Tank Storage Association

Enabling the energy transition

The role of the bulk liquid storage sector

As essential energy partners, we are determined to up the ante and ensure that our sector can support and facilitate access to the broad mix of energy solutions that will be necessary to meet the UK's emissions reduction targets.

PETER DAVIDSON
—
Executive Director
Tank Storage Association

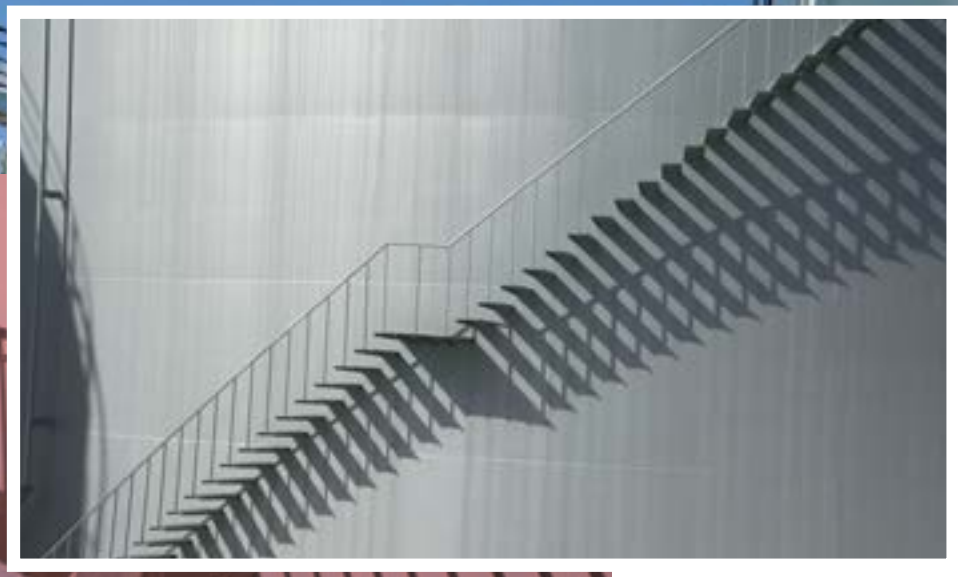
Foreword

I am delighted to introduce TSA's future vision for the bulk liquid storage sector, *'Enabling the energy transition – The role of the bulk liquid storage sector'*. This vision foresees a key role for the bulk liquid storage sector and associated logistics in the energy transition and in supporting the achievement of the UK's decarbonisation targets.

As essential energy partners, we are determined to up the ante and ensure that our sector can support and facilitate access to the broad mix of energy solutions that will be necessary to succeed. The bulk liquid storage sector already has some insight into what a changing landscape might mean for its infrastructure and is already active in many of the areas of growth that will drive success going forward. Ultimately, significant investment in enabling infrastructure, along with collaboration and partnership, will be key to seize opportunities and enable solutions for change. To that end, we conclude our report with a number of recommendations setting out our sector's essential considerations as we move towards the next phase of the transition and continue to generate economic benefits for all.

I look forward to working with you all towards achieving our vision for the future of the UK's bulk liquid storage sector.

The UK’s bulk liquid storage sector supports growth and prosperity by importing, exporting, storing and blending liquid products that are integral to our daily lives.



The energy transition

Reducing emissions will require partnership, significant investment and well-coordinated efforts by governments, businesses, supply chains, consumers, and other stakeholders. As essential partners in the energy transition, we are committed to the innovation and evolution that will be necessary to succeed.

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The Tank Storage Association

The Tank Storage Association is the trade association representing the interests of over 60 member companies engaged in the storage of bulk liquids and the provision of products and services to the sector.

Our members provide and support an essential interface between sea, road, rail and pipeline logistics for a diverse range of essential products, including transport and heating fuels, chemicals, animal feed and foodstuffs. In the process, they are responsible for the direct employment of around 4,000 highly trained, specialised people. The association also takes a leading role in safety encouraging cross-sectorial cooperation and knowledge transfer via a number of fora including the COMAH Strategic Forum and Process Safety Forum.

