

GRAIN LNG

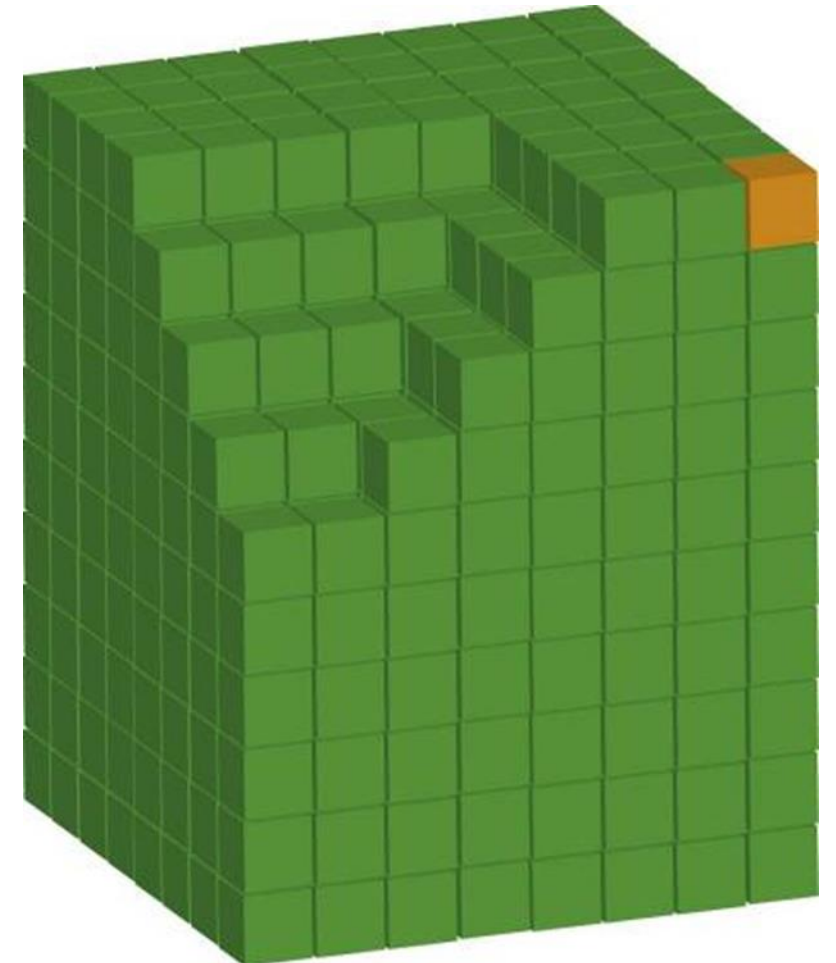
Challenges & benefits for the deployment of LNG in ports



October 2017
BPA Conference, Poole, UK

What is LNG?

- LNG is Liquefied Natural Gas
- Identical to the gas at home
- Stored as a liquid at -161°C in heavily insulated tanks
- Stored at low pressures, (0.1 barg)
- When natural gas is a liquid it reduces its volume by 600 times
- It enables large volumes of gas to be transported long distances safely and efficiently



