

PROJECT DRAGON

A sustainable aviation fuel (SAF) production facility, Land at Crown Wharf, Port Talbot Docks



DESIGN AND ACCESS STATEMENT

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A Proposal for a Sustainable Aviation Fuel Production Facility, Port Talbot Docks

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1.0 Summary of the Proposal

1.1 Applicant & Agent

The applicant is LanzaTech UK Limited. ([Link to LanzaTech website](#))

The agent is Turley Associates Limited. Contact Cardiff@turley.co.uk 02920 3444445

All contact regarding the planning application is to be via the agent or via the Local Planning Authority.

1.2 Site Location

The site is located at Crown Wharf, Port Talbot, SA13 1RB.

What three words: Loft.counters.automate.

Co-ordinates: 51.582969,-3.784794

1.3 Proposals summary

This development is a facility for the manufacture of sustainable aviation and sustainable diesel fuels. Sustainable fuels of the types proposed are used to replace fossil fuels thereby reducing CO2 emissions and the climate change effects of aviation, road and rail vehicles, and small power generation.

Physically, this development involves demolition of existing structures and erection of a Sustainable Aviation Fuel (SAF) production facility, including enclosed ground flare, storage tanks, installation of pipework and electrical, processing and utility equipment, administration, warehouse and laboratory buildings, new access, car parking and transport infrastructure including a truck loading area and associated works, hard and soft landscaping, areas for temporary construction laydown, and associated development.

The wider development also involves establishment of shipping links to the facility via the construction of a loading/unloading jetty; these aspects will be covered under a separate application and / or appropriate marine licenses. Once operational, the development, will provide up to 130 - 150 FTE jobs, many of which are for high-skill / high-value positions. The development will also provide a wide range of other jobs in the wider community in support of the proposed operation.

1.4 Application Type

This application is for full planning permission.

1.5 Application information

This application includes architectural information as listed overleaf:

OrganisationEcom	Role
LanzaTech Uk	Applicant
Turley	Planning consultant
Turley	EIA assessment
EDP	Archaeology and Heritage
Turley	Sustainability
Turley	Economics
Turley	Strategic communications
Turley	LVIA
Karius	Air quality
JBA Consulting	Flood risk and drainage
Hunter Acoustics	Acoustic
EDP	Landscape
RPS	Ecology
SCP Transport	Highways and transport
Part B	Fire Risk Assessment
AECOM	Lighting Assessment
Technip	Engineering Contractors
Inspire Architects	Architecture

Table 1 – Navigation table to application document contents



A Proposal for a Sustainable Aviation Fuel Production Facility, Port Talbot Docks

Source	Drawing Number	Revision	Drawing Name	Description
Inspire Architects	2143.01-IA-ZZ-ST-DR-A-0100	P13	Site location plan	
Inspire Architects	2143.01-IA-ZZ-ST-DR-A-0101	P8	Site location plan – Ownership Boundaries	
Inspire Architects	2143.01-IA-ZZ-ST-DR-A-0200	P11	Existing site key plan	
Inspire Architects	2143.01-IA-ZZ-ST-DR-A-0201	P8	Existing site plan (Area 1)	
Inspire Architects	2143.01-IA-ZZ-ST-DR-A-0202	P9	Existing site plan (Area 2)	
Inspire Architects	2143.01-IA-ZZ-ST-DR-A-0203	P8	Existing site plan (Area 3)	
Inspire Architects	2143.01-IA-ZZ-ST-DR-A-0204	P9	Existing site plan (Area 4)	
Inspire Architects	2143.01-IA-ZZ-ST-DR-A-0210	P14	Proposed site key plan	
Inspire Architects	2143.01-IA-ZZ-ST-DR-A-0211	P13	Proposed site plan (Area 1)	
Inspire Architects	2143.01-IA-ZZ-ST-DR-A-0212	P15	Proposed site plan (Area 2)	
Inspire Architects	2143.01-IA-ZZ-ST-DR-A-0213	P13	Proposed site plan (Area 3)	
Inspire Architects	2143.01-IA-ZZ-ST-DR-A-0214	P15	Proposed site plan (Area 4)	
Inspire Architects	2143.01-IA-ZZ-ST-DR-A-0215	P18	Proposed PDZ layout & equipment list	
Inspire Architects	2143.01-IA-ZZ-ST-DR-A-0216	P9	Proposed PDZ layout – external surface finishes	
Inspire Architects	2143.01-IA-ZZ-ST-DR-A-0217	P10	Proposed site plan – PDZ & temp. construction areas	
Inspire Architects	2143.01-IA-ZZ-ST-DR-A-0220	P13	Proposed site key plan – EIA boundary shown	
Inspire Architects	2143.01-IA-ZZ-ST-DR-A-0227	P9	Site location plan – EIA boundary shown	
Inspire Architects	2143.01-IA-ZZ-ST-DR-A-0228	P8	Existing site key plan – EIA boundary shown	
Inspire Architects	2143.01-IA-ZZ-ST-DR-A-0240	P6	Proposed site fencing layout	
Inspire Architects	2143.01-IA-ZZ-ZZ-DR-A-0400	P9	Existing site sections	
Inspire Architects	2143.01-IA-ZZ-ZZ-DR-A-0401	P11	Proposed site sections – sheet 1 of 2	
Inspire Architects	2143.01-IA-ZZ-ZZ-DR-A-0402	P11	Proposed site sections – sheet 2 of 2	
Inspire Architects	2143.01-IA-ZZ-ZZ-DR-A-0500	P6	Proposed zone 1 plant elevations – enclosed ground flare	
Inspire Architects	2143.01-IA-ZZ-ZZ-DR-A-0501	P7	Proposed zone 2 plant elevations – collection basin	
Inspire Architects	2143.01-IA-ZZ-ZZ-DR-A-0502	P7	Proposed zone 3 plant elevations - substation 3000	

Table 2 (continued overleaf) – List of architectural information for this application



A Proposal for a Sustainable Aviation Fuel Production Facility, Port Talbot Docks

Source	Document Number	Revision	Document Name	Description
Inspire Architects	2143.01-IA-ZZ-ZZ-DR-A-0503	P6	Proposed zone 4 plant elevations – tanker loading	
Inspire Architects	2143.01-IA-ZZ-ZZ-DR-A-0505	P6	Proposed zone 5 plant elevations – ethanol tanks	
Inspire Architects	2143.01-IA-ZZ-ZZ-DR-A-0506	P8	Proposed zone 6 plant elevations – process modules	
Inspire Architects	2143.01-IA-ZZ-ZZ-DR-A-0507	P6	Proposed zone 7 plant elevations – sustainable aviation fuel tanks	
Inspire Architects	2143.01-IA-ZZ-ZZ-DR-A-0508	P6	Proposed zone 8 plant elevations – sustainable diesel tanks	
Inspire Architects	2143.01-IA-ZZ-ZZ-DR-A-0509	P6	Proposed zone 9 plant elevations – hydrogen generation	
Inspire Architects	2143.01-IA-ZZ-ZZ-DR-A-0510	P8	Proposed zone 10 plant elevations	
Inspire Architects	2143.01-IA-ZZ-ZZ-DR-A-0511	P6	Proposed zone 11 plant elevations – metering & water tanks	
Inspire Architects	2143.01-IA-ZZ-ZZ-DR-A-0512	P6	Proposed zone 12 plant elevations – water package & tank	
Inspire Architects	2143.01-IA-ZZ-ZZ-DR-A-0513	P6	Proposed zone 13 plant elevations	
Inspire Architects	2143.01-IA-ZZ-ZZ-DR-A-0514	P6	Proposed zone 14 plant elevations – substation 2000 & liquid nitrogen storage	
Inspire Architects	2143.01-IA-01-ZZ-DR-A-0300	P7	Proposed process control building plans	
Inspire Architects	2143.01-IA-01-ZZ-DR-A-0301	P7	Proposed process control building elevations	
Inspire Architects	2143.01-IA-02-ZZ-DR-A-0300	P8	Proposed laboratory plans and elevations	
Inspire Architects	2143.01-IA-03-ZZ-DR-A-0300	P8	Proposed gatehouse 1 plans and elevations	
Inspire Architects	2143.01-IA-04-ZZ-DR-A-0300	P7	Proposed gatehouse 2 plans and elevations	
Inspire Architects	2143.01-IA-05-ZZ-DR-A-0300	P9	Proposed workshop plans and elevations	
Inspire Architects	2143.01-IA-06-ZZ-DR-A-0300	P8	Proposed warehouse store plans	
Inspire Architects	2143.01-IA-06-ZZ-DR-A-0301	P1	Proposed warehouse store elevations	
Inspire Architects	2143.01-IA-09-ZZ-DR-A-0300	P8	Proposed admin building plans and elevations	
Inspire Architects	2143.01-IA-10-ZZ-DR-A-0300	P3	Proposed amenity shelter 1 plans and elevations	
Inspire Architects	2143.01-IA-11-ZZ-DR-A-0300	P3	Proposed amenity shelter 2 plans and elevations	
Inspire Architects	2143.01-IA-12-ZZ-DR-A-0300	P3	Proposed cycle store plans and elevations	
Inspire Architects	2143.01-IA-XX-XX-RP-A-0910	P11	Design and Access Statement	

