Green Distilleries Application Form

Proposal Summary

1. Name of Bidder (This should be the lead organisation/co-ordinator for the proposed project)
Protium Green Solutions Limited

2. Project Name
HyLaddie

3. Project Lot Number?
1

4. Technology Type/Category
Hydrogen fuel switching and zero emission boiler

5. Estimated Start Date
* 01/07/2021

6. Project Duration (months)
1 21

7. Estimated End Date
* 15/03/2023

8. Total Project Cost (£)
2997541.64

9. Total BEIS Funding applied for (£)
2997541.64

10. Project Summary (please provide one or two sentences)

Protium Green Solutions working with Bruichladdich distillery aim to create a novel onsite fuel switching process that will replace a medium fuel oil boiler with a first of a kind hydrogen boiler. The novel direct combustion chamber DCC™ will be used part of the time to create zero carbon heat for the distilling process.

11. Public Description of the Project - The public description of the project should be a brief non-confidential description of the project that BEIS may use in online or printed publications. Please describe the project objectives and key deliverables and the expected project benefits. Maximum 300 words

In support of the distilleries 'net zero' by 2050 target Protium Green Solutions working with Bruichladdich distillery aim to create a novel onsite fuel switching process that will replace a medium fuel oil boiler with a first of a kind hydrogen boiler. The novel direct combustion chamber DCC™ will be used part of the time to create zero carbon heat for the distilling process. An electrolyser will be placed on site to provide oxygen and hydrogen for the DCC™. The DCC™ recycles all water from the combustion process back to the electrolyser reducing the environmental footprint further.

Following successful delivery of Phase 1 feasibility study, Phase 2 aims to prove the technical viability of the DCC™ as a zero-carbon replacement for the existing boiler in a short timeframe. The Phase 2 demonstrator will prove the technical viability of the DCC™ while demonstrating a clear path to full commercial operations.

Heating represents one of the largest sources of GHG emissions in the UK, around 37% of total GHG emissions, with industrial processes 14% of total emissions. The production of Scottish whisky is seven times more carbon intensive than gin and was estimated to produce around 530,000 tonnes of CO2 equivalent in 2018, the majority of which came from heat required in the distillation process. A key recommendation from the Sixth Carbon Budget is to take up low-carbon solutions and reduction of 78% to carbon emissions by 2035 from 1990 levels. The DCC™ technology presents a scalable and widely applicable way of decarbonising heat in the distilling industry and goes beyond a low carbon solution to a "net zero" solution. The application of DCC™ technology can effectively reduce the carbon emissions associated with distillation heat.

Eligibility Criteria

12. Eligibility Criteria

	Yes	No
1. Project Led - ***Projects must be led by a UK based company the same company that led Phase 1. The demonstration study must also take place in the UK.*** **Is the project being led by the same company that led Phase 1, and that the demonstration study will take place in the UK?**	X	
2. Technology and Transferability - ***The technology must be directly transferable to the distillation sector, including from maltings through to maturation.*** **Is the technology transferable to the distillation sector (from malting to maturation)?**	X	
3. Innovation and technology readiness - ***This Competition is to support the development of innovative fuel switching or fuel-switch enabling technologies that are directly transferable to the distilleries sector (from malting to maturation). It is to support the development of technologies that are not yet commercial from Technology Readiness Levels (TRLs) 4 to 7 at the start of the projects.*** **Will your technology/ system be at TRL 4 – 7 at the start of the project?**	X	
4. Innovation and technology readiness - ***The focus of the Competition is to support the development of innovative fuel switching or fuel switch enabling technologies that are directly transferable to the distilleries sector (from malting to maturation).***		

Exclusions: Funding will not be provided for projects where the technology development focuses on: ***- CCUS (Carbon Capture Utilisation and Storage)*** ***- Energy efficiency (apart from heat pumps which is in scope)*** ***- Switching of feedstocks, (except where feedstock provides chemical energy to drive the process)*** **Does your project exclude the technologies listed above?**	X	
5. Project status ***- BEIS is unable to fund retrospective work on projects.*** **Can you confirm that your application does not seek funding for retrospective work on this project?**	X	
6. Additionality ***- Projects can only be funded where evidence can be provided that innovation would not be taken forwards (or would be taken forwards at a much slower rate) without public sector funding.*** **Can you confirm the funding requested from BEIS for your project cost for Phase 2 will be equal to or below £3m?**	X	
7. Contract size ***- Phase 2 – Demonstration phase (SBRI): Split into Lot 1 (up to £5.99m) and lot 2 (up to £3m) with a total of £8.99m. The maximum funding available per project is £3m. If we don't receive sufficient bids (in number or in quality) to use the funding from one Lot we will reallocate funding to the other Lot if the bids in that Lot score the 60% pass mark All projects will be ranked against the assessment process and criteria (section 7). Demonstration studies must be complete by 12pm (noon) BST 15th March 2023.*** **Can you confirm the funding requested from BEIS for your project cost for Phase 2 will be equal to or below £3m?**	X	
8. Eligible project costs ***- SBRI is aimed at organisations working on research and development (R&D) of an innovative process, material, device, product, or service prior to commercialisation. Funding is available for R&D activities only, including related dissemination activity. Projects requesting funding for commercialisation activities are not eligible.*** ***The full list of eligible project costs is set out in Appendix 2 and outlined in Section 5 of the Green Distilleries Phase 2 Application Notes.*** **Can you confirm that requested funding is for eligible costs only?**	X	
9. Project end date ***- Phase 2 Demonstration Studies must be completed and approved by BEIS (projects need to allow for time for the BEIS monitoring officer to review the demonstration study final report and amend accordingly) by 12pm noon GMT 15th March 2023.*** **Can you confirm that the project will meet the specified project end dates?**	X	
10. Risk-Benefit sharing ***- The sharing of risks and benefits is an important aspect to the SBRI approach. Projects receive financial support and retain any intellectual property generated, with certain rights of use retained by BEIS. Project outputs are also expected to be shared widely and publicly and project teams are not permitted to include profit in the eligible project costs.*** **Do you agree to this approach?**	X	
11. Applicants and Project Team Make-up ***- The Phase 2 Demonstration project is expected to be delivered by a project team or consortium. A single project application must be submitted by the lead project member (the project co-ordinator).*** ***Members of the project team can be:*** ***• Private sector companies: both SMEs and large enterprises can apply as sole applicants or as part of a consortium with other private sector companies, or in a consortium with academic, research or public sector organisations.*** ***• Academic, research, public, third sector or community organisations must work as part of a project consortium with private sector organisations – they cannot be sole***	X	

applicants to this competition. ***The project team co-ordinator can be a private sector company, academic, research, public, third sector or community organisation as long as they have the necessary skills and capacity to effectively lead the proposed demonstration project and have a route to market.*** **Can you confirm that your project team meets eligible organisation requirements?**		
12. Planning, Regulatory and Environmental Permissions - ***Where planning, regulatory and environmental permits are required, the applicants must ensure that these permits will be in place to successfully complete the demonstration before the end of the Phase 2 Demonstration Study (12pm noon GMT 15th March 2023).*** **Can you confirm that the necessary permits required to successfully deliver the Green Distilleries Phase 2 project will be in place to successfully complete the demonstration before the end of the Phase 2 Demonstration Study (12pm noon GMT 15th March 2023)?**	X	

13. Delivering multiple projects - If project consortium member(s) are part of multiple successful bids they must be able to deliver on them and they must not have applied for funding for the same piece of work more than once.

	Yes	No
13 (a) Eligibility question: If you or your consortium are part of multiple successful bids would you be able to successfully deliver all projects if necessary?	X	
13 (b) Eligibility question: If you or your consortium are part of multiple successful bids could you please confirm that you have not applied for funding for the same piece of work more than once?	X	

Contact and Organisation Details

1. Protium Green Solutions Limited Contact Details

Title [This information has been redacted]

Name

Position

Email

Mobile Number

Organisation Website protium.green

2. Organisation Name

Protium Green Solutions Limited

3. The registered address of the Lead Organisation

Address Line 1 Unit 110

Address Line 2 164-180 Union Street

Address Line 3 -

Town/City London

Postcode SE1 0LH

4. County

Greater London

5. UK Region

London

6. Country

United Kingdom

7. Project Location: Is this registered address the location where the main activity of the proposed project will be carried out? If the answer is No you will be asked to provide location details in the separate Project Cost Breakdown Form.

No

8. Organisation Type

Private Company

9. Organisation Size

Small Enterprise <50 employees

10. Number of employees (including directors)

[redacted]

11. Company Registration Number

12080654

12. Turnover Amount (in most recent annual accounts)

[redacted]

13. Turnover Date (in most recent annual accounts)

* 31/07/2020

14. Balance Sheet Total (total assets net of depreciation)

[This information has been redacted]

15. Balance Sheet Date (total assets net of depreciation)

* 31/07/2020

16. Is the Organisation able to recover VAT?

Yes

17. Organisation Maturity

1-5 years

18. How is the organisation currently funded? (Choose all that apply)

[This information has been redacted]

19. Organisation Status: a brief introductory description of the company to set the scene for the assessors Maximum 250 words

Protium is a green hydrogen energy services company that develops renewable energy and green hydrogen infrastructure for clients to help them reduce their emissions and meet their (and the Government's) Net Zero targets. The infrastructure [This information has been redacted] The company is 22 months old and has grown to [This information has been redacted] employees withing a year and has begun delivering projects for clients. We focus on food and beverage manufacturing, heavy goods transport and aviation as our key sectors.