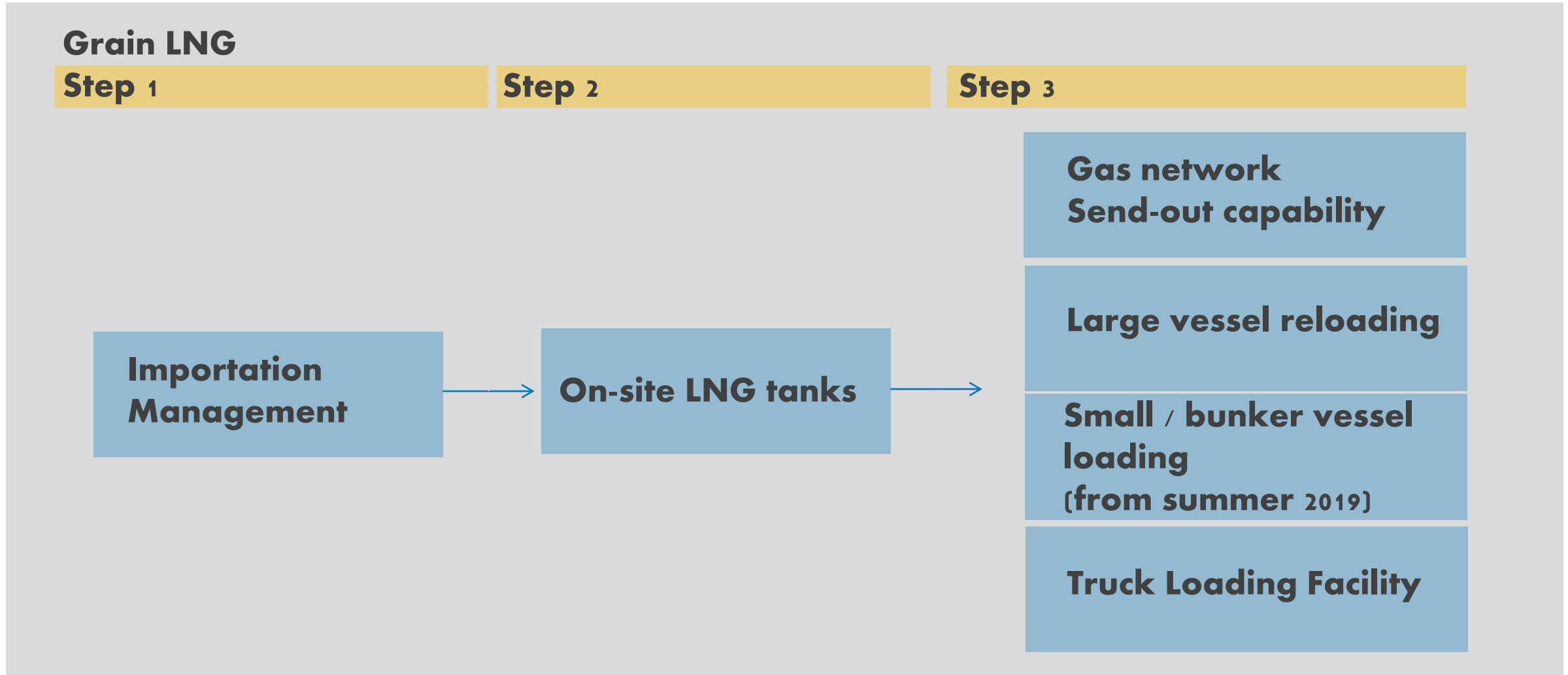
Grain LNG – Overview

- Regasification terminal located in the South East of England
 - Optimal location near the high demand center of London
- Largest LNG terminal in Europe
 - Storage capacity of 1,000,000 m³
 - Ability to meet over 20% of UK gas demand
- Long term capacity secured by 6 primary capacity holders
 - Highly flexible service (capacity holders control storage and send out)
 - Extensive nitrogen facilities – ability to process LNG from anywhere in the world
- Truck loading facility launched late 2015
 - Currently the most utilised facility in NWE
- Marine break bulk marine loading facility – planned for 2019