Table 2 (continued) – List of architectural information for this application



A Proposal for a Sustainable Aviation Fuel Production Facility, Port Talbot Docks

1.0 Summary of the Proposal

1.6 Consultation and Collaboration

This planning application has been informed by extensive and detailed discussions with officers across various disciplines at Neath Port Talbot Council (NPTC), as well as other stakeholders. Further information is detailed in the accompanying Planning Statement and Pre-application Consultation Report.

Discussions with officers at NPTC have progressed over the past two years from the very early stages of the proposal and the open nature of the pre-application process illustrates the collaborative approach taken by LanzaTech. Initial discussions with NPTC's Development Management team started in 2021 and regular pre-application meetings have taken place throughout 2023. These have involved planning, environmental, highways and other specialist officers. LanzaTech has also facilitated joint meetings with NRW and NPTC, where relevant. These covered key crossover topics, such as noise, air quality and marine / permitting elements. The feedback received throughout pre-application discussions has informed the design evolution and technical detail set out in this planning application.

ABP is the landowner of the PDZ and the majority of the land within the site boundary. LanzaTech has actively engaged with ABP throughout the project development process, which has included bi-weekly meetings to discuss the various elements of the proposed development and any associated agreements. This demonstrates the commitment of both LanzaTech and ABP to the successful delivery of the proposed development.

LanzaTech launched its initial communications website in respect of the project in April 2023 and has hosted a number of public consultation events in the local community. The proposal was well received, with recognition of the site's context, potential, the need to decarbonise and the opportunities associated with the production of sustainable aviation fuel. Comments raised regarding environmental topics, biodiversity and health and safety have been addressed as part of this planning submission. Items such as flare design and the prominence of the development have been modified to reflect comments and guidance received.

LanzaTech also completed the mandatory Pre-application Consultation (PAC) process with owners / occupiers, community consultees and specialist consultees during August 2023. The process was carried out in accordance with The Town and Country Planning (Development Management Procedures) (Wales) Order 2012.



A Proposal for a Sustainable Aviation Fuel Production Facility, Port Talbot Docks

1.0 Summary of the Proposal

1.7 Planning Policy Compliance

*The Development Plan comprises Future Wales: The National Plan 2040 (February 2021) and the adopted Neath Port Talbot Council Local Development Plan ("LDP"), adopted in January 2016. The LDP guides the future development for NPTC, and sets out where, when, and how much new development can take place during the plan period (2011 to 2026). The proposed development has been assessed against the policies contained in these documents. A Planning Policy Matrix (included within the submitted Planning Statement) sets out each policy in detail and provides an analysis demonstrating how the application proposal complies with the requirements of each. Specifically, in terms of policy relating to design, **Policy BE1 (Design)** states that all development proposals are expected to demonstrate high quality design which considers the natural, historic, and built environmental context, and contributes to the creation of attractive, sustainable places. The Policy states that proposals will only be permitted where specified criteria are met. It states that:*

"All development proposals will be expected to demonstrate high quality design which fully takes into account the natural, historic and built environmental context and contributes to the creation of attractive, sustainable places. Proposals will only be permitted where all of the following criteria, where relevant, are satisfied:

1. It complements and enhances the character and appearance of the site, building or area in terms of siting, appearance, scale, height, massing and elevation treatment; 2. It respects the context of the site and its place within the local landscape, including its impact on the important arterial gateways into the County Borough, its effects on townscape and the local historic and cultural heritage and it takes account of the site topography and prominent skylines or ridges; 3. It utilises materials appropriate to its surroundings and incorporates hard and soft landscaping and screening where appropriate; 4. It would not have a significant adverse impact on highway safety, the amenity of occupiers of adjacent land or the community; 5. Important local features (including buildings, amenity areas, green spaces and green infrastructure, biodiversity and ecological connectivity) are retained and enhanced as far as possible; 6. It achieves and creates attractive, safe places and public spaces, taking account of 'Secured by Design' principles (including where appropriate natural surveillance, visibility, well-lit environments and areas of public movement); 7. It plays a full role in achieving and enhancing an integrated transport and communications network promoting the interests of pedestrians, cyclists and public transport and ensures linkages with the existing surrounding community; 8. It uses resources, including land and energy, as efficiently as possible through: (a) Making the best and most efficient use of the land available through being of appropriate density taking into account the character and appearance of the area, normally a minimum of 35 dwellings per hectare in the Coastal Corridor Strategy Area or a minimum of 30 dwellings per hectare in the Valleys Strategy Area; (b) The layout and form of the development does not preclude the reasonable use of other adjacent land; (c) Developing brownfield land in preference to greenfield land where possible; (d) Minimising building exposure while maximising solar gain. 9. Its drainage systems are designed to limit surface water run-off and flood risk and prevent pollution; 10. The layout and design of the development achieves inclusive design by ensuring barrier free environments, allowing access by all and making full provision for people with disabilities"

***Policy SP4 (Infrastructure)** states that development will be expected to make efficient use of existing infrastructure, and where required make adequate provision for new infrastructure.*

***Policy TR2 (Design and Access of New Development)** states that development proposals will only be permitted where criteria set out in the policy are satisfied. It states that:*

"Development proposals will only be permitted where all of the following criteria, where relevant, are satisfied: 1. The development does not compromise the safe, effective and efficient use of the highway network and does not have an adverse impact on highway safety or create unacceptable levels of traffic generation; 2. Appropriate levels of parking and cycling facilities are provided and the access arrangements for the site allow for the safe manoeuvring of any service vehicles associated with the planned use; 3. The development is accessible by a range of travel means, including public transport and safe cycle and pedestrian routes; 4. Transport Assessments and Travel Plans are provided for developments that are likely to create significant traffic generation".

The site is accessible by sustainable modes of transport, offering future employees a range of transport options. Access to the ABP site entrance on foot and by bike is of a good standard and there are multiple transport connections within close-proximity, which provide access to a range of local destinations. Prospective staff will not be wholly reliant on the private car for travel to work. All relevant design criteria set out in Policy BE1 have been complied with and considered in the evolution of the scheme design which has been designed to ensure compatibility with the surrounding area and environment.

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2.0 The Brief

2.1 The Brief

LanzaTech is a carbon capture, transformation and recycling company headquartered in Skokie, Illinois, USA. LanzaTech have developed a novel gas fermentation process that can utilize a range of solid and gases waste materials that are pre-treated before being fed to specially bred microorganisms that produce ethanol. The ethanol is converted into sustainable aviation fuel, sustainable diesel and a wide range of other products via a second process.

