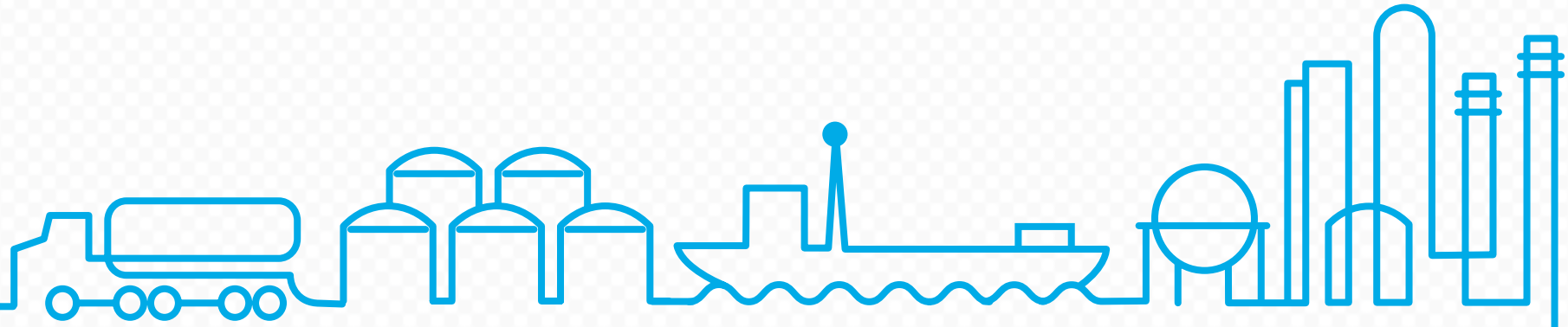
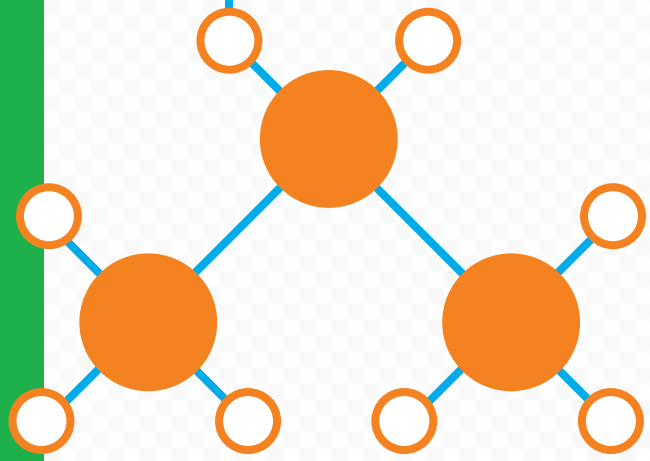


Guernsey Hydrocarbon Supply Programme



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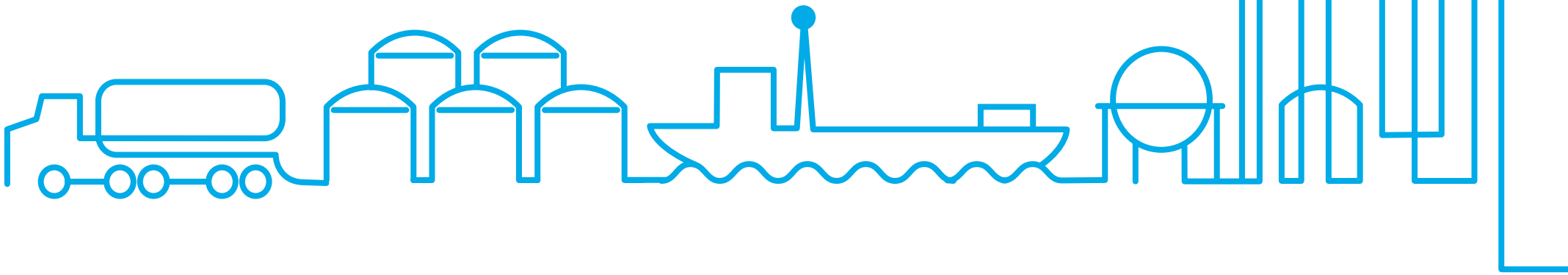

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Hydrocarbon Supply Programme

For over 80 years Guernsey has imported fuels to the Island to support the community and its economy. Despite this the current system has a number of risks which need to be addressed to ensure we can continue to provide fuels safely, reliably and at an affordable price now and in the future.

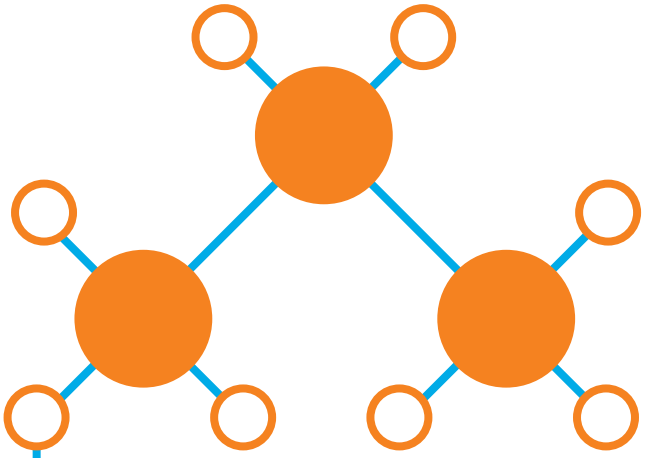
The Guernsey Hydrocarbon Supply Programme has been implemented to review Guernsey's current supply chain and make recommendations to the States of Guernsey on how best to secure the Island's long-term fuel needs, which include the import of petrol, diesel, kerosene, gas oil, aviation fuel, liquid petroleum gas and heavy fuel oil.

Community and economic life in Guernsey is dependent on the timely delivery of hydrocarbon fuels, and it is essential that the whole supply chain to the island is robust.

The purpose of this document is to explain:

- What the Guernsey Hydrocarbon Supply Programme is,
- What hydrocarbons are,
- Why they are important to Guernsey,
- What the current supply chain is,
- What is the progress to date,
- What remains to be done.

It should be noted that no decisions have yet been made on the solution. The Guernsey Hydrocarbon Supply Programme is still in its first stage looking at a range of options.



02 Hydrocarbon Supply Programme Vision and Timetable

Programme vision

The vision of the Guernsey Hydrocarbon Supply Programme is to provide:

A safe and secure hydrocarbon supply delivering socio-economic value to Guernsey.