20. Does the organisation have a parent company? (If yes you will be asked to provide details)

No

1. Description of novel technology, technical feasibility, replicability and performance of Green Distilleries solution

1a. Please give a high level description of the proposed Green Distilleries solution, including a description of the novel technology, its technical feasibility and its replicability. (5%) (applicants can use the upload link to provide supporting evidence and illustrations

any further text beyond the word limit will not be assessed) With reference to the Phase 1 Feasibility study, applicants are expected to: Describe the technology readiness level (TRL) at the start of the project, and at the end of the Phase 2 Project. Describe why the Green Distilleries solution is novel and how it will support the decarbonisation of the distilleries sector. Describe how the proposed Green Distilleries Solution can be replicated across the distilleries sector and the advantages of this solution over other state of the art technologies. Describe how the solution(s) work, including a description of your engineering design for the demonstration, and how it fits into distillery processes to enable decarbonisation of the sector. Provide evidence to demonstrate that the proposed approach is technically feasible, providing justifications for all technical data provided. This should reference earlier feasibility work, including engineering designs, engineering calculations and the outputs of other feasibility research Explain how the outputs of the feasibility work you have carried out to date have informed your engineering design. Explain how your demonstration project will accelerate the development of fuel switching/fuel switch enabling technologies Describe the potential challenges and barriers of the proposed solution and how they will be overcome/mitigated. (Maximum 2000 words)

See GDC174 HyLaddie - 1a for charts and tables

Following completion of the Phase 1 feasibility, report submitted to BEIS in March 2021, Protium has been provided with further definition around the operation of the Bruichladdich Distillery. This has enabled Protium to provide a more comprehensive solution based on the original feasibility study. [This into

[redacted] Hydrogen has been identified as an alternative fuel source to help reduce emissions at whisky distilleries.

Graph 1.1: Bruichladdich Distillery Steam Consumption (September 2020)

For Phase 2 of the Green Distilleries Project, further feasibility will be carried out to confirm how power will be supplied to a 250 kW electrolyser via the grid using the existing connection from the distillery and how the elctrolyser and DCC™ will work together to deliver zero emission heat. Hydrogen and oxygen are expected to be produced at night-time, to take advantage of cheaper energy tariffs, the hydrogen will then be stored on land adjacent to the distillery, known as “the Croft”. During the day, the electrolyser will switch off and the hydrogen and oxygen from the croft will be fed onto the site and into the Direct Combustion Chamber (boiler) DCC™. The operating philosophy of the facility is to be confirmed during Phase 2 of the project. A summary of the proposed concept layout for this project is shown in Figure 1.1 below.

Figure 1.1: HyLaddie Conceptual Configuration

The objective of Phase 2 is to prove the technical viability of the DCC™ (a zero-carbon replacement for the existing boiler) in a short timeframe, enabling the scheme through further phases to be scaled to a commercially viable configuration. This unit will then produce hydrogen and oxygen, which will be stored offsite. Hydrogen and Oxygen from offsite will then be fed into the DCC™ during the day.
The operational configuration expected to be utilised for the demonstration, is as follows:
1. Run a 250 kW electrolyser with 0.8 tonnes of H2 storage and 6 tonnes of O2 storage.
The Phase 1 study determined the Bruichladdich distillery has the potential to import around 800 kVA of electrical import capacity from the grid on Islay which is operated by SSE. This is not fully utilised and site demand is below 500 kW during the evening, allowing for a 250 kW system to sit comfortably behind the meter without the need for grid upgrades. The configuration reduces the need for onsite storage of hydrogen and oxygen at the distillery and the associated risks. Bruichladdich are currently in the process of converting their electrical connection from low to high voltage, this will increase the amount of excess electricity that is available from the import connection.
Phase 2 will provide Bruichladdich and Protium with operational data for a 12-month period and two months of trial testing, while allowing for a rapid deployment and reduction of on-site CO2 emissions. It is envisaged that after Phase 2, when the technology and configuration is proven, hydrogen and oxygen will be produced from a larger commercial scale electrolyser offsite operating alongside a new renewable energy project on the island. Hydrogen and oxygen from this larger site can then be delivered to the croft and fed into the site using the existing installed DCC™ and associated piping / storage.
The appeal of this approach is that it can be rapidly deployed, it provides clear steps to de-risk the project to all parties and has a demonstrable path to delivering reduced GHG emissions and fuel costs.

While the DCC™ technology has been proven in the lab and in the field at small scale, there are potential challenges in commercially scaling it for use throughout the industry and for other heat and steam applications. The scalability challenges and potential mitigation strategies are:
· Currently there is one manufacturer in the UK who is supporting HTI and Deuterium to prepare the fabrication drawings for the suite of DCC™ capacities. Once these are prepared the DCC™ will be able to be manufactured by a variety of companies through a competitive tender process. This approach will achieve greater scalability.
· The DCC™ system's resiliency during continuous operations is not yet demonstrated, however the system will be fitted with multiple monitoring systems so that the operating data can be collected and analysed throughout its use at Bruichladdich.
As the distilling sector is committed to achieve net zero by 2050, the counterfactual would require hydrocarbon fuel substitution for distillery steam-raising. There are several options to achieve net zero emissions in the distilling sector however these counterfactual options also have several barriers to scale including:
· Electrified heat is not suitable for all remote and / or grid-constrained locations such as Islay.
· Biogas requires interventions, retrofit or complete replacement of the boiler system. Liquid biofuel can be viewed as a like-for-like alternative to the fuel oils in use currently, however it has relatively high production costs, supply chain and reliability of supply issues, GHG emissions and potentially land-use sustainability issues which operators may wish to avoid on ESG grounds.
Hydrogen blending can be utilised in systems that operate on natural gas to reduce the carbon emissions. However, this is not applicable for remote locations which do not have access or connection to the natural gas network, such as Islay.

To provide supporting evidence and illustrations upload your file/s here. Please do not upload any further text in order to go beyond the word limit, it will not be assessed. Max upload size per file - 10MB Max number of files - 5

- File: GDC174 HyLaddie - 1a.docx - Download
- File: HyLaddie DCC Final Version.jpg - Download
- File: BR_Dist_Hydro_7A_Email.jpg - Download
- File: BR_Dist_Hydro_7G_Email.jpg - Download

1b. Please give a high-level description of the performance of the Green Distilleries solution. (15%) (applicants can use the upload link to provide supporting evidence and illustrations, any further text beyond the word limit will not be assessed) With reference to the Phase 1 Feasibility study, applicants are expected to: Identify and compare the performance of their solution with other state of the art technologies Describe the technical and commercial advantages of your solution over other state of the art technologies Describe the scalability of the solution and applicability/replicability across different distillery sites (is the technology transferable to other industrial sectors?) Describe costs of the solution, providing a detailed analysis on the lifetime costs of your solution costs (including CAPEX and OPEX) comparing these costs to other state of the art technologies. Describe how the solution will impact product quality, costs and output. Identify any uncertainties associated with these cost estimates and how the design and execution of your demonstration study will address these uncertainties Explain the impact the solution would have on a site in terms of health & safety, air quality, fuel delivery logistics and production disruption and how the applicant will ensure the necessary risk assessments and training will be carried out. (provide a qualitative and quantitative comparisons to these impacts relative to the current state of the art technologies) Explain where planning permission/environmental permits are required, the applicant must justify and provide reasoning as to how these permits will be in place to successfully complete the demonstration before the end of the Phase 2 Demonstration Study (12pm noon GMT 15th March 2023) (Maximum 2000 words)

See GDC174 HyLaddie - 1b for charts and tables

The DCC™ configuration offers various performance advantages over its state-of-the-art competition:
· One main advantage of the DCC™ unit compared to other alternatives is the near-complete recovery of heat, resulting in >95% efficiencies. Since the technology relies on thermal condensing, only the superheated steam from the reaction comes into contact with the boiler tubes before being condensed back into water. In conventional fuel boilers, the flame and hot gasses transfer the energy to boiler tubes and then exit into the atmosphere via a smokestack – losing valuable heat in the process and

resulting in maximum efficiencies of 90%. 100% hydrogen boilers could also present ~92% efficiency, however, there is no evidence of this at an industrial scale (HySpirits project achieved 85% boiler efficiency). The increased efficiency of the DCC™ boiler contributes to reduced OPEX.
· The DCC™ unit produces zero emissions and air pollutants, contributing to the zero emissions distilleries goal. In contrast, all other hydrocarbon combustion boilers produce substantial amounts of CO2, NOx, as well as PM, and SOx emissions, where heavy oil and solid fuels are used. The lack of exhaust gases from the DCC™ reduces parasitic losses to a minimum, compared to other boiler types, due to the absence of from ID / FD fans. Other 100% hydrogen boilers eliminate CO2 emissions; however, they would require Flue Gas Recirculation (FGR) and/or other NOx abatement technologies to reduce NOx emissions necessary to comply with the MCPD, leading to increased CAPEX and OPEX.
· One significant issue raised by Bruichladdich distillery is the lack of available fresh water, which would limit the options for on-site electrolysis to produce green H2 and O2. However, the DCC™ unit offers a near complete closed-loop system, whereby all the products from combustion can be captured and recycled back into water for use by a H2 electrolyser. This is a significant advantage over other 100% hydrogen boilers, for which significant amounts of purified water would be required to be fed into an on-site electrolyser for hydrogen production, where there would be additional energy requirements in water purification and pumping / transportation.
· Other benefits of the DCC™ unit are based on its demand-response and the ability to adjust the variable output based on operating demand. The unit can fully ramp up or ramp down in seconds and has a cold start time of less than 5 minutes. The DCC™ unit offers instantaneous response to variable requirements. Traditional fossil-fuel based boilers offer less variable output flexibility or require greater reserves to do so, which uses up additional fuel, increasing OPEX.
· Lastly, the greater connectivity offered by the DCC™ unit allows for remote monitoring and control, along with proactive maintenance management.
With regards to scalability and replicability of the DCC™ compared to other distilleries, it should be noted that the steam demand of the process is proportionate to the size of the distillery and its annual production. Every distillery requires substantial amounts of steam (usually 1-10 MW scale), and as such the proposed DCC™ technology can be replicated in other distilleries. However, the current DCC™ tube boiler design limit is approximately 3 metres, meaning that the unit cannot be scaled up >5 MW. In situations where the demand exceeds 5 MW, a modular approach would be required using the existing tube boiler design, but with removable inbed coils, which allow the reaction box to be expanded to any size.