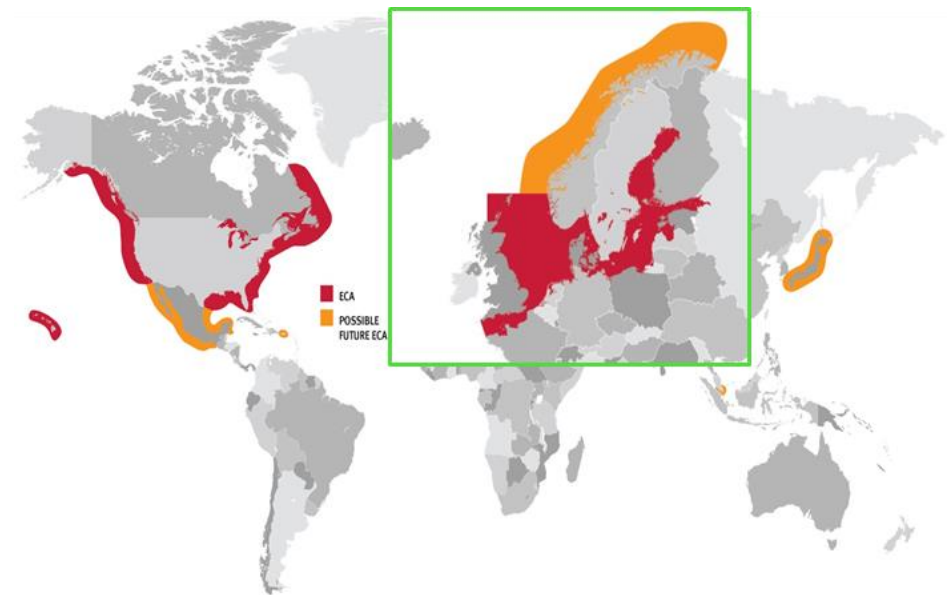
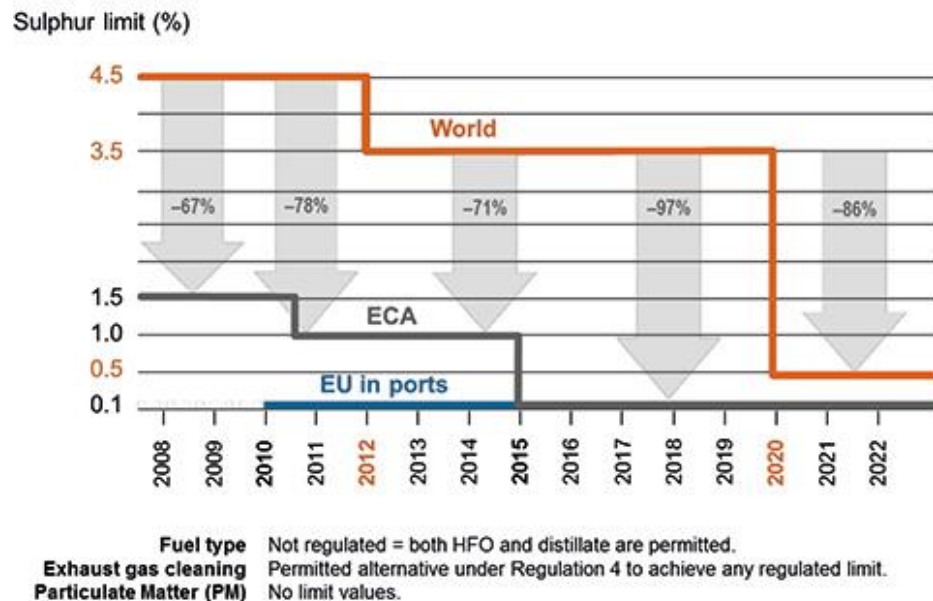


Grain LNG's role explained

- Grain LNG facilitates the importation and forwarding of LNG into the UK market and beyond



- International Maritime Organisation (IMO) regulations reduce global Sulphur limit to 0.5%
- Emission Controls Area already set at 0.1%.
- LNG as a clean fuel meets requirements within ECAs
- Alternatives to LNG are more expensive overall



- LNG is a globally sourced product and the market offers considerable upside in terms of growth and increasing supply sources.
- Grain LNG is uniquely placed in the Southern UK to accept all LNG deliveries from around the world

Regulatory Considerations



Global SOx emissions capped at 0.5% by 2020. Tightening of NOx emissions also need to be considered. Restrictions will likely get stricter over time. Also requires consideration over EU legislation covering deployment of LNG in inland and strategic port points.

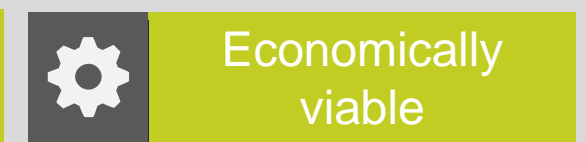


Public pressure on companies to switch to green fuels is increasing. LNG is a cost effective solution

Technical Considerations



Significant supply investments provide long term security of LNG supply to downstream users



The cooling process results in LNG being stored 600 times denser than natural gas in ambient state.