Timeline overview

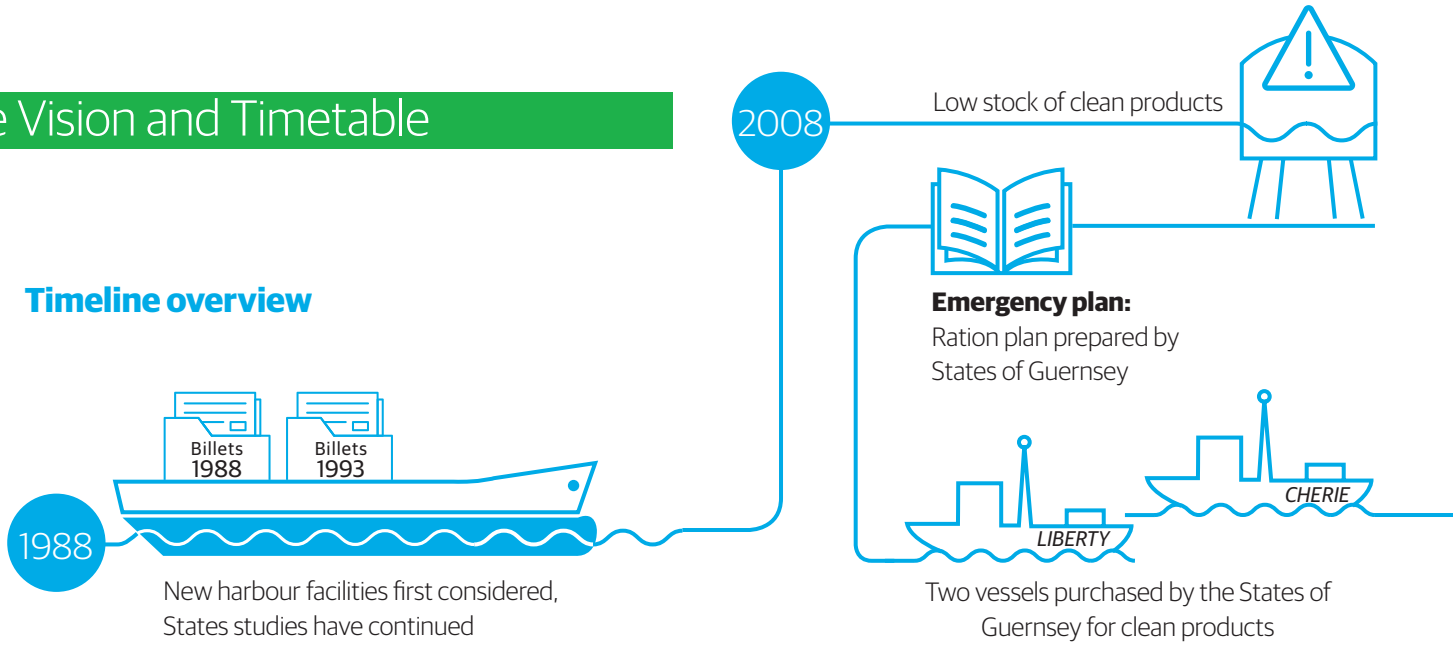


Figure 1: Guernsey Hydrocarbon Supply Programme Timeline

Managing a Successful Programme

A programme is made up of a specific set of related projects identified by an organisation that together will deliver a defined objective, or set of objectives, for the organisation.

The Guernsey Hydrocarbon Supply Programme is based on the Managing Successful Programme methodology (States of Guernsey best practice and globally recognised approach) which has the following phases:

SOC – Strategic Outline Case

- This phase includes the development and evaluation of options and provides a business justification for recommending a preferred solution.

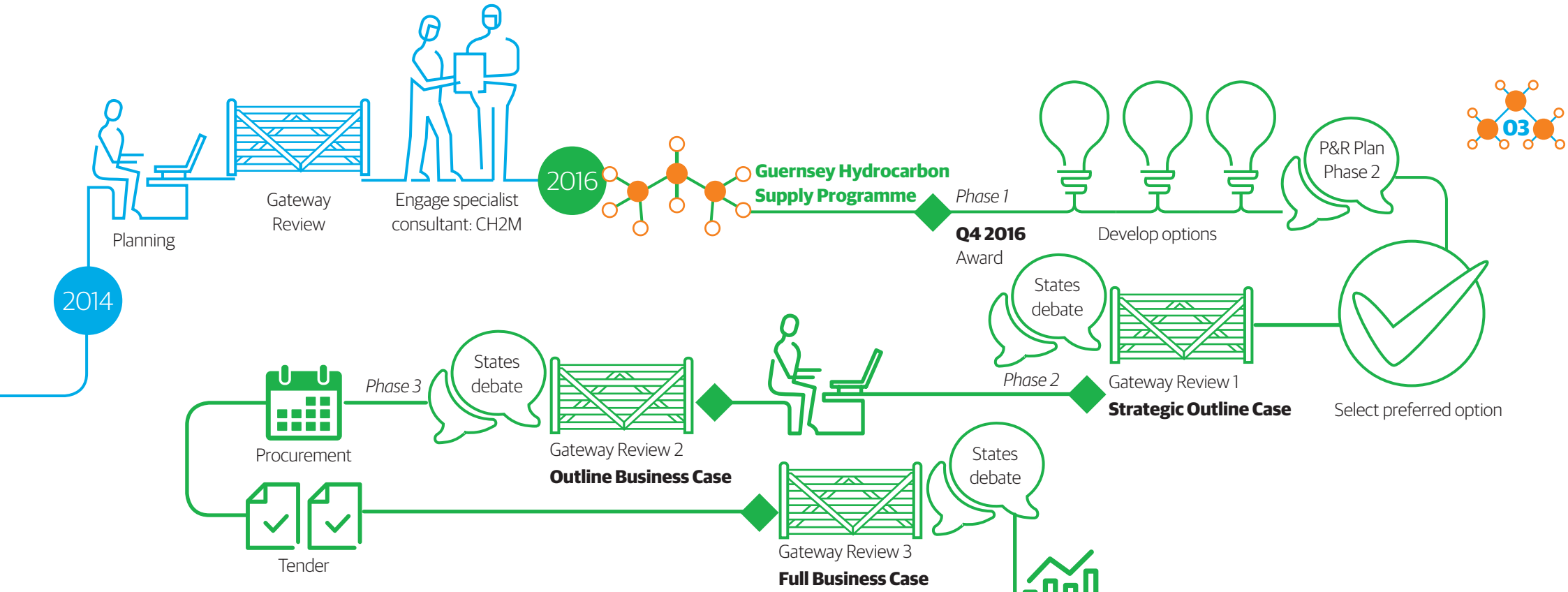
OBC – Outline Business Case

- This phase develops the business strategy and may include: site investigations, engineering design and optimisation of the option.

FBC – Full Business Case

- This phase includes a delivery strategy including funding and procurement routes and completing a tender process.

There are approval gateways at end of each phase and the States of Guernsey will make the decision following these gateways to continue to the next phase. After the FBC there will be a financial investment decision to implement a project(s) to realise the benefits and programme vision.



Timeline of programme

The safe and secure supply of hydrocarbons to Guernsey has been considered by the States of Guernsey since the late 1980s.

Due to supply chain issues, in 2008 on island stock levels of petroleum products dropped to less than a few days of supply. To address this, demand calming measures were introduced by the distributor companies. The States of Guernsey prepared contingency plans under Emergency Powers legislation to allow a system for fuel rationing should deliveries of petroleum products to the Island continue to be disrupted.

In late 2008 the States of Guernsey decided to purchase two tankships that were capable of serving St Sampson's Harbour to help secure the Island's continued supply of petroleum products.

In 2014 the States of Guernsey began planning for the Hydrocarbon Supply Programme. In 2016 specialist consultants CH2M were appointed to provide programme management services and expertise in the development of options and recommendations.

On successful completion of the three business case gateway reviews the States of Guernsey will make a financial investment decision. If successful the selected option will be implemented and once complete the benefits realised.

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04 What are Hydrocarbons?

Hydrocarbon definition

A hydrocarbon is an organic compound consisting entirely of hydrogen and carbon.

Why are hydrocarbons important?

"The success of the Bailiwick both as a community and as an economy depends of securing a continuous supply of petroleum based products whether in the form of petrol for cars, diesel for commercial transport, kerosene for heating our homes, offices and institutions or aviation fuel. Supplies of petroleum products are as essential as supplies of water or electricity and are likely to remain so for years to come."