Following completion of Phase 1, DCC™ costs were refined and are as follows:
· CAPEX: [This information has been redacted], expected to reduce by 50% as major components benefit from economies of scale, improved efficiencies in manufacturing and a replicable design allowing more manufacturers to be consulted. CAPEX is expected to reduce with larger units, with a lower cost per MW of installed capacity since controls (one of the most expensive parts of the system) are only needed once and the same components can be installed for various unit sizes.
· Annual OPEX relies heavily on the local H2 and O2 production infrastructure. Green H2 from electrolysis costs vary between 7.5 pkWh to 14 pkWh currently, which is competitive with the carbon price adjusted cost of delivering fuels such as diesel, coal, or LPG (Liquified Petroleum Gas) to remote island locations. However, a report from the Hydrogen Council predicts that the cost of renewable H2 production will fall drastically by up to 60 % over the coming decade due to the declining costs of renewable electricity generation and the scaling up of electrolyser manufacturing. We therefore see green hydrogen costs falling to between 5.5 pkWh – 10 pkWh before 2030. Parasitic electricity costs of the DCC™ are limited, due to the absence of ID/FD fans.
· Maintenance costs: [This information has been redacted] Minor inspections expected on an annual basis, with major overhaul every 10 years.
· Lifespan of DCC™ unit: The boiler is made of stainless steel with nickel making it extremely durable and recyclable. The steam condensing characteristic provides a natural process barrier, further protecting the boiler tubes from potential hydrogen embrittlement. Provided the water chemistry in the boiler is maintained as per ASME guidelines it is not expected to wear out. A conservative approach is ~30 years, compared to 20 years of a 100 % H2 boiler.
The DCC™ unit is intended to supply steam to a closed process heating system and as such will not have a direct impact on product quality. The system will be developed to ensure that the current exceptional quality of the distilled spirits is maintained. Similarly, the system at prototype stage does not reflect an instantaneous cost saving, Bruichladdich prides itself on being a leader in decarbonisation and as such is not focused on purely economic gains. Bruichladdich is B Corp certified and committed to using business as a force for good, being a pioneer and beacon organisation for sustainability. As such the company sees the HyLaddie project as part of its positive contribution to the environment and local community and has inherent worth.
The existing Medium Fuel Oil (MFO) is shipped to the site by sea via the pier located near Bruichladdich. During the demonstration phase, all the hydrogen fuel will be generated on site, reducing CO2 emissions associated with fuel transportation. Should the project move to commercial phase, both the DCC™ and the electrolyser can be scaled to provide all the fuel for Bruichladdich,

reducing the need for future MFO deliveries and simplifying the fuel logistics for the distillery.
Generating fuel on site de-risks Bruichladdich distillery from potential future transportation disruptions, such as the recent Suez Canal blockage and providing them fuel independence. While maritime shipping is considered one of the lowest emitting freight options (10 – 15 g/tkm), the fuel shipping up from Liverpool to Islay is around 400 km each way once a month, generating 96 – 144 tonnes of CO_2 per year.
Financially, there is an element of future cost mitigation, given that the process currently uses medium fuel oil. Assuming a gradual increase in medium fuel oil (4% pa), and projected increases in the CCL (Climate Change Levy) and Carbon tax (in line with the latest BEIS estimates), a long-term increase in the price of MFO is expected at Bruichladdich almost double by 2040.

Graph 1.2: Long Term MFO Cost Impact on Bruichladdich

During Phase 1, a commercial study was conducted to determine the potential costs / savings that can be achieved by Bruichladdich during both the demonstration and full commercial phase of the project. Protium worked closely with Bruichladdich to refine the initial costs and assumptions made prior to Phase 1 and a revised calculation is presented that is also reflective of the current equipment design configuration. For brevity, the assumptions can be found in the Phase 1 report and only the results are presented.
The unit cost per kWh of hydrogen fuel vs. MFO will be significantly higher during the initial trial stage, but the increased efficiency of the hydrogen system will reduce the total fuel cost difference. We expect that during the demonstration phase the zero emission heat costs would be at a premium to MFO, however Protium believe that following a successful trial significant savings could be achieved as a second stage green hydrogen commercial production site is developed. The results for the demonstration phase are presented in Table 1.1.

Table 1.1: Bruichladdich Energy Costs for 2022

Beyond 2022, Protium's Phase 1 analysis showed a different commercial story. In addition to anticipated energy inflation increases in the price of MFO and in associated carbon related taxes over the decade, Protium analysis showed that a commercial scale deployment of green hydrogen could deliver zero emission green heat at a lower cost per kWh.

Table 1.2: Predicted Bruichladdich Energy Costs for 2030

The introduction of the DCC, electrolyser and associated gas storage will require planning consent and an environmental permit to operate.
Permitting: Bruichladdich operates the distillery in accordance with an existing Pollution Prevention and Control (PPC) permit from the Scottish Environmental Protection Agency (SEPA). A variation to the permit will be applied for, to include the addition of the DCC (anticipated to be regulated as a thermal plant of >1 MW input rating under Schedule 1B of the amended PPC regulations, despite having no emissions) and the electrolyser as a means of hydrogen production which is regulated under Schedule 1A Section 4.2 Part A (a)(i). Preapplication discussion with SEPA will commence immediately after Phase 2 begins. The negligible expected environmental impact of the proposed new additions will mean that the application will be concise and is not expected to require any detailed impact assessments. Preparation of the variation application should take no more than 4-6 weeks; a typical determination period by SEPA for a low environmental impact variation would ordinarily take no more than 6 months. It should be noted that SEPA has recently experienced a serious cyber-attack which has had long term consequences on the timeliness of their determinations, although the situation is expected to improve later in 2021 with a reasonable worst case of the variation application being concluded during 2022.
Planning: Planning permission will be required for the alterations and addition of the DCC to the Bruichladdich Distillery building and the use of the Croft as a gas storage facility. The distillery is currently classified as a Category C Listed Building and therefore listed building consent may also be required.
Preapplication discussion with SEPA will commence immediately after Phase 2 begins. Preparation of the planning and listed building consent applications will take place concurrently, with finalisation and submission within 4 weeks following end of FEED engineering. The statutory time limit for determination of planning and listed building consent applications is 8 weeks, which would result in determination in Q4 2021.

To provide supporting evidence and illustrations upload your file/s here. Please do not upload any further text in order to go beyond the word limit, it will not be assessed. Max upload size per file - 10MB Max number of files - 5

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2. Long term development plan, carbon saving, dissemination and delivery of Social Value

2a. Please provide a description of your long-term development plan for your Green Distilleries solution. (10%) (applicants can use the upload link to provide supporting evidence and illustrations, any further text beyond the word limit will not be assessed) With reference to the Phase 1 Feasibility study and how the Phase 1 feasibility study has helped influence these plans, applicants are expected to: Describe the long-term development plan for the technology, further development, commercialisation, and exploitation beyond the Green Distilleries competition (15th March 2023), including a credible route to market. Describe long term plans for further development, commercialisation, exploitation post project and how this lines up with HMG's legal target to achieve Net Zero and key government policies and roadmaps such as the 10 Point Plan, 6th Carbon Budget, Energy White Paper and the Industrial Decarbonisation Strategy Explain how the project/technology supports and enables goals set out in the 10 Point Plan, 6th Carbon Budget, Energy White Paper and the Industrial Decarbonisation Strategy. Highlight the key barriers and challenges to achieving commercialisation, timescales, and estimated long term development costs, and how these will be addressed. Describe the timescale and costs of your development plan Describe the market potential/replicability of the solution and how the solution could help achieve Net Zero (Maximum 2000 words)

See GDC174 HyLaddie - 2a for charts and tables

Protium Green Solutions has an affiliate organisation in the UK called Deuterium Heating Ltd that holds the exclusive rights to develop and commercialise the DCC™ unit across the UK. The IP was originally developed and proven at a pilot scale in Stockton California, it has not yet been fully developed or demonstrated at a commercial scale (or site). Deuterium aims to facilitate field demonstration projects to secure the requisite operating hours for full commercialisation of the technology, while developing additional IP and promoting the wider roll-out of DCC™ units across the UK and Europe. The HyLaddie project will be an important first commercial milestone for the technology, helping to understand in-field performance attributes, finalise costs, and develop case studies that can be incorporated in sales and marketing materials. The DCCTM technology lends itself to scalability as it:

· Can be retrofitted as a brownfield installation to existing facilities.
· Can be applied to remote locations that are grid constrained and may not have access or connection to a natural gas network. This is particularly the case in Islay and other remote parts of Scotland where distilleries are located.
· Uses stainless steel as materials of construction which are not rare materials and are easy to source and recycle at end of use.
· Does not require any novel fabrication methods.
· Requires significantly less operation and maintenance vs. a traditional boiler due to the reduction of moving parts and the cleanliness of the products.
· Is modular in design, allowing for scale to meet any steam demand.

The distilling sector is committed to achieve net zero by 2050 and for most distilleries this would require finding a substitute to hydrocarbon steam generation. In order to achieve the high distinction Scotch whisky's receive, distilleries take advantage of the natural Scottish rivers and burns and are in rural areas which do not necessarily have the grid and natural gas infrastructure in place. On Islay, where eight distilleries are located, there is no natural gas connection, and the grid connection is likely insufficient to support electric heat generation for all the distilleries. All eight distilleries generate steam from MFO delivered by ship from Merseyside. This project aims to prove the viability of generating steam from green hydrogen by demonstrating the applicability of the DCC™ at Bruichladdich. Following a successful demonstration phase of the project, the application of the DCC™ has the possibility to be applied to all distilleries across Islay, removing the need for any MFO deliveries to the island and operating all distilleries on hydrogen. [This information has been redacted]