To create sustainable demand for LNG, sellers need to carefully consider buyer requirements as the downstream market evolves. The market needs to ensure that downstream factors are taken into account as requirements may differ slightly for different marine sectors.



Landed LNG Commodity

LNG is landed in Europe and purchased in US dollars. LNG buyers will likely purchase LNG stocks on similar terms into and/or around the UK market



Level Playing Field

Local LNG bunkering could present vessel operators with a great added value service which can be administered within ports; potentially attracting new clients.



Upstream Investments

Interest levels are growing and upstream companies are investing heavily in assets such as bunkering vessels to help support market growth



Large Commitments

Commitment levels are growing in various marine segments; in and around the UK and beyond

Managing LNG requires consideration to ensure optimum cost efficiencies and to ensure economic viability for the downstream market



Safe Handling

The LNG industry has an excellent safety record. An accident involving an LNG tanker or vessel is unlikely but measures should be taken to ensure appropriate training of key personnel



Movement

UK law prevents drivers from leaving a loaded LNG tanker unattended and whilst in transit.



Flexibility

Buyers require flexible access to commodity and infrastructure. Buyers do not always want to be subject to 'take or pay' contracts and may prefer a 'filling station' model



....an excellent opportunity

There are currently no vessel loading facilities in the UK, meaning buyers have to collect by truck or buy from a European facility. This presents a great opportunity for port provision from Grain

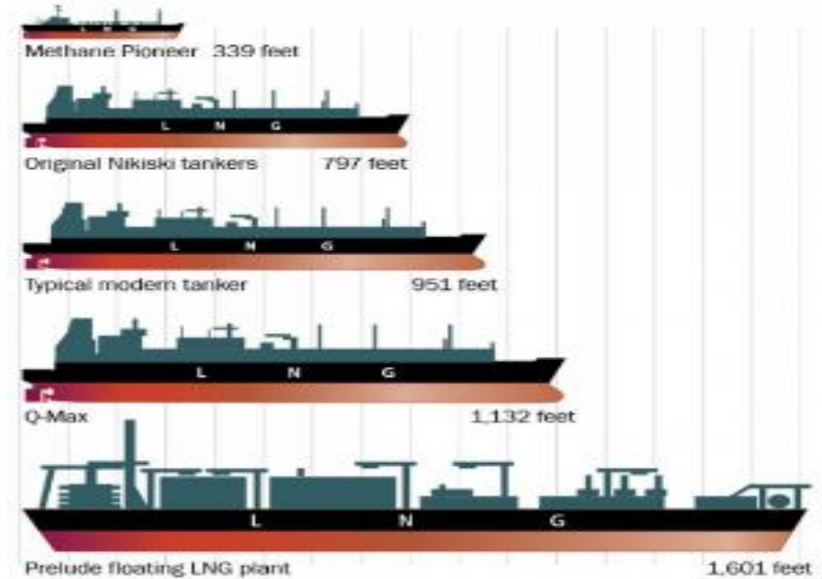


Why Break Bulk Marine?

- Grain Facility is not designed for the smaller break bulk vessels.
- Design to cater for 1,000 – 20,000m³ vessels using fixed loading arms
- Length 50m to 150m



LNG tankers grow in size



Option 1 – Truck to ship bunkering

Supporting end users requires flexibility! Grain has developed their truck loading service following extensive market engagement, and continues to accept and act upon feedback and suggested amendments.