Billet D'Etat 2009 Tank ship purchase

Hydrocarbon Demand

A hydrocarbon demand study for Guernsey has been undertaken by PricewaterhouseCoopers. The fuels used in Guernsey include: petrol, diesel/gas oil, aviation gasoline (avgas), jet fuel, heating oil/kerosene, liquid petroleum gas (LPG) and heavy fuel oil (HFO).

The forecast is for the demand for hydrocarbons to reduce over time. Approximately 81,000 tonnes of hydrocarbons were imported to Guernsey in 2016 (enough to fill the Beau Sejour swimming pool more than 320 times). It is forecast this could reduce to approximately 64,000 tonnes in 2050. The reduced demand is mostly through improvements in the fuel efficiency of road transport and heating systems.

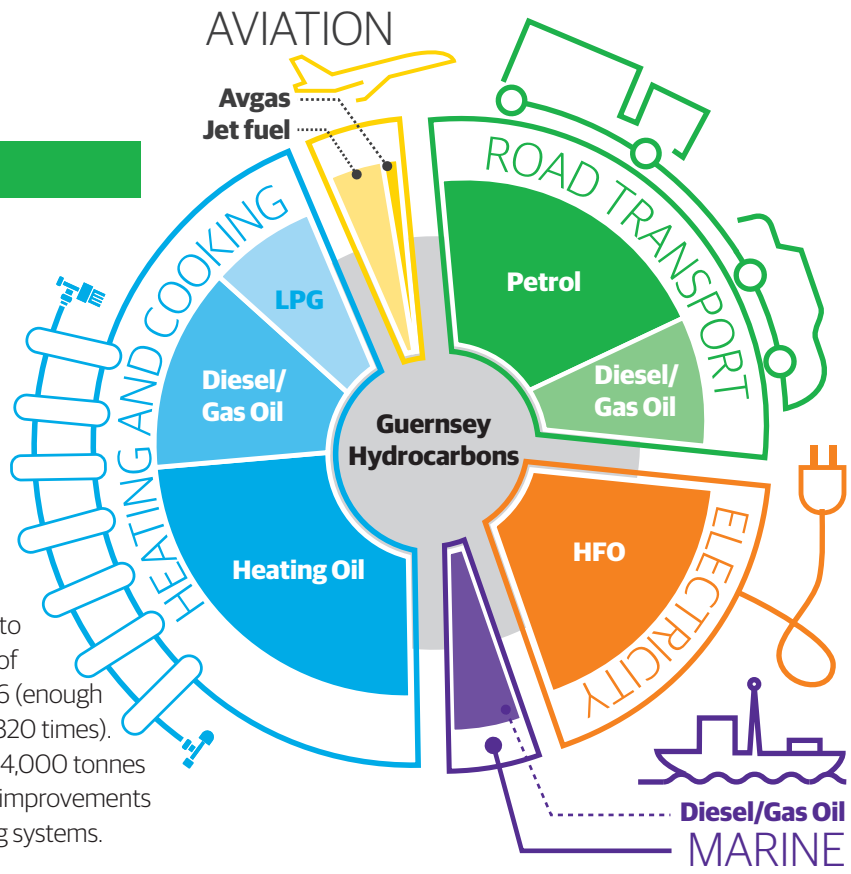

Figure 2: Guernsey hydrocarbons by type and use case, 2016

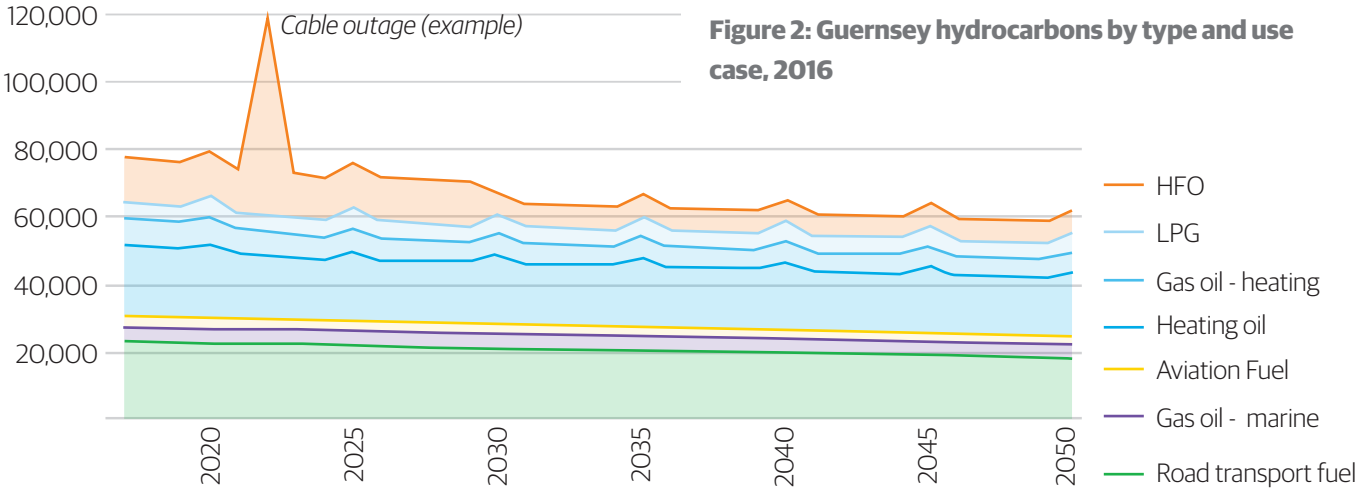

Figure 3: Guernsey hydrocarbons demand by product (tonnes)

Current Policy

The Guernsey Hydrocarbon Supply Programme has only considered current States of Guernsey implemented policy in the work completed to date.

Guernsey's energy policy is set out in the Energy Resource Plan 2011. This describes a vision for the year 2020 which includes a gradual decarbonisation and diversification of Guernsey's energy generation, while maintaining a sustainable and secure supply. The policy confirmed the States of Guernsey's commitment to retaining sufficient sources of electricity to meet requirements, in any circumstance where two sources were unavailable at the same time. This is known as the N-2 policy.

The Energy Resource Policy 2011 also includes a target for renewable electricity generation of 20% by 2020. An agreement is in place until 2022 that Guernsey has access to certified low carbon electricity (Nuclear and Hydroelectric) through the cable link to France, of which 30% is renewable.

Guernsey is included in the UK's international obligation to achieve an 80% reduction in greenhouse gas emissions by 2050 compared with 1990 levels. Since 1990 Guernsey has achieved a 29% reduction.

Future Policy

The Hydrocarbon Supply Programme is a pipeline project within the States of Guernsey Policy and Resource Plan – Phase 2 which will be debated in the June 2017 States debate. The Policy and Resource Plan proposes a review of the current policy described in the Energy Resource Plan 2011. It notes that this updated Energy Resource Plan is critical to inform, and will be informed by, the Guernsey Hydrocarbon Supply Programme.

The Energy Resource Plan and Hydrocarbon Supply Programme will also inform and be informed by the Guernsey Renewable Energy Team (RET) Programme. RET's local renewable energy generation vision is to deliver energy independence and greater energy security, with a lower environmental impact than the current approach.

Under current policy it is expected that hydrocarbons will need to be imported for the foreseeable future for transport (cars, lorries, buses, boats and planes), for heating/cooking and on-Island electricity generation (when the cable link is undergoing maintenance). The amount of hydrocarbons imported will be influenced by future States of Guernsey policy which may affect:

- The amount of on island generation of electricity
- Building insulation improvements
- Uptake of electric vehicles
- Population changes

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06 What is the current supply chain?