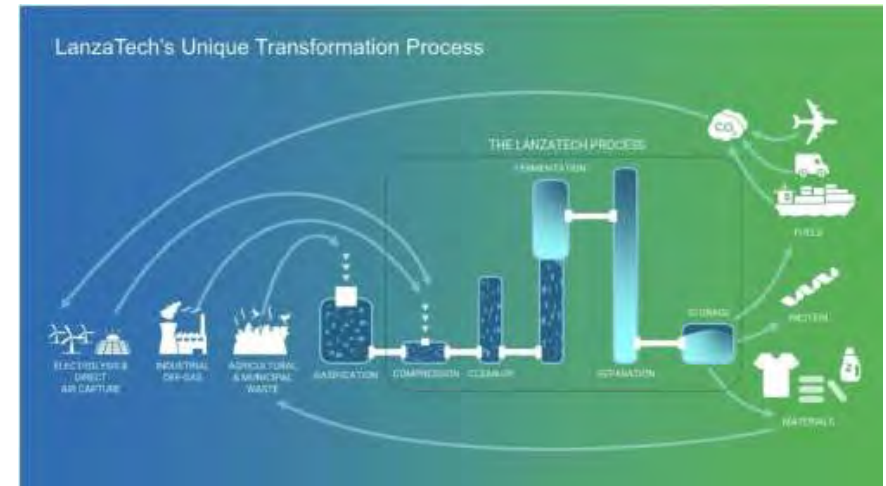
An explanation of this process can be seen in the Turley Environmental Statement chapter 4 and in this external link: [Lanzatech process](#)

The brief for this project is to develop a suitable industrial manufacturing facility for the second process, the conversion of ethanol to sustainable aviation and sustainable diesel fuels using the LanzaJet ATJ technology.

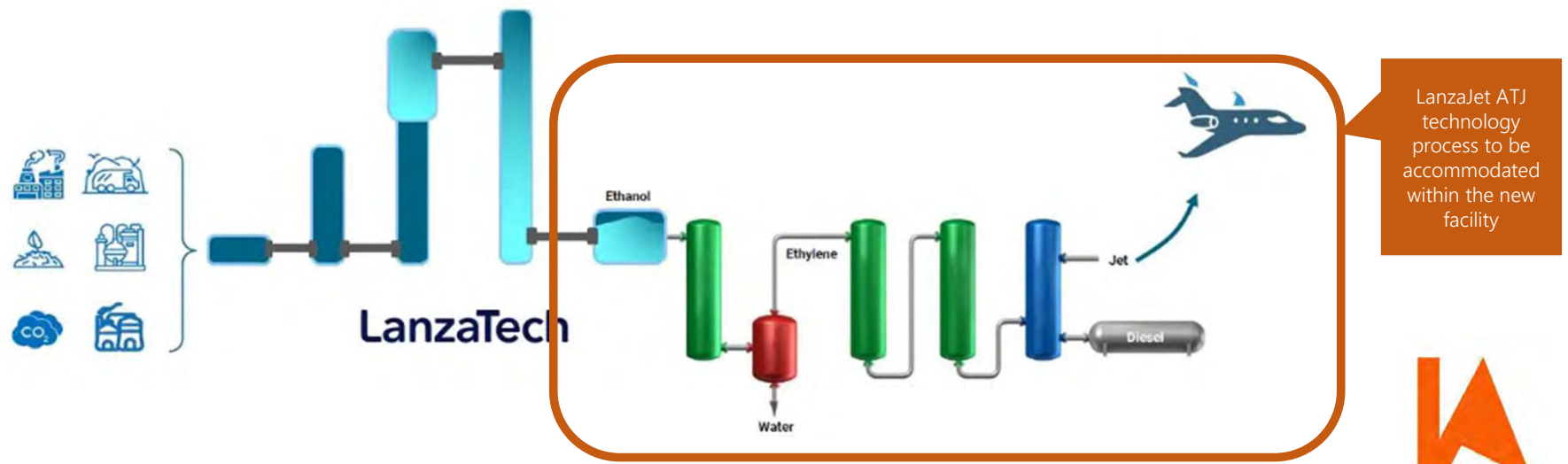
2.2 The Vision

LanzaTech is working towards a post-pollution future in which the carbon needed in fuels and products is recycled in a circular system rather than being sourced from virgin fossil fuels and the proposed development reflects this vision. The proposed facility is envisaged as a long-term, carbon reducing, sustainable source of sustainable aviation and biodiesel fuels that is an asset to Port Talbot and the wider area, providing jobs and contributing to the industrial heritage of the district.

LanzaTech



Figures 1 (top) and 2 (below) – High level overview of the LanzaTech process



A Proposal for a Sustainable Aviation Fuel Production Facility, Port Talbot Docks

3.0 Site and Context Analysis

3.1 Site Description

The proposed development site is located on Crown Wharf, Port Talbot Docks and was formerly used in connection with industrial activity. Whilst the land is largely flat, industrial activity has contributed some mounded areas and levelled others (see topographical survey). There is no existing built development on the area of the site to be developed, but to the East of the site are an arrangement of buildings and industrial equipment some of which will be demolished as required to provide sufficient construction lay down space. Otherwise, the site remains largely empty with a low covering, naturally occurring vegetation typically resembling coastal scrub but also containing Japanese knotweed. Immediately prior to the development of the site, the landowner will carry out extensive works to remove and / or contain the Japanese knotweed, with a process of herbicidal treatment being undertaken in September 2023. To the north of the site there is a quayside allowing maritime access which compliments the nearby road and rail connections in providing ample transport solutions for the proposed facility. The site is particularly well suited to the proposed use in terms of geographical location, previous use, delivery of feedstock material and distribution of product.

Key facts:

- Application Area: 17.98ha
- Site area for development: 9.12ha (Referred to as the 'production development zone' or 'PDZ')
- Site area required to provide sufficient space for construction and material storage spaces until such time as the development of the PDZ is complete: 7.44ha (Known as the Temporary Construction Areas or TCA's)
- GEA of buildings to be demolished: 4,711m²

3.2 Context

Immediately neighbouring the site are a cement factory, the remaining elements of the steel production facility of which some parts are functional and operational, and a range of other heavy industry employers including construction and crane hire. These uses occupy the low-level land around the harbour. Port Talbot has been notable and distinguished by its long history of heavy industry, particularly metal ore processing which includes tin, copper and ferrous metals, and transportation of coal products. These industries have left a built legacy in the area characterised by tall industrial structures that are particularly visible from the M4 and surrounding hills. It has changed and reshaped the land reclaiming marshland from the estuary and sea. Finally, it has and created a distinct local culture and pride. More widely, there are significant areas of residential housing, other employment uses, and some leisure uses associated with the harbour. The M4 motorway sits within a mile of the site, as does the mainline rail line, both of which are main transportation routes running from South-Western Wales to London.

Away from the flat, low-lying area around the harbour there are extensive hills that form an edge to the settlement running parallel with the M4 motorway. These hills offer a vantage point on to the town, industrial area and harbour including the proposed development site.

Details of the existing site can be found in the following documents:

- Inspire Architects – Existing site drawings
- JBA Consulting - Flood Consequences Assessment
- Turley Associates - Environmental Impact Assessment and Environmental Statement
- Hunter Acoustics – Baseline Noise Survey
- Turley Associates - Archaeology and Heritage assessment
- Turley Associates / Ocean CGI – Landscape and visual impact assessment
- RPS – Preliminary Ecological Appraisal
- SCP – Transport Assessment
- AECOM – Lighting Assessment



A Proposal for a Sustainable Aviation Fuel Production Facility, Port Talbot Docks



Figure 3 - Aerial view of Port Talbot demonstrating the clear zones that form the town being industrial, residential, motorway and countryside



A Proposal for a Sustainable Aviation Fuel Production Facility, Port Talbot Docks



Figure 4 – Site location and surrounding land uses. Note that the site benefits from transport options including road, rail and sea. Along with projects in Pembrokeshire the docks area of Port Talbot is part of the Celtic Freeport Area (see inset) an initiative that will provide Wales with a sustainable green energy industry and provide an accelerated pathway towards a Net-Zero economy.



