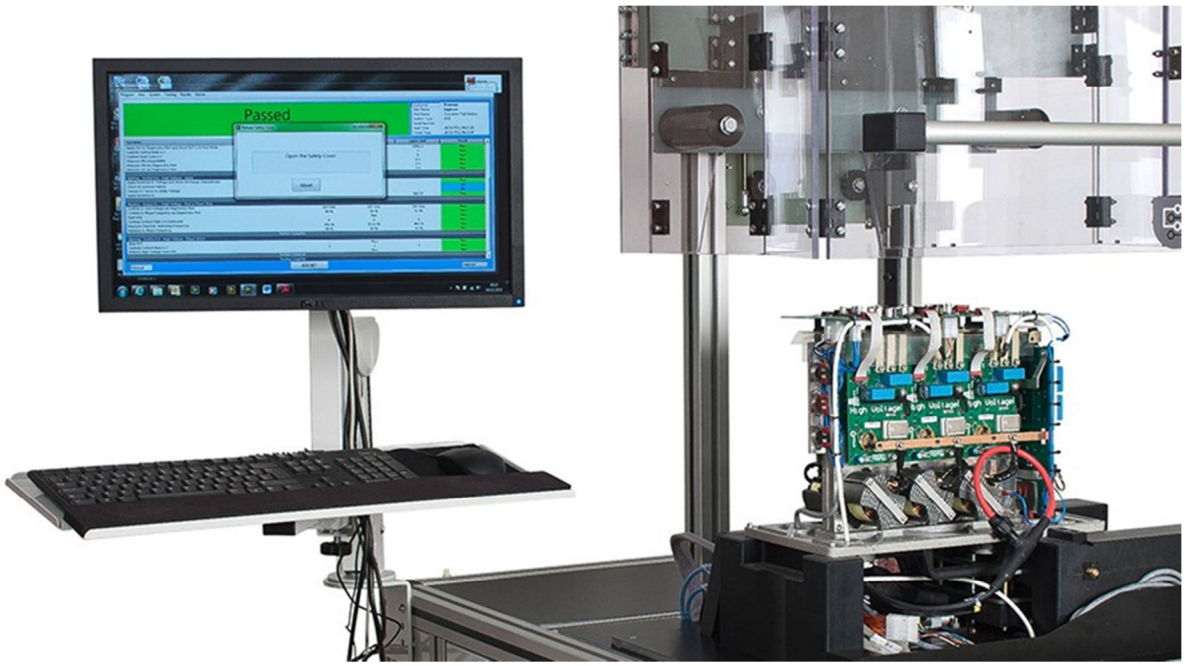
As part of the project a number of significant pieces of capital equipment will be purchased.

The most significant investment will be made in the mechanical test environment to establish two state of the art test cells with automated control and test capability, and in the assembly machinery to allow the company to manufacture its products. The investments are designed to maximise productivity.

Equipment will include:

- Industrial compressors to drive Hot Gas Stands.
- Specialist test control and monitoring systems for the Hot Gas stand measurements.
- Build fixtures for new products, including fully automated assembly fixtures and driven linear slides for component fitting. Designed to allow production at a rate of 600 units per year from a single operator.
- Specialist lifting devices to aid single operator working:
  - Bespoke error proofed lifting frames to avoid component damage.
  - Zero balance devices to aid single operator working.
- Line side storage of heavy items to allow simple and clean unloading.

- Automatic torque control tooling to maximise throughput and quality and traceability.
- Pressure test rig for leak detection.
- Heating fixture to reduce heating time and accurately control temperature in build process
- Inspection fixture to allow repeatable accurate measurement of parts.
- Contactless Laser Scanning for complicated aero surfaces, cutting edge accuracy and speed.
- Laser Etching for quick and efficient marking of components and label creation for system identification.
- Large Capacity Balancing Machine for balancing capability up to 25kg allowing assembled rotors and wheels to be balanced.
- Automated Stock Control for detecting component quantity used and identifying refill requirements, ensure minimum stock holding lineside and no dead time waiting for kanban refill.
- Digital Process Screens and Software. All instructional and recording documentation can be uploaded and delivered Electrically direct to the workstation, ensuring an environmentally friendly, paper free production environment. Job tracking can be completed live and parts can be scanned onto jobs ensuring class leading levels of traceability.