[This information has been redacted] The emissions savings are even greater when potential future expansion plans are factored in which will lead to greater CO2 emissions if the distilleries remain operating on MFO.
As the project moves beyond Phase 2 into the commercial stage, the generation of hydrogen and oxygen can be done using a commercial scale electrolyser combined with renewable developments in the local area such as the West Islay Tidal Farm (initially 30 MW growing up to 400 MW at full scale). This provides a significant opportunity to capitalise on excess power for green hydrogen and oxygen generation. Utilising local large capacity renewable energy assets offers both Bruichladdich and the other distilleries a potentially commercially viable green hydrogen source, generated at a centralised location on Islay and delivered to each distillery. As mentioned previously, the DCC™ technology once proven at Bruichladdich can be rolled out to the other distilleries on Islay. The modularised designs of both the DCC™ and electrolysers lend themselves to scaling up and relocation around Islay.
Combining this with a centralised green hydrogen generation hub, this technology can be used to decarbonise all distillery operations on Islay. This centralised hydrogen hub will provide the opportunity for Islay to be a net exporter of hydrogen to other neighbouring distilleries. For example, on the neighbouring island of Jura there are two further distilleries for Jura Whisky and Lussa Gin. The DCC™ technology could potentially be applied to both distilleries and be supplied with hydrogen from the Islay Hydrogen Hub. Looking beyond the decarbonisation of the distilleries, the green hydrogen hub can be used to provide hydrogen for mobility and transport operations such as buses and heavy goods vehicles on Islay, providing the island an opportunity to reach “Net Zero”.
The implementation and development of the DCC™ is aligned with two points from the governments “Ten Point Plan for a Green Industrial Revolution”. As the DCC™ technology uses hydrogen and oxygen, it synergises perfectly with the electrolysis of water which produces the two main feedstocks. DCC™ technology will likely coincide with the growth of the global electrolyser market which has the potential to reach 2,600 GW by 2050 compared to 0.2 GW installed today, capitalising on economies of scales and aligns to Point 2: Driving the Growth of Low Carbon Hydrogen. The DCC™ emits no carbon-based or NOx pollutants when burning pure hydrogen with pure oxygen under vacuum conditions, setting a new Best Available Technology (BAT) benchmark. As such, it outperforms the Industrial Emissions Directive (IED) as well as the Medium Combustion Plant Directive (MCPD) emission limit values for CO and NOx emissions and shows clear innovation in the hydrogen boiler industry, aligning with Point 10: Green Finance and Innovation. Additionally, the DCC™ technology aligns ideally with several UK government published goal from, including but not limited to, “Powering our Net Zero Future” and Climate Change Act.
Heating represents one of the largest sources of GHG emissions in the UK, 37% of total GHG emissions, with industrial processes 14% of total emissions. The production of Scottish whisky is seven times more carbon intensive than gin and, is estimated to produce around 530,000 tonnes of CO2 equivalent in 2018 with the majority of that from the heat required in the distillation process. A key recommendation from the Sixth Carbon Budget is to take up low-carbon solutions and reduction of 78% to carbon emissions by 2035 from 1990 levels. The DCC™ technology presents a scalable and widely applicable way of decarbonising heat in the distilling industry and goes beyond a low carbon solution to a “net zero” solution. The application of DCC™ technology can effectively reduce the carbon emissions associated with heat for distillation.
DCC™ technology is suitable for any sector which makes use of hot water and steam eliminating the need for fossil fuels in the generation of industrial heat, a typically difficult to decarbonise sector. This is highlighted in the Energy White Paper which states “production and use of clean hydrogen will be important in achieving net zero emissions by 2030”. While the DCC™ technology is by no means a silver bullet to solving the problem of decarbonising heat, this technology can be widely applied across the heat generation industries. This is further reflected in the Industrial Decarbonisation Strategy, specifically in Chapter 4 around fuel switching, where a governmental aim is to speed up the industrial processes transition to low carbon alternatives. This project is the first if its kind in the world, not just the UK, and if proved viable will set a template for replication globally and put UK at the spearhead of decarbonisation around the world.

The combination of using green electricity from renewable sources to generate green hydrogen and oxygen via electrolysis and in turn generating steam and heat is a net zero solution to the problem of decarbonising industrial heat.

To provide supporting evidence and illustrations upload your file/s here. Please do not upload any further text in order to go beyond the word limit, it will not be assessed. Max upload size per file - 10MB Max number of files - 5

- File: GDC174 HyLaddie - 2a.docx - Download

2b. Please provide figures for the estimated carbon savings generated by your Green Distilleries solution and explain the wider benefits that your Green Distilleries solution will contribute to. (10%) (applicants can use the upload link to provide supporting evidence and illustrations, any further text beyond the word limit will not be assessed) With reference to the Phase 1 Feasibility study where applicable, applicants are expected to describe the commitment your organisation will make to ensure that opportunities under the contract deliver Social Value Policy Outcomes, via the following: Estimate the potential emissions savings from the solution and provide the basis behind the calculation for your site and if replicated across the distillery sector/other industrial sectors. Please provide further justification and reasoning behind calculations used to calculate carbon savings attached as an Annex as part of your application form. Describe how the emissions savings will contribute to the UK's Net Zero by 2050 target. Provide information about job creation and other benefits generated because of the Green Distilleries proposal, including those beyond the Green Distilleries competition. Describe how the project will benefit and impact the local environment and community beyond the Green Distilleries Competition Describe how the project supports the Government's plans of "Build back better" and "levelling up" of the economy (Maximum 2000 words)

See GDC174 HyLaddie - 2b for charts and tables

The current Bruichladdich boiler uses Medium Fuel Oil (MFO) to generate steam, this has a significant carbon footprint. By switching to the DCC™, using hydrogen and oxygen gas, the distillery could significantly reduce emissions if the gases are produced through the electrolysis of water using renewable energy. For Phase 2 of the project, the hydrogen and oxygen gases fed to the DCC™ will initially be produced by a 250 kW electrolyser connected to Bruichladdich's electrical import connection. While this connection is a "guaranteed green" contract which theoretically means that 100% of Bruichladdich's electrical energy is supplied from renewable sources, some of the power on the Scottish grid does come from natural gas (albeit a declining %). Fortunately, the Greenhouse Gas (GHG) intensity of the regional electricity grid in Scotland is much lower compared to the national UK grid intensity, which means that the project will deliver greater GHG savings from grid-powered electrolysis in Scotland than continued use of MFO.
The emissions reductions calculated during Phase 1 grant application were refined for the technical configuration proposed for Phase 2. The assumptions for the calculation can be found in the Phase 1 report and the full calculation has been included within the Appendix. The results for the emissions reductions are presented in Table 2.2.

Table 2.2: Current and future CO2 emissions for BAU and Hydrogen scenarios

Due to batch operation for gin and whisky production, the distillery does not need to reach full boiler replacement to achieve a product based on hydrogen generated steam. The demonstration phase of the project allows the production of individual batches that has the potential to be produced from hydrogen generated steam. While whisky has a long maturity, gin can come to market within a short time period and sold during the demonstration phase.
The smaller system and grid connection does mean that the emission reductions achieved will not be as high as the full-scale solution and green hydrogen sourced from dedicated renewables. However, this configuration will allow the project partners to prove the technology in the shortest timeframe possible and will deliver GHG emission savings compared to Business as Usual (BAU). The DCC™ proposed for the Phase 2 demonstration project has been sized for future full commercial application at Bruichladdich. The scale up to full commercial phase will include the addition of a commercial scale electrolyser, estimated to be at least 2 MW, with a tie-in to a new build renewable power project.
The full 100% decarbonisation benefit the DCC™ solution will be unlocked with the provision of green electricity.
In addition to reducing CO2 emissions, the European Environment Agency has published additional emission factors for air pollutants under the EMEP/EEA Pollutant Emission Inventory Guidebook 2019. The following emissions were extracted from Table 3.9: Tier 1 emission factors for NFR source category for liquid fuels. Based on typical properties for medium fuel oil, the gross calorific value is expected to be 41.08 MJ/L.

Table 2.3: EEA Typical Emissions Factors

In addition to the above pollutants, the combustion of medium fuel oil can emit harmful and poisonous heavy metals into the air such as Pb, Cd, Hg, As, Cr, and Zn. Comparatively, the DCC™ unit produces zero GHG emissions and air pollutants. By sourcing green hydrogen on-site (which is not included in the feasibility study) as fuel, there would be zero emissions across the life cycle of boiler operations. Indirect GHG emissions and air pollutants, such as those released from the extraction, processing and distribution of medium fuel oil to the Distillery would also be eliminated.

The avoidance of air pollutants is particularly important for the island of Islay because of high per capita emissions and relatively poor air quality on a per capita emissions basis. The emission levels on Islay are 16 tonnes CO2e per capita, significantly higher than the UK average of 7 tonnes CO2e, per capita. Since the island does not have a natural gas grid, most of its industrial and residential heating and heavy power needs come from the combustion of solid and liquid fuels, which produce more pollutants and emissions than natural gas. Conversion of heating technologies to the DCC™ will have a material impact on air quality on the island and for the health of its inhabitants. Additionally, the island has freshwater constraints, which necessitates minimal water consumption. The DCC™ solution is unique in its ability to continuously recycle the water produced by hydrogen combustion for reuse in the electrolyser loop substantially reducing the water demand.
The emission savings from the HyLaddie project will contribute to the UK's Net Zero by 2050 targets by directly reducing emissions from heating for buildings and industry, and offering a future pathway accelerating those emission reductions. As mentioned previously, heating represents one of the largest sources of GHG emissions in the UK with industrial processes representing 14% of total emissions. To achieve the UK's Net Zero targets, these emissions must be reduced by more than 95% through the adoption of alternative technologies like those fuelled by hydrogen. Hydrogen will be suitable for any sector which makes use of hot water and steam: related food and drink sectors such as brewing, food processing, baking, vegetable oil extraction etc. Industrial sites that could take advantage of the DCC™ technology are those which:
· Are close to frequently curtailed renewables, e.g. wind turbines which undergo significant periods of generation where power export is not possible due to grid conditions. Production and storage of hydrogen enables long term storage of excess renewable power.
· Are close to tidal arrays where the diurnal profile can be buffered by hydrogen generation and storage.
· Are connected to the gas grid and could take advantage of centralised hydrogen production and distribution if current plans to repurpose the grid to carry hydrogen are successful.
In the UK's Clean Growth Strategy, the Government plans to phase out the installation of high-carbon fossil fuel heating in new and existing businesses that are not connected to gas grid by 2020. The HyLaddie project directly supports this government ambition by commercialising a new low-carbon heating solution to the UK market.
In relation to the government's plans for "build back better", this project sits at the forefront of hydrogen for heating and potentially provides the framework for the next step in using hydrogen for providing industrial heat. Between manufacturing, assembly, installation and providing fuel to operate a DCC™ unit, Protium predicts an average of five jobs created per installation. This would equate to more than 1,800 direct and permanent jobs created across the UK if the proposed configuration were to become the new normal for the 360+ distilleries across the UK. Most of these jobs would be created in remote locations and industrial towns, thus supporting the governments "levelling up" agenda and expanding the UK supply chain for green hydrogen technologies.