A Proposal for a Sustainable Aviation Fuel Production Facility, Port Talbot Docks



Figure 5 – Land use diagram



A Proposal for a Sustainable Aviation Fuel Production Facility, Port Talbot Docks



Figure 6 – Access & Movement Diagram – Travel Modes

Key	
Site	
Motorway	
A roads	
Rail	
Shipping	
Cycle	



A Proposal for a Sustainable Aviation Fuel Production Facility, Port Talbot Docks



Figures 7 (top) and 8 (bottom) – View from A4241 towards the proposed development site, and aerial view over harbour

A Proposal for a Sustainable Aviation Fuel Production Facility, Port Talbot Docks



Figures 9 to 11 – view from the centre of the site. The site is largely flat with vegetation ranging from 0.5m high to 3m+ in places. The main cover is a mixture of indigenous species and Japanese knotweed. Most of the existing trees on site are self-seeded but there are some planted leylandii on the eastern boundary. Some exploratory works were ongoing at the time of the photographic survey and will remain ongoing during the planning application. These works include the monitoring and recording of contamination using boreholes, the erection of reptile fences and the spraying of Japanese Knotweed. It should be noted that there are tall structures such as chimneys, towers, industrial buildings or flares overlooking the site from all directions.



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Figures 12 to 18 – Typical plants and trees on site. The main body of the development area is subject to Japanese knotweed but the areas around the perimeter of the site, the quayside and the area set aside for lay down are home to native species often pioneering land recovered from the steel works process.



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Figures 19 to 21 – The cement factory, operated by Hanson / Heidelberg.



A Proposal for a Sustainable Aviation Fuel Production Facility, Port Talbot Docks



Figures 22 to 24 – Other surrounding buildings, especially those to the East of the site are derelict or in poor condition.



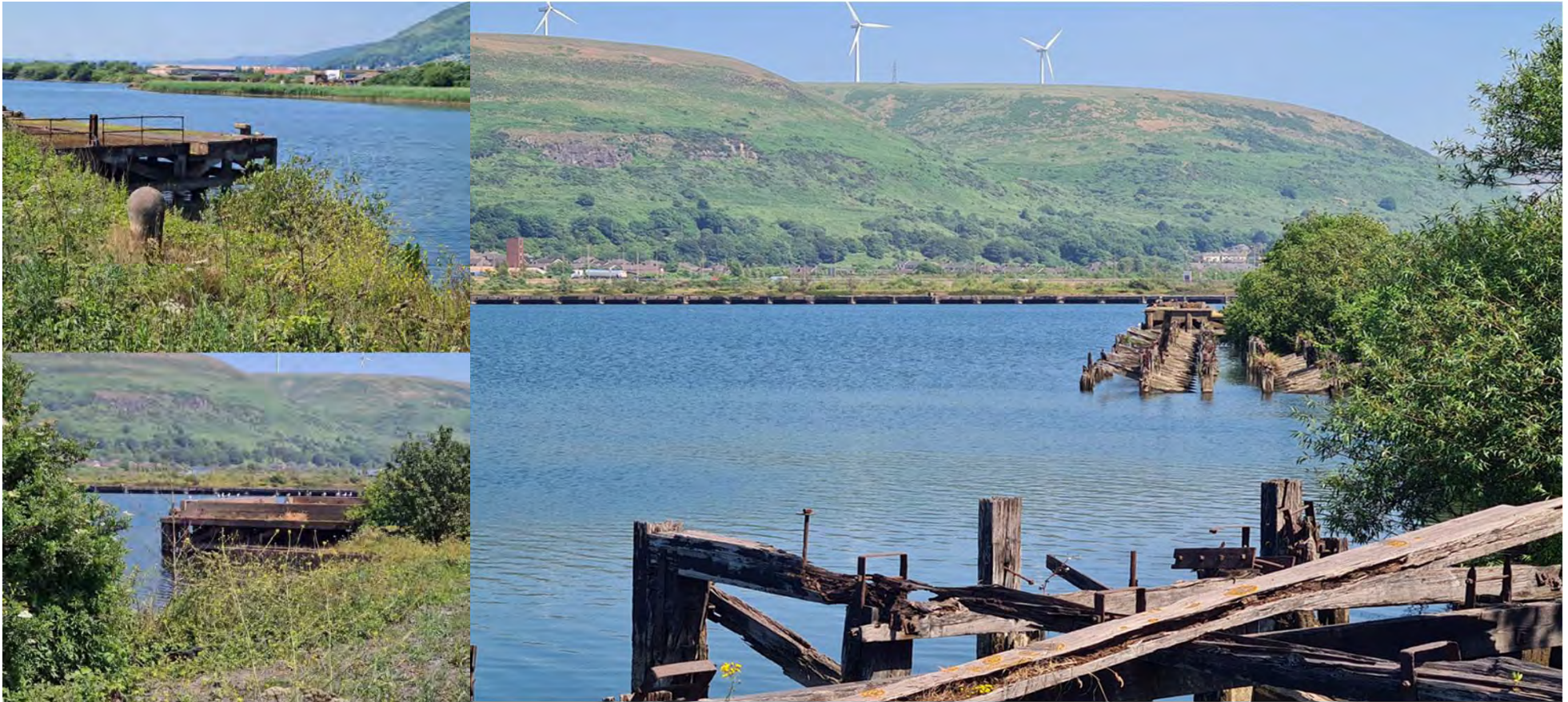
A Proposal for a Sustainable Aviation Fuel Production Facility, Port Talbot Docks



Figures 25 to 28 – The eastern lay-down area. This area is one of those to be used to receive deliveries of construction materials during the erection of the facility. There is substantially less vegetation in this area and the ground is of poorer quality being stoney in nature.



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Figures 29 to 31 – The existing quayside facilities are currently derelict. Works to replace any jetty will include the removal of redundant structures. These matters are covered under a separate application for a marine license.



A Proposal for a Sustainable Aviation Fuel Production Facility, Port Talbot Docks

3.0 Site and Context Analysis

3.3 Usage History

The site area has been in industrial use since at least 1876 where the site can be seen as being adjacent to a copper works with the outlining area around the docks being indicated as marsh and named Morfa Newydd (New Marsh) suggesting the land was being progressively reclaimed from the estuarine sea.

By 1913, more of the land on the marsh has reclaimed and is beginning to be developed. A coal works is noted on the site and there are extensive rail connections provided to the dock where a hydraulic power station has been created. The copper works is also accommodated in different buildings.

Later, by 1947, Buildings appear to have been altered to include a steel ceiling manufacturer and a Briquette works. Copper works are comprehensively replaced with steel works.

Figures 32 (top) to 34 (Bottom) – Historic maps of the site surveyed during 1876, 1913 and 1947.