The bulk liquid storage sector in the UK

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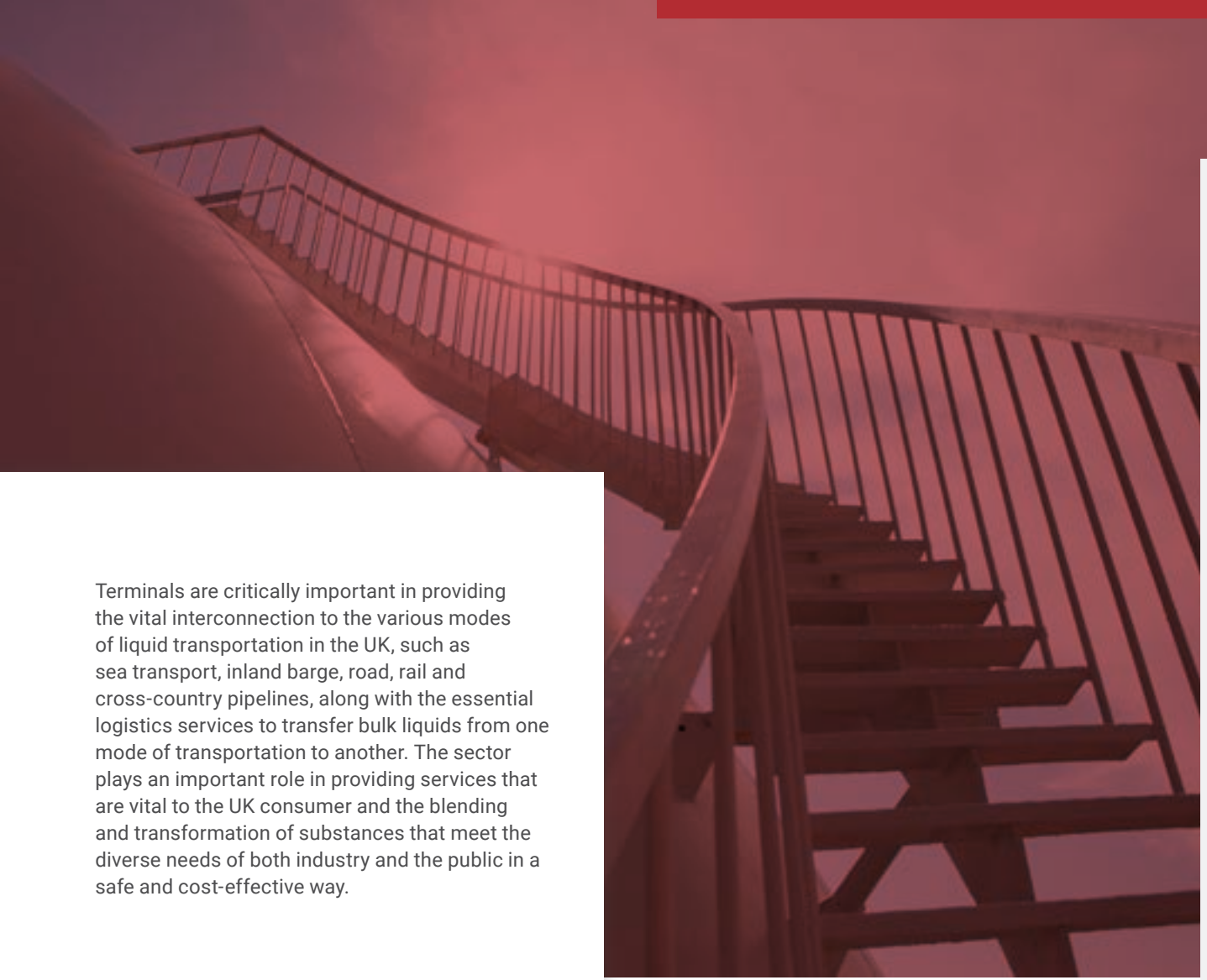


Terminals are critically important in providing the vital interconnection to the various modes of liquid transportation in the UK, such as sea transport, inland barge, road, rail and cross-country pipelines, along with the essential logistics services to transfer bulk liquids from one mode of transportation to another. The sector plays an important role in providing services that are vital to the UK consumer and the blending and transformation of substances that meet the diverse needs of both industry and the public in a safe and cost-effective way.