4.4. Approvals

The main approvals required are planning permission for the new site. Bowman's operational requirements are within Industrial B2 use and are not dissimilar to the recent UTP development at the site.

Key approvals are as follow:

- LEP Board approval
- Bowman Board approval
- Fareham BC Board approval

- Planning permission approval

The Board funding approvals are to be completed before the summer break and the initial detailed designs completed for planning application to be submitted at the end of August. The Enterprise has pre-planning approvals and with a number of the elements of the site already complete (roads & utilities) the planning is expected to be expedient to ensure full approvals are in place in early Q3, ahead of the assumptions in the project timeline below.

Bowman has already engaged an environment, health and safety consultant and no major approvals have been flagged to date.

Bowman has been engaged with Andy Wannell and the team at Fareham Borough Council intensively for the last 2 months and discussions are advanced.

4.5. Project Timetable

Milestone	Planned completion date
LEP Approval	End of July 2016
Bowman Board Approval	End of July 2016
Fareham BC Approval	End of July 2016
Planning Application	End of August 2016
Detailed Design Complete	End of September 2016
Planning Consent	End of November 2016
Works Start	Beginning of December 20172016
Test Cells Complete	31st March 2017
Productionisation Equipment Procured	31st March 2017
Factory Build Complete	End of June 2017
Fit out of facility	End of September 2017
Site Move Complete	End of December 2017

4.6. Further phases

Post completion of the initial build and product ionisation environment designed to support the business to circa £30m GVA there will be a phase 2 to support further commercial progress on the land reserved adjacent to the initial build, the project being of a similar scale to phase 1 in 2018-2020.

5. Financial Case

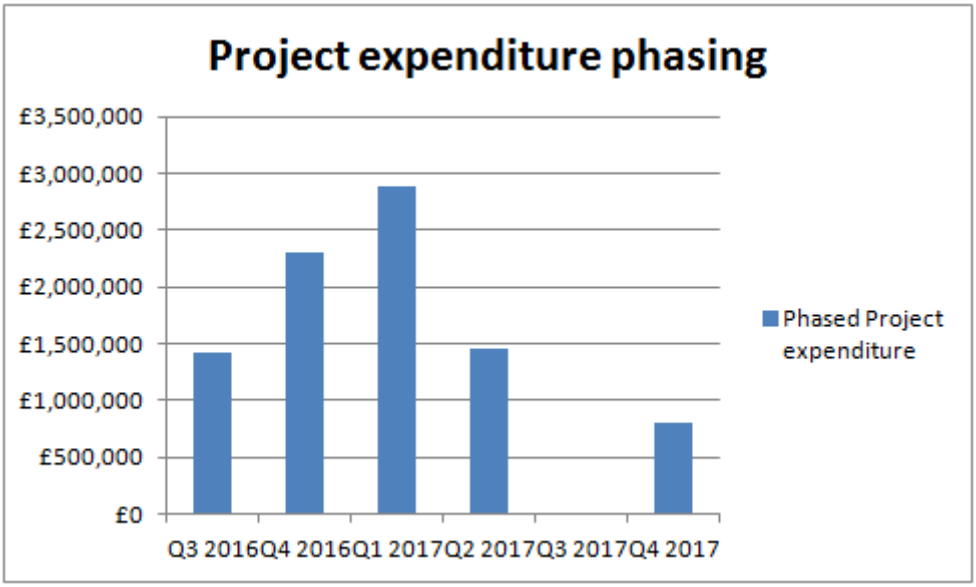
5.1. Introduction

This section sets out the forecast financial implications of the preferred option (as set out in the economic case section) and the proposed deal (as set out in the commercial case).