3.0 Site and Context Analysis

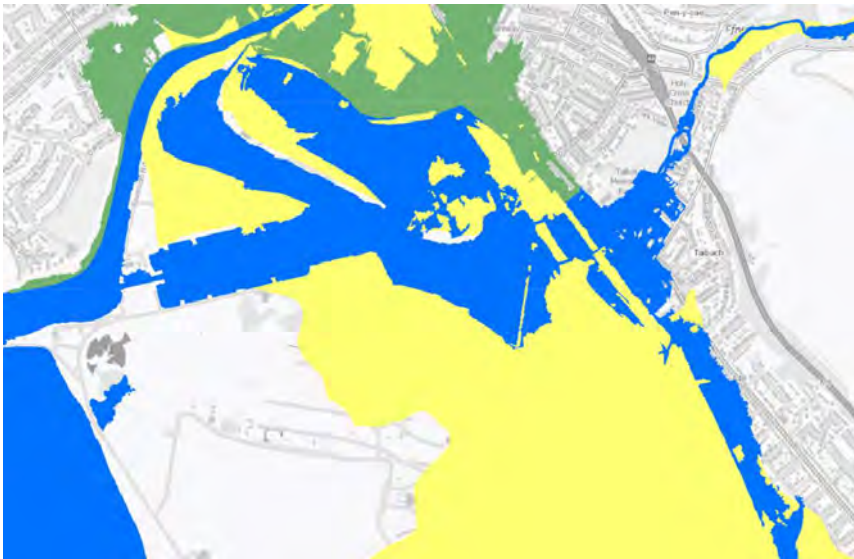
3.4 Constraints and Opportunities

The constraints that inform the development are:

- a) Potential for flooding as the site lies in an area of tidal flooding. This affects the level of the site and the drainage solutions. Refer to the flood risk assessment, the SUDS/SAB documentation and the drainage information provided with this application.*
- b) Potential for contamination to affect the development and for the development to create contamination that affects the wider area, especially the docks. Please see the submitted ground investigation report for further information.*
- c) The presence of knotweed (to be removed prior to construction of the development)*
- d) The visibility of the site from areas around the docks. Refer to the LVIA and other visualisations for details.*

The opportunities that inform the development are:

- a) Excellent transportation options for industrial materials and similarly excellent active travel credentials for operational staff*
- b) Relatively flat site with few constraints allowing design flexibility and efficient design, full accessibility and safe working*
- c) The possibility of using some of the areas of the site for ecological remediation*
- d) The existing uses that surround the site and the similarly sized (mass and scale) buildings and industrial equipment mean this development should not be out of place.*
- e) The local availability of skilled industrial workers.*



Figures 35 – Flood map showing the site lies in zones B and C2



3.0 Site and Context Analysis

3.5 Site Selection Process

A thorough site selection process was undertaken in August 2021. Within this wider process a number of sites across the Borough were assessed for their suitability for the proposed development, and a structured methodology was applied to the analysis, assessing the key opportunities, constraints and relevant planning policies and allocations. The following matters formed part of the assessment criteria:

- a) Accessibility – to key utilities, resources, hydrogen and transport modes including options for road, rail and sea*
- b) Environmental constraints including flood risk, biodiversity, contamination, noise and air quality*
- c) Minimum site size and configuration*
- d) Land ownership arrangements*
- e) Landscape and visual impact*
- f) Safeguarding of land and COMAH status*
- g) Residential amenity*
- h) Future development intentions and surrounding context*
- i) Policy position, designations, and allocations*
- j) Associated consents and requirements*

The site at Crown Wharf was identified as the preferred option for functional, operational, and planning reasons. Key to this is the site's strategic location (with plentiful transportation options) within the industrial core of Port Talbot and surrounding dock facilities, adjacent to active industrial uses and the Port Talbot Steelworks. It represents under-utilised, previously developed land with excellent access to industrial skills, products and resources to support the development.

The site is included in the ABP Future Port Talbot Programme, which aims to create a new low-carbon manufacturing cluster and will act as a catalyst for surrounding development.



A Proposal for a Sustainable Aviation Fuel Production Facility, Port Talbot Docks

4.0 Design Development

4.1 Precedent material

Similar processes transforming ethanol to sustainable aviation fuel are in operation globally. This includes a very similar large scale production facility that will shortly begin production in Georgia, USA operated by LanzaJet. The production of the SAF involves a three-step conversion process for which each individual process-step is widely used in the chemicals industry. The scale of the proposed facility will make it a global leader for this technology. The majority of the items that will be on site concern the industrial process and, in this instance, the industrial layout is concerned with:

- a) Delivery and storage of feedstock materials including a jetty (jetty under separate application)
- b) Processing of the feedstock materials and conversion to sustainable fuels
- c) A ground flare for discharging excess gas
- d) Storage of sustainable fuels
- e) Buildings and supporting services for the running and maintenance of the operation.
- f) Substations and supporting utilities
- g) Distribution facilities



Figures 36 – A similar facility to Project Dragon, LanzaJet Freedom Pines Fuels facility in Georgia, USA is approximately 1/3 the size of these proposals. Heights of equipment are comparable.



Figures 37 to 41 – Other LanzaTech projects from around the world.



A Proposal for a Sustainable Aviation Fuel Production Facility, Port Talbot Docks

4.0 Design Development

4.2 Industrial Process - Transport Options

The scale of the proposed development's operation requires the transfer of materials, both feedstocks and finished products. The site selected for this project has excellent infrastructure owing to the:

- a) The harbour side and dock area which is large enough and has deep enough water for large shipping
- b) Road connections to the M4 motorway

There is also rail connections very close to the site, but these would require a prohibitively expensive investment to re-commission. LanzaTech has therefore elected to receive feedstock via ship and distribute their finished products via road (sustainable diesel, which represents 10% of the product created) and sea (sustainable aviation fuel, 90% of product created). These are the most appropriate and efficient methodologies. Two major elements of the project will therefore be the construction of:

- a) A road tanker turning and loading area for collecting sustainable diesel fuel products
- b) A jetty into the dock to receive shipping, unload the feedstock and load the finished sustainable aviation fuel products (jetty under marine license).



Figure 42 – Diagram of available transport options



Figure 43 – A ship typical of those delivering feedstock material.



Figure 44 – Typical loading of a tanker with sustainable diesel.



4.0 Design Development

4.3 Industrial Process - Storage of feedstock materials

The storage of feedstock materials in this instance is via a large bunded tank complex. The tanks for this application are typically 20m high and have a diameter of 22m and will store around 7,600 m³ per each of the four tanks of ethanol pumped from delivering ships at the jetty position. Ethanol is a colourless, organic compound with a pleasant odour, which has a wide range of applications. It is widely used as a fuel in vehicles, usually blended with petrol; has extensive applications as a solvent and chemical feedstock; is widely used in the food and beverages industry, used in personal care & cosmetics; and pharmaceuticals

Being a fuel in itself, ethanol is flammable and combustible so fire and security precautions around the facility will be carefully considered.

Ethanol is also a potential contaminate and pollution prevention measures include bunded tanks with impermeable walls and floors, interceptors and a strong system for recovery of any spilt materials.



Figure 45 – Typical vessels for the storage of feedstock ethanol in a bunded compound.