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- File: GDC174 HyLaddie - 2b.docx - Download
- File: GDC174 - Appendix - Emissions table.docx - Download

2c. Please provide a description of your dissemination plan for your Green Distilleries solution. (10%) (applicants can use the upload link to provide supporting evidence and illustrations, any further text beyond the word limit will not be assessed) Applicants are expected to: Identify the relevant stakeholders, including plant manufacturers and suppliers, end users, trade bodies and academia Provide a dissemination plan, including a timetable for any dissemination activities, describing how the learnings from the demonstration study will be shared with industry. The plan should include key stakeholders, lessons learnt, and any challenges faced during delivery. Describe how the outputs of the demonstration study will be disseminated beyond the end of the Green Distilleries Competition (15th March 2023) (Maximum 1000 words)

See GDC174 HyLaddie - 2c for charts and tables

To ensure the outputs from Phase 2 will inform future practice in the distilleries sector, a crucial part of this project is to share the working experience of fuel switching to hydrogen and application of a novel technology in the DCC™. The following dissemination strategy has been developed.
Using a multi-channel approach to dissemination we will combine our dissemination programme with project milestones. We aim to use feedback from the dissemination process in informing further work

and problem solving. We have a goal of face-to-face dissemination events, although it is anticipated that this is unlikely in all circumstances due to the possibility of changing Covid restrictions.
Through stakeholder mapping we will identify key dissemination audiences at different milestones throughout the project. The consortium will maximise exposure to industry and other interested parties using a variety of dissemination channels and activities, including:
· Engagement of key stakeholders via round table discussions organised by/through our membership of relevant trade organisations including:
· Food and Drink Federation,
o In the recent FDF Net Zero report Deuterium was explicitly referenced as an available technology for heating in the sector (Page 13).
o FDF Webinars secured for June and October 2021
· Scottish Whisky Association.
· Maltsters Association of Great Britain
o Protium recently presented to the Maltsters Association on opportunities for hydrogen in the sector with positive feedback from the members.
· UK Hydrogen and Fuel Cell Association
o Protium CEO Chris Jackson is the Chair of the UKHFCA. Additionally, Chris chairs the UK Hydrogen Coordination Forum and has been asked to join the BEIS Advisory Council 'Sector Development' subcommittee. Protium is a founding member of HyCymru and a member of SHFCA.
· Webinar presentations of the project, including challenges, findings and lessons learnt that may be of use to others considering similar projects. These will be organised/promoted with trade associations to reach a wide audience through their proprietary email lists.
· Presentation of findings at trade organisation events such as the FDF Conference to engage with a wider audience.
· Direct online promotion by consortium members on our own websites and social media channels (YouTube, Twitter, LinkedIn).
· Direct email to relevant clients through consortium mailing lists.
· Industry White Paper.
· Presentation of project and key concepts to relevant stakeholders attending COP26 in November 2021 – Publication of an industrial white paper.
· As appropriate, press releases to general public on project deliverables and next steps. Protium works with Bold White Space as their communications agent to disseminate Protium's announcements to national and trade media.
· Chris Jackson (Project Director, as described in Q4A) is one of the co-hosts of the Everything About Hydrogen podcast. The largest global hydrogen podcast listened to in over 130 countries with an average audience of 7,000 listeners per month.
· Protium has relationships with universities where the project would be of keen interest, specifically Protium has a relationship with Professor Cook of the University of Nottingham Brewing, Malting and Distilling School.
Additionally, information will be collected, and networks established throughout this study to further inform and strengthen the strategy.
Finally, should the project result in the DCC™ technology being successfully integrated into production at the distillery, Bruichladdich's brand team will perform an all channels, social media take over and marketing campaign based on the progressive and innovative fuel switch and emissions reduction nature of this technology. Bruichladdich will disseminate news of the project to its consumers, competitors and throughout its supply chain in this way and, through these communications, will encourage engagement and questions, thus widening the exposure and accessibility to information as far as possible. Due to the way the distillery operates in batches for both gin and whisky production, Phase 2 of the project will allow for both gin and whisky to be produced based on steam entirely generated by hydrogen. Gin will be able to be brought to market within a short time and in close alignment with Bruichladdich's current 'go one' marketing campaign

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- File: GDC174 HyLaddie- 2c.docx - Download

3. Project Financing

To accompany your application you must upload the Green Distilleries Project Cost Breakdown Form here. Max upload size per file - 5MB Max number of files - 1

- File: HyLaddie Phase 2 Finance Form.xlsx - Download

3a) With reference to the Phase 1 Feasibility study and how the Phase 1 Feasibility study has helped firm up these costs, applicants are expected to: Fully fill in the Green Distilleries Phase 2 project finance form. Clearly demonstrate that the project can deliver a workable solution (including the use of modelling or demonstration). Provide clear reasonings to the overheads and eligible costs Provide reasonings and justifications behind cost estimates, including any contingency and assurance planning for costs (please attach any evidence in terms of letters of support, contracts, existing agreements along with your Phase 2 application). Provide a detailed description of major cost items greater than £10,000. Justify costs and provide certainty of availability and assurance of costs provided for materials, equipment and products that are required for the Green Distilleries Phase 2 Project. BEIS normally calculates overheads as a fixed percentage of all direct labour costs at 20%, but in exceptional circumstances the overhead rate could be higher, applicants will have to justify overheads above this percentage, this must be fully detailed in the application. (Maximum 1000 words)

See GDC174 HyLaddie - 3a for charts and tables

The HyLaddie consortium are requesting £2,997,542 of grant funding from the Green Distilleries Competition. This funding is split into the following:

Table 3.1: Project Cost Breakdown

Capital costs have been gained through engagements with OEMs during the feasibility studies whilst factored cost estimates have been calculated from discussions with EPCs industry best practice from Protium's internal experts. Engineering and civils work will include costs subcontracted to the selected EPC, these costs will include additional FEED and Detailed Design work to be completed ahead of construction. The consortium have requested funding to cover staff costs, overheads, and travel to the Bruichladdich site. Finally, additional grant funding has been sought to cover operating costs during the 12 months of operations planned for the project. These costs will support feedstock, materials and maintenance costs for the production of hydrogen and equipment respectively.

Capex, Materials & Subcontractors
Prior to conducting the Phase 1 study, all project costs were calculated based on factored equipment costs and rule-of-thumb type estimation which resulted in an AACE Class V estimate (+100%/-50%). As the project progressed and the equipment sizes configured, the main equipment vendors were contacted to obtain budgetary quotes therefore bringing the equipment cost accuracy to AACE Class III (+30%/-20%). There are presented in Table 3.2 below.

Table 3.2: Main Equipment [This information has been redacted] CAPEX

Several EPC providers were consulted for non-binding budgetary quotations during Phase 1 to obtain engineering and construction costs. Due to the confidential nature of the information regarding the project prior to Phase 2 award, the EPC contractors were provided with limited information and therefore could only price the project based on norms and factors typically associated with these projects. Protium then adjusted the generic factors to bespoke factors, based on engineering judgement, to be more suitable for Project HyLaddie. The full break down for the project costs are presented below in Table 3.3.

Table 3.3: Project HyLaddie Total Installed Cost (TIC)

The line items included within the TIC costs are all typical items associated with an EPC project and based on the combined experience of several high-profile EPC companies with experience in successfully delivery million pound to multi-billion-pound EPC projects. Due to the estimate being a factored estimate, the contingencies for the costs are included within the factors.
The TIC cost presented is reflective of the 250 kW electrolyser. This however does not consider potential value engineering during FEED and long-term commercial negotiations that would occur during the procurement stage of the project which has the potential to bring down the cost of the equipment.
Following award of the Phase 2 grant, Protium will work collaboratively with the OEMs and EPC

Contractors to obtain binding quotations on the FEED and EPC costs.

Consortium Costs
As Project managers Protium will manage all consortium and subcontractor partners to deliver the project. Protium's team will be responsible for preparing the commercial proposition, leading all negotiations with external parties and overseeing the project. Onsite Bruichladdich's team will support the project through any data inputs needed, site assistance and access, and facilitation with integrating the new system to the existing system. Deuterium will provide their expert advice on the installation of the DCC™ during the development phase. Additional work will be carried out by Deuterium during operations. , ITPEnergised will support the consortium by leading engagement on planning and permitting. They will be responsible for ensuring all permits are in place ahead of operations commencement and drive local council outreach to ensure all necessary stakeholders are consulted.

Operating Costs
To facilitate the deployment of this project the consortium will seek to claim support to cover operating costs. Costs are assigned into two categories:
• Production of hydrogen,
• DCC™ spares and contingencies
• Maintenance.
The consortium will manufacture green hydrogen with green electricity and water. The key cost for hydrogen production will be electricity sourced through Bruichladdich's existing green PPA. The costs covered will be those in excess of Bruichladdich's existing energy costs [This information has been redacted] Based off the consortium's modelling this would total [This information has] across the year.
As a process electrolysis and hydrogen storage are well understood and will likely incur limited maintenance costs. The DCC™ builds on existing boiler technology which is a familiar to industrial heating engineers, however as a new deployment at a commercial site the consortium will seek additional maintenance costs to ensure the system operates maximally and all safety concerns are addressed on an ongoing basis throughout the project. This additional cost would include onsite staff and spare materials; as modelled would be [This information has been redacted]
Operating costs model is attached: HyLaddie Feasibility Operating Cost Model 050521.