365/24/7 loading and ancillary services

Grain offers access to 36 truck loading slots per day, which is likely to be expanded in future

- Ancillary services now offered in response to market demand including cool-downs & nitrogen purging



Flexible booking service

Number of slots secured annually and utilised as required

- Loading dates can be booked up to 40 days in advance and users can secure additional flexibility (e.g. the ability to roll slots over from one contract year to the next)



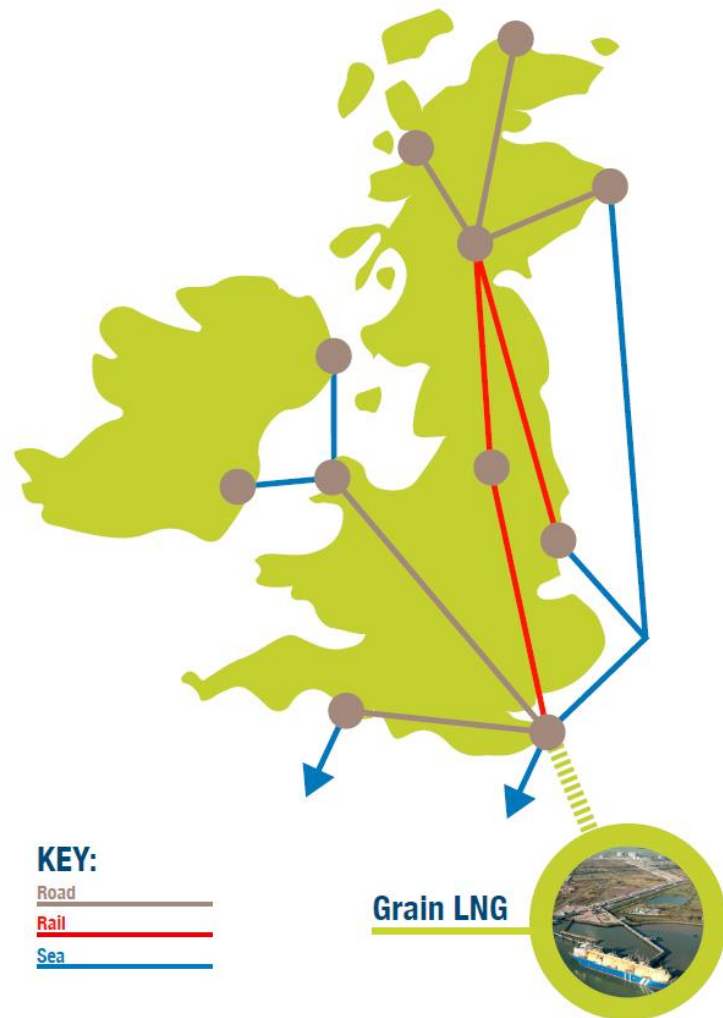
Flexible pricing

Users choose whether to secure fixed or variable slots

- Variable slots can be booked in advance for a small capacity charge
- If slot is not utilised, only capacity charge is payable
- Fixed slots are cheaper but users pays the full fee if slot is not utilised

Option 2 – Intermodal ISO container solution

ISO transportation by rail will be available from Isle of Grain late 2017. Grain customers are able to load ISO containers on a 24/7 basis. Customers have the option to connect to rail depots in Southern and Central England



Operations

Containers can be loaded onto the rail network or onto a vessel at the local port facility. Only one driver required, and for a reduced period of time



Increased Bunkering volume

Option for multiple trucks or ISO containers to bunker vessels simultaneously



Safety

Transport by rail and/or sea significantly safer than via road



Flexibility & cost benefits

Grain infrastructure contracts designed to provide as much flexibility as possible. Alternate to road transportation offers significant logistical cost savings subject to location

Grain is planning to launch a small scale marine facility in Q3 2019. Innovative ‘floating loading unit’ - a ‘quick to market’ solution that can be provided at the lowest possible cost. Currently engaging with the market to fully develop the service



Operations

Solution will allow us to reload small & bunkering vessels (up to 20,000 m³) without impacting our primary capacity holders

- Unit can be moved off and on the jetties as required



Flexibility

Design is fully compatible with current facilities and services. Grain’s intention is to provide as much contractual flexibility as possible