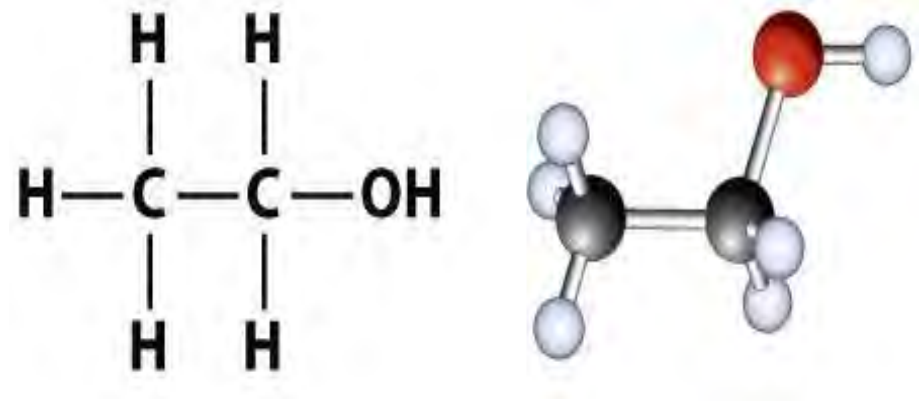


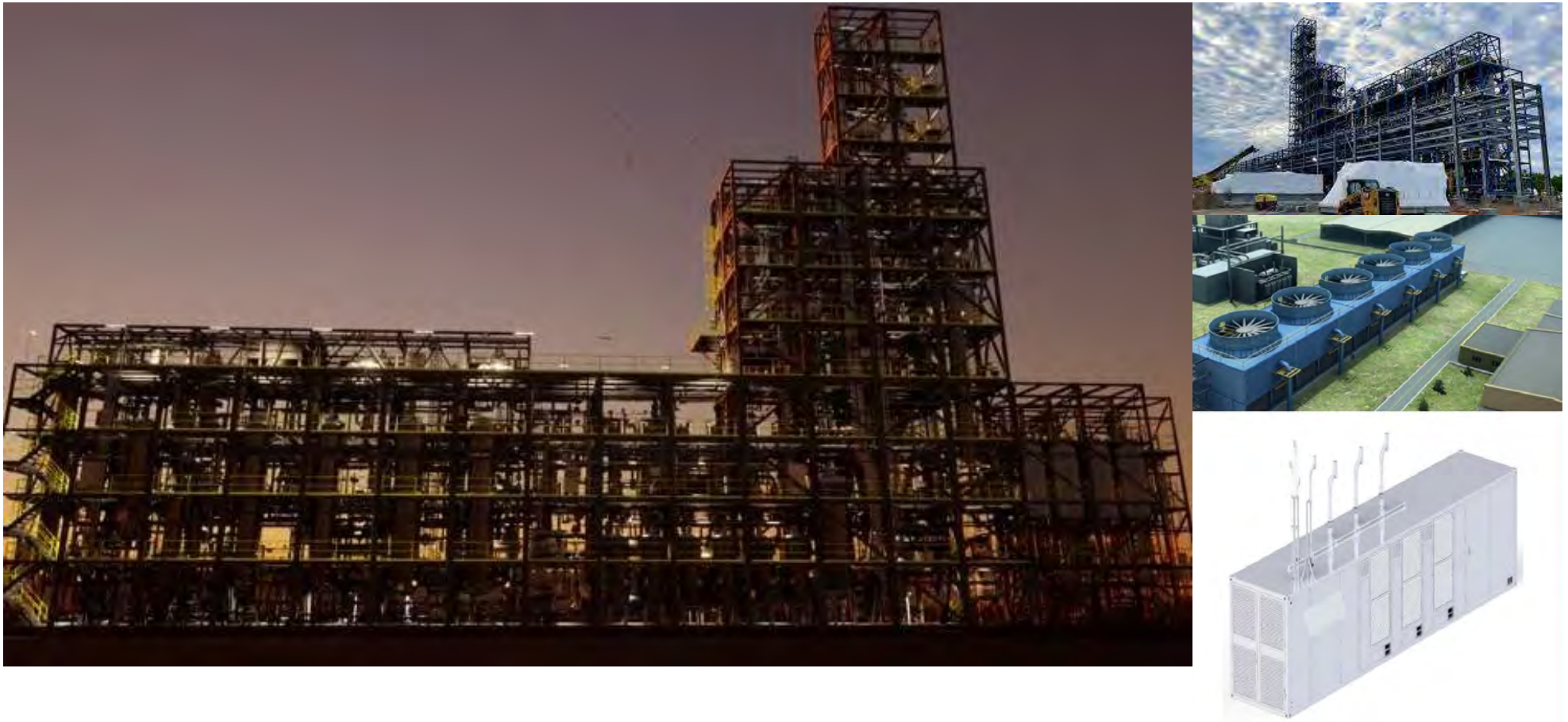
Figure 42 – Ethanol molecules



4.0 Design Development

4.4 Industrial Process - Processing of the feedstock and conversion to fuels using the LanzaJet™ ATJ technology

The process for converting ethanol to sustainable fuels involves multiple stages and the resulting equipment is complex in design. Such complex equipment is normally supported and accessed via a lattice of steelwork structures and stairways. Safety and identification of items are always key in industrial process design, and the colour schemes involved tend to be determined by these factors and economy of production.



Figures 46 to 49 – early-stage design modelling for the process element of the development, plus (inset) an example of a LanzaJet development's process module under construction. It should be noted that the process relies on other equipment such as coolers, compressors and other packaged equipment.



4.0 Design Development

4.4 Industrial Process - Processing of the feedstock and conversion to fuels using the LanzaJet™ ATJ technology.

The following diagram explains the processes involved in converting sustainable sourced ethanol to more complex fuels types including sustainable aviation fuel.

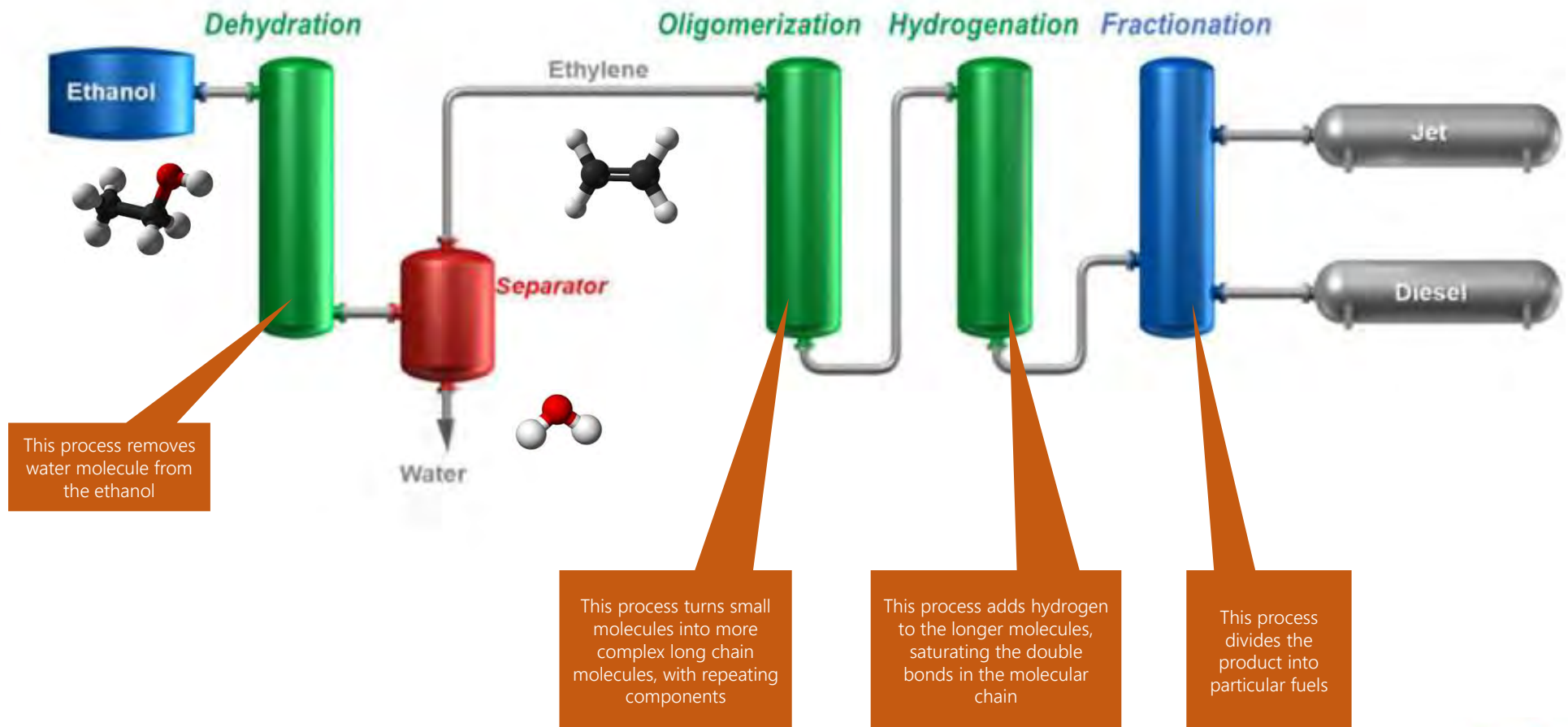


Figure 50 – LanzaJet ATJ process.



