

European tank storage in transition: Multi-stakeholder alignment and cooperation

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Timeline



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The European tank storage sector and the global energy landscape

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June 2021

| HCSS Geo-economics



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European tank storage in global value chains Outlook to 2030

Irina Patrahau, Michel Rademaker, Lucia van Geuns, Sarah Ojukwu and Philip Geurts
April 2022



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European tank storage in today's global value chains

What role does it play in our economy?

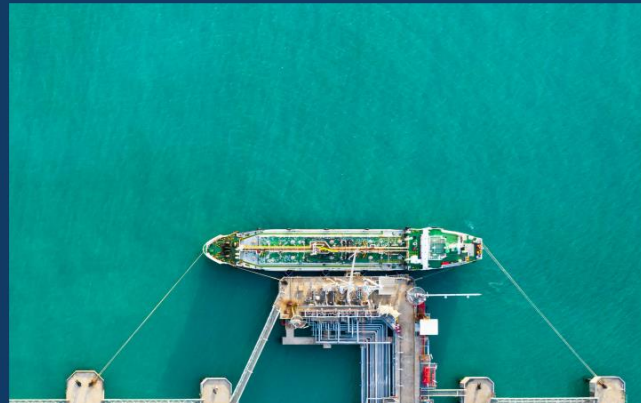
Irina Patrahau, Michel Rademaker, Lucia van Geuns, Jilles van den Beukel
March 2022



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The European tank storage sector 2050 and beyond

Irina Patrahau, Michel Rademaker, Lucia van Geuns, Philip Geurts and Sarah Ojukwu
May 2022



Integral part of domestic and global supply chains

Figure 2. The role of tank storage in the refined oil products and petrochemicals value chains

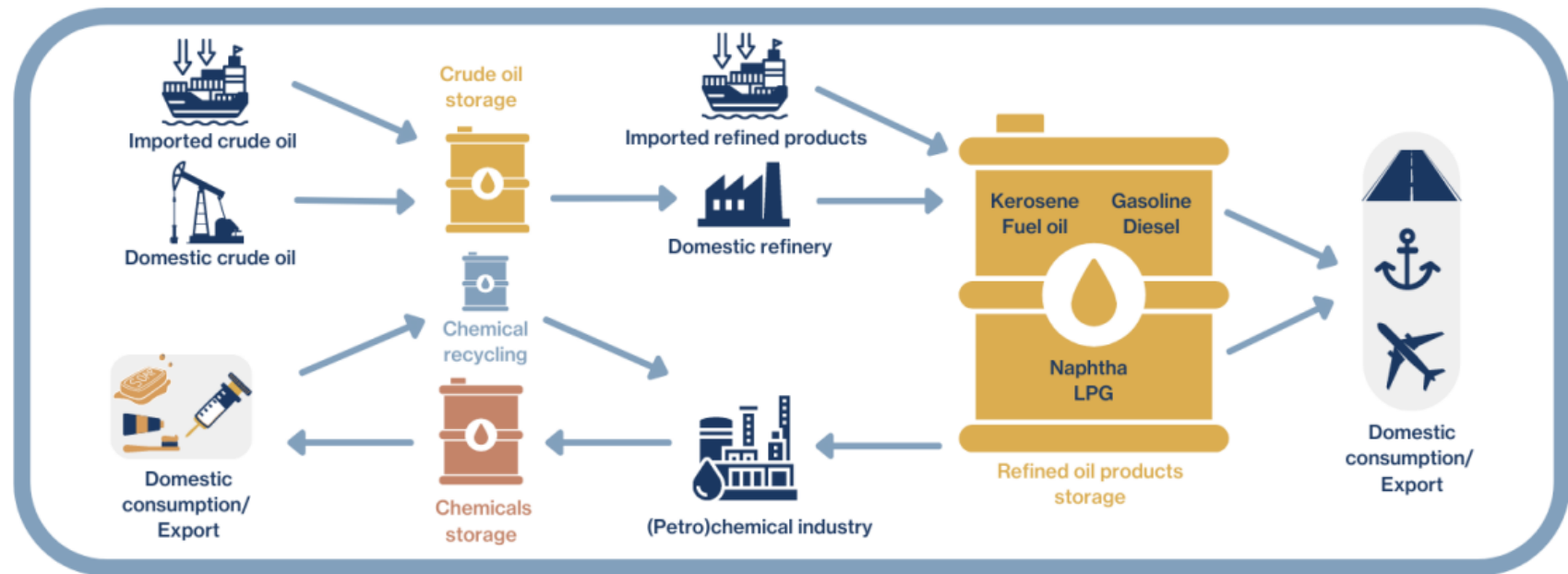


Figure 1. National associations within FETSA and their main characteristics⁵



Independent storage sector in Europe

- 1. Logistics
- 2. Supporting regional industry
- 3. International trade
- 4. Strategic storage

The European tank storage sector

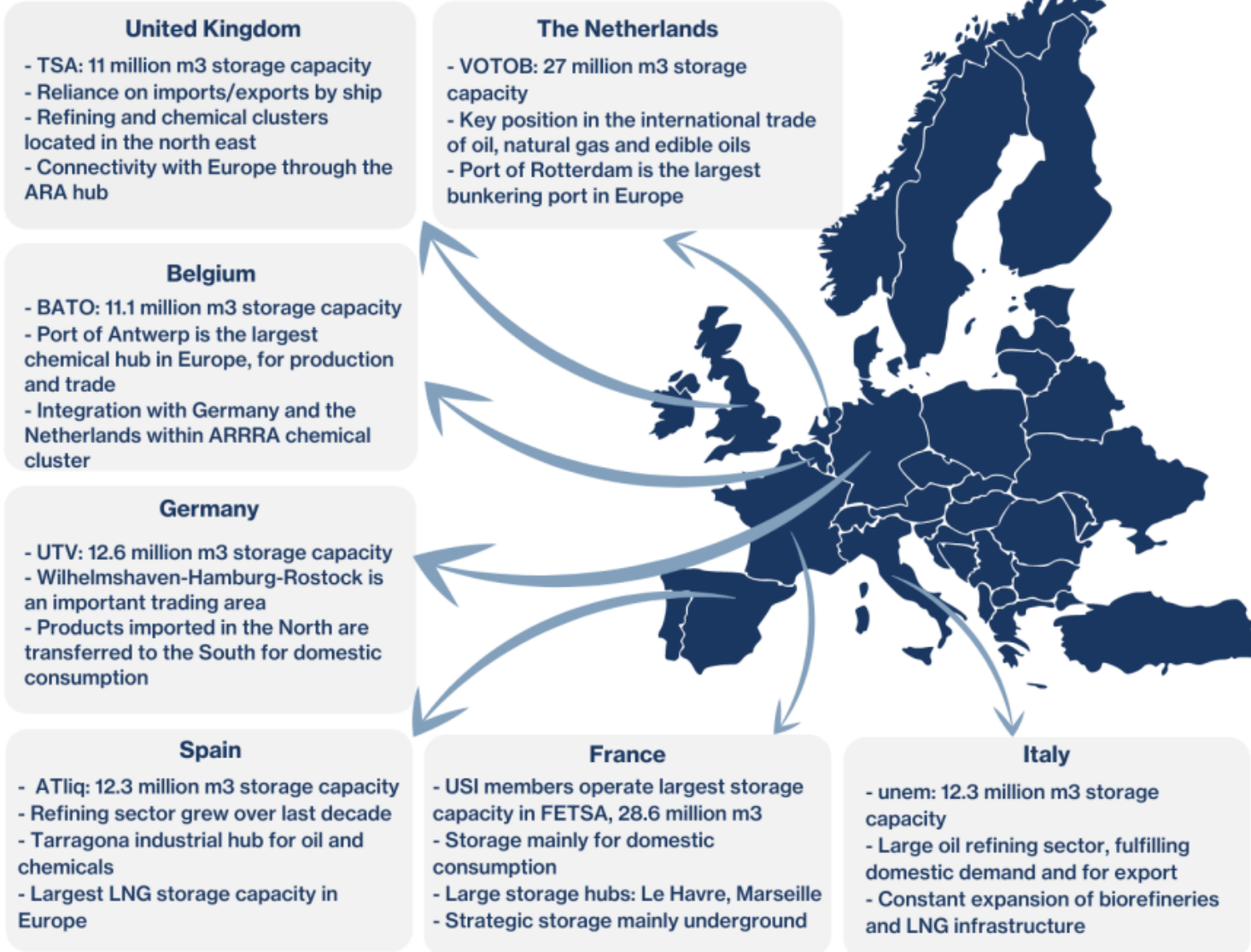


Figure 1. National associations within FETSA and their main characteristics⁵



1. Logistics

- Homes, offices and cars
- Ports, airports, defense sector
- Part of the energy, manufacturing, transport, food supply chains

The European tank storage sector

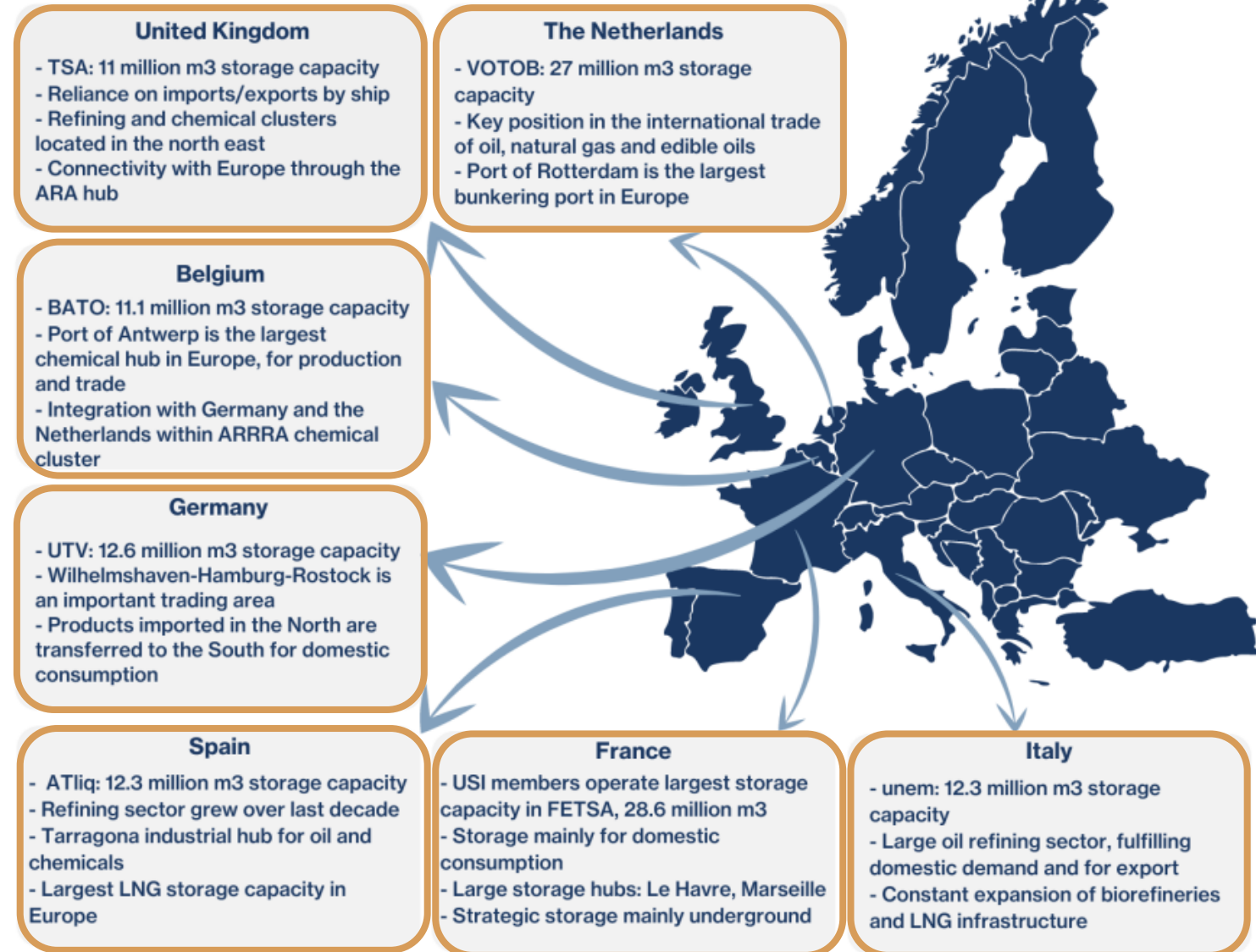


Figure 1. National associations within FETSA and their main characteristics⁵



2. Supporting regional industry

- Efficient and integrated clusters of import terminals, storage facilities, oil refineries and (petro)chemical factories
- Thousands of manufacturing companies depend on oil products and natural gas for their industrial processes

The European tank storage sector

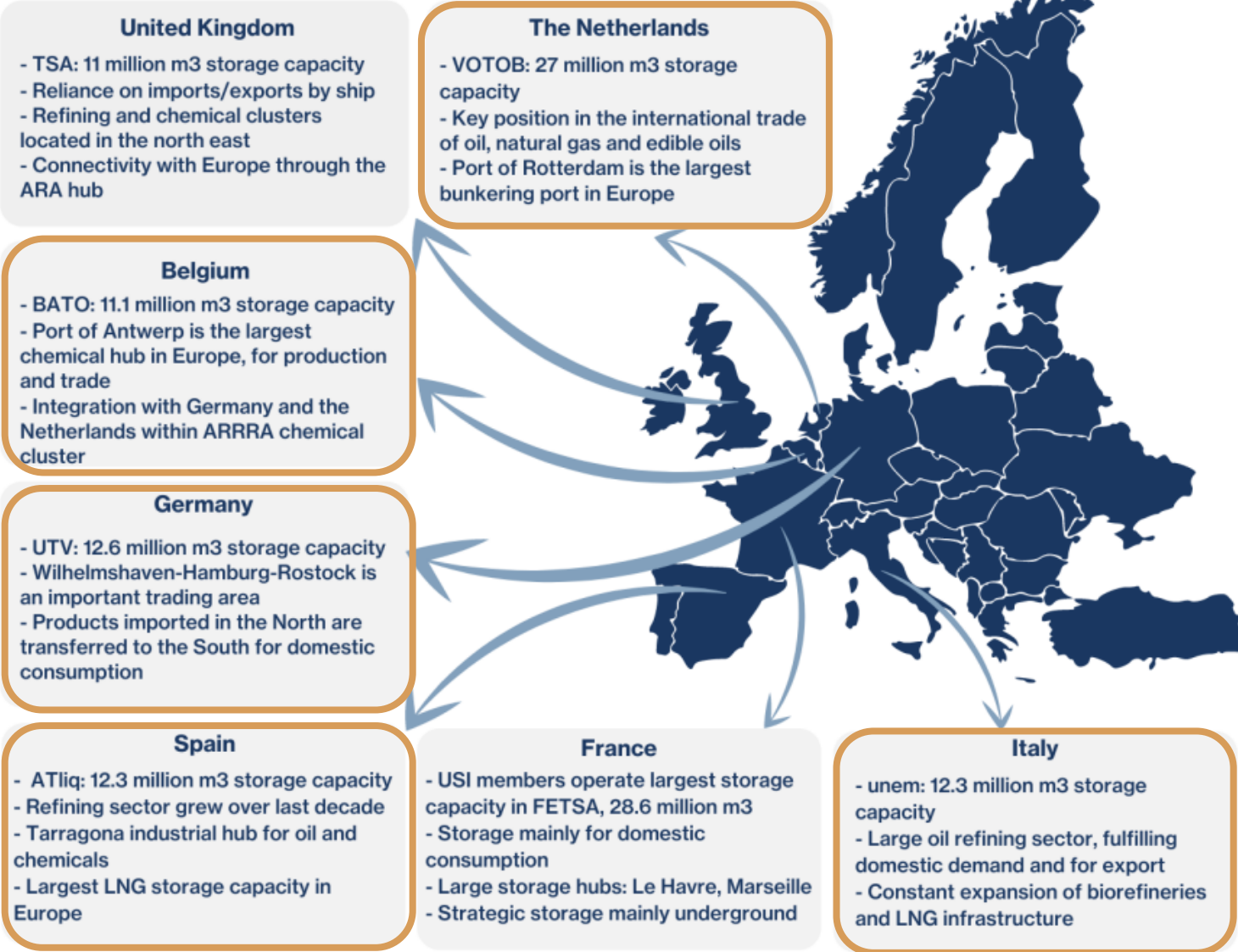


Figure 1. National associations within FETSA and their main characteristics⁵



3. Trade

- Tank storage contributes to commodity trading
- By holding inventories of liquid products, tank storage acts like a buffer in the physical market
- ARA region trade hub for crude oil, refined products and chemicals
 - Geographical location
 - Well-developed infrastructure
 - Low transport and handling costs
- The energy transition shifting trade centres away from Europe?

The European tank storage sector

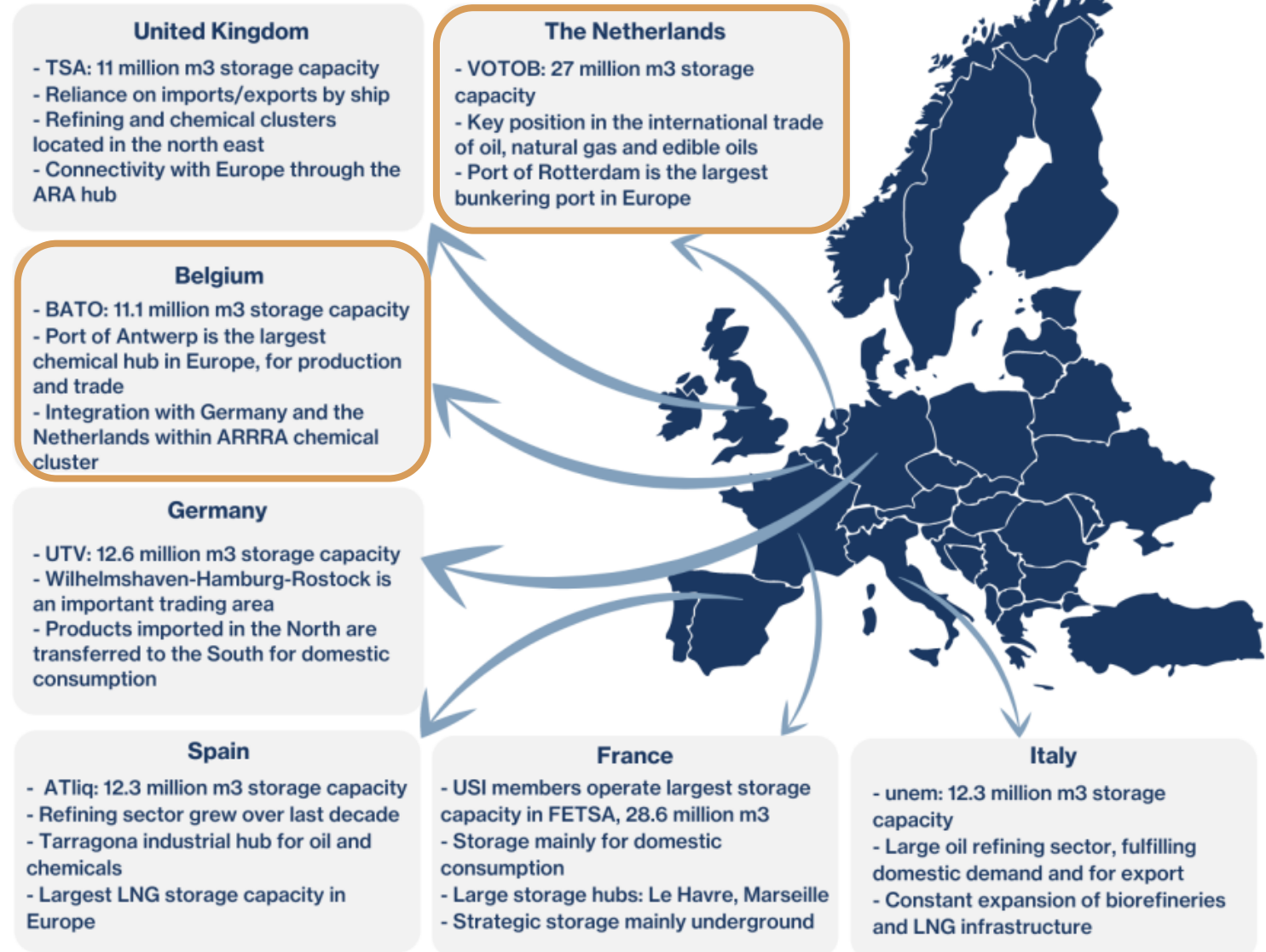


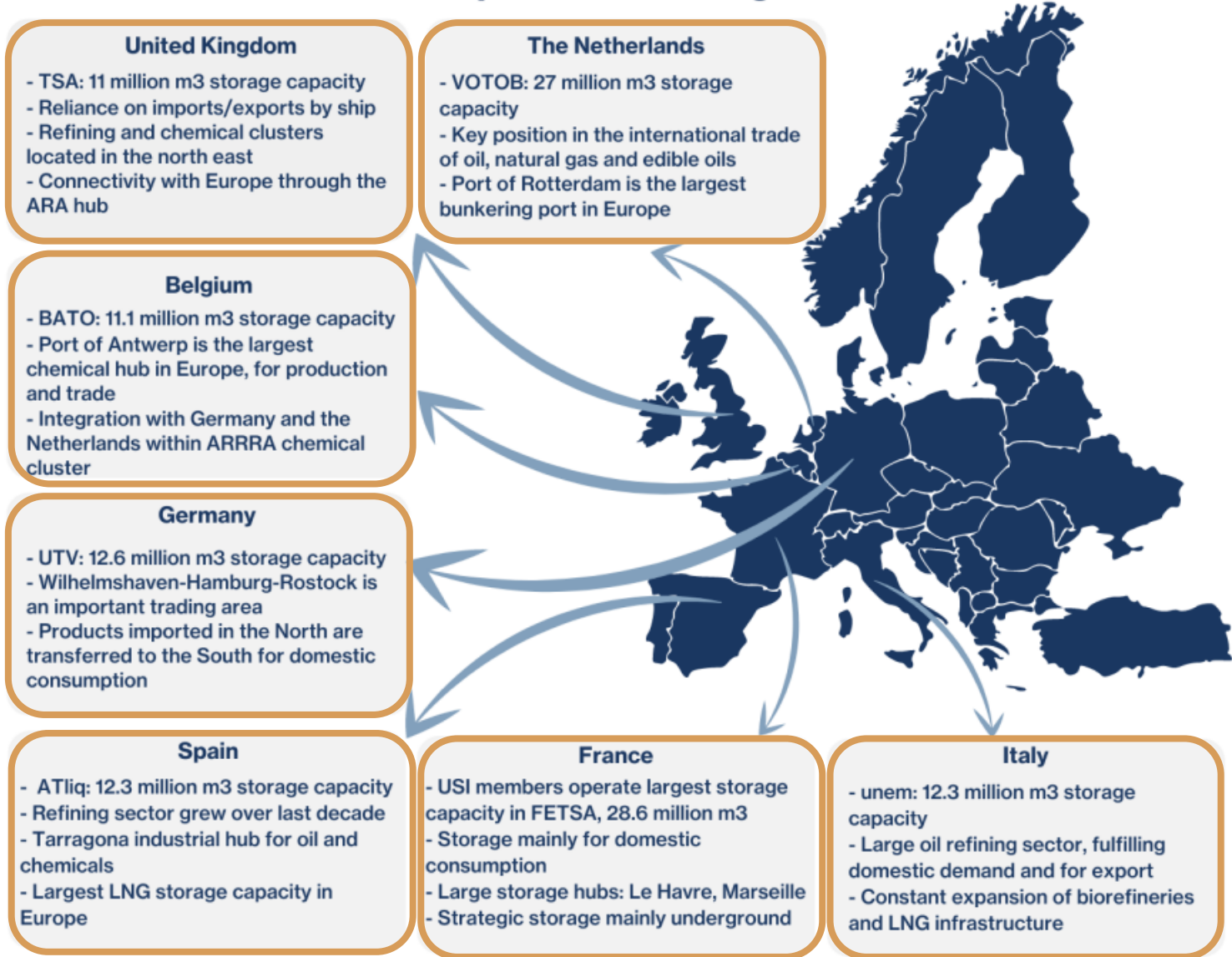
Figure 1. National associations within FETSA and their main characteristics⁵



4. Strategic storage

- Independent storage companies hold strategic stocks acc. to IEA agreement and EU directive
- So far, only oil was held as strategic stocks
- Since war in Ukraine, natural gas too
- Later: different hydrogen carriers?

The European tank storage sector



Outlook to 2030

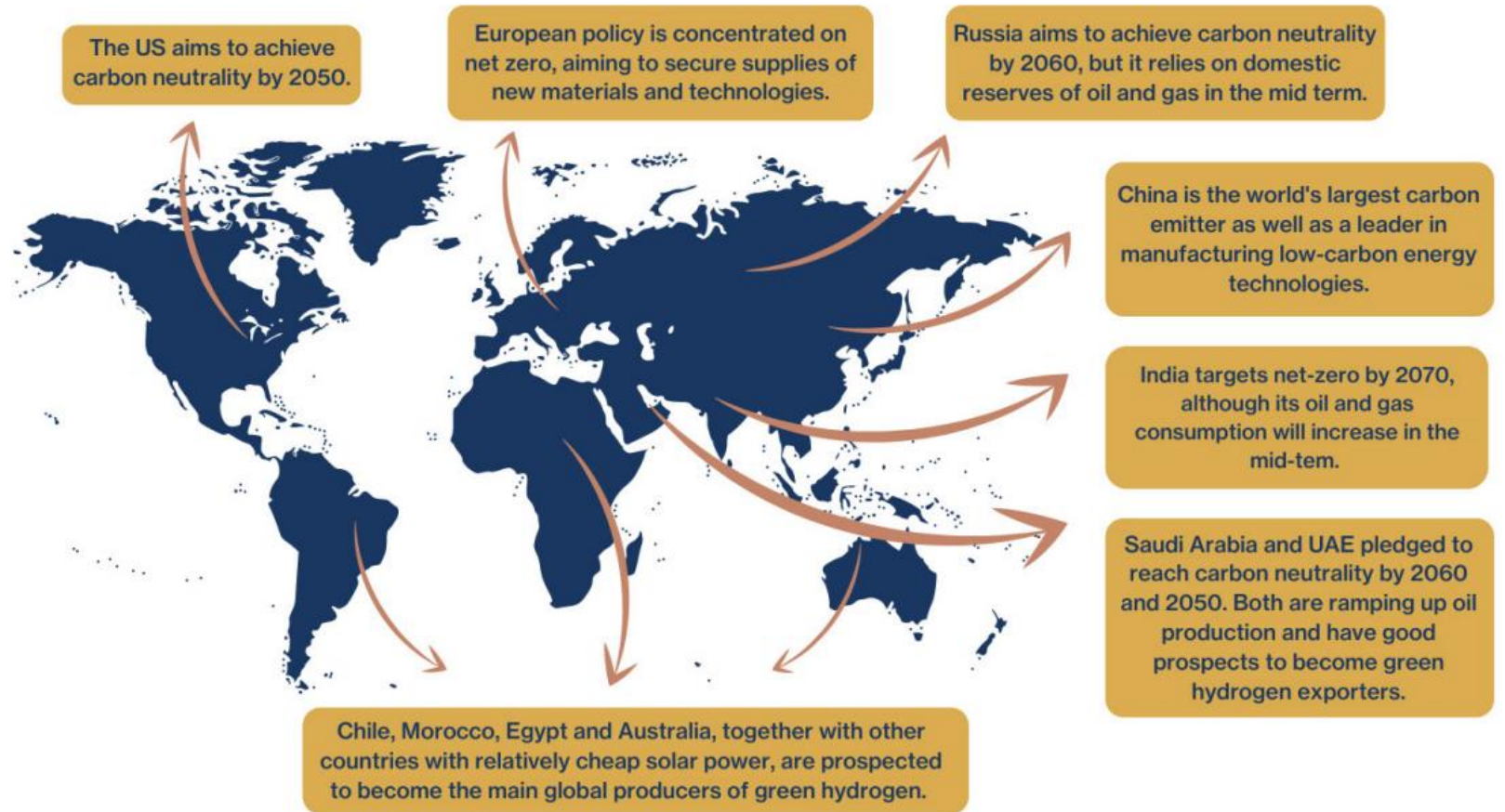
Table 1. Mid-term outlook for tank storage



Product	European storage requirements	European trends	Global trends	Implications for European tank storage	
				Opportunity	Threat
Crude oil	↓	European demand and production of crude and refined oil products are reduced due to the expected decrease in demand for road transport fuels (gasoline and diesel).	The global production center of crude oil is even more concentrated in the Middle East, with Saudi Arabia and UAE reaping benefits from the lack of investments elsewhere. China becomes the largest refiner in the world and leads petrochemical production. The global consumption center moves toward Asia Pacific and Africa due to increasing living standards and population growth.	Increased need for blending services for transport in the mid-term. As European industry weakens, storage becomes more important for imports and domestic security of supply.	Trading slowly moves toward larger oil production and consumption centers, outside of Europe. Blending is an intermediate solution before complete electrification.
Gasoline	↓				
Gasoil/diesel	↓				
Fuel oil (shipping fuel)	↔	Aviation and shipping will not be fully decarbonized in the mid-term. Blending synthetic with conventional fuels is essential in reducing emissions.		Aviation and shipping continue requiring oil products as fuels, with increasing blending targets.	Blending is an intermediate solution before complete decarbonization.
Kerosene	↔				
Naphtha	↔	European chemical and petrochemical industries are struggling to maintain profitability due to international competition from China and the Middle East.		In the mid-term, naphtha continues to be the main feedstock for industry.	In the long-term, industries will start using alternative types of low carbon feedstock.
LNG	↑	Europe is increasingly dependent on LNG imports.	Qatar and UAE are investing in new infrastructure for the production of natural gas. It is unclear whether Russia remains Europe's main supplier. Consumption moves toward Asia Pacific, with China as the world's largest gas consumer.	More LNG will be traded toward and via Europe. More storage is required to satisfy demand.	Permitting and building necessary infrastructure for LNG takes time and is often opposed by the public.
Biofuels	↑	The requirements for blending biofuels with conventional ones are expected to increase. Advanced biofuels are preferred.	The US and Brazil are the largest producers of biofuels, but domestic policy support determines adoption.	Blending is essential in the decarbonization of transport.	Blending is an intermediate solution.
Hydrogen	↑	European ports are aiming to become hydrogen hubs. Most hydrogen will either be imported via pipelines in a compressed form or by using different energy carriers.	Large-scale domestic production of green hydrogen is likely in e.g. North Africa and the Middle East, where low-cost solar electricity can be easily generated.	Proactivity and investments in innovation and pilot projects are beneficial.	Lack of action could prevent companies from gaining a sustainable license to operate.
Electricity storage	↑	Large-scale battery storage is still in an early development phase.	Large-scale battery storage is still in an early development phase.		
Carbon storage	↑	Carbon storage is still in an early development phase.	Carbon storage is still in an early development phase.		
Chemicals	↑	The European chemical industry loses competitive advantage to China and other low-cost producers.	China, Saudi Arabia, Russia diversify their downstream services and become more active in chemical production.	Chemical facilities could become important in hydrogen storage through ammonia or methanol. Investing in low-carbon and circular techniques could re-establish European production.	Technological advancement is required for the chemical industry to start using new feedstock and energy sources.
Edible oils	↑	The European edible oil market is expanding.	Sustainability concerns make the production of palm or rapeseed oil less desirable.	No disruptive change is foreseen in the mid-term and long-term.	

Outlook to 2050

Figure 1. The international playing field 2050-2070



- New energy sources
- New players
- New dependencies

Energy carriers and infrastructure requirements



Compressed hydrogen: lowest energy density, large spatial requirements for storage

Can make use of retrofitted natural gas infrastructure.



Liquid hydrogen: most mature for transport on large distances today

Cannot use LNG infrastructure.



Methanol: E-methanol (made from hydrogen with CO₂) not yet mature

Methanol infrastructure exists.



(Green) Ammonia: High energy density compared to other carriers but highly toxic.

Ammonia infrastructure exists.



LOHC: Expected to become a cheap form for transporting hydrogen >1500km.

Can use diesel and gasoline infrastructure.



Synthetic fuels will most likely play a role in the fuel supply for the transport sector.

Sustainable aviation fuels can use existing kerosene infrastructure with modifications.

Energy carriers and technologies



Battery storage: lithium-ion, lithium-iron-phosphate, flow batteries, saltwater batteries



Carbon capture, utilization and storage can enable the production of low-carbon hydrogen and can help decarbonize the industrial sector



Recycling: The global consumption of plastics makes it likely that in the long- term recycling will become indispensable.

Conclusion

- Today, tank storage is an important component of energy supply chains
- The energy transition requires a balancing act of the old and new systems
 - Many pathways to 2050 and beyond
 - New players, new trade hubs, new products, new dependencies?
 - New products in strategic storage
 - Expanding services further than storage
 - Broadening expertise into new liquid and non-liquid carriers and products
- The energy transition requires multi-stakeholder cooperation along supply chains and with legislators



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