To provide supporting evidence and illustrations upload your file/s here. Please do not upload any further text in order to go beyond the word limit, it will not be assessed. Max upload size per file - 10MB Max number of files - 5

- File: GDC174 HyLaddie - 3a.docx - Download
- File: HyLaddie Feasibility Operating Cost Model 050521.xlsx - Download

3b) Value for money to HM Government - Please describe how your Green Distilleries solution represents good value for money for HM Government. (15%) (applicants can use the upload link to provide supporting evidence and illustrations, any further text beyond the word limit will not be assessed) Applicants are expected to: Provide evidence for the additionality achieved with this funding. Demonstrate a fair balance of risk and benefits for BEIS, including no element of profit in the project costs. Describe why the proposal represents good value for money for HM Government, where costs are realistic and justified and are likely to secure the expected project aims and deliverables, including the selection and costing of suppliers and subcontractors. The answer should explain the following: How the availability of public funding makes a material difference to the actuality and pace of moving the solution towards commercialisation, and Qualify and quantify the savings that are being passed on to HM Government to reflect the asymmetric balance of risks and benefits accruing to the project consortium and HM Government. (please refer to Risk-Benefits sharing Section 4 (10) of this application guidance form). As part of the assessment process for Phase 2, project teams will be asked to clearly state, where cost savings are being provided compared to exclusive development contracts. These cost savings form part of the eligibility conditions for the Competition, i.e. projects that do not offer justified cost savings will not be eligible for Phase 2 funding. (Maximum 1000 words)

See GDC174 HyLaddie - 3b for charts and tables

The production of Scotch generated ~530,000 tonnes of CO2 equivalent in 2018; the consortium's Phase 1 report showed that there was a technically and commercially viable process that could reduce these emissions to 0 tonnes of CO2e. This funding from BEIS will allow the consortium to

demonstrate this, progressing our journey towards Net Zero in the UK and in one of Scotland's most important industries.
Bruichladdich's commitment to sustainability is clear through their aggressive zero emission targets and their certification as a B-Corp however the COVID-19 pandemic has increased pressure on all companies looking to invest in their sustainability initiatives. With Government support the consortium will be able to mitigate the challenge of investing in a core sustainability initiative when market liquidity is low. Government support will derisk the installation of the DCC™ at Bruichladdich who otherwise may have looked at lower carbon fuels or energy efficiency improvements which would not deliver the material emissions reductions required by the Government's Net Zero targets costing the government more in climate change mitigation and adaptation in the long term. The return on investment will be realised in:
· New manufacturing jobs (both for the DCC™ and electrolysers)
· A scalable zero emission heating solution (for roll out across the distilling sector)
· Improved air quality, fewer respiratory illness demands on the NHS
The consortium has committed to working at economic cost rates for this project reducing the cost to government (See table 3.3 at bottom of section). The remainder of this section will review each of the above statements to demonstrate how funding will provide additionality, risks and returns are apportioned, and value for money.
Manufacturers are apprehensive when it comes to alterations of their existing heating configuration due to the mission critical nature of heat in many manufacturing processes. Deuterium's DCC™ solution has been successfully demonstrated at a test scale, however many companies are cautious about being early adopters of new technologies that haven't been widely tested, particularly when the changes affect their processes and end products. During Phase 1 the consortium advanced the design of the DCC™ system for a manufacturing site, sized the equipment such that it can deliver savings beyond the demonstration phase, and identified a UK manufacturer (Unit Birwelco). We are now confident that the solution can be manufactured and installed at the Bruichladdich site. A further challenge exists due to the lack of equipment integrators who can provide both low emission technologies, and low emission fuels.
Given these impediments, public funding would make a material difference to both Bruichladdich and Protium, to help achieve the Distillery's net zero emissions targets and deploying and refining Deuterium's innovative heating process. Whilst the DCC™ boiler solution has been operational at a pilot scale; the technology has not been deployed at a commercial site. Public funding for this project would reduce the risks for Bruichladdich to investigate a new heating solution and offer a pathway for accelerating the testing and verifying of the technology. Without funding it will be difficult to deploy the DCC™ boiler commercially until later in the decade when more stringent penalties are applied to those using high emitting fuels.
By awarding funding to the consortium, the Government would assume the technology risk associated with a TRL 7 asset and expedite the deployment of said asset. In acknowledgement of the Government's investment the consortium will deliver the project at cost. To calculate the project capital costs we have engaged several suppliers for all equipment to ensure we have fair costs. The suppliers would expect to provide engineering and installation work for their equipment with the project being wrapped by an EPC company (not selected). We have benchmarked our equipment costs against our preferred partners that we have an existing relationship with and for whom this project would have a material impact on their companies' credentials. In that respect Protium is investing its existing goodwill with suppliers to maximise the return on the government's investment.
The size of the proposed electrolyser system have been designed to deliver the greatest amount of hydrogen/emissions reductions without excessively impacting the available space at the site. Both configurations will deliver meaningful decarbonisation at the site with the possibility that the steam demand could be targeted to decarbonise a specific batch of production each week. The consortium hopes to be able to produce zero emission product during demonstration delivering immediate returns to both the project and the Government's initiative. The equipment has also been sized so that the DCC™ could meet the distilleries entire thermal demand (were enough hydrogen supplied). This means that following a successful demonstration Protium would seek to deploy a commercial scale deployment on Islay.
Public funding will make a material difference to the actuality of the DCC™ boiler solution, accelerating commercialisation of this technology. Phase 1 helped the consortium to advance the design of the system for the distillery and select a UK manufacturer for the boiler (Unit Birwelco). Unit Birwelco is a South Wales based company seeking to deliver the first DCC™ systems for the UK market, in turn creating new jobs, deepening the UK's expertise as a boiler manufacturer, and sustainability hub. As one of the first deployments of its kind this will be a critical project for defining the experience required for these jobs (both in boiler manufacturing and hydrogen production).
The consortium sees the initial government investment as seed funding which could deliver deep decarbonisation of Islay and provide a roadmap for decarbonisation of other islands around the UK. A significant RoI for the UK Government.
Finally, additional cost savings for the HM Government from the emission reductions are from healthcare, avoided air pollutants like NOX, SOX, and PM. According to studies conducted by the NHS, the health and social costs of air pollution in England could reach £5.3Bn by 2035 without action to reduce NOX and PM emissions.

Table 3.3: Project HyLaddie Cost Savings

To provide supporting evidence and illustrations upload your file/s here. Please do not upload any further text in order to go beyond the word limit, it will not be assessed. Max upload size per file - 10MB Max number of files - 5

- File: GDC174 HyLaddie - 3b.docx - Download

4. Project delivery and teams

4a. Project team and Organisation – Please provide a description of your project team and organisation for the Green Distilleries Phase 2 Demonstration Study. (10%) (Please attach any CVs to the application prior to submission) (applicants can use the upload link to provide supporting evidence and illustrations, any further text beyond the word limit will not be assessed) Applicants are expected to: Identify the skills and competencies necessary for each task. Provide an organogram mapping skills, competencies, roles, and responsibilities (including percentage of overall time that key members will be dedicating to the project). Outline the key roles for each partner and the proposed governance arrangements between the partners to ensure effective project delivery. List any external parties responsible for delivering goods or services worth more than 10% of the total project value and explain how they will ensure that these parts of the project do not give rise to delays in the delivery of the project. Guarantee access to any necessary specialist facilities, operational knowledge and skills, or other resources required to execute the project. Provide details of the relevant skills, qualifications, and experience of main project team members including descriptions and evidence of previous relevant work carried out. Include brief details of relevant previous projects, including the date, location, client and project size. Provide brief CVs of lead individuals within the project team in an Appendix to the Application (CVs should be no longer than 2 pages each). Have a strong delivery team with proven experience of successfully delivering comparable projects. (Maximum 2000 words)

See GDC174 HyLaddie - 4a for charts and tables

Figure 4.1 presents the proposed organogram for Project HyLaddie Phase 2.

Figure 4.1: Project HyLaddie

A description of the knowledge and expertise of the Project HyLaddie delivery team is presented below:
Executive Committee (Chief Executive Officer) – [This information has been redacted] [This informa] is the CEO of Protium and the Director and Founder of Deuterium Heating [This informati] previously led the World Bank's research into Hydrogen & Fuel Cells, in addition to other new renewable technologies, prior to this [This informa] worked at Temporis Developments, a renewables project developer. Currently [This informa] is working on two fuel switching projects for a large brewer and food and beverage company worth ~£200m and ~£40m respectively. In 2018 [This informa] worked with the governments of Saudi Arabia and the UAE to advise them on their energy strategy and policies for renewables and hydrogen. [This informa] is a contributing author to six World Bank publications on renewable energy and recently wrote the world banks hydrogen and fuel cell report. Additionally, he is well known as the co-host of the Everything About Hydrogen podcast and is the Chair of the UK Hydrogen & Fuel Cell Association.
Executive Committee (Chief Project Development Officer) – [This information has been re] (Protium): [This informa] is a highly experienced Entrepreneur and Engineer within the energy field. He is a Founding Shareholder and Executive Board Member of Advanced Power AG a business that develops, structures and finances low carbon electricity in Europe and North America. Since its formation nearly 4,000 MW of projects developed by Advanced Power have been constructed and Advanced Power continues to manage 3,000 MW having raised in excess of $4 bn of construction capital. During his 35 years in the power industry [This informa] has been involved in all aspects of the power industry including the manufacturing, development construction and operation of power plants. [This informa] has a deep knowledge of the European Energy system and supports conferences within this field as an Advisory Board member of the Enlit conference team and a Fellow of the Institution of Mechanical Engineers.
Executive Committee (Chief Commercial Officer) – [This information has been redac] (Protium): [This information has been redac] is one of the leading voices of hydrogen globally. He has developed and led a number of ground-breaking

hydrogen projects in recent years, increasing knowledge of the cross-sector / cross-vector opportunities presented by hydrogen – how hydrogen can help decarbonise power, heat, transport and industrial applications. [redacted] has extensive experience of international business development and consultancy in the petrochemical, fine chemical, and pharmaceutical sectors. He gained an MSc in Managing Catalytic Technology from Liverpool University and is a member of the Royal Society of Chemistry.

Executive Committee (Chief Operations Officer) – [redacted] (Protium): [redacted] has 4 years' experience working for KPMG in its Deal Advisory team in the Middle East. During this time he worked on the due diligence for the Public Investment Fund's acquisition of a stake in ACWA Power and on KPMG Saudi's largest project managing a public-private partnership for the Saudi Ministry of Labour. Experience at managing teams in unstructured environments, [redacted] lead operations at several start-ups following his return to the UK and helped them grow. At Protium, [redacted] has worked across all aspects of the business and leads in the development of the company's project financing models. He holds a Masters degree in Middle Eastern Economics and Arabic from the University of London and a Bachelors in Politics, Philosophy and Economics from the University of York.

Lead Project Manager – [redacted] (Protium): [redacted] is the Head of Regulatory Affairs & Manager of Protium Wales as well as a manager at Deuterium. She was also the Chief Engineer at the Institution for Mechanical Engineers in London. [redacted] has a PhD from Cardiff University examining hydrogen from waste technologies, an MSc in Sustainability, Planning and Environmental Policy and a BEng in Environmental Engineering also from Cardiff University. [redacted] is a member of the Institution of Mechanical Engineers, IOM3 and is a Chartered Engineer and Scientist.