TSA's members

1. Operate over 290 terminals across the UK and Ireland, 76 of which are COMAH sites
2. Have a combined bulk liquid storage capacity of over 9,000,000 m^3
3. Maintain over 3,000 storage tanks
4. Have an annual throughput of 75,000,000 tonnes of product including transport and heating fuels, chemicals, animal feeds and many more
5. Safely manage 1,100,000 road movements, 7,500 sea movements, 20,700 rail movements and more than 1,000 inland barges per year

The role of the bulk liquid storage sector in the energy transition

Reducing emissions will require partnership, significant investment and well-coordinated efforts by governments, businesses, supply chains, consumers, and other stakeholders. As essential partners in the energy transition, we are committed to the innovation and evolution that will be necessary to succeed.

The United Kingdom has set ambitious targets to reduce emissions. Under the Climate Change Act 2008 and the fifth carbon budget, covering 2028-32, the UK Government has set a target for a 57% reduction in greenhouse gas emissions (GHGs) by 2030 against a 1990 baseline. By 2050, all GHG emissions are to be brought to net zero from 1990 levels. In practical terms, this means changes in energy generation, industrial processes, transport, buildings and heat. With just three decades to make this change happen, we highlight the role and potential of the UK's bulk liquid storage sector and associated logistics in the energy transition and in supporting the achievement of the UK's decarbonisation targets.

The UK's bulk liquid storage sector supports growth and prosperity by moving, storing and blending many of the modern products, feeds and chemicals that are integral to our daily lives. The sector has a key role to play in unlocking future opportunities, including:

- ☑ supporting access and provision of traditional and alternative energy sources using existing infrastructure
- ☑ creating the necessary flexibility to manage change and accommodate the integration of new energy alternatives
- ☑ ensuring that critical bulk liquid products, such as feeds and chemicals, continue to flow efficiently to meet demand
- ☑ helping to balance demand for legacy liquids
- ☑ providing expert advice, innovation and product testing

Supporting access and provision of traditional and alternative energy sources

Over the past decade, despite an increase in economic growth and growth in population, the energy intensity of the UK economy has fallen considerably as has its actual final energy use[1], due to energy efficiency improvements and structural changes in the economy[2]. The UK's CO_2 emissions have also fallen significantly[3] owing to an increased use of more carbon efficient fuels and renewables[4].

The transport sector is currently the largest energy-consuming sector in the UK, accounting for around 39.9% of final energy consumption[5], followed by the residential, industrial, and commercial sectors. Energy consumption in both transportation and industry are widely dominated by oil. International bunkers for aviation and maritime transport also make up a large part of domestic oil consumption, but are counted as exports. The transport energy system's strategic flexibility is heavily supported by the bulk liquid storage sector. For example, net imports of middle distillates, such as diesel and aviation fuel, have increased steadily owing to a misalignment between UK production and domestic demand. This means that around half of the UK's demand for diesel and over 60% of aviation fuel demand are currently met by imports[6], with the bulk liquid storage sector providing the necessary infrastructure and staging area for distribution throughout the entire supply chain.

A number of initiatives to decarbonise transport have been brought forward by the UK Government. These include plans to end the sales of conventional cars and vans by 2040 and an ambition for most cars and vans to be zero emission by 2050. An interim goal for at least 50% — and as many as 70% — of new car sales to be ultra-low emission by 2030 has also been set out as part of the UK Government's Road to Zero Strategy[7] to facilitate a roll-out of low-carbon alternatives. Meeting the UK's future ambitions will require the support and contribution of a wide range of players and a broad mix of solutions. Most crucially, the bulk liquid storage sector will be pivotal in supporting access to traditional and suitable energy alternatives as well as in providing the flexibility needed to integrate these alternatives. That means careful advance planning and management to ensure the supply chain can be maintained in the interim and to minimise change in the consumer experience. Indeed, meeting varying demand for fuels, both in terms of volume and product types, while maintaining the sustainably of hydrocarbon derivative supply chains, feeding the general manufacturing and chemical industries, is an opportunity as much as it is a challenge for the bulk liquid storage sector.

The bulk liquid storage sector already has some insight into what a changing landscape might mean for its infrastructure and is already active in many of the areas of growth that will drive success going forward.