Hydrocarbons imported to Guernsey can be split into three types; clean products, Heavy Fuel Oil (HFO) and Liquid Petroleum Gas (LPG). Each are currently transported to Guernsey by different ships from three different primary sources of supply.

How are hydrocarbons imported to Guernsey and who imports them?

Almost all of the ships used to import hydrocarbons berth at St Sampson's Harbour.

Clean products are typically imported from a refinery in Pembroke (Wales) using the States of Guernsey owned ships the Sarnia Cherie and Sarnia Liberty which are operated by James Fisher Everard. There are two importers of clean products to the Island; RUBIS Group (operations at South Quay) and Channel Island Fuels Limited (operations at North Pier). The products are piped from the ship in underground pipes to the storage tanks.

HFO is imported on behalf of Guernsey Electricity Limited from a refinery at Fawley (England) using the ship the Jaynee W which is owned and operated by Whitakers. The ship berths at North Pier and the HFO is piped underground to storage tanks next to the power station.

LPG is imported on behalf of Guernsey Gas (International Energy Group) from Flushing (Netherlands) using ships owned and operated by B-Gas. Ships berth at the South Quay and the LPG is piped to underground storage tanks.

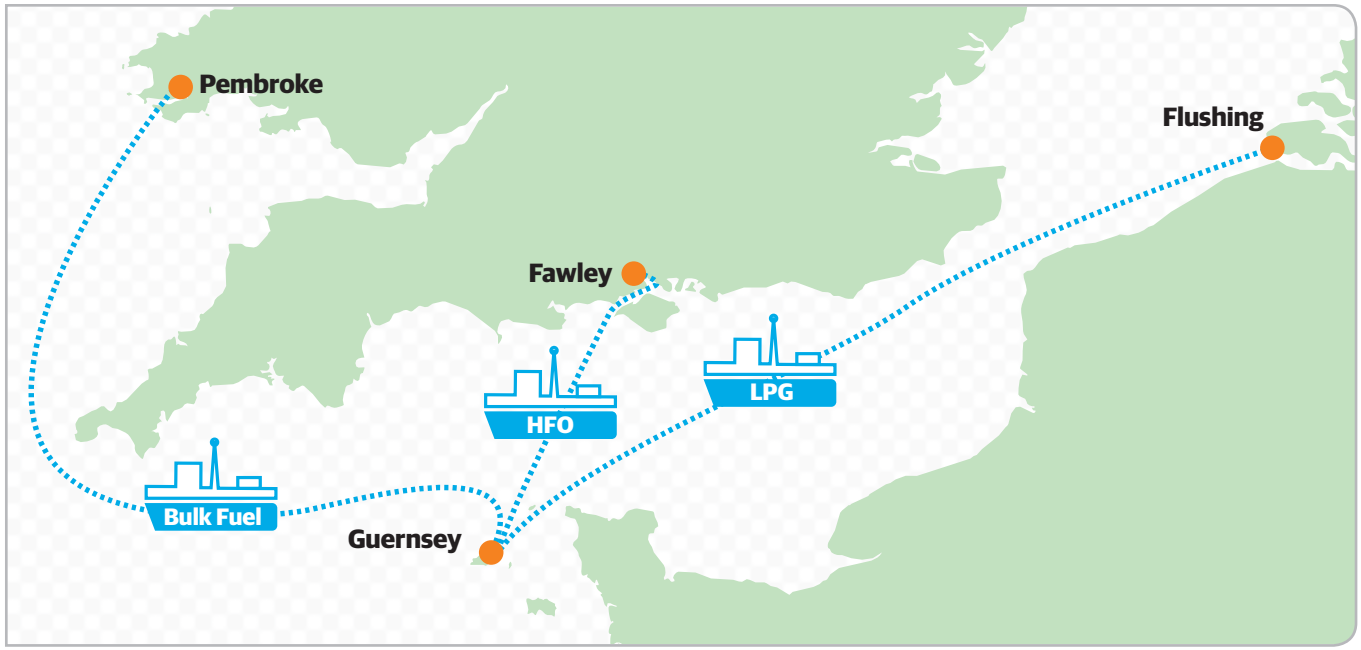

Figure 4: Guernsey Imports

Source of supply	Hydrocarbon product	Importer
Gunvor, Flushing, Netherlands	LPG	Guernsey Gas (International Energy Group)
ExxonMobil, Fawley, Southampton	Heavy Fuel Oil	Guernsey Electricity Limited
Valero, Pembroke, Wales	Petrol/Diesel/JetA1/Avgas /Kerosene Petrol/Diesel/Kerosene	Fuel Supplies (C.I) Ltd [RUBIS Group] Channel Island Fuels Limited (CIFL)
Resellers	Avgas, SU10	Fuel Supplies (C.I) Ltd [RUBIS Group]