5.2. Costs

The total costs for the project are shown in the table over the page, together with a phased expenditure profile. The projections are based on a mix of outline design and detailed design.

		Total
New build facility at Daedulus		3,600,000
Fit out of new facility for full move of staff		847,500
New hot gas stand test facility 1	Construction/High power Electrical works	619,601
	Compressor	138,000
	Others (Design/Fit-out/instruments)	610,879
New hot gas stand test facility 2		300,000
Productionisation	KTG (110Kw) Development- Internal Lab. Design/Proto-type test	250,366
	KTG (110Kw) Development - Others	54,157
	KTG (110kw) Productionisation	216,000
	KTG (110 Kw) Casting&Machining Tooling (Casing/Wheel/housing)	144,000
	KTG (110Kw) Manufacturing fixtures	138,120
	XTG (270 Kw) Development	144,867
	XTG (270Kw) Development - test refurb/set-up	69,000
	XTG (270Kw) Productionisation	241,038
	XTG (270 Kw) Castings & Machining	82,142
	XTG (270 Kw) Sleeve & stator	24,816
	QTG (2-4 Mw Engines) Development - Internal Lab. Design/Prototype test	250,366
	QTG (2-4 Mw Engines) Development - Others	54,157
	QTG (2-4 Mw Engines) Casting & Tooling	144,000
	QTG (2-4 Mw Engines) Manufacturing fixtures	138,120
	QTG (2-4 Mw Engines) Productionisation	216,000
	PE Mk5 - Development	40,588
	PE Mk5 - Design improvements/CE marking/software upgrades	97,837
	PE Mk5 - Converter FATEICT test house	86,785
	PE Mk5 - Converter CalibrationICT test house	115,715
	PE Mk5 - Others	248,100
Sub-total		**8,872,154**



5.3. Cashflow

The table below shows the short term capital requirement for this project, and also other discretionary capital projects that the company has in its forecast.

	2016 Q3	2016 Q4	2017 Q1	2017 Q2	2017 Q3	2017 Q4	Total
Capital expenditure	1,426,977	2,301,246	2,886,288	1,455,000	-	802,643	8,872,154
Other capital projects	100,000	100,000	112,500	112,500	112,500	112,500	650,000
Total	1,526,977	2,401,246	2,998,788	1,567,500	112,500	915,143	9,522,154
Funded by:							
Bowman funding	100,000	100,000	1,027,010	667,500	112,500	915,143	2,922,153
Fareham Borough Council	900,000	900,000	900,000	900,000	-	-	3,600,000
LEP funding	526,977	1,401,246	1,071,778	-	-	-	3,000,000
	1,526,977	2,401,246	2,998,788	1,567,500	112,500	915,143	9,522,153

The funding of the other discretionary capital projects is through existing cash reserves, which are provided by a combination of equity funding and debt finance.

5.4. Sources of funds

The company is currently in discussions with Fareham Borough Council for them to construct and let a facility to Bowman on a long term lease.

Bowman has to date been a loss making company, due to the huge R&D expenditure required to develop and commercialise the technology. The company has therefore been dependent upon shareholder support throughout its twelve year existence – over the course of that period, over £28m of equity has been provided by its shareholders. In December 2015, the company obtained significant investment from a major new shareholder, Ombu Group, who have provided a large injection of both cash and relevant industry knowledge and experience into the company. Ombu, and the existing shareholders, are fully supportive of the company's strategy and are aware of the potential need for future funding requirements.

Bowman have a number of capital projects in our forecast, and if there are project overspends, there is the ability to manage some of the other discretionary projects.