4.0 Design Development

4.5 Industrial Process – Disposing of waste gas

During abnormal working conditions the production process can generate excess flammable gas which on occasions needs to be vented and burnt. To allow this part of the process to take place and the gas not escape creating a possible hazard, a flare is required. There are two types of flare commonly used for this activity; an elevated flare and an enclosed ground flare. In this instance, a ground flare is preferred as it will be less intrusive into the surroundings in terms of appearance, size, noise and smoke emission.

Details of the expected frequency and conditions that require the operation for the flare can be found in the Environmental Statement and the table 4. The proposed ground flare has been extensively discussed and assessed with the local planning authority at pre-application stage, with details being agreed on the site-specific circumstances.

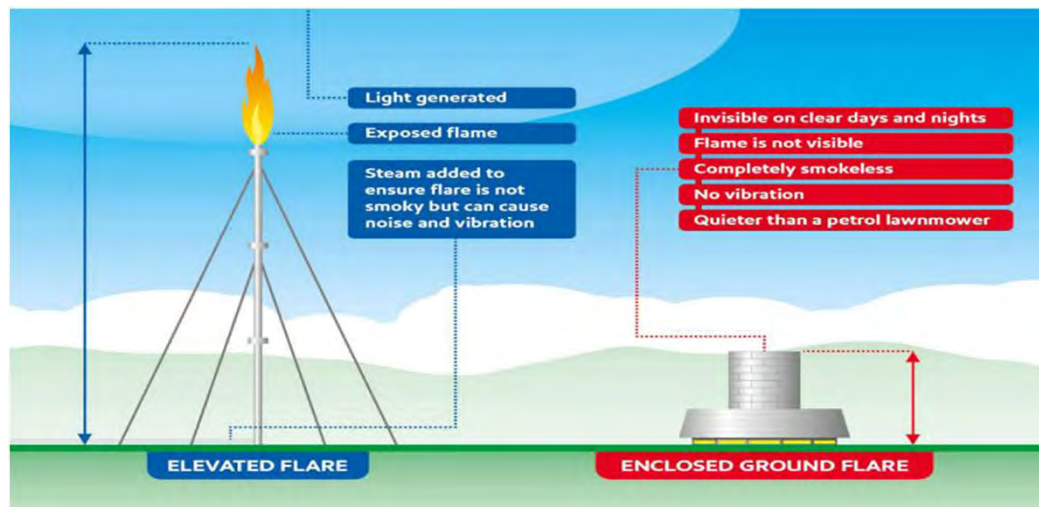


Figure 51 – Typical flare types and their respective advantages



Figures 52 to 55 – Details of ground flares used in other similar facilities.



4.0 Design Development

4.6 Industrial Process - Storage of sustainable fuel products

Following manufacture but prior to loading for distribution, fuel products are stored in unpressurised tanks. The tanks for this application are typically 20m high and have a diameter of 18.5m and will store around 5,370m³ of sustainable aviation fuel product pumped from the process area.

The volume of sustainable diesel fuel produced and stored on the site is lower and the tanks are correspondingly small.

As with the ethanol storage there are risks associated with fire, security and contamination and appropriate measures are required to ensure safety. The required mitigation is inherent in the detailed design for these items and will be complemented by the LanzaTech site operational process and procedures following discussion with the Health and Safety Executive as the relevant regulator.

Other prominent items on site include a station in a secure compound allowing sustainable diesel to be loaded in road vehicles for delivery and within the PDZ, liquid nitrogen tanks for cooling purposes.



Figure 56 – Equipment for sustainable fuel delivery to road vehicles

Figure 57 – Liquid nitrogen tanks are also a prominent feature of the development



A Proposal for a Sustainable Aviation Fuel Production Facility, Port Talbot Docks

4.0 Design Development

4.7 Site Layout

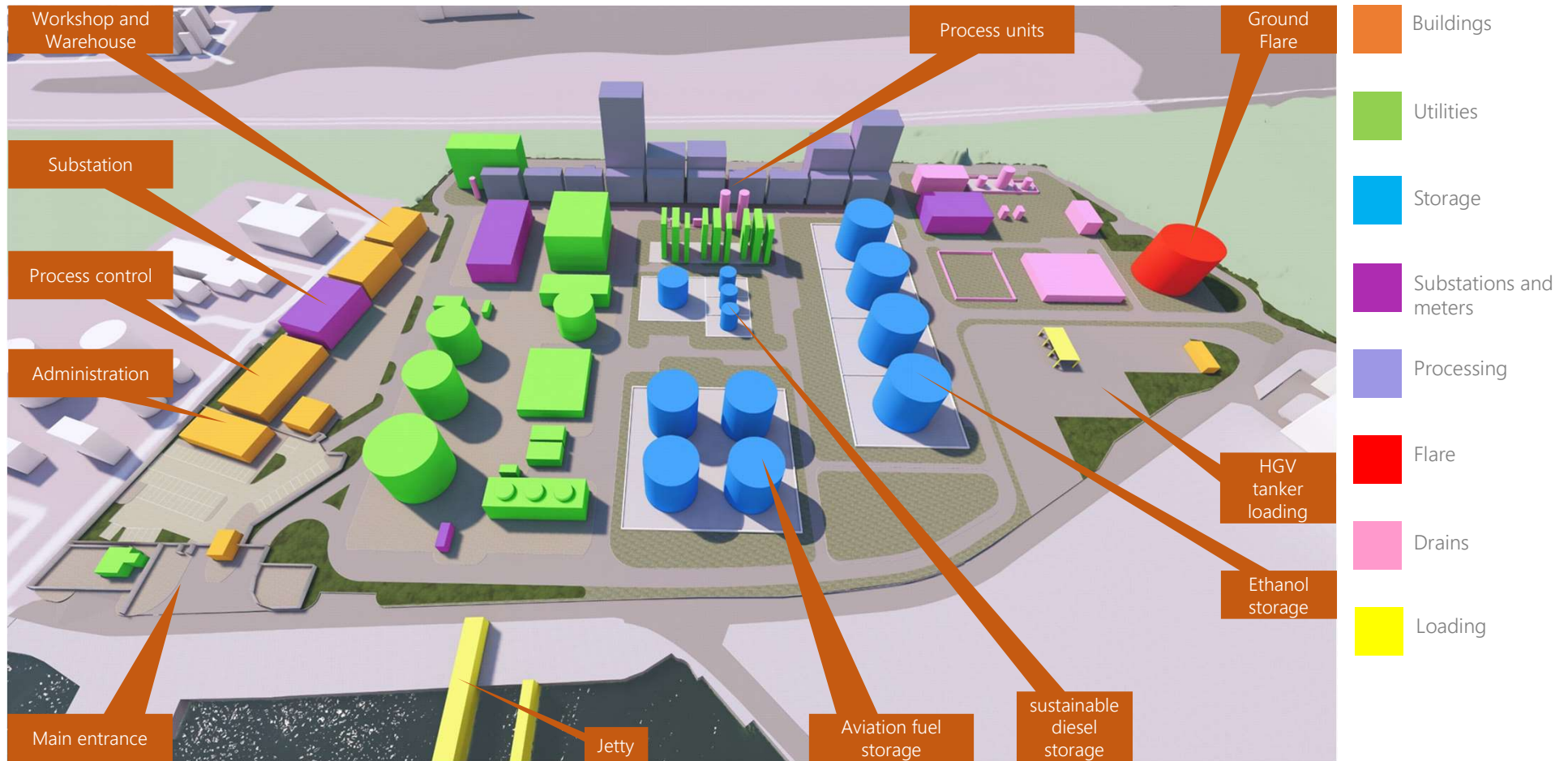


Figure 58 – The final site arrangement was established during scheme development.