RTFO

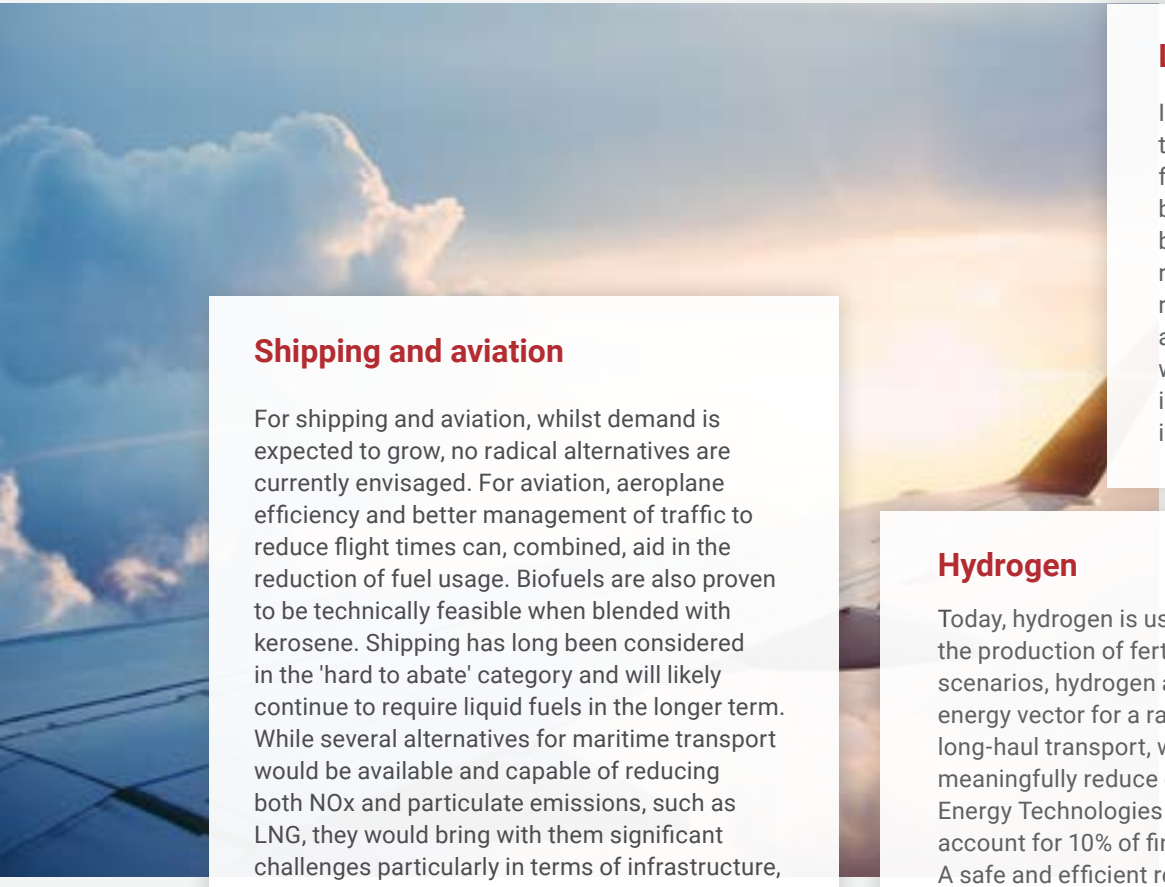
Initiatives such as the Renewable Transport Fuels Obligation (RTFO), requiring an increasing share of biofuel in road transport fuels, are heavily dependent on terminals' storage capacity and blending capabilities. Looking ahead, the sector will require substantial investment to facilitate increased blend volumes in support of the UK's future decarbonisation targets and to facilitate increased penetration of low-carbon fuels.

IMO 2020 regulations

A reduction in the sulphur content of marine fuel - to be capped at 0.5% by mass to meet new International Maritime Organisation (IMO) 2020 regulations[8] from 1 January 2020 – will also require terminal operators to adapt in order to enhance the fuelling infrastructure where possible, in one of the largest changes in fuel specifications undertaken at one time.

Decarbonisation of heat

The decarbonisation of heat brings its own set of challenges for the bulk liquid storage sector and the consumer alike. The UK government has recorded its commitment to fully decarbonise heating in homes and businesses by 2050, bringing new challenges to the fore. In 2018, the residential sector was responsible for about 15%[9] of total GHG emissions, with consumption dominated by gas. 6% of heat demand was met from renewables[10], and less than 2% from district heating. Fuel oil is also used to heat homes and businesses that are 'off-grid' and not connected to the gas transmission network. As essential energy partners, suppliers of domestic home heating fuels can also play a part in the energy transition and a low-carbon future by providing heating oil blended with sustainable biofuel for homes across the country. This will require considerable infrastructure upgrades, such as new tankage, loading arms and blending facilities.



Light-duty road transport

In the context of light-duty road transport, according to a recent study by Concawe[12], a low-carbon liquid fuels strategy would have the potential to reduce, by 2050, the 2015 life-cycle GHG emissions level by 87%[13]. Synthetic and paraffinic fuels may also reduce carbon emissions by up to 75% as shown in recent road trials[13]. For the bulk liquid storage sector, accommodating higher blends of sustainable biofuel with existing hydrocarbons will require minimal infrastructure changes thus also minimising changes in the consumer experience.

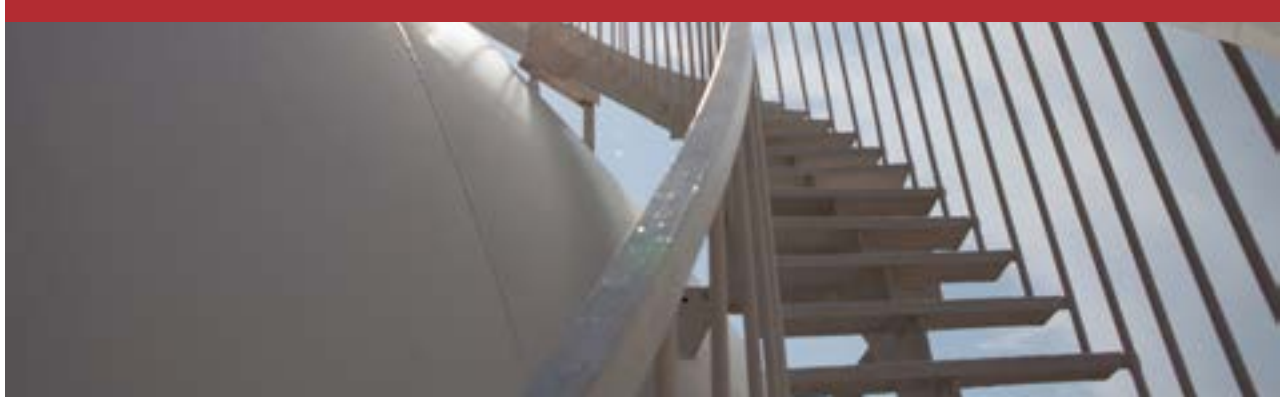
Shipping and aviation

For shipping and aviation, whilst demand is expected to grow, no radical alternatives are currently envisaged. For aviation, aeroplane efficiency and better management of traffic to reduce flight times can, combined, aid in the reduction of fuel usage. Biofuels are also proven to be technically feasible when blended with kerosene. Shipping has long been considered in the 'hard to abate' category and will likely continue to require liquid fuels in the longer term. While several alternatives for maritime transport would be available and capable of reducing both NOx and particulate emissions, such as LNG, they would bring with them significant challenges particularly in terms of infrastructure, development costs or increased technical complexity.

Hydrogen

Today, hydrogen is used mostly in oil refining and for the production of fertilisers. In a number of future scenarios, hydrogen also emerges as an attractive energy vector for a range of sectors, including long-haul transport, where it is proving difficult to meaningfully reduce emissions. According to the Energy Technologies Institute[14], hydrogen could account for 10% of final energy consumption by 2050. A safe and efficient refuelling infrastructure, and purchase price, currently represent a barrier to uptake.

Looking ahead, an increased penetration of alternative fuels will bring with it its own set of questions with regard to consumer behaviour, overall potential as well as relative cost-effectiveness.



Creating the necessary flexibility to manage change

Looking ahead, an increased penetration of alternative fuels will bring with it its own set of questions with regard to consumer behaviour, overall potential as well as relative cost-effectiveness.

Bulk liquid storage terminals in the UK handle a variety of products each with their own distinct supply chain footprints. Fuels and hydrocarbon derivatives currently account for over 65% of tonnage throughput[11]. As essential energy partners, terminals will be required to accommodate acceptable liquid alternatives hence playing a pivotal role in the energy transition and in supporting the achievement of the UK's decarbonisation targets.

It is widely accepted that future transport solutions will encompass a wide range of technologies and that low-carbon liquid fuels will be playing an essential part for sectors that have limitations in using electricity directly, such as long-distance heavy-duty transport, aviation, and maritime transport as well as for the petrochemical sector.

It is clear that energy alternatives, new or developing, will have their own characteristics as well as advantages and disadvantages. What is also clear is that managing both traditional and alternative energy sources will require facility enhancements and a flexible, robust bulk liquid storage sector and associated logistics able to accommodate the wide range of technologies that may be needed in the future to meet the UK's decarbonisation targets.

A constructive and collaborative approach, with clearly defined transition paths and realistic timelines, will therefore be key in enabling the sector to play its part in the energy transition. Coupled with a technology neutral approach that incentivises a whole range of low-carbon technologies, it will enable all energy partners to succeed in supporting the UK's ambitions.

The sector will have to help balance strains on demand for legacy liquids in a declining market while addressing the availability of current infrastructure against a growing demand for alternatives.

Help balance the demand for legacy liquids

Of the ~96 million barrels of oil consumed globally each day, just under 60 million are used in transport globally. In the longer term, it is widely assumed that, owing to advances both in fuel efficiency and the move to alternatives, demand for liquid fuels will see an upturn in the late 2020s, followed by a decline as the transition phase starts. Conversely, growth in overall global oil demand will be supported by the petrochemical sector. In this context, the challenges faced by the bulk liquid storage sector will be manifold. The sector will have to both help balance strains on demand for legacy liquids in a declining market while addressing the availability of current infrastructure against a growing demand for alternatives. This will require conversion of existing assets, space and significant investment at a time of great pressure on margins. Furthermore, with demand for petrochemicals expected to rise, maintaining the sustainability of hydrocarbon derivative supply chains, feeding the general manufacturing and chemical industries, will also require a responsive, flexible and robust bulk liquid supply sector at a time of great change.

A sector fit for the future

Providing expert advice, innovation and product testing

The bulk liquid storage sector and associated supply chain are well positioned to meet challenges ahead and accommodate the wide range of alternative energy sources that may be needed in the future. From investing in latest technology and innovations, to employing highly trained, specialised personnel in order to meet ongoing safety and environmental standards, the industry is also capital intensive. In playing our part in helping the UK meet its targets, we are determined to up the ante. For our sector, this will involve tackling uncertainty about the future of energy supply and that of a shifting future energy mix. It will also involve investment not only in infrastructure, but on innovation and knowledge as critical inputs for change.

Key recommendations

- **WORKING TOGETHER, IN PARTNERSHIP WITH INDUSTRY, TO SEIZE OPPORTUNITIES FOR A RESPONSIVE, FLEXIBLE AND ROBUST BULK LIQUID SUPPLY SECTOR.**
- **ENSURING THE ENERGY TRANSITION ADVANCES IN PARALLEL WITH REQUIRED CHANGES IN BULK LIQUID INFRASTRUCTURE BY SAFEGUARDING THE BENEFITS OF A SAFE AND RESILIENT BULK LIQUID STORAGE SECTOR AND ASSOCIATED SUPPLY CHAIN.**
- **SETTING CLEARLY DEFINED TRANSITION PATHS AND REALISTIC TIMELINES TO ENABLE A STABLE LANDSCAPE FOR LONG-TERM INVESTMENTS AND AVOID DELAYS CAUSED BY THE LACK OF NEW TRANSITIONAL NATIONAL INFRASTRUCTURE.**
- **ENSURING THAT POLICIES ARE COHERENT AND SUPPORTIVE OF THE BROAD RANGE OF SOLUTIONS NECESSARY TO SUCCEED, WHILE ADOPTING A TECHNOLOGY NEUTRAL APPROACH.**
- **EMPOWERING INDUSTRY BY FACILITATING DIALOGUE, COOPERATION AND KNOWLEDGE TRANSFER IN THE AREA OF SAFETY, IN THE CONTEXT OF ALTERNATIVE ENERGY SOLUTIONS.**

Notes

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2. International Energy Agency, 'World Energy Balances 2019'
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11. Tank Storage Association, 'Statistical Review 2019'
12. Concawe 'Impact Analysis of Mass EV Adoption and Low Carbon Intensity Fuels Scenarios', 2018
13. Concawe Review, Vol. 27, No. 2, 'Impact analysis of mass EV adoption and low-carbon intensity fuels scenarios', 2019
14. Paraffinic fuels for Europe (ASFE). See http://www.synthetic-fuels.eu/paraffinic-fuels/air-quality
15. Energy Technologies Institute, 'Options, Choices, Actions Updated: Clockwork & Patchwork - UK Energy System Scenarios', 2018

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