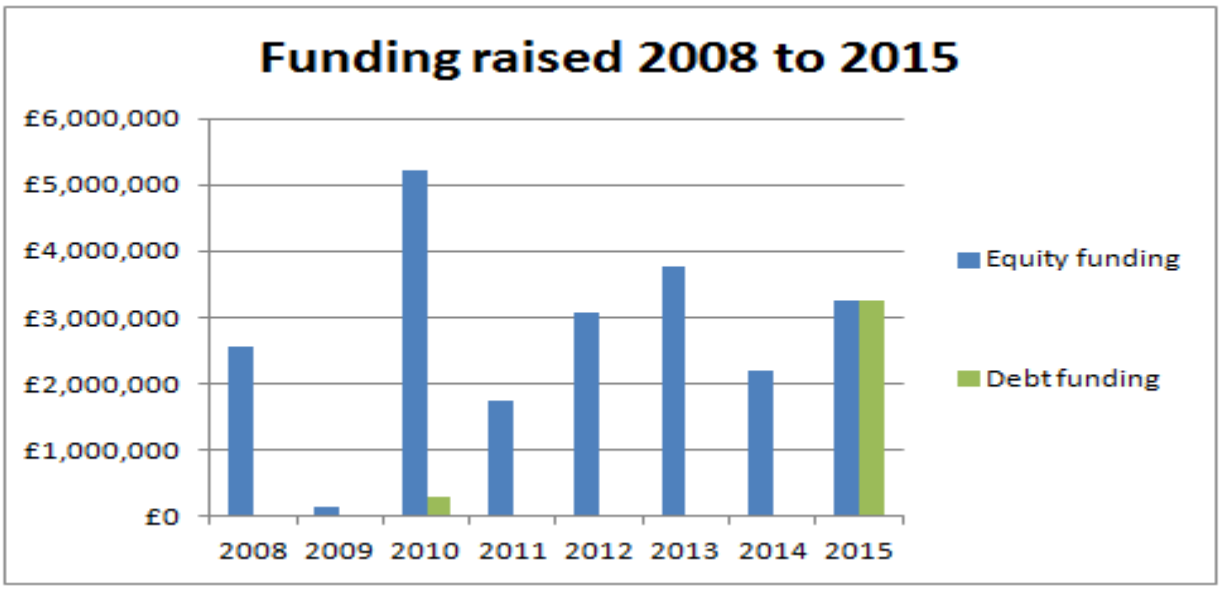
5.5. Status of funding

Bowman still retains funding headroom from its previous funding round which includes the ability to fund its contribution to the project based on current forecasts.

In the event of any delays in commercial progress or unforeseen issues the company has a proven track record of being able to raise equity and debt funding to support the development of its technology, as shown by the chart below.

5.6. State Aid

As part of preparation of this business case a check has been completed confirming it is compliant with existing state aid rules.



6. Management Case

6.1. Introduction

This section of the business case addresses the "achievability" of the scheme. Its purpose is to detail the actions that will be taken to ensure successful delivery of the scheme.

6.2. Project governance

The delivery of the project will be under the governance of the Main Board of Directors. This includes 5 Non-Executive Directors including the Chairman and the founder.

Peter Ward acts as independent Chairman and has a wealth of senior Board experience in the automotive and Electrics sectors. He was previously the Chairman of Rolls-Royce Motor Cars and Cunard amongst other roles, including Vickers, Ricardo and Harley Davidson.

Lars McBride represents Octopus Investments and was previously a FTSE 250 Finance Director following a successful early career in corporate finance with a number of leading city firms. Latterly Lars has been involved in a number of successful engineering company growth stories, normally in the Chairman role. Lars also holds an MSc in Oceanography from Southampton University

Mark King recently joined the Board as an introduction by Sir John Rose to represent Ombu group. Mark has deep operational management experience having spent the majority of his career at Rolls-Royce plc., where he grew ultimately to be President of Aerospace.

Arild Nerdrum represents Fjord Capital's interest in Bowman. Arild has a wealth of business experience from a background across diverse sectors from shipping to mining.