Lead technical delivery – [redacted] (ITPE): [redacted] (BSc(Hons.), CEnv, Csci, MIEnvSc, FIAQM) has over 25 years of experience in the environment industry, more than 20 years of which has been in consulting. [redacted] has produced a suite of guidance for regulators in the UK on gaseous and particulate monitoring techniques which called on this direct experience. In the 2000s he developed innovative major capital project carbon footprinting and lifecycle analysis services for Atkins, with a focus on transparency and traceability in source data, emission factors and calculation methodologies. At ITPE, [redacted] is Technical Director for the Advisory Services business stream with responsibilities covering industrial air pollution permitting and pollution control issues, assisting clients with their obligations under the Industrial Emissions Directive and the latest iterations of Best Available Techniques for pollution control. He has worked closely with Protium during 2020 providing technical support and reviews across multiple hydrogen projects. He has been called as Expert Witness on air quality matters on several occasions in the UK and Ireland. He is a Chartered Environmentalist and Chartered Scientist, a Member of the Institute of Environmental Sciences and a Fellow of the Institute of Air Quality Management.

Production Director – [redacted] (Bruichladdich): [redacted] is a highly experienced Distillery Manager turned Production Director who started working with Bruichladdich in 2001, as part of the team that resurrected the distillery after being idle for 6 years. [redacted] became distillery manager at 28, becoming one of the youngest distillery managers in Scotland at the time. With over 20 years experience at Bruichladdich distillery, [redacted] has intimate knowledge of the distilling process and will provide invaluable knowledge for the project.

Operations Manager – [redacted] (Bruichladdich): [redacted]) is an experienced business consultant with a demonstrated history of working in the management consulting industry. During his career he has been involved in the management of all aspects of business operations, especially technology, people and processes to deliver outstanding world class, efficient and sustainable results. [redacted] holds a BSc in Engineering Systems from Napier University and he will act as the main point of contact with the Bruichladdich distillery during phase 1 and phase 2 of the HyLaddie project.

Within Protium, there is over 100 years of combined project delivery experience, ranging from feasibility studies through the engineering, construction and operation which can be drawn upon for expertise. Additional experience from within Protium can be onboarded if necessary to assist with the project.

In addition to the above consortium partners, the project will receive support from Deuterium Heating Limited as a consortium partner. Deuterium was established in 2020 having been awarded an exclusive licence for the IP of a hydrogen boiler system from an American company (Hydrogen Technologies Inc. (HTI)) which was looking to develop and commercialise the technology. Deuterium draws on internal expertise from [This information has been redacted] and advisors from the partner company in the USA. [redacted] is currently undertaking his PhD at Cardiff University focusing on analysis and modelling of pathways for decarbonising heat in the UK. He also has an MSc in Fuel Technology from Swansea University. As part of the consortium, Deuterium will manage OEMs relating to the DCC™ and oversee installation, maintenance and operations of the DCC™ system at the site. Protium, as consortium lead, will oversee the work from these partners. Protium has a close relationship with Deuterium as an affiliate of Protium, this close relationship and their experience working together will help ensure that there are no delays in the delivery of the project.

Protium has engaged with three premier EPC contractors with a successful history of delivering large scale, specialist, EPC projects. Critical success factors of EPC projects are the cost, on-time delivery and quality of the end result, and the following contractors have an excellent track record of fulfilling those requirements. A detailed comparison of the three EPC contractors approached is included as an attachment. The strength, depth and size of the EPC contractors selectors ensures there will always be a specialist readily available in order to answer any technical queries raised as the project progresses.

In addition to providing project delivery excellence, through the EPC contractors the project will have access beyond local resources and to a global resource pool of specialist talent and shared knowledge which is essential for successful project delivery.
All major equipment manufacturers have been engaged during Phase 1 and therefore major equipment lead times have been well established. The lead times have been factored into the project plan, which has input from the EPC contractors, therefore minimising risk of slippage in schedule.

To provide supporting evidence and illustrations upload your file/s here. Please do not upload any further text in order to go beyond the word limit, it will not be assessed. Max upload size per file - 10MB Max number of files - 10

- File: GDC174 HyLaddie - 4a.docx - Download

4b. Project Plan - Please provide a project plan for your Green Distilleries Phase 2 Demonstration Study, including any work packages and milestones. (10%) (applicants can use the upload link to provide supporting evidence and illustrations, any further text beyond the word limit will not be assessed) Applicants are expected to: Complete Table 4a (project work packages), outlining in detail the key work packages for Phase 2. Complete Table 4b (project milestone and deliverables), outlining the project milestone and associated deliverables for Phase 2. Download the excel spreadsheets through the link below. Once you have completed the forms please save it locally. The tables can then be uploaded using 'choose file' option after the question box. Table 4a - Project Work Packages Table 4b - Project Milestones and Deliverables Present a well thought-out, robust, credible, project plans. Provide a detailed plan to include any contingency planning for risks, costs, time and resources. Provide a separate high-level Gantt chart or outline project plan listing the key tasks and timescales. Provide stage gate review points in the project life that captures key project milestones/risks. (Maximum 2000 words)

See GDC174 HyLaddie - 4b for charts and tables

Project Plan
The key work packages and milestones identified for Project HyLaddie Phase 2 are listed in Table 4a and 4b. A project plan in the style of a Gantt chart is included in the Appendix and outlines the major activities and milestones associated with Phase 2.
To control the costs and schedule of the project, the Earned Value (EV) methodology will be applied consistently though project completion. The EV will be assessed monthly as a minimum and likely completed on a two-week basis. Cost and schedule forecasting will be done from the EV method. This will provide Protium with regular accurate status updates of the project and to allow for more accurate reporting to BEIS.
Stage Gate reviews will be conducted at various points of the project to ensure all parties are aligned on the project and design progress prior to moving to the next stage. The key stage gate review points are:
· FEED completion – Ensure all FEED documentation is accurate, packaged up and ready for Detailed Engineering. Key documentation to be checked are all P&IDs are Issued for Design (IFD) with all HAZOP actions incorporated.
· Detailed design completion – Ensure all design documents are packaged and ready for construction. All FATs for equipment is completed and signed off. Key documentation to be checked are all P&IDs are RFD and mechanical datasheets are completed.
· Construction complete – Ensure all assembly and erection of the equipment and piping is complete and construction signed off by the EPC Contractor.
· Commissioning complete – All commissioning checks and activities are signed off by the EPC contractor and final sign off by Protium on the acceptance testing.
· Demonstration Phase complete – End of the 12 months demonstration phase and marks the end of the Phase 2 project.
Following award of the Phase 2 grant, the schedule and all milestones will be updated following submission of a detailed project plan from the EPC Contractor.
Roles and Responsibilities
Protium will be responsible for the overall delivery of the project and will manage the work of the main EPC Contractor who will be responsible for the project execution. Protium will assign at least three resources who will be responsible for overseeing the daily work of the EPC Contractor and de-risk the chance of miscommunication or misalignment with the project plan. To ensure the successful delivery of this project, Protium have engaged with world-class EPC Contractors, regularly ranked high in the ENR Top 250 Global Contractors list, and with extensive experience in delivering EPC projects on time

and to budget.
In developing the initial project plan, the OEMs were consulted during the Phase 1 project to understand their lead times and identifying the long lead items. The long lead items were used as the basis of the project plan as this defined the critical path for the project. Adequate float was included within the project plan presented in the appendix to cover off against slippage. In addition, an EPC contractor was consulted to provide high level details on the FEED and EPC schedules, as well as high level milestones. The schedule provided factors into account time for a feasibility verification, FEED and detailed engineering work. By allowing for both verification of the feasibility work completed during Phase 1 and FEED, it greatly reduces the risk of cost and schedule slippage during the engineering and construction stage of the project. It is expected that long lead items can be procured alongside the FEED and detailed engineering, minimising the project timeline, as there is little chance for design variation. Shorter lead and cheaper items such as vessels and pumps will have their design and configuration finalised during FEED and procurement will start post FEED completion.
Following award of the project to an EPC Contractor, the project will undergo a rigorous evaluation of the scope and define the various work required. To manage the various work packages set out in the project plan, the project will establish a work breakdown structure (WBS) and WBS dictionary extending down to the individual tasks at design level. The WBS will take the high-level tasks presented in the project plan and reduce it down to shorter and more detailed work packages. The smaller work packages will be as short as possible, have a measurable completion criterion, and be assigned to an individual for ownership. This allows for a more accurate measure of the cost, time and resources required to complete tasks. The smaller work packs will feed into increasingly larger work packs which form the basis for the WPs presented in the schedule. This allows for greater definition over the costs, resources and time required for completion of the project and de-risks the project.
Communication Plan
As the Project lead, Protium is responsible for the communication between all relevant stakeholders on the project. A communication plan will be developed prior to the project kick which will include, but not limited to:
• Meetings and frequency (MOM, attendees, etc.);
• Issuing of documents (Transmittals, document control procedure, stakeholders, etc.); and
• Shared OneDrive so all can access and work in one area.
Quality Plan
As the Project lead, Protium is responsible for the quality of the project. A quality management plan will be developed prior to the project kick which will include, but not limited to:
• Quality audit review schedule and quality standards for which the project is measured against (ISO9001, etc.);
• On award, the EPC contractor and OEMs will be required to submit their quality plant and the EOC and OEM quality performance will be measured against and integrated into the overall quality management plan for the project; and
• Document Quality Assurance Procedure.