4.0 Design Development

4.7 Site Layout



Figure 59 – Receipt of Ethanol feedstock and on-site storage. Feedstocks and products from the plant will pass to the jetty via below ground pipeworks.



4.0 Design Development

4.7 Site Layout

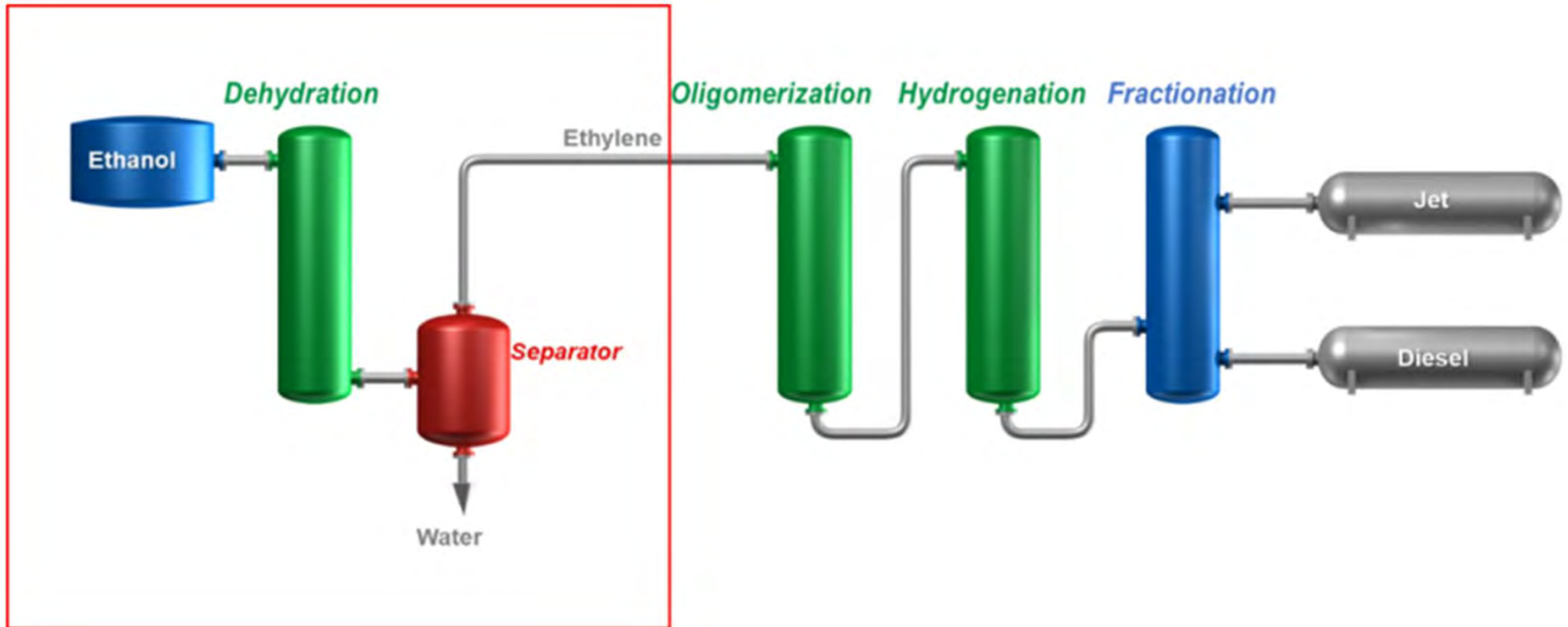


Figure 60 – The first phase of the industrial process is to remove water from the ethanol. This process produces ethylene and water.



4.0 Design Development

4.7 Site Layout



Figure 61 – Ethanol is de-hydrated, and ethylene separated



4.0 Design Development

4.7 Site Layout

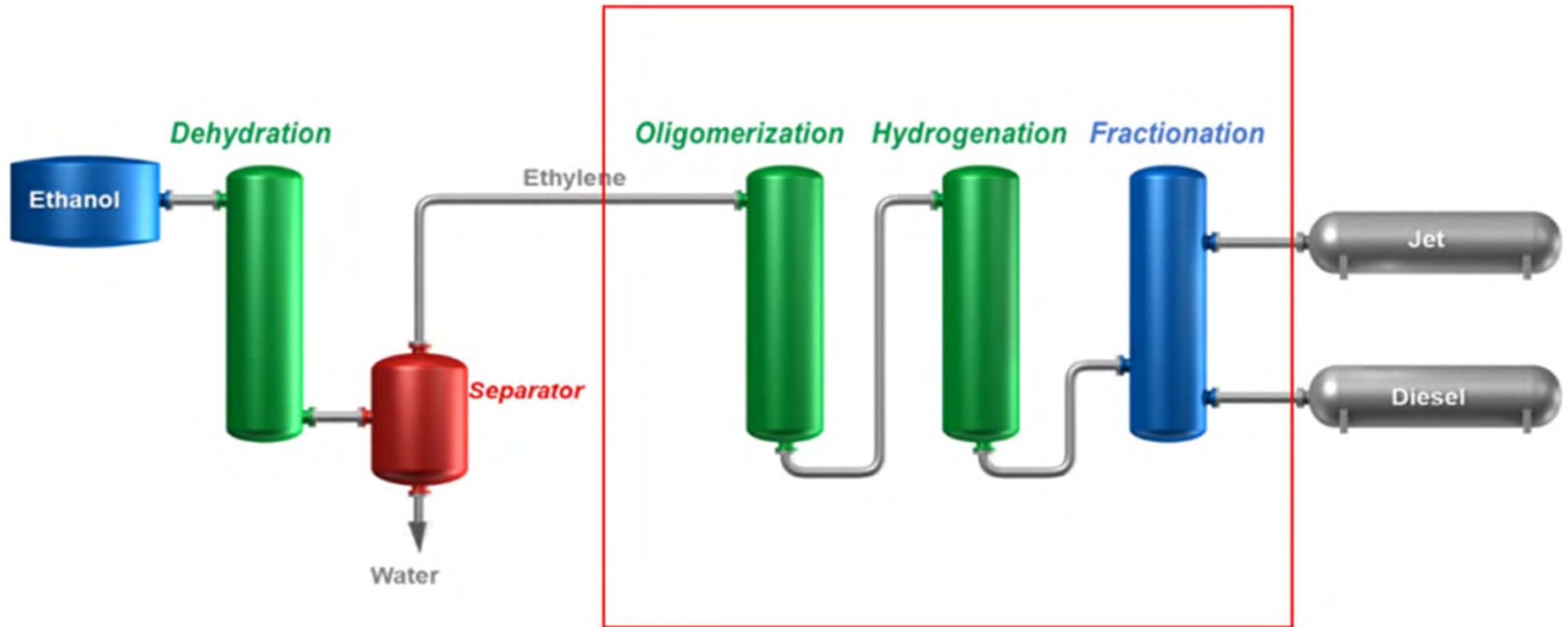


Figure 62 – The second phase of the industrial process is oligomerisation, a process that changes small molecules such as ethanol, into larger molecules normally consisting of a small number of repeating units. Thereafter the process switches to hydrogenation, a process that saturates the oligomerised molecules with hydrogen. Finally, the resulting product is fractionalised, a common process used to separate grades of fuel using temperature.



4.0 Design Development

4.7 Site Layout



Figure 63 – Site storage of finished products



4.0 Design Development

4.7 Site Layout



Figure 64 – Distribution of finished products. Products will be moved around the site via pipe runs that are not shown in this diagram for clarity. For details of pipe runs refer to the architectural drawings.