Tony Davies OBE founded Bowman Power and held the position of CEO until 2011. Tony has a vast amount of experience in developing technology companies and was an industrial adviser to UK Prime Minister Margaret Thatcher from 1981 to 1986.

The company has invested over £15m in Product Development over the last 10 years and has delivered a similar value in funded programmes for Corporate Customers

6.3. Project management and delivery

6.3.1. Team

The project will be sponsored by the Operations Director with support from the Finance Director and Engineering Director.

Nils Jolliffe (Operations Director) has a wealth of project management experience which includes project management of a move to a 25k sq. ft site and expansion of operations at Raymarine in 2005 and was in his last role in charge of operations at the £100m Turnover Eaton Aerospace plant in Segensworth.

David Lamb (Finance Director) also has broad project management and investment management experience. In his early career David qualified and grew into a senior Projects Controller role with Transport for London working on major long term investment projects. In his last role David also worked with Nils at Raymarine as the company doubled its turnover during a rapid growth period. David has been with Bowman since 2009 and was shortlisted for Private Company Finance Director of the year in 2014

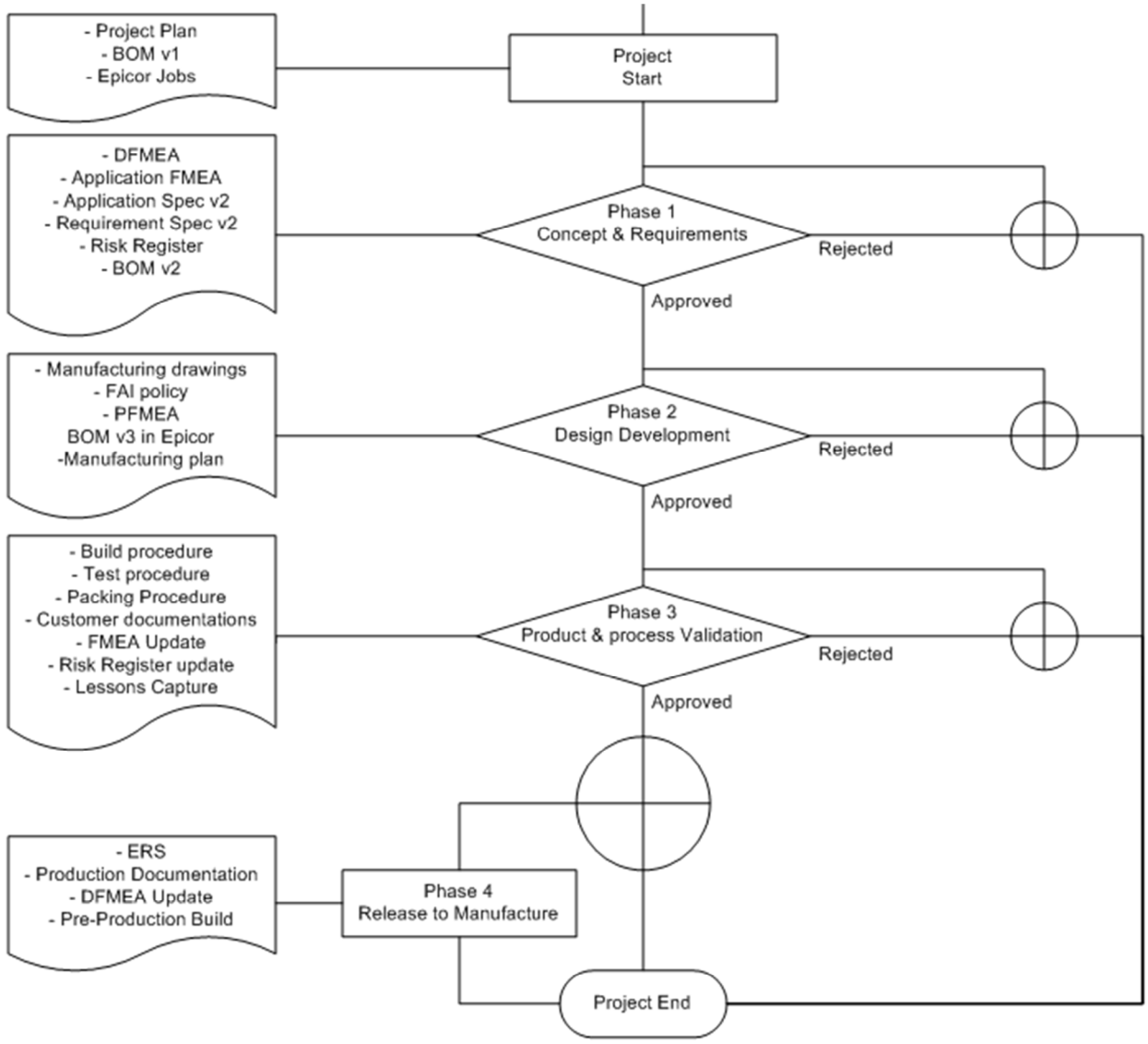
Paul Dowman-Tucker (Engineering Director) is a very experienced fellow of the Royal Institution of Naval Architects. Prior to Bowman Paul spent most of his career with Vosper Thornycroft and latterly BAE SYSTEMS rising to the position of Chief Engineer. Paul has a wealth of experience in delivering complex long term engineering projects. He joined the company in 2012 and has led the delivery of the new generation of Bowman's products.