To complete question on Project Plans you must upload Table 4a (project work packages) and Table 4b (project milestone and deliverables) here. And to provide supporting evidence and illustrations upload your file/s here. Please do not upload any further text in order to go beyond the word limit, it will not be assessed. Max upload size per file - 10MB Max number of files - 5

- File: GDC174 HyLaddie - Table 4a.xlsx - Download
- File: GDC174 HyLaddie - Table 4b.xlsx - Download
- File: GDC174 HyLaddie - 4b.docx - Download
- File: GDC174 - Appendix - Project HyLaddie Phase 2 Gantt Excel export.xlsx - Download

4c. Project Risks – Please complete a risk register (table 4c) and provide a description of the risks and risk mitigations for your Green Distilleries Phase 2 Demonstration Study. (5%) (applicants can use the upload link to provide supporting evidence and illustrations, any further text beyond the word limit will not be assessed) Applicants are expected to: Complete Table 4c (risks and risk management) outlining key project risk register for the Phase 2 Demonstration Studies, identifying key risks and providing suitable mitigation strategies. This should also include contingency planning. Download the excel spreadsheet through the link below. Once you have completed the form please save it locally. The table can then be uploaded using 'choose file' option after the question box. Table 4c - Risks and Risk Management - Phase 2 Show a realistic and robust approach to risk management. Justify and provide reasoning to the risks and mitigation actions identified (Max 1500 Words)

See GDC174 HyLaddie - 4c for charts and tables

Goes with risk register annex as Table 4C
The Risk Register for this project is a log of all identified risks, their probability and impact to the project, the risk category they belong to, mitigation and contingency strategy, and if required when the risk will occur. The principal risk areas were identified and captured in a Risk Register at the bidding stage and were further developed during Phase 1. These will be kept under review as Phase 2 progresses. Following on from the award of the grant, following the project kick off, a risk review workshop will be conducted involving all parties (Protium, Bruichladdich, ITPE and the EPC Contractor) involved with the project delivery to identify, mitigate and plan against risks associated with the project. This list is not intended to be exhaustive. It will remain a live document that will grow as project-specific knowledge and experience increase. Key points in the project will identify new risk, such as during design changing in FEED, which will grow the register. To capture this, risk reviews will be an ongoing process held after certain key milestones to ensure the risk register is always consistent with the state of play for the project. Risks, risk rating and relevant mitigation actions at this stage are presented in in a separate Annex. The project manager will be responsible for assigning project risks, keeping the project risk register up to date and leading the risk register reviews.
The Risk Register stems from the overall project risk management strategy which, in turn will form the risk management plan within the Project Execution Plan, will be put into place prior to the start of the project to identify, manage and remediate against risks. The initial risks identified at the bidding stage were identified following an initial project risk assessment. During Phase 1, the risk register was developed further following a risk review following completion of the Phase 1 project.
The approach Protium has taken to managing project risk is by a methodical process where each risk identified is assigned a probability and impact rating, which than ranks the various risks.
In order to determine the severity of the risks identified by the team, a probability and impact factor was assigned to each risk. This process allowed the project manager to prioritise risks based upon the effect they may have on the project. The project manager utilised a probability-impact matrix to facilitate moving each risk to the appropriate place on the chart. Once the risks were assigned a probability and impact and placed in the appropriate position on the risk matrix, the project manager recorded each risk down in the Risk Register. Risks are categorised into low, medium or high based on the product of probability and severity.
The highest ranked overall risks will be assigned risk managers, who will be responsible for taking the necessary steps to implement the mitigation response at the appropriate time during the schedule if required. Risk managers will provide status updates on their assigned risks in the project team meetings. Risk monitoring will be a continuous process throughout the life of this project. As risks approach on the project schedule the project manager will ensure that the appropriate risk manager provides the necessary status updates which include the risk status, identification of trigger conditions, and the documentation of the results of the risk response.
As more risks are identified as the project progresses, they will be qualified and the team will develop avoidance and mitigation strategies. These risks will also be added to the Risk Register and the project plan to ensure they are monitored at the appropriate times and are responded to accordingly. As risks are mitigated, the mitigating action will be recorded and the risk will be closed on the register.
The risks for this project will be managed and controlled within the constraints of time, scope, and cost. All identified risks will be evaluated in order to determine how they affect this triple constraint. The project manager, with the assistance of the project team, will determine the best way to respond to each risk to ensure compliance with these constraints. In extreme cases it may be necessary to allow flexibility to one of the project’s constraints or for the project manager to escalate the issue to the executive committee.
Upon the completion of the project, during the project close-out process, the project manager will analyse each risk as well as the risk management process. Based on this analysis, the project manager will identify any improvements that can be made to the risk management process for future projects. These improvements will be captured as part of the lessons learned knowledge base.

To complete question on Project Plans you must upload Table 4c (Risks and Risk Management) here. And to provide supporting evidence and illustrations upload your file/s here. Please do not upload any further text in order to go beyond the word limit, it will not be assessed. Max upload size per file - 10MB Max number of files - 5

- File: GDC174 HyLaddie - 4c.docx - Download
- File: GDC174 HyLaddie - Annex - Risk Matrix.xlsx - Download

Collaborative Application

Is this a collaborative application? If yes you will be asked to provide contact and organisation details for each partner.

Yes

Partner 1 Contact and Organisation Details

Contact Details

Title [This information has been redacted]

Name

Position

Email

Mobile Number

Organisation Website https://www.itpenergised.com/

Organisation Name

Energised Environments Limited

The registered address of the Partner Organisation

Address Line 1 4th Floor, Centrum House,

Address Line 2 108-114 Dundas Street,

Address Line 3 -

Town/City Edinburgh

Postcode EH3 5DQ

County

Midlothian

UK Region

Scotland

Country

United Kingdom

Organisation Type

Private Company

What is the size of the organisation?

Medium Enterprise <250 employees

Number of employees (including directors)

[redacted]

Business Registration Number

SC450178

Turnover Amount (in most recent annual accounts)

[redacted]

Turnover Date (in most recent annual accounts)

* 30/06/2021

Balance Sheet Total (total assets net of depreciation)

[redacted]

Balance Sheet Date (total assets net of depreciation)

* 30/06/2019

Is the Organisation able to recover VAT?

Yes

Organisation Maturity

6-10 years

How is the organisation currently funded? (Choose all that apply)

[This information has been redacted]

Does the organisation have a parent company? (If yes you will be asked to provide details)

No

Additional Partner

Do you need to add an additional partner?

Yes

Partner 2 Contact and Organisation Details

Contact Details

Title [This information has been redacted]

Name

Position

Email

Mobile Number

Organisation Website https://www.bruichladdich.com/

Organisation Name

Bruichladdich Distillery Company Limited

The registered address of the Partner Organisation

Address Line 1 The Bruichladdich Distillery

Address Line 2 -

Address Line 3 -

Town/City Bruichladdich

Postcode PA49 7UN

County

Argyll

UK Region

Scotland

Country

United Kingdom

Organisation Type

Private Company

What is the size of the organisation?

Medium Enterprise <250 employees

Number of employees (including directors)

[redacted]

Business Registration Number

SC209196

Turnover Amount (in most recent annual accounts)

[redacted]

Turnover Date (in most recent annual accounts)

* 31/03/2020

Balance Sheet Total (total assets net of depreciation)

[redacted]

Balance Sheet Date (total assets net of depreciation)

* 31/03/2020

Is the Organisation able to recover VAT?

Yes

Organisation Maturity
>10 years

How is the organisation currently funded? (Choose all that apply)
[This information has been redacted]

Does the organisation have a parent company? (If yes you will be asked to provide details)
Yes

Parent Company Details (for Partner Organisation)

Parent Company Details	
Organisation Name	Remy Cointreau UK Limited
Address Line 1	Third Floor Newlands House,
Address Line 2	40 Berners Street,
Address Line 3	-
Town/City	London,
Postcode	W1T 3NA

Country
United Kingdom

Number of employees (including directors)
[redacted]

Business Registration Number
08129324

Turnover Amount (in most recent annual accounts)
[redacted]

Turnover Date (in most recent annual accounts)
* 31/03/2020

Balance Sheet Total (total assets net of depreciation)
[This information has be

Balance Sheet Date (total assets net of depreciation)
* 31/03/2020

Organisation Maturity
>10 years

Additional Partner

Do you need to add an additional partner?
Yes

Partner 3 Contact and Organisation Details

Contact Details	
Title	[This information has been redacted]
Name	
Position	
Email	
Mobile Number	
Organisation Website	-

Organisation Name
Deuterium Heating Limited

The registered address of the Partner Organisation

Address Line 1 Flat 8

Address Line 2 4-6 Davenant Street

Address Line 3 -

Town/City London

Postcode E1 5AQ

County

London

UK Region

London

Country

United Kingdom

Organisation Type

Private Company

What is the size of the organisation?

Micro Enterprise <10 employees

Number of employees (including directors)

[redacted]

Business Registration Number

12566949

Turnover Amount (in most recent annual accounts)

[redacted]

Balance Sheet Total (total assets net of depreciation)

[redacted]

Is the Organisation able to recover VAT?
Yes

Organisation Maturity
1-5 years

How is the organisation currently funded? (Choose all that apply)
[This information has been redacted]

Does the organisation have a parent company? (If yes you will be asked to provide details)
No

Additional Partner

Do you need to add additional partners?
No

Programme Performance Indicators and Benefits

How would you describe the nature of your innovation project?
Hardware Development
Service Development
Process Development

State how many FTE jobs could be retained in your organisation as a result of participation in this project? (enter a number)
4

State how many FTE jobs could be created in your organisation as a result of participation in this project? (enter a number)
3

What is the number of Partner Organisations supported to deliver the project? (enter a number)

3

Technology Readiness Level at Project Start

	1	2	3	4	5	6	7	8	9
							X		

Expected Technology Readiness Level at Project Close

	1	2	3	4	5	6	7	8	9
									X

The Green Distilleries Competition will aim to realise the following benefits. Please select which benefits your innovation could potentially contribute to.

	Yes	No
Further understanding of technical feasibility of fuel switching/ enabling technologies	X	
Successfully demonstrate fuel switching/enabling technologies	X	
Develop industry and market awareness of fuel switching/enabling technologies	X	
Build an evidence base to improve BEIS knowledge for industrial decarbonisation	X	

Declaration Forms

Please download the following Green Distilleries Declarations Document to be signed offline and re-uploaded through the link below. If convenient you can use e-signature to sign the documents. Green Distilleries Phase 2 Declarations Max upload size per file - 5MB Max number of files - 1

- File: GDC174 Protium HyLaddie Declaration 1-5.pdf - Download

Terms and Conditions

Please read the competition's Terms and Conditions (linked below) and select the YES button below to declare you have read them: Green Distilleries Phase 2 Terms and Conditions

	Yes
I have read the Terms and Conditions	X

Application Form Checklist

As well as the completion of this Application Form please check that, if required, you have provided the following information.

	Yes	No
Green Distilleries Project Cost Breakdown Form	X	
Partner Information Form *If more than three Partners*	X	
Project Plan	X	
Risk Register	X	
Attached supporting documentation *Clearly referenced*	X	

Signatory Page

Enter details below

Name of Organisation	Protium Green Solutions Limited
Signature *Please insert name*	[This information has been redacted]
Position in Organisation	
Date (DD/MM/YYYY)	05/05/2021