Safety

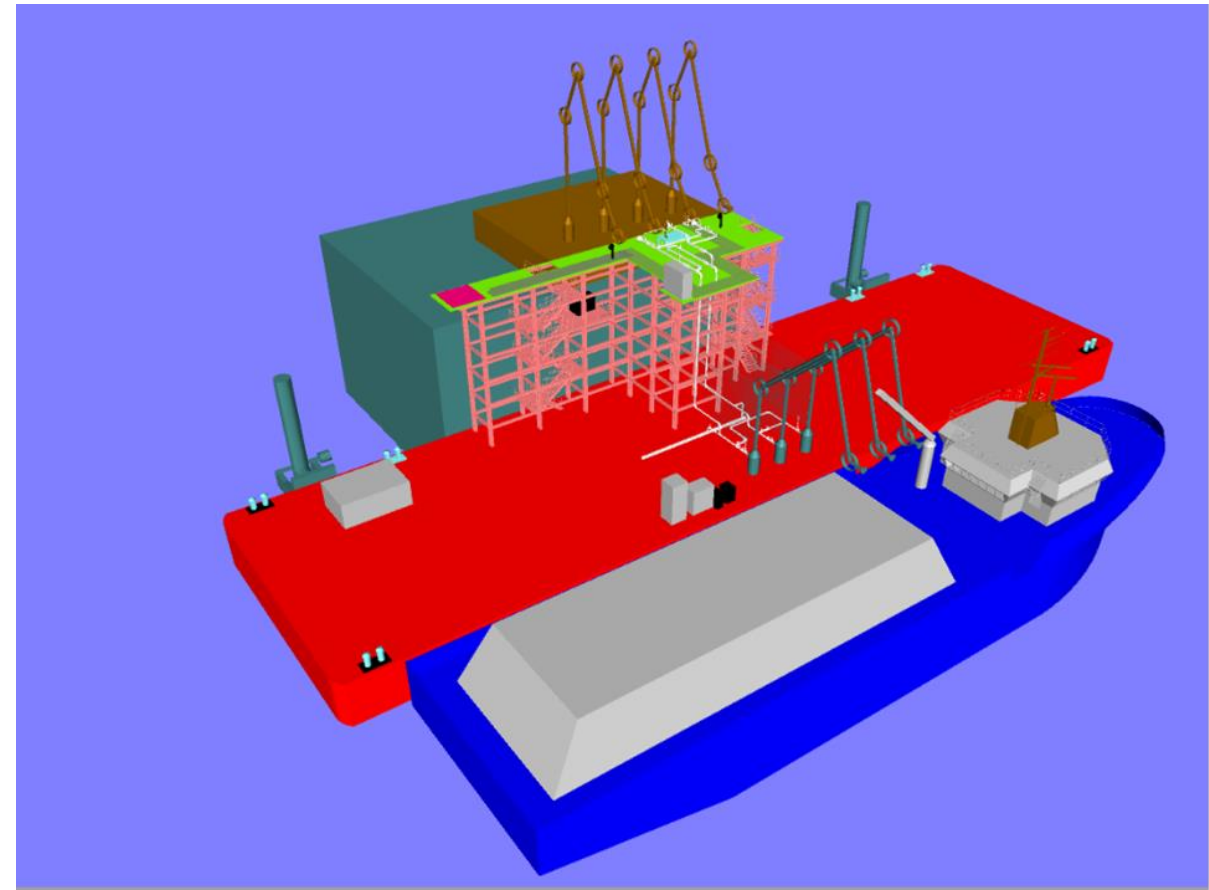
The unit will utilise our existing jetties, loading arms and associated safety systems



Transparency

Clear pricing for the loading shipper

- Variable costs, incremental boil off gas, shrinkage etc. to be absorbed by the LNG supplier (i.e. the Grain primary capacity holder)





- Grain LNG offers a large LNG importation facility to the UK market which can support the emerging need of the marine industry; offering UK ports with an excellent opportunity to play a key role in the new LNG bunkering value chain
- LNG offers both economic and broader environmental benefits to end users and upstream suppliers are evolving to cater for the emerging market
- LNG suppliers typically will take the price risk on supply to ensure that user demand is always met
- LNG infrastructure owners need are committed to supporting the marine industry
 - At the lowest possible cost and with as much flexibility as possible
- All LNG players will to continue to share knowledge as to the merits of LNG:
 - A clean, reliable and future-proofed source of fuel