The project manager will be George Maybury. George has led the feasibility work on our test facilities having been a manager of some of our product development work previously. As a qualified Mechanical Engineer with experience from organisations such as Delphi. George has a strong grounding in managing the technical aspects of the projects as well as the general project management activity.

6.3.2. Gate review process

Projects within Bowman Power are delivered via a controlled "gate review" based project management process where key project stages such as concept design, detailed design are reviewed by peers.

In addition the project will be reviewed by the wider executive team on at least a monthly basis and reviewed with the Main Board at every meeting.



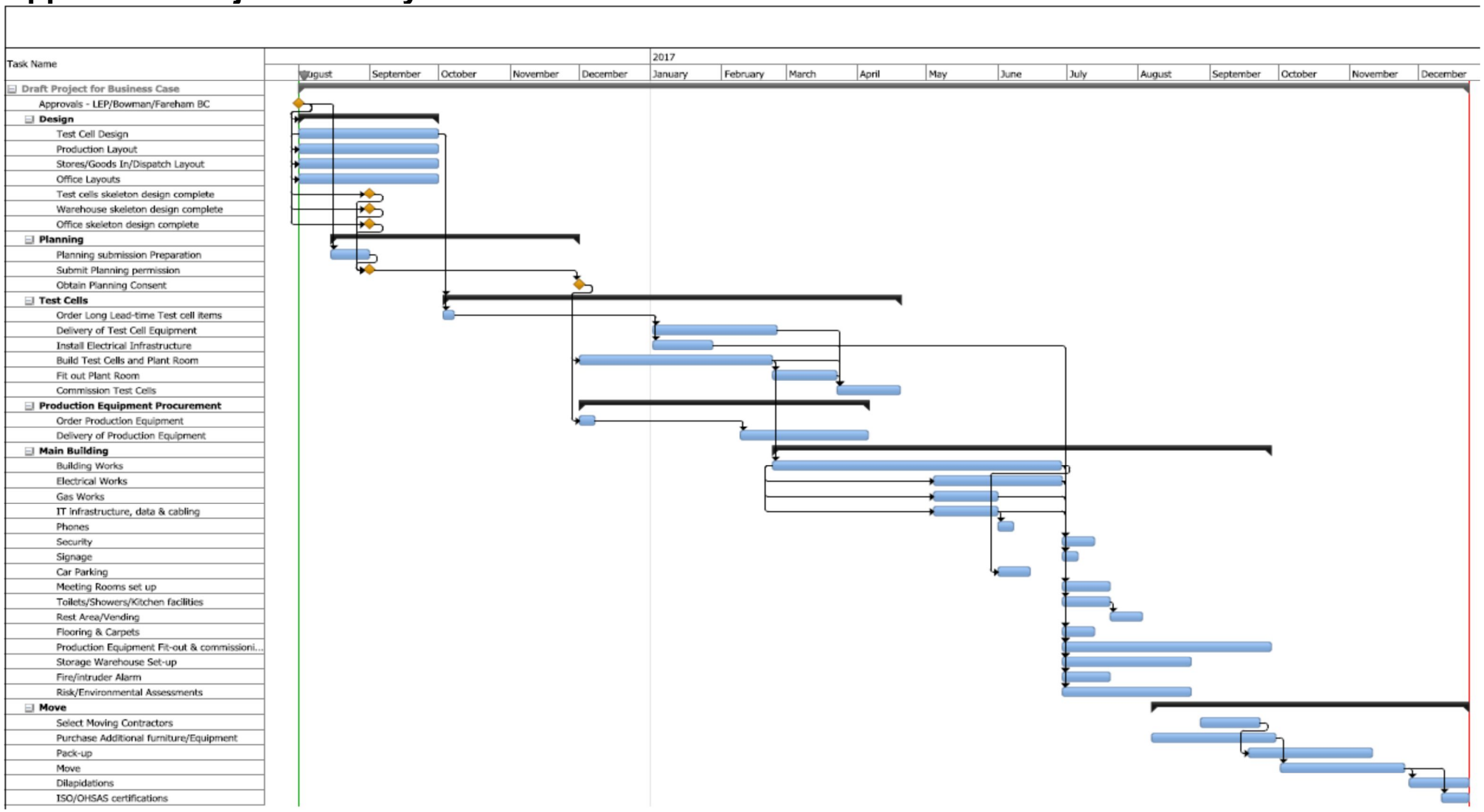
6.3.3. ISO accreditation

As part of ensuring the company is ready to scale to achieve its goals and to qualify as a supplier to its customer the company has an established Quality, Health, Safety and Environmental management system and has recently passed its re-audit to comply with the ISO 9001, 14001 and OHSAS 18001 standards.

6.3.4. Contracting arrangements for construction

Construction of the new facility will be led by Fareham Borough Council and will likely utilise existing contractors on site through standard procurement procedures. As part of the financial case and detailed design a number of suppliers have been identified by Bowman already through a competitive tender process.

Appendix 1 Project Delivery Plan



Appendix 2 Case Study of Bowman Technology

ETC boosts payback on new power plants

Wärtsilä is a global provider of power solutions for the power industry, and marine, gas and oil sectors, with customers in over 170 countries. The company is a leader in the energy sector, with a strong focus on engine optimisation and technological innovation.

In 2011, Wärtsilä began working with Bowman Power Group, in Bermeo, Spain, to evaluate the effectiveness of Bowman's Electric Turbo Compounding (ETC) exhaust recovery system. The company was seeking ways to improve engine efficiency and deliver additional power output without increasing fuel consumption. The trials in Spain demonstrated that the ETC system would increase net power output by 1.4%, with no impact on engine operation.

Based on this success, in 2012 Wärtsilä's Energy Solutions division challenged Bowman to prove the long-term performance of the system over a 4,000 hour trial in Tirenda, Turkey, with rigorous durability tests carried out on a 9MW Wärtsilä 34SG engine, in a Wärtsilä operated power plant.

Proven results:

- 1.5% additional free power generated
- Zero impact on engine reliability
- Over 600 trouble free engine shut-downs and start-ups
- Over 450MWh of free energy generated in total
- Over 8,200 system running hours
- Accelerated payback on an entire power plant project

ETC as standard fit

As a result of the long-term trials, ETC technology is now standard-fit on new Wärtsilä power plant projects. Complete the form opposite to access the full case study.