Table 1: Guernsey Import Suppliers

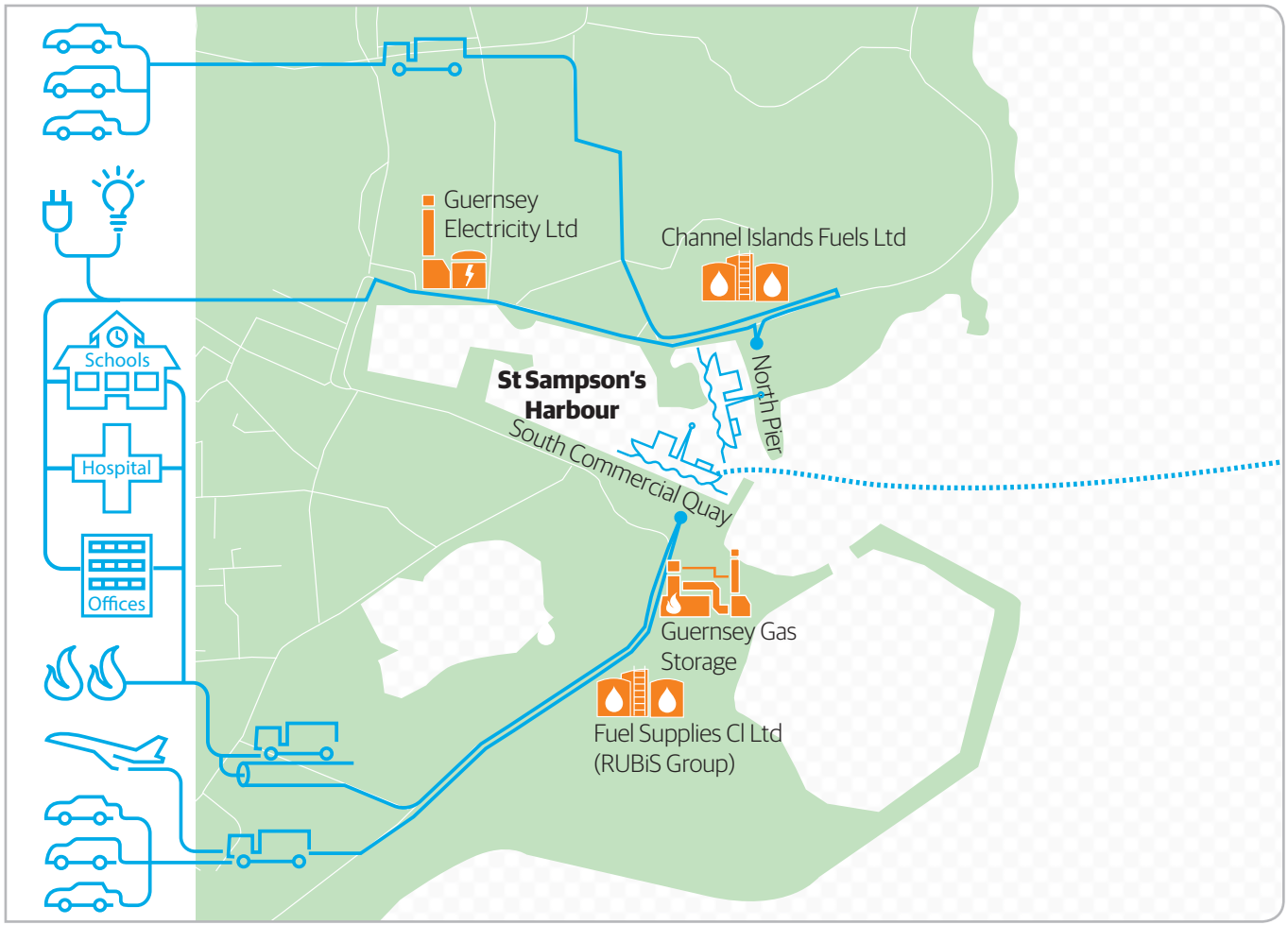

Figure 5: St Sampson's Harbour

Challenges exist in using St Sampson's Harbour, including: strong tidal currents on approach; strict limits on vessel length; a narrow, shallow and rocky harbour mouth; and berths that dry out at low tide. This requires specialised ships that can sit on the harbour bed when the tide is out.

The ships have to be strengthened to allow them to sit on the harbour bed – referred to as aground. These ships are termed NAABSA; Not Always Afloat But Safely Aground.

To allow the ships to sit on the harbour bed Guernsey Harbours has to inspect and prepare the harbour bed to ensure it is flat. This activity is completed the low tide before the ship is due and an excavator is used.

The ships require a particular minimum depth of water to enter St Sampson's Harbour so that they can safely navigate the rocky approaches. This depth of water is only achieved for a few days around each fortnightly spring tide. Once inside St Sampson's Harbour the ships berth and connect to the pipework at the berth. The unloading operations takes approximately 6 hours during which the tide goes out and the ship sits on the harbour bed. When the unloading is complete the ship disconnects from the pipework and then sails out of St Sampson's Harbour on the next high water.

Small volumes of specialist product are transported to Guernsey via the Roll On Roll Off ferries which call at St Peter Port Harbour.

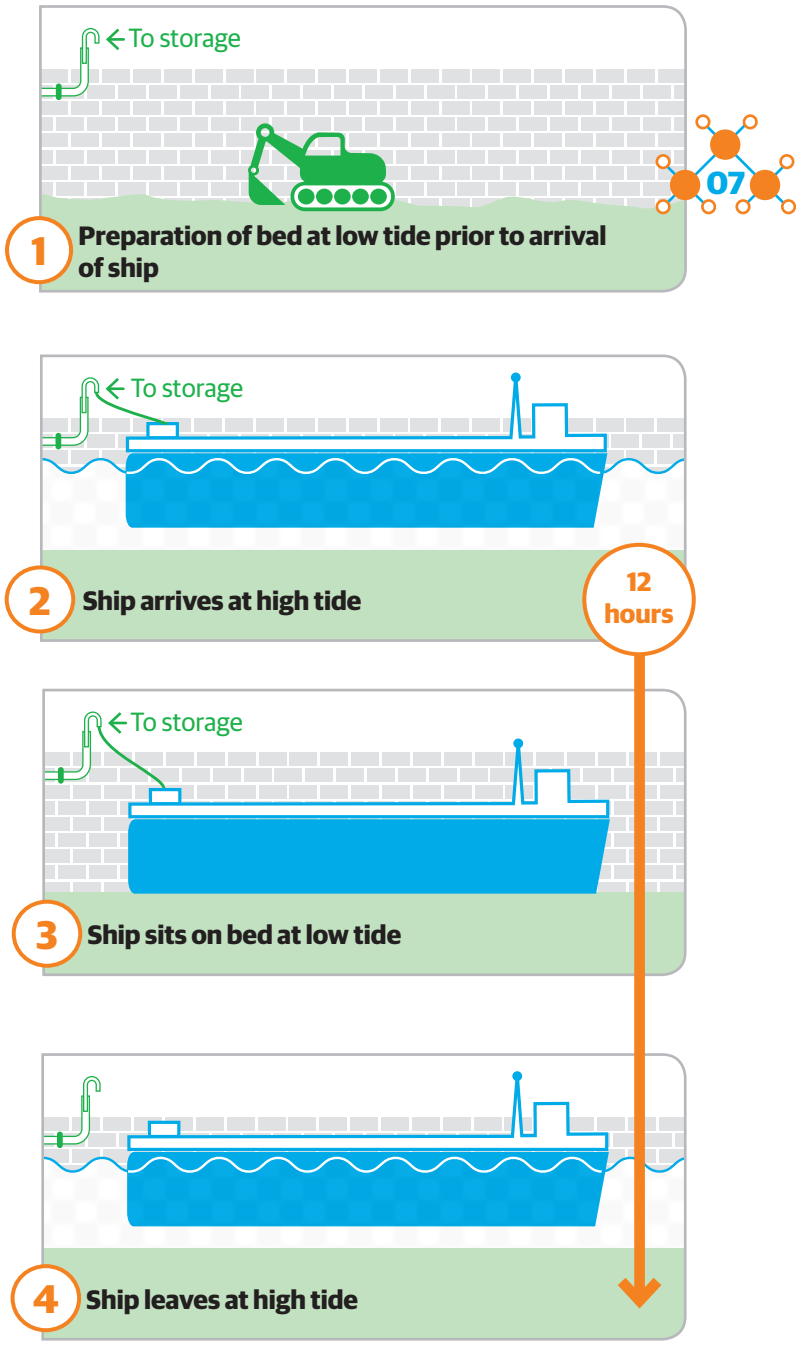

Figure 6: St Sampson's Harbour operation

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08 Why change the current supply chain?

Why change the current supply chain?

The current supply chain is not broken but planning is required to ensure it does not break in the future.

All supply chains contain risks. The objective of this programme is to reduce the level of risk to ensure security of supply.

There are elements of the supply chain, the current ships, the storage tanks and connecting pipework for example, which have a limited lifetime. Action will be required to address these issues.

How are risks identified within the current supply chain?

An understanding of the risks in the current supply chain has been developed through discussions with stakeholders involved in supplying, shipping, importing and distributing fuel in Guernsey and by comparison with other similar supply chains.

A risk assessment methodology provided by the States of Guernsey Risk Officer based on UK Government good practice was followed as below:

1. A series of risks were described to capture the elements of the supply chain; background information and evidence was gathered to determine the confidence level of the assessment
2. Workshops were held to assess their likelihood (probability of occurring) and impact (consequence if they occur)
3. Each was assessed on a 5 point scale to determine a risk score
4. Scores for each risk were plotted on a risk matrix to assess whether they were acceptable to the States of Guernsey
5. For each risk, a reasonable worst case scenario was scored and consideration given to risks associated with more likely but less impactful outcomes (lower range) and less likely but more impactful outcomes (upper range)

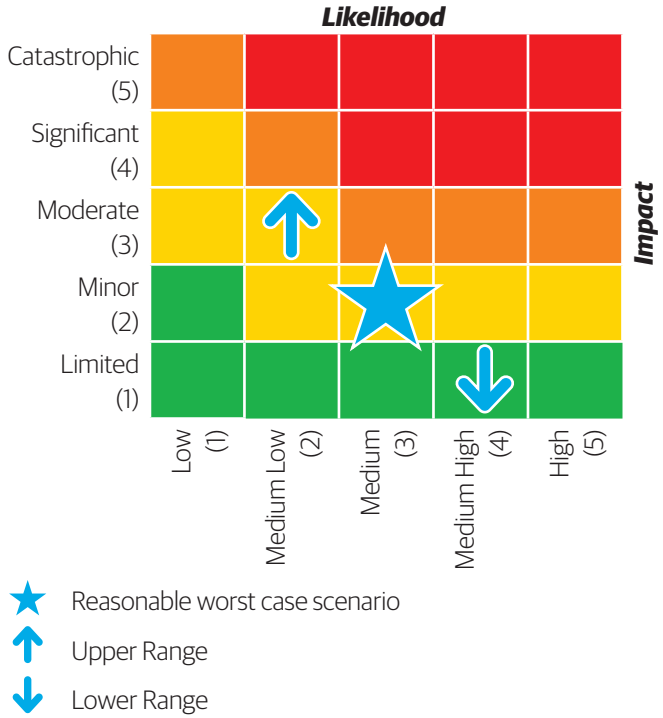

Figure 7: Example Risk Matrix

What are the main risks?

Shipping related – There are very few ships in the world fleet capable of servicing St Sampson's Harbour and there are no definitive plans to replace the current ships that serve Guernsey. Furthermore, bringing these ships into St Sampson's Harbour is inherently difficult due to the narrow, shallow and rocky entrance with strong tidal currents. This has in the past resulted in minor collisions with harbour infrastructure.

Fire and explosion risks – These exist where the fuel ships discharge to the storage tanks, where the fuel is stored and then transferred to on-island distribution vehicles. While these activities are well managed and overseen by the States of Guernsey Health and Safety Executive, there remain risks inherent with this type of operation. The proximity to businesses and homes in the St Sampson's area increases the impact.

Low Fuel Stocks – This has occurred in the past and may do so in future. At present the tidal restrictions at St Sampson's Harbour mean that missing a planned delivery due to weather or other issues may result in a delay in fuel deliveries until the next spring tide which is around ten days. As there is no strategic storage on the island, stocks could run low very quickly.

Monopoly or lack of private sector appetite –The relatively small market for fuel on Guernsey means that fuel supply to the island will remain a niche business. Guernsey currently relies on market forces to provide most of the supply chain. With demand forecast to fall and potentially increasing costs of operation, the market may become less attractive to commercial enterprises. This could lead to current operators increasing prices or pulling out of the market.

How do we assess solutions?

Three main criteria will be used to assess potential solutions:

1. **Reduction in risk –** Reduce risk to a level consistent with the States of Guernsey risk appetite i.e. move the reasonable worst case scenario and upper range for each risk out of the red zone.
2. **Meet the critical success factors –** Critical Success Factors were identified by the States of Guernsey and confirmed at the start of the Hydrocarbons Supply Programme
3. **Cost –** Cost will be assessed to establish the affordability of proposed solutions.

Figure 8: Main criteria to assess potential solutions

Investment Objective	Critical Success Factor Measure	Measure
Value for money	Optimal (economic and strategic) solution implemented to secure supplies.	Achieved at a whole-life cost equal or less than comparable facilities in other jurisdictions. All elements are competitively tendered.
Minimising safety risks to the Island	Reduce number of households and businesses within Development Protection Zone (DPZ) around the fuel storage tanks. Reduce number of households and businesses within unloading berth blast zones.	80% reduction
Security of supply	On-Island fuel storage maintained above defined strategic levels in line with the security of supply strategy to mitigate against disruption in event of delays in delivery.	98% of the time
Reliability of supply	Fuel available when required and without rationing.	Always

Table 2: States of Guernsey Hydrocarbon Supply Programme Critical Success Factors

10 What are others doing?

How do others import hydrocarbons?

Typically hydrocarbons are imported in bulk via the largest ship possible. The use of berths that dry out is unusual for import of hydrocarbons as generally fuel discharge berths around the world have developed to accept larger ships and remain floating.

The International Safety Guide for Oil Tankers and Terminals notes that:

> *"A limited number of ports that have significant tidal ranges allow tankers to operate when they are unable always to remain afloat while alongside the cargo handling berth. This type of operation is considered exceptional and should only be permitted following a comprehensive risk assessment and the implementation of all safeguards identified to deliver a safe operation."*

Although there are many ports and harbours in the UK and worldwide which have drying berths for commercial ships the Hydrocarbons Supply Programme has not identified any locations where drying berths are used for the import of hydrocarbons on a basis similar to that in Guernsey.

Other island communities, for example the Scottish islands, St Helena, Ascension and the Falkland Islands use always afloat berths as they have smaller tidal range or a smaller population which allows less frequent fuel deliveries.

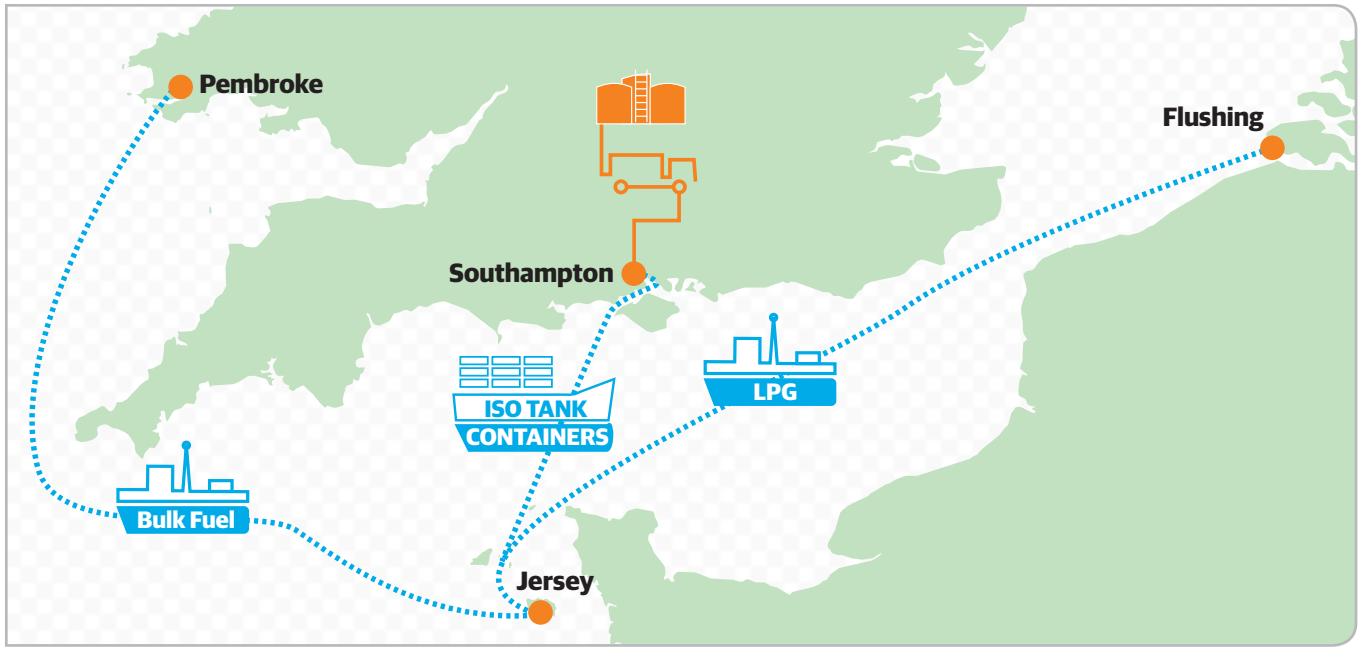

Figure 9: Jersey Imports

What does Jersey do?

Jersey imports all of the same hydrocarbon products as Guernsey except for heavy fuel oil (HFO). The hydrocarbons are imported to Jersey via both bulk shipment and unitised cargo.

The fuel berths at Jersey do not require ships to sit on the harbour bed. Jersey has deep water berths so the ships have sufficient water at low tide to remain afloat. Jersey has a larger port so ships are not limited to 80m as per the St Sampson's restrictions nor do they require such high manoeuvrability, as is the case at St Sampson's due to the narrow harbour entrance.

All of the ships that deliver petroleum products and LPG to Guernsey also serve Jersey.

A percentage of the Jersey hydrocarbon market is supplied via ISO tank containers. These are shipped to Jersey on the Load-On Load-Off (LOLO) service that calls at both Guernsey and Jersey.

Jersey has some risks in relation to ship age however, Jersey has more options to mitigate the risk due to the size and characteristics of the upload facilities.

What are we doing to make the vision a reality?

Making the vision a reality

A safe and secure hydrocarbon supply delivering socio-economic value to Guernsey.

What has been done so far?

Given the importance of a secure hydrocarbon supply to Guernsey, the States of Guernsey are investing time and resources in a significant programme of work to look at the existing supply chain. The programme will identify the good and not so good elements of the current supply chain and develop a wide range of potential solutions. A decision will not be made until we can be clear on what is a good long term solution.

To date the following deliverables have been prepared as part of this phase:

- Data Review
- Stakeholder Engagement
- Demand Study
- Evaluation Criteria
- Statement of Requirements
- Development of long list of options for supply chain components

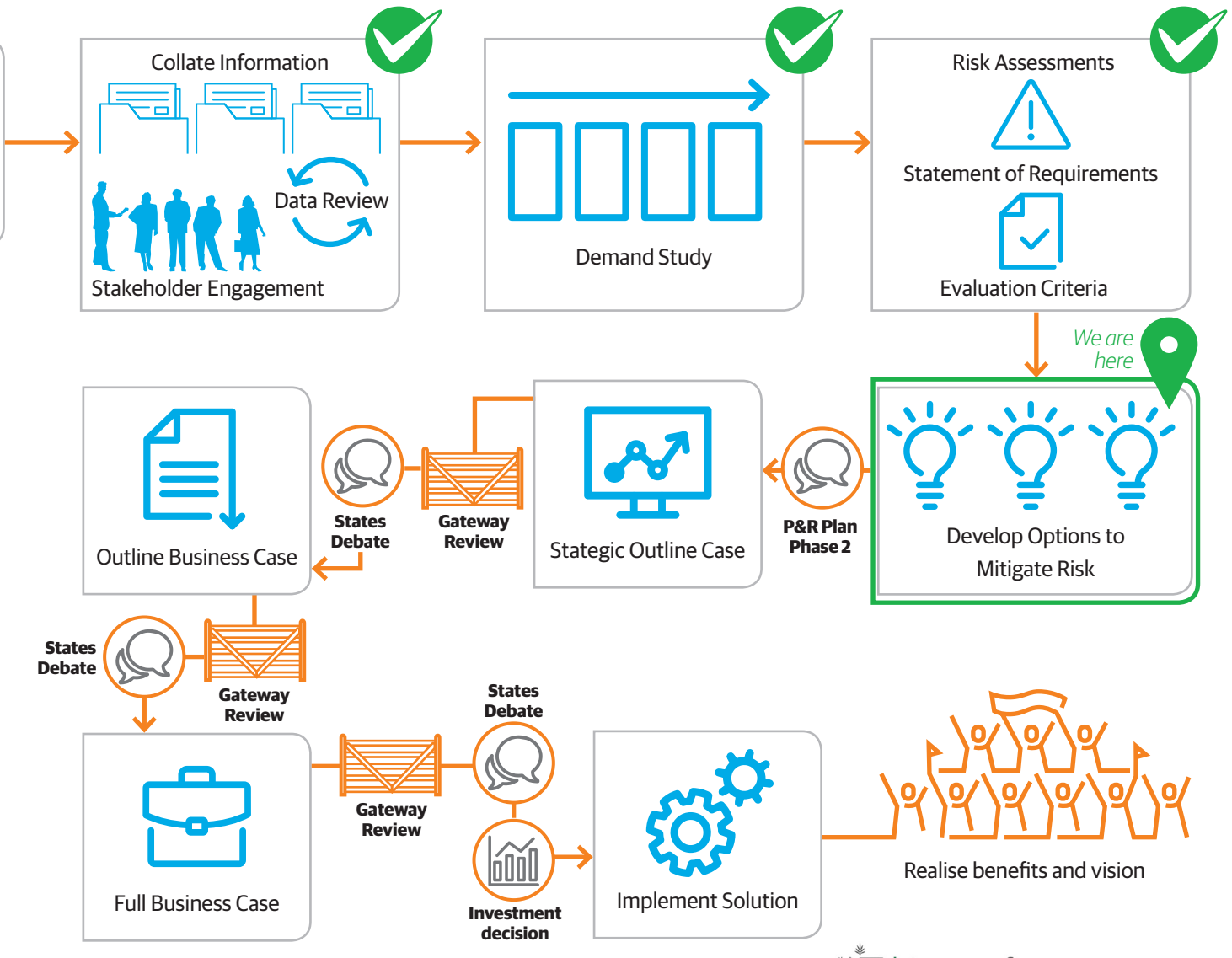

Figure 10: What we are doing

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What is the solution?

There may be different solutions for each of the fuels, a range of timescales for implementation, and a balance between initial (capital) and ongoing (operational) costs.

A range of options has been developed for each component in the supply chain. These will be combined to test alternative solutions. These supply chain solutions will be assessed to see which ones are best at reducing the main risks, can meet the Critical Success Factors and achieve the Guernsey Hydrocarbon Supply Programme vision.

When suitable supply chain solutions have been identified, they will be tested to see how well they could cope with future changes in States of Guernsey policy. These may include reducing hydrocarbon demand, increasing the use of renewables, or the installation of a second electricity cable link.

Long list of options:

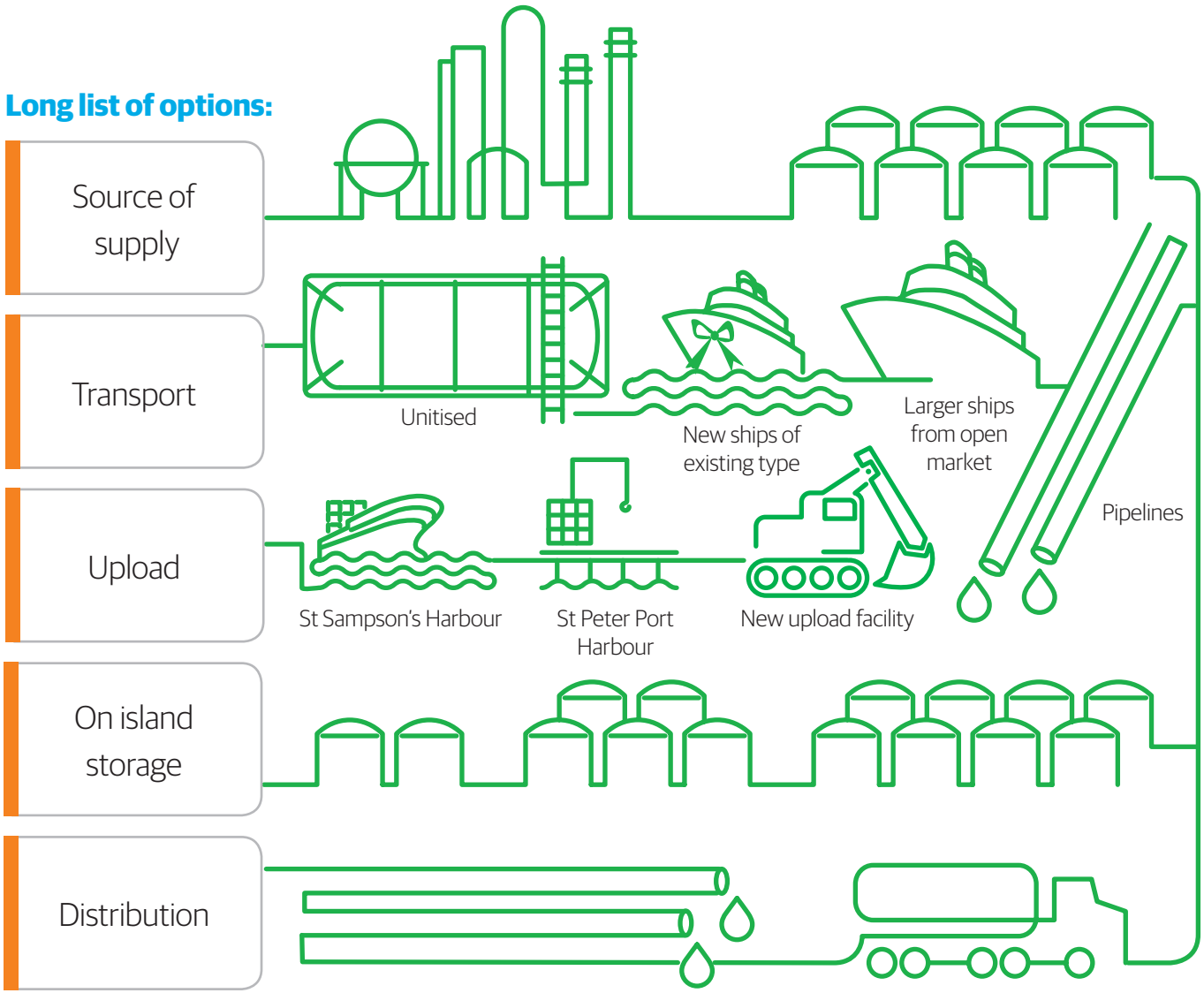
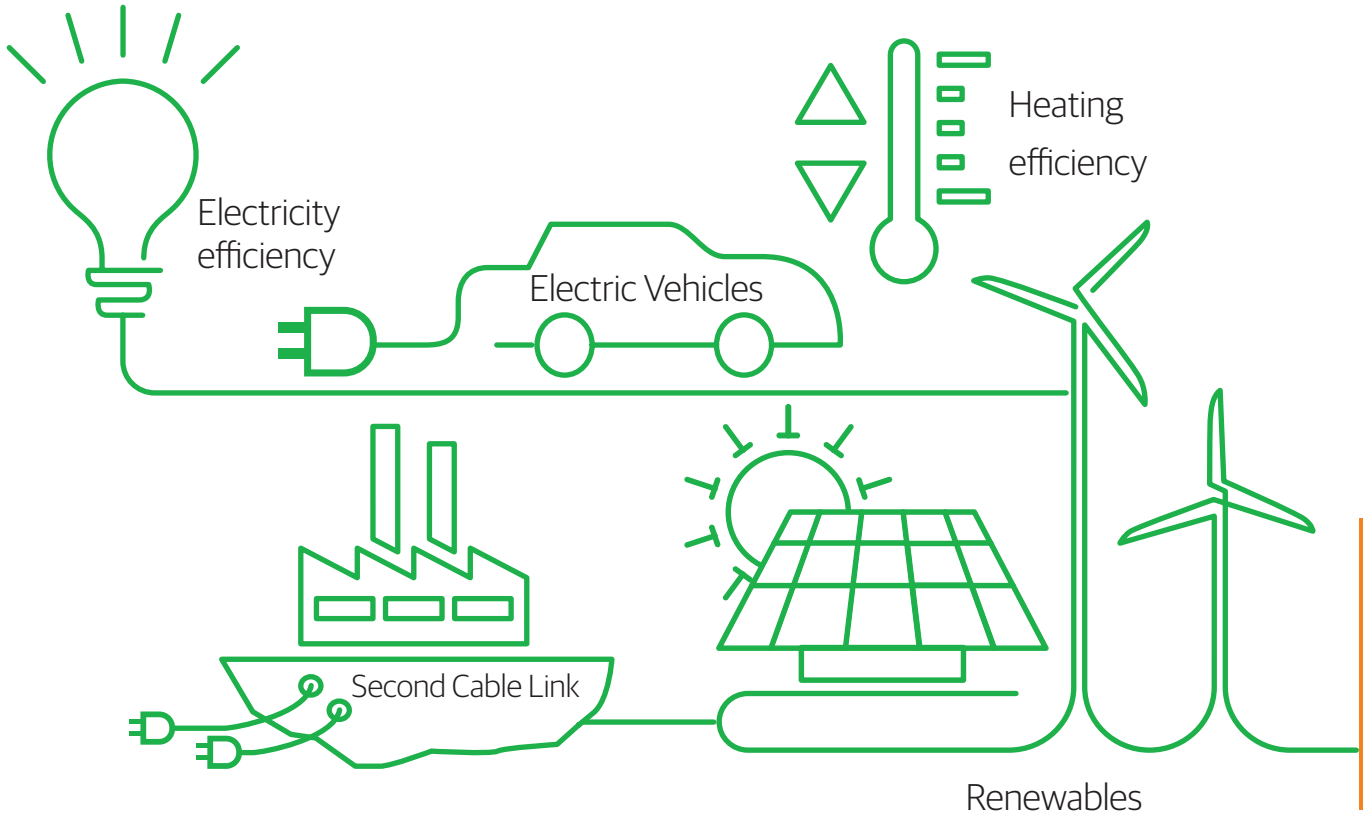


Figure 11: Possible options

Factors that may influence the solution:

Technology developments, consumer behaviours and States of Guernsey Policy may decrease or increase the demand for hydrocarbons.



What are the next steps?

The next phase of the programme will include the development of cost estimates to enable an evaluation of the options for the supply chain components. A recommendation of a preferred option will be included in the Strategic Outline Case (SOC). The States of Guernsey will undertake a Gateway Review on completion of the SOC to ensure the work has addressed all the requirements for the development of a major programme. The review is carried out by an external advisor not involved in the development of the programme but familiar with the States of Guernsey process and industry best practice.

Subject to this review the work will continue through the development of the OBC and FBC, each with its own Gateway Review, to the implementation of solution and realising the benefits.

Want to find out more?

Keep a look out on www.gov.gg /fuels for information on the Hydrocarbon Supply Programme.

Please submit comments or questions by email:

fuels@gov.gg

States of Guernsey ch2m

June 2017 Revision 1

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