The Drive for Cleaner **Marine Fuels**

TotalEnergies

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OUR BELIEF

Energy is life.
We all need it
and it's a source of progress.
So today, to contribute to
the sustainable development of the planet
facing the climate challenge,
we are moving forward, together,
towards new energies.

Energy is reinventing itself,
and this energy journey is ours.
Our ambition is to be a world-class player
in the energy transition.

That is why

**Total is transforming
and becoming TotalEnergies.**

**Patrick Pouyanné,
Chairman and Chief Executive Officer,
TotalEnergies**

Jérôme Leprince-Ringuet

Vice-President Marine Fuels, TotalEnergies

The shipping industry has set course for decarbonization with the goal of reducing at least 50% in its total annual greenhouse gas (GHG) emissions from international shipping by 2050, compared to 2008. At the same time, the sector also needs to responsibly meet increasing fuel consumption driven by the rising demand for shipping.

As a result, the shipping industry is facing an enormous two-fold energy challenge, which ultimately requires an energy transition. One that will radically transform its reliance on heavy fuel oil, replacing it with more sustainable and cleaner energies that take carbon out of this transport mode.

In essence, shipping needs to reinvent its energy.

From our daily conversations and discussions with our shipping customers and partners, we know how complex and daunting a challenge it is to undertake this energy transformation.

For this reason, we have created this publication, to emphasize our commitment and confidence in helping to guide and support the shipping sector through its decarbonization journey.

At TotalEnergies Marine Fuels, we are proud to be part of this global energy transition – both within our own organization and within today's shipping industry.

In May 2020, TotalEnergies declared our ambition to get to net zero emissions by 2050, together with society. Importantly, we seek to fulfil this ambition in partnership with our customers, by sharing this carbon neutrality ambition with them.

As part of an integrated, broad energy company operating across the oil and biofuels, natural and green gases, renewables and electricity markets, we are committed to creating multiple energy solutions that are clean, reliable, practical and above all – effective for our shipping customers' energy needs and decarbonization strategies.

Active in more than 120 ports around the world, we are putting sustainable development and our customers at the heart of our projects and operations.

We are actively focussed on innovating new fuel products and services as well as developing the necessary infrastructure, support and training in order to help our customers make the transition to alternative fuels, ensuring they meet the environmental regulations placed upon them today and well into tomorrow as we move towards IMO 2050.

To achieve this, we will increasingly leverage our Company's investments into renewable energies to offer an array of marine fuel solutions. These wide-ranging, long-term efforts include working on various alternative, lower- and zero-carbon solutions, such as new, advanced biofuels and green hydrogen-based fuels (including e-methane, e-methanol, e-ammonia, e-hydrogen etc.).

Nevertheless, we cannot forsake the urgency of reducing today's emissions.

In terms of the alternative fuel solutions available today, LNG is the cleanest marine fuel solution available at scale, delivering a range of benefits in helping to drive down GHG emissions whilst improving ports' air quality with assurance that the fuel does not release any black carbon. Crucially, LNG also provides us with the gateway to the development of next generation solutions, including lower-carbon bioLNG, which I believe will serve as an important pathway to enable the shipping sector in reaching its decarbonization goals.

This document therefore looks at the strong business case for ship owners and charterers to adopt LNG as a marine fuel. Through it, I hope you will gain a greater understanding of TotalEnergies' view on the role of LNG in the global shipping sector's energy transition, as well as the development strategy, plans and investments we have made and will continue to make, to facilitate the uptake of LNG bunkering globally.

As a leader within the global marine fuels market and an early mover in enabling LNG bunkering, we will continue to work with, and support, our shipping customers as they develop their pathway towards decarbonization. We will also continue to collaborate widely and invest in R&D efforts that are vital to accelerating the development of shipping's fuels of the future. Together, I believe we can and will rise to this challenge and achieve a carbon-free shipping future.

At TotalEnergies Marine Fuels, our commitment is to our customers and to the environment through innovation, collaboration and excellence.

Tackling Climate Change

and the Need for Fewer Emissions

The world needs more energy, but with fewer emissions. And with more than 90% of goods transported by sea, the shipping industry has a major role to play in helping to contribute towards the global fight against climate change.

The shipping industry's annual Greenhouse Gas (GHG) emissions totals more than one billion tonnes[1] – more than any single country's emissions outside the world's top five emitters – highlighting just how important the need for decarbonization is. In order to mitigate the impact of GHG emissions from international shipping, the International Maritime Organization (IMO), has set various measures throughout the years, which culminated in the Initial IMO Strategy established in 2018.

IMO GHG STRATEGY

The IMO adopted an Initial Strategy in 2018[2] to reduce GHG emissions from ships, with a vision to phase them out as soon as possible within this century.

The initial GHG strategy envisages, in particular:

- A reduction in carbon intensity of international shipping by at least 40% by 2030, pursuing efforts towards 70% by 2050, compared to 2008;
- Total annual GHG emissions from international shipping should be reduced by at least 50% by 2050 compared to 2008.

While operational enhancements available to the industry will improve the energy efficiencies of the current global fleet, longer term solutions, such as alternative fuels and associated new ship designs, are necessary if the shipping industry is to achieve the IMO2050 target. These solutions require significant investment in research and development (R&D) before they are ready to be used at scale.

(1) https://www.imo.org/en/OurWork/Environment/Pages/Fourth-IMO-Greenhouse-Gas-Study-2020.aspx

(2) https://www.imo.org/en/MediaCentre/HotTopics/Pages/Reducing-greenhouse-gas-emissions-from-ships.aspx

IMO REGULATIONS FOR GHG EMISSIONS REDUCTION FROM SHIPPING

1997

Resolution on **«CO_2 emissions from ships»** establishes IMO mandate on GHG emission control

2003

Resolution on **«IMO Policies and Practices related to the Reduction of Greenhouse Gas Emissions from Ships»**

2013

New regulatory tools to improve the energy efficiency of international ships:

- **Mandatory design requirements (EEDI)** for new ships, which set increasingly strict carbon intensity standards
- **Mandatory Ship Energy Efficiency Management Plan (SEEMP)** for operators to improve the energy efficiency of all ships

2015

EEDI phase 1:

10% reduction in carbon intensity of the ship

2016

Mandatory IMO Data collection system:

Ships of 5,000 gross tonnage and above **(~85% of emissions from international shipping)** are required to collect fuel oil consumption data for annual reporting to IMO, from 1st January 2019

2018

Resolution on the Initial IMO Strategy on reduction of GHG emissions from ships

2019

- Adoption of a procedure to **assess the impacts on States** of candidate measures.
- Strengthening of the **EEDI requirements** for some ship types
- Resolution on ports and shipping cooperation
- Establishment of a **GHG Technical cooperation Trust Fund** within IMO

2020

EEDI phase 2:

Up to 20% reduction in carbon intensity of the ship

Global Sulphur Cap:

Sulphur content of bunker fuel is limited to 0.5% from 3.5% effective 1st January 2020

2023

- Complete short-term measures and revise the initial Strategy
- **Implementation of additional EEXI, CII and Enhanced SEEMP on 1st January 2023**

2023

2023-2030

Mid-term measures to reduce carbon intensity of the fleet by at least 40%

2025

EEDI phase 3:

Up to 30% reduction in carbon intensity of the ship.
Note: early entry into effect (2022) for several ship types with up to 50% carbon intensity reduction for largest containerships

2030

2030-2050

Long-term measures to reduce carbon intensity of the fleet by at least 70%

2050

At least 50% reduction of total annual GHG emissions

Zero GHG emissions

As soon as possible in this century

Adapted from «IMO Action to Reduce Greenhouse Gas Emissions from International Shipping» leaflet

Leading the Clean Marine Fuels Market

In tandem with our preparation for IMO 2020, we at TotalEnergies Marine Fuels shifted our strategic focus from delivering high sulphur fuel oil, to cleaner marine fuel solutions. Our goal is to support our shipping customers in their efforts to reduce their emissions and to contribute to IMO's decarbonization strategy.

Along with the development of low-sulfur fuels that comply with the new IMO sulphur limit regulations, we recognised early that LNG represents the best alternative solution today - in terms of emissions, availability and price - to reduce shipping's environmental footprint.

As such, TotalEnergies started planning for this move several years ago through a range of investments in LNG infrastructure at key bunkering hubs. In August 2020, we took delivery of our first chartered LNG bunker vessel, *Gas Agility,* following the signing of a time charter party agreement with Mitsui O.S.K. Lines, Ltd. (MOL) in February 2018 and the start of her construction in November 2018.

In November 2020, the 18,600-m³ vessel completed her first LNG bunkering operation for the world's largest LNG-powered containership, the 23,000 TEU *CMA CGM Jacques Saadé,* at the Port of Rotterdam in the Netherlands.

At the end of 2019, TotalEnergies announced the signing of a long-term charter contract with MOL for a second LNG bunker vessel , which will enter operational service in December 2021 and be based in the Port of Marseille-Fos, Southern France, to serve the Mediterranean region.

In December 2019, TotalEnergies signed a 10-year fully termed agreement with Pavilion Energy Singapore to co-develop a LNG bunker supply chain in Singapore. This agreement follows a Heads of Agreement inked by the two companies in June 2018. The cooperation includes the shared long-term use of a new 12,000-m³ LNG bunker vessel.

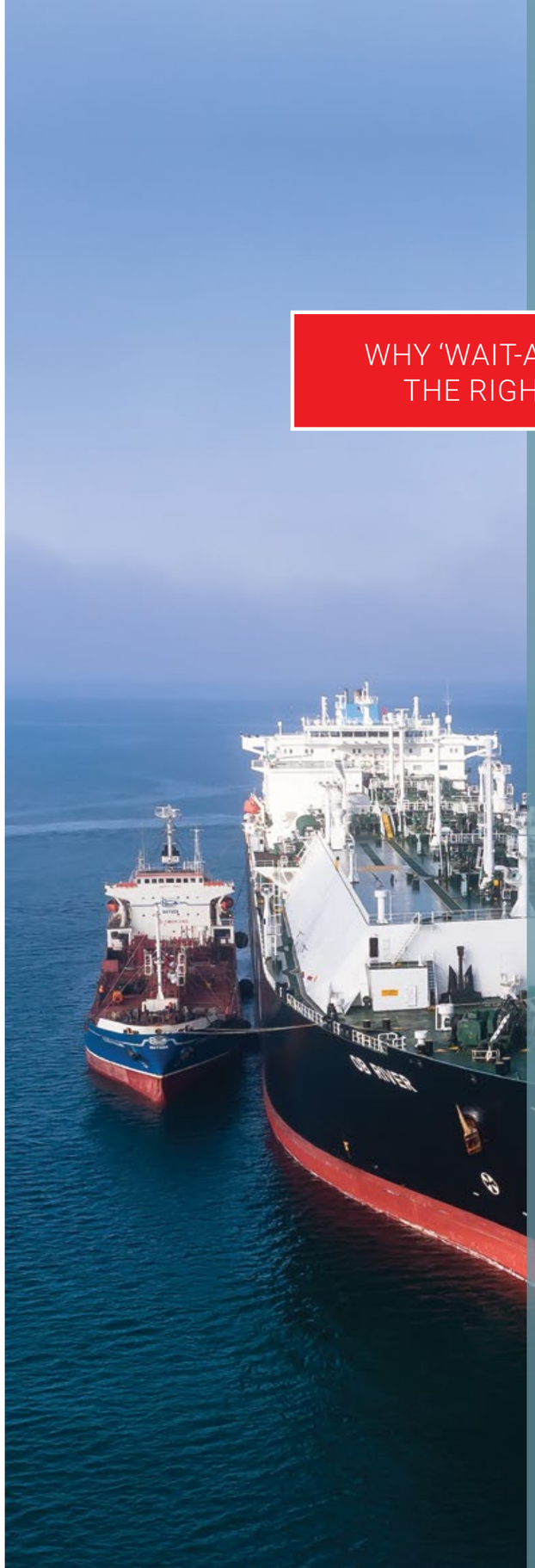
DEVELOPING BROAD ENERGY SOLUTIONS

In May 2020, TotalEnergies declared the ambition to get to net zero emissions by 2050, from production to the use of energy products sold to our customers, together with society. In line with the Company's climate ambition, we are developing broad energy solutions to reduce shipping's emissions.

Leveraging on the Company's wider low-carbon investments and R&D capabilities, TotalEnergies Marine Fuels is focusing on developing a range of low- and zero-carbon marine fuels. We are also actively working in cross-industry coalitions and joint projects to study these fuels of the future, in terms of their technology, availability, costs, infrastructure and compatibilities.

Nevertheless, these solutions still sit at different stages of development and shipping cannot wait till these technologies are commercialized before the sector starts to curb its vessels' emissions.

Compared to conventional fuel, LNG is the cleanest marine fuel available at scale and is an operational-ready solution today.



WHY 'WAIT-AND-SEE' IS NOT THE RIGHT STRATEGY

While some ship owners are opting for a 'wait-and-see' approach until new fuels come into the market, we at TotalEnergies believe tackling the climate challenge as a shared responsibility must start now.

Inaction worsens the problem, intensifies the existing challenges and sets our industry and the environment on a backward path. As GHG emissions are cumulative, the decarbonization challenge is tougher if we only take steps to address it later.

If the IMO targets are to be met, there is no 'either LNG or alternative fuels' scenario. We must grasp the benefits of LNG today.

As an operational-ready solution, embracing LNG does not come at the expense of investing time and trillions of dollars estimated in developing the fuels of the future.

TotalEnergies is committed to the energy transition and we firmly believe that LNG is part of that energy basket today and will be in the future. Investing in LNG forms part of our long-term vision in creating different pathways to help the shipping sector achieve its decarbonization goals.

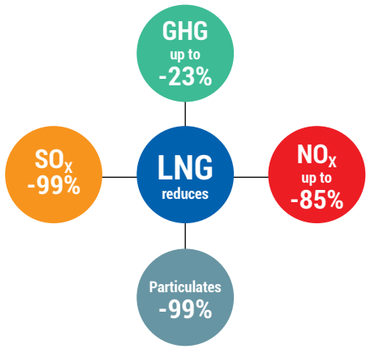
Why LNG?

LNG is a proven, competitive and safe alternative marine fuel available at scale today that supports the shipping industry's move towards decarbonization.

In parallel, LNG provides shipping operators with the added confidence of knowing there is scalability, availability and investment in infrastructure globally to meet current and future demands.

A number of key factors are driving the increased move to LNG as today's viable shipping fuel solution:

- **Clear environmental benefits**
- **A pathway to lower-carbon and even carbon-neutral bioLNG and synthetic LNG,**
- **Mature supply chain that allows for scalability and affordability, and**
- **Growing infrastructure at key bunkering ports**



In terms of its emission-reduction benefits, LNG marine fuel helps to cut:

- **Sulfur emissions by 99%,**
- **Fine particle emissions by 99%,**
- **Nitrogen oxide emissions by up to 85%,**
- **Greenhouse gas emissions up to 23% (Well-to-Wake) [3]**

Until low- and zero-carbon fuels are mature, scalable and competitive, LNG is the best fuel option to balance the current shipping fuel mix and will be a key fuel in contributing to a carbon-free shipping future.

From a shipowner's standpoint, LNG offers practical, environmental and commercial sense.

(3) Sphera's '2nd Life Cycle GHG Emission Study on the Use of LNG as Marine Fuel' study: https://sphera.com/research/2nd-life-cycle-ghg-emission-study-on-the-use-of-lng-as-marine-fuel/

TACKLING METHANE EMISSIONS THROUGHOUT THE SUPPLY CHAIN

While methane emissions can have a significant impact on the total well-to-wake GHG emissions of marine engines, it is crucial to note that the development of dual-fuel engines started decades ago and engine makers have since improved their engines to minimize methane slip.

In analyzing the role of methane emissions, we believe it is necessary to use the most up to date, available data for evaluation. Sphera's latest study[4] is a credible research, which has demonstrated that the latest generation LNG engine solutions today are showing minimal methane slip. The study also showed that two-stroke engines 'slip' less methane compared to the four-stroke engines, and the majority of the current global fleet and the order book for future LNG-fuelled ships are oriented toward two-stroke engines. Further technological improvements are expected to extensively reduce methane slip by 2030.

As an integrated energy company, we at TotalEnergies are also proactively working to reduce our methane emissions along our natural gas value chain. We recognize that if the integrated natural gas value chain is to be part of the energy transition, we need to strictly limit our emissions of methane, which has far greater global warming potential than carbon dioxide.

TotalEnergies has therefore made a commitment to maintain methane emissions at operated gas facilities close to zero, with a target of less than 0.1% of commercial gas produced. In addition, the Company has embarked on a second phase of the Oil & Gas Methane Partnership (OGMP), with a more ambitious methane-reporting program that will extend gradually and include non-operated assets.

To sustain this strong momentum in emissions reduction, TotalEnergies established a CO_2 Task Force in 2019 that draws on TotalEnergies' full array of expertise. The Company also systematically posts emissions data at the entrance of each industrial site, to raise awareness and motivate the workforce. Many small projects are contributing to lower emissions as well. A bottom-up review launched in 2020 to identify such projects across the Company revealed more than 500, some in the analysis stage and others already in execution.

(4) https://sphera.com/research/2nd-life-cycle-ghg-emission-study-on-the-use-of-lng-as-marine-fuel/

State of the Market

Growing Demand for Marine LNG

Since the birth of LNG shipping in 1959, significant innovation has been made to extend the LNG supply chain and develop new market application opportunities. This includes expanding its use as a marine fuel.

Following the launch of the first commercial LNG-fuelled ship in 2000, GLUTRA, a Norwegian ferry, the use of marine LNG has not only spread globally over the last decade, but also included many more ship types.

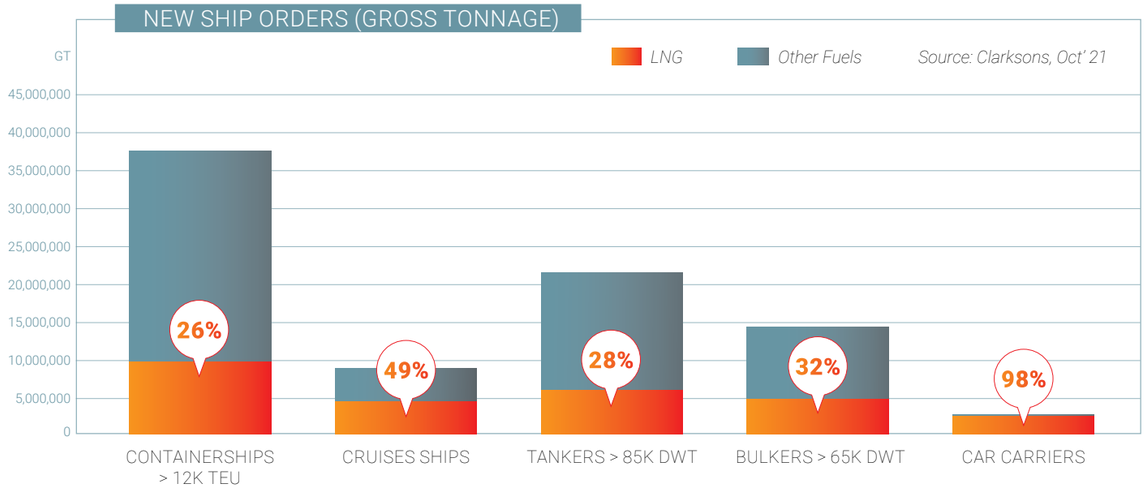
In the cruise industry, Carnival led the way with their first LNG-powered vessel – the AIDAnova – making her maiden voyage from Germany in December 2018. Other major cruise lines including MSC Cruises, Ponant, Disney Cruise Line, Royal Caribbean, and TUI have also added LNG-powered ships into their own fleets.

Popularity for LNG-fuelled vessels has continued across the container-shipping sector, with players including CMA CGM, Mediterranean Shipping Co. (MSC) and Hapag Lloyd making significant investments in newbuild LNG-powered container ships.

With approximately 230 LNG-fuelled vessels currently operating, shipping's transition to LNG is evident in the continued acceleration of LNG-fuelled ship orders. According to Clarksons' October 2021 data, LNG-fuelled vessels represent more than 30% of the total Gross Tonnage on order.

This reflects a rising global momentum for shipping companies to take positive action – now – to reduce their environmental footprint by using LNG as their solution choice.

TotalEnergies forecasts the LNG bunker market could reach 10 million tonnes a year by 2025 and represent 10% of the bunkering market by 2030.

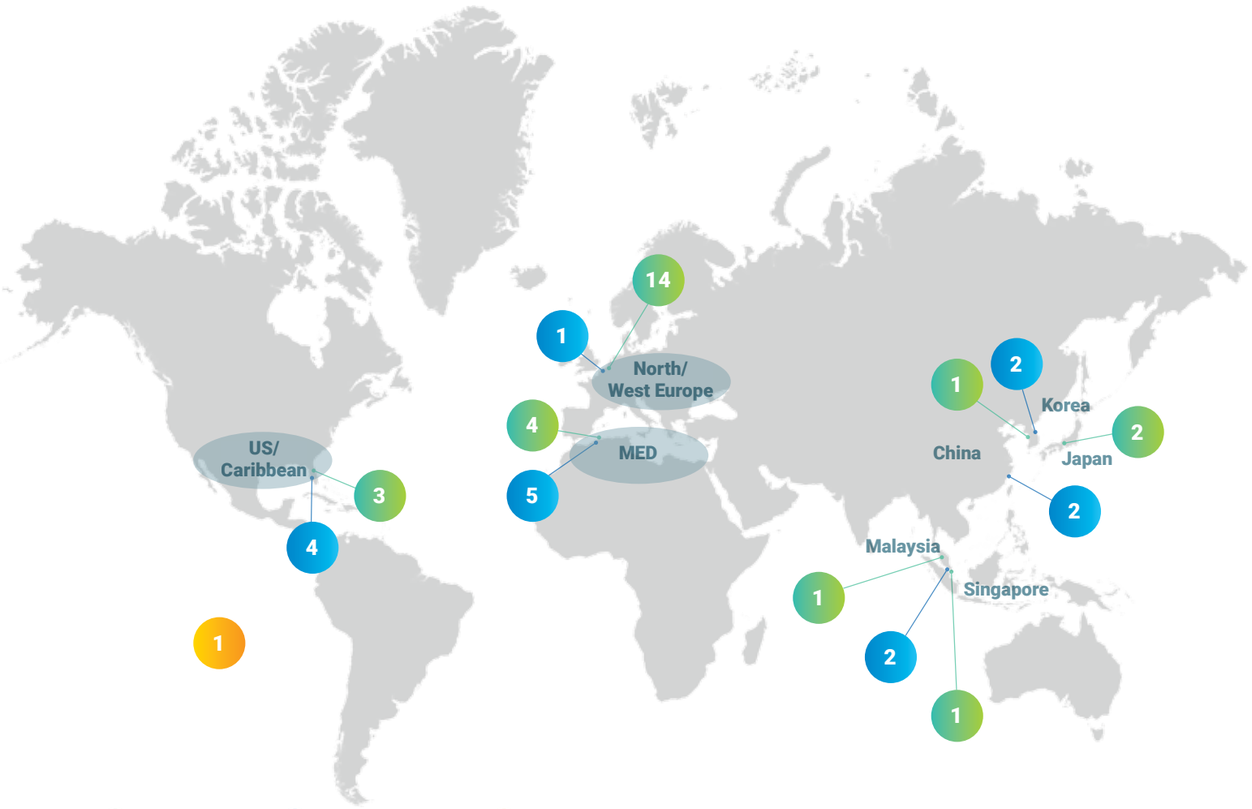


Traction in developing LNG bunkering infrastructure has consequently expanded to facilitate the uptake of LNG marine fuel, with several leading ports and LNG bunker suppliers alike having established key initiatives and made significant progress in support of these developments.

As at end December 2020, Clarksons recorded 124 ports with LNG bunkering facilities, up from 114 at the start of the year and forecasts this will increase to 170 by 2022.[5]

It also projects that the LNG bunkering fleet will double in size in the next two years.

Today, there are 26 LNG bunker vessels in operation globally and the fleet will grow to 43 units offering an aggregated capacity of between 7 and 8 million tonnes per year by early 2024.



(5) https://www.offshore-energy.biz/clarksons-27-of-the-order-book-to-run-on-alternative-fuels/

A Pathway to BioLNG

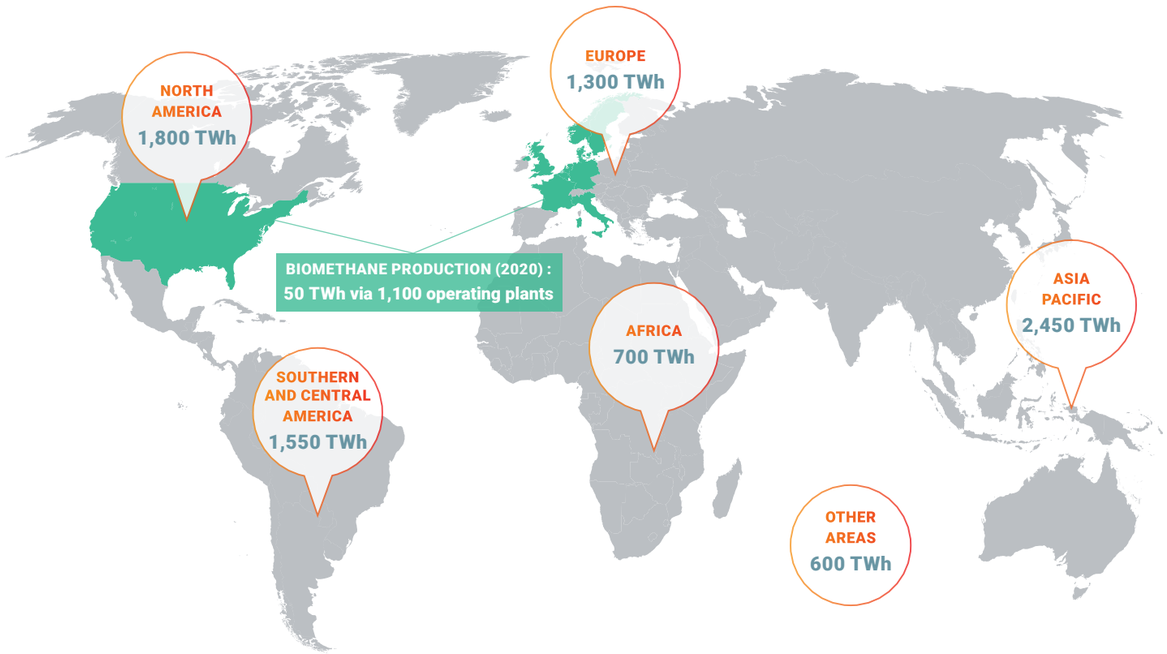
As a next step in its evolution, we believe that biomethane, together with LNG, can provide a viable pathway to achieve shipping's decarbonization goal.

The biomethane market is growing and has huge opportunities to become a global industry. In 2020, biomethane production reached about 50TWh globally via supply from 1,100 operating plants. This production potential could grow to reach a capacity of 8,500 TWh.

A study conducted independently by research and consultancy organization, CE Delft,[6] concludes that bioLNG (liquefied biomethane) is a scalable solution for the maritime sector.

Estimated sustainable global supplies could potentially exceed the future energy demand of the global shipping fleet. It also showed that bioLNG will likely be commercially competitive relative to other low- and zero-carbon fuels.

A GROWING BIOMETHANE MARKET WITH GLOBAL OPPORTUNITIES



Source: International Energy Agency (IEA)

Furthermore, the expanding LNG-fuelled fleet could utilize bioLNG without needing to undertake any modifications, and the existing supply infrastructure will still be fit for bunkering purposes with either fuel when bioLNG becomes scaled up.

This benefit alone will help reduce the capital outlay for brand new alternative fuels infrastructure, which it is estimated, could run into trillions of dollars.

(6) https://cedelft.eu/publications/availability-and-costs-of-liquefied-bio-and-synthetic-methane/

(7) https://marinefuels.totalenergies.com/news/press-release/energy-transition-shipping-first-biolng-production-project-french-port

THE COMMERCIAL AVAILABILITY OF MARINE BIOLNG

TotalEnergies has started to contribute to the commercial availability of marine bioLNG.

Through our first chartered LNG bunker vessel, the 18,600-m³ Gas Agility, we refuelled the 23K TEU *CMA CGM Jacques Saadé* containership in November 2020, and demonstrated the capability in supplying bioLNG in the bunker mix with the introduction of biomethane for approximately 13% of the LNG delivered.

Undertaken through the Guarantee of Origin (GO) certificates mechanism, this marks the shipping industry's first commercial use of biomethane on this scale.

We are now looking at the wider commercialization of biomethane and expect the appetite for bioLNG bunkering to grow, as ship owners' orders of LNG-propelled vessels continue to increase.

As part of TotalEnergies' work in the Coalition for the Energy of the Future, we will be helping to shape France's first bioLNG production for shipping. Developed with CMA CGM and Elengy, this major project is set to transform household waste from the Métropole Aix-Marseille Provence into bioLNG in the port of Marseille Fos. The bioLNG will be used to advance green mobility from the port, notably for CMA CGM's LNG-powered vessels.[7]

TotalEnergies' LNG Bunkering

Value Offering

A Pioneer in LNG Bunkering

As one of the first movers in the supply of marine LNG, TotalEnergies has actively invested in LNG bunkering infrastructure in key global ports, to serve our customers that have chosen LNG as the cleaner fuel choice. Our goal is to extend our LNG supply chain across strategic bunkering hubs.

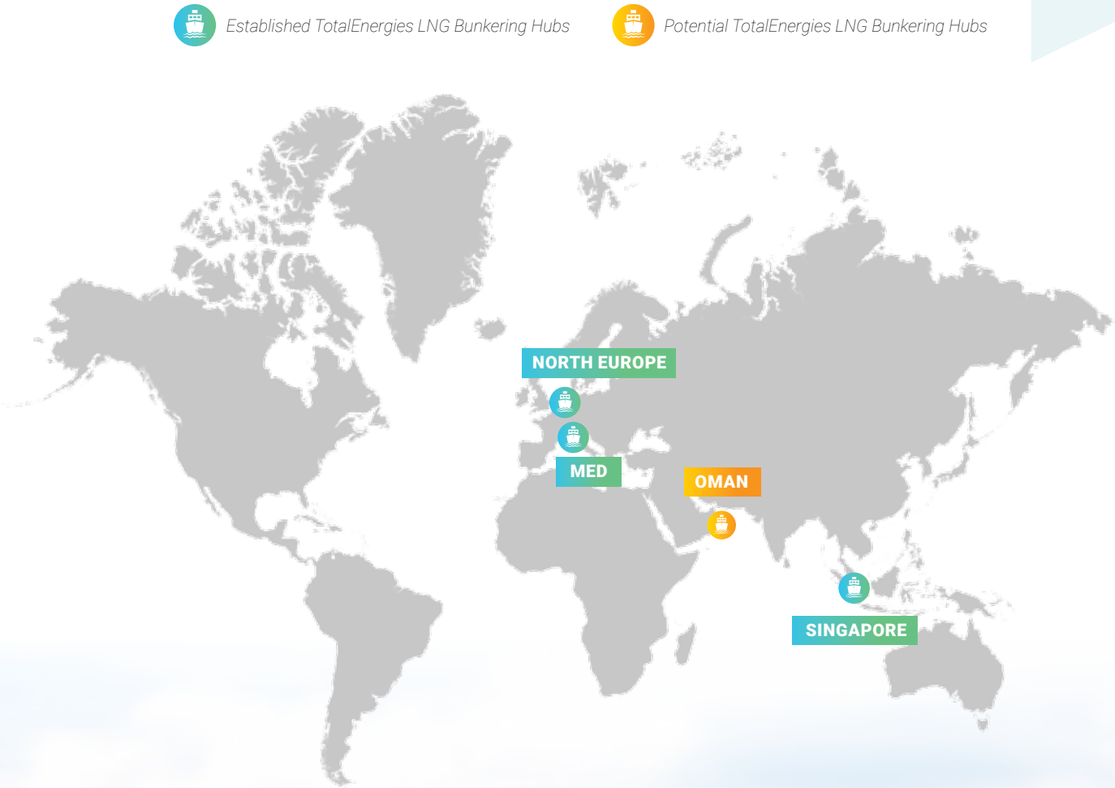
Following over three years of planning and collaboration with our partners, TotalEnergies' first chartered LNG bunker vessel – the 18,600m³ Gas Agility – was launched into active operations, in Rotterdam, in November 2020.

By 2022, we will commence operations of our second chartered LNG bunker vessel - the Gas Vitality - in Marseille, France, and share the use of a third bunker vessel in Singapore, where we are proud to have been awarded a LNG bunker supplier license in February 2021.

These assets, with high capacity and flexible operating parameters, are designed to serve a wide variety of vessels of all sizes - enabling us to develop tailor-made solutions for different shipping segments.

True to our goal, we are also actively exploring opportunities to develop LNG bunkering hubs in other key ports.

TOTALENERGIES' LNG BUNKERING NETWORK



Delivering Value through our Integrated LNG Business Model

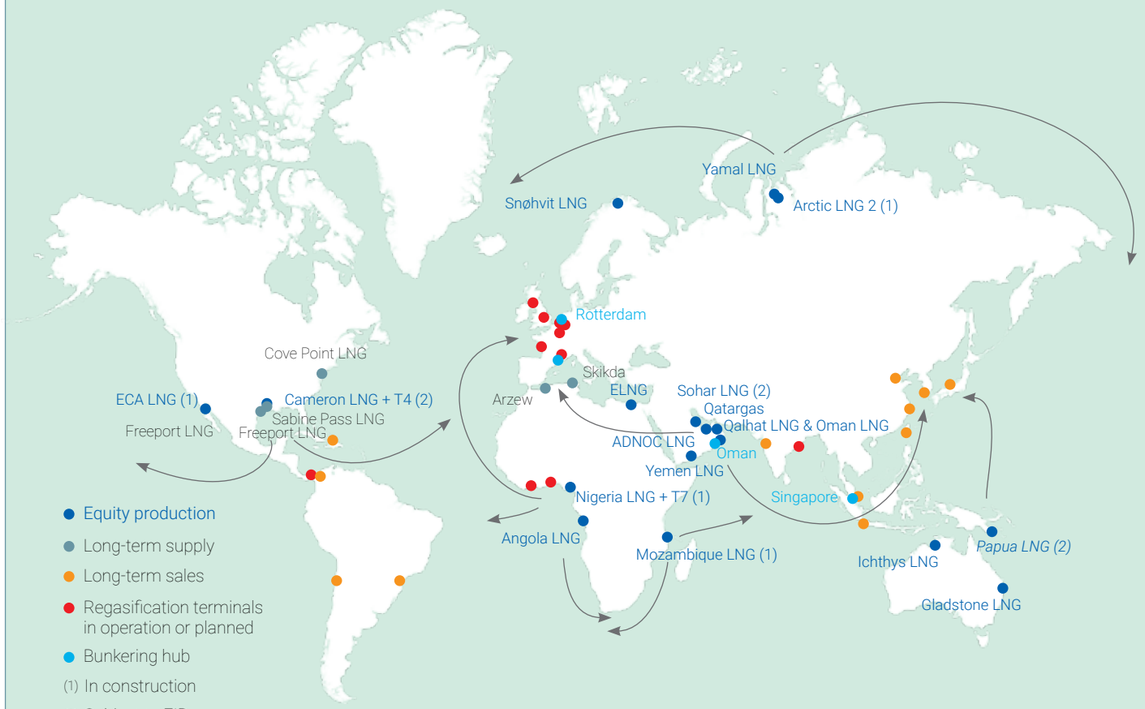
At TotalEnergies, we believe natural gas has an important role in the global maritime industry's energy transition.

As the second-largest LNG player globally, we have developed a portfolio right across the value chain aggregating LNG liquefaction, transportation, trading, regasification and marketing all over the world with operations in all key LNG market demand areas.

Through our ongoing LNG investment programmes, including our interests in liquefaction plants in Qatar, Nigeria, Russia, Norway, Oman, Egypt, the United Arab Emirates, the United States, Australia and Angola, we will have a global portfolio of nearly 50 Mtpa by 2025.

Importantly, our integrated LNG business model enables us to provide customers with flexible and secure LNG sourcing and customized pricing solutions.

TOTALENERGIES LNG GLOBAL PORTFOLIO



Equity production → **Trading and shipping** → **Regasification and supply of gas** → **Development of new markets**

Maximizing value through global scale and integration

50 Mt/y
LNG sales by 2025

+30%
LNG production growth 2025 vs. 2020

Strong Trading Capabilities to Help with **Price Risk Management**

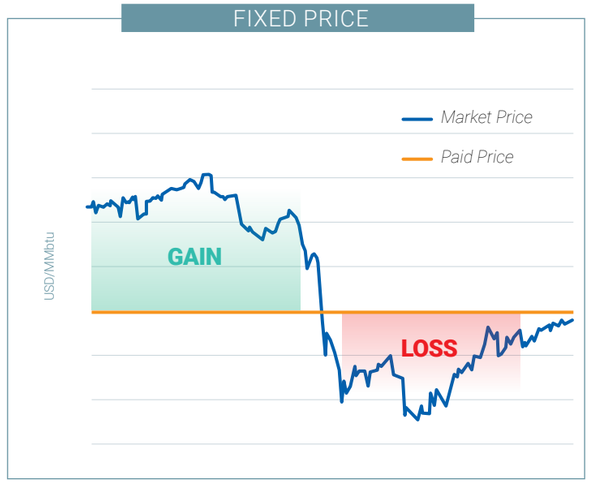
TotalEnergies has the scale, flexibility and strong trading capabilities to work with our customers to develop customized pricing solutions that provide both the assurance and commercial sense for their investment in LNG bunkering.

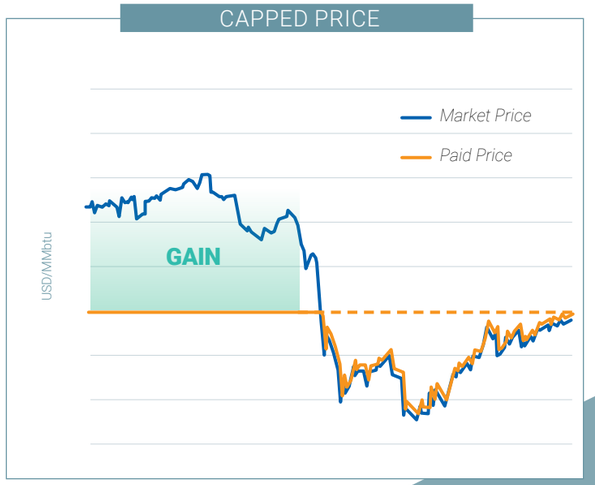
We understand the challenges and difficulties that customers can have to find the right pricing solution. As a result, we have developed a number of solutions that are customer orientated, flexible and tailored to their specific needs.

These pricing solutions can provide a number of benefits including:

- Securing a fixed pricing model throughout the year to avoid seasonal, market swings and fluctuations
- Protection against prices exceeding a maximum cap to help your investment
- Enjoying known price discounts now rather than potential benefits from possible future market price drops

Our team is a highly experienced one and we are here to bring that knowledge to help our shipping customers.





A Commitment to Safety & Operational Excellence

As a global leader in the LNG market, we are ever-ready to guide our customers through this energy transition by offering the opportunity to tap into the knowledge, expertise and understanding we have developed through our investment and development of LNG ship-to-ship bunkering operations, to support their operations and specific requirements.

SAFETY & ENVIRONMENT

Safety is a pillar of TotalEnergies' values and we are committed to address holistically all risks associated with our projects and products, across all stages - from the design to the delivery phase and actual bunkering operation of the receiving vessel.

Our chartered LNG bunker vessels are designed in accordance to the IMO International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code), and integrate all required safety features usually onboard LNG carriers.

Safety requirements are carefully followed and integrated in accordance to local port regulations and international maritime standards. Additionally, the LNG bunker vessels are enabled to carry out SIMOPS LNG bunkering for the receiving vessel, without delaying the customer's commercial operations.

Our internal technical specialists conduct risks analyses and safety studies that help to determine different control zones, including hazardous areas, safety zones around the LNG transfer system and the larger monitoring areas to ensure a safe and efficient bunkering operation.

TotalEnergies Marine Fuels is also supporting the ship managers in the development of local port operations procedures where the LNG bunker vessel is deployed.

High manoeuvrability for operations without tugs' assistance in port is also implemented onboard the vessels. This set-up in turn reduces fuel consumption and emissions.

Finally, the LNG bunker vessels deployed by TotalEnergies also meet the highest technical and environmental standards, using LNG as fuel for power generation, and integrating a complete management of the boil-off gas through a sub-cooling unit. Operations are designed in order to transfer marine LNG without gas release to the atmosphere, and the LNG bunker vessels can receive vapor return from customers when required by them.

DESIGNED FOR FLEXIBILITY AND OPTIMAL PERFORMANCE

To accommodate the wide range of stems to be delivered, the cargo tanks can operate at all loading ranges to ensure a multi-customer delivery service.

The quantity and quality of the product delivered is controlled on board through technologies to measure the LNG composition and latest generation metering equipment, in line with local regulations and recommendations.

An electronic system, which is ready to be adapted to an "e-BDN" solution, issues the Bunker Delivery Note including all required information.

OPERATIONS MANAGEMENT

TotalEnergies Marine Fuels is involved with the ship manager in the development of LNG bunkering procedures and the establishment of joint procedures between the LNG bunker vessel and the receiving vessel. Our team of specialists actively supports our customers towards the development of their project when shifting to LNG bunkering, from design stage to the bunkering operation.

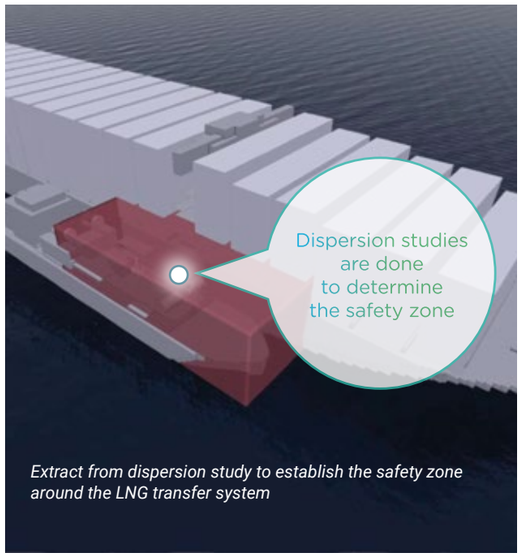
The manning of the LNG bunker vessels deployed by TotalEnergies Marine Fuels complies with LNG standards as developed through the Society of International Gas Tanker and Terminal Operators (SIGTTO) Matrix of competency. Compliance is controlled by the TotalEnergies vetting department. The crews will also follow necessary training required by national regulations to operate the bunker vessel as a harbour craft, and to safely carry out ship-to-ship LNG bunkering operations.

ENSURING COMPATIBILITY WITH DIVERSE VESSEL TYPES & SIZES

Today, TotalEnergies Marine Fuels is developing fit-for-purpose solutions with a diverse range of vessel types and sizes, independent of their LNG fuelled storage and equipment.

To ensure wide compatibility, our bunker vessels' LNG transfer systems are developed to be able to accommodate large range of positions of the receiving ships' manifolds. This is considered in the design of the LNG transfer system, handling system, cargo pumps and the boil-off gas management system.

TotalEnergies Marine Fuels also closely follows the compatibility verification of the LNG bunker vessel with the receiving ships to be supplied. We have the expertise and experience to accompany our customers along their development process to optimize the bunkering operation and ensure a safe and efficient bunker operation.



Extract from dispersion study to establish the safety zone around the LNG transfer system

TOTALENERGIES' INVOLVEMENT IN STANDARDS DEVELOPMENT

TotalEnergies' specialists are also involved with international organizations such as the Society for Gas as a Marine Fuel (SGMF) and ISO for the development of standards. These standards aim to increase the level of safety and to standardize equipment and procedures to facilitate compatibility between LNG bunkering and receiving vessels. This cooperation extends to equipment providers, who are encouraged and supported to develop innovative solutions to facilitate the bunkering operation.

As a Board Member of SEALNG, SGMF and an active member of SIGTTO, Singapore's MPA Technical Reference 56 (TR 56) and ISO working groups, TotalEnergies is committed to contribute to the development of industry regulations and safety best practices on the use of gas as a marine fuel.

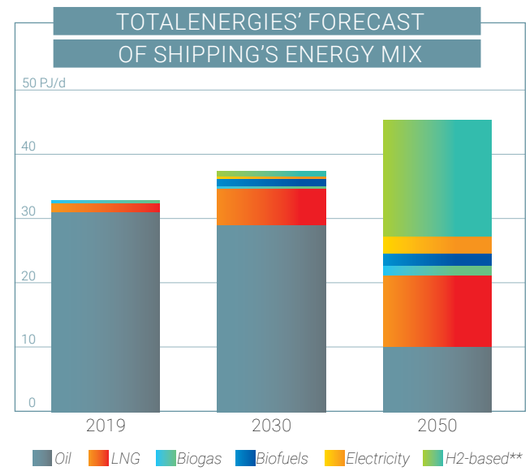
The Future of Marine Fuels

As we head towards IMO2050, there is no doubt that the future of shipping will comprise a mix of fuel solutions and the shipping industry will need all of them to meet future fuel demands.

We believe LNG has an important role, along with bioenergies and hydrogen-based fuels, in shipping's energy transition. The adoption of marine LNG is expected to continue to experience an accelerated growth into 2030.

In tandem with this growth, we believe within this decade (2021-2030), the shipping industry will see the practical development and deployment of a variety of bioenergies and hydrogen-based fuels, including e-Methanol, e-Methane (synthetic LNG), e-Ammonia and e-Hydrogen. The application of these fuel solutions will centre on first-mover initiatives and pilot trials, which are designed to demonstrate the capability of new vessels in using these fuels.

Finally, the market's scaling up of hydrogen-based fuels is likely to materialize between 2030-2040, in line with the ramp up of electrolysis to commercial levels.



** Includes H2, e-fuels (H2 + CO_2), methanol, ammonia...

A Global Leader in LNG Today and Low-Carbon LNG Tomorrow

TotalEnergies aims to eliminate carbon wherever possible in the LNG value chain, from gas production to LNG plants and carriers. Additionally, TotalEnergies plans to produce low-carbon LNG. One of the methods involves blending biogas or clean hydrogen with natural gas, or to use in its place.

In September 2020, TotalEnergies created a Biogas business unit within its Gas, Renewables and Power (GRP) branch, to build up capabilities for this fuel. The Biogas business unit plans to produce 1,500 GWh of biomethane annually by 2025 and 4,000 to 6,000 GWh a year by 2030.

It will draw on the Company's existing operations in the biogas industry and its sale and purchase agreements for more than 50 GWh/year through its affiliates, including: Quadran-Methanergy, which builds methanation and waste gas recovery units, Clean Energy in the US, and its affiliates in the Netherlands, Belgium and Germany that maintain a network of bio-natural gas vehicle fuel and bio-LNG stations.

Additionally, in January 2021, TotalEnergies acquired Fonroche Biogaz, the largest producer of biogas in France, which holds an installed capacity of 500 GWh, thereby further strengthening the Company's presence in the market.

While TotalEnergies Marine Fuels' goal is to be able to provide physical supply of liquefied biomethane bunkers to our shipping customers, the high costs of liquefying and transporting this fuel makes it uneconomical as an immediate standalone solution.

One associated development that may create demand for greener LNG blends is consumer demand for green fuel certification such as the Guarantees of Origin (GO) certificates mechanism. With the successful introduction of bioLNG via the GO certificates mechanism in November 2020, we will ramp up this offer to our customers to steer the industry towards these lower-carbon marine fuel solutions.

Accelerating the Drive

Towards Biofuels in the Shipping Sector

In terms of the alternative fuel solutions available today, we believe biofuels will provide a critical role in the future fuels mix, given that they can be blended into existing fuels and deployed across the current fleet.

TotalEnergies has announced plans to increase our biofuels production capacity as part of our new strategy. The Company plans to increase our biofuels production capacity from 0.3mt/year in 2020 to 2mt/year by 2025 and 5mt/year by 2030.

To make that ambition a reality, TotalEnergies is seeking to develop synergies with existing assets, such as our La Mede biorefinery[8], which was converted from a conventional refinery in 2019 and has the capacity to produce 500 KT of biofuels annually.

In September 2020, we also announced a project to convert our Grandpuits refinery into a zero-crude complex[9] including biofuels and bioplastics units, which are expected to be commissioned by 2024, with an annual production capacity of 170 KT of sustainable aviation fuel, 120 KT of road biofuel and 50 KT of bionaphtha for producing bioplastics.

Additionally, TotalEnergies and five partners are working hard to industrialize the BioTfueL® technology[10] with an aim to its commercialization in early 2022. The BioTfueL® project is designed to transform lignocellulosic biomass (straw, forest waste, dedicated energy crops) into biofuel via thermochemical conversion. The partners' goal is to develop an end-to-end set of processes for producing second-generation biodiesel and biojet fuel.

Consequently, TotalEnergies is also exploring the development of dedicated biofuels for shipping.

(8) https://totalenergies.com/energy-expertise/projects/bioenergies/la-mede-a-forward-looking-facility

(9) https://totalenergies.com/expertise-energies/projets/bioenergies/grandpuits-biofuels-bioplastics

(10) https://totalenergies.com/energy-expertise/projects/bioenergies/biotfuel-converting-plant-wastes-into-fuel

Developing Hydrogen-based

Fuel Solutions

In July 2020, TotalEnergies set up a Clean Hydrogen business unit, with the goal of shaping the Company's ambition to become a large-scale producer of carbon-free Hydrogen.

Through this dedicated unit, we see strong potential for the development of a range of Hydrogen-based marine fuel solutions including e-Methane (synthetic LNG), e-Methanol, e-Ammonia and e-Hydrogen.

R&D is critical to help us achieve these goals, and at TotalEnergies, we are joining forces along with other key industry leaders to intensify our investigation into these future fuel solutions, starting with e-Ammonia.

Projects include:

- A joint study framework with 34 leading companies across diverse industries to study common issues on Ammonia as an alternative marine fuel[11]
- A joint project with other maritime industry leaders, through the Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping[12], to assess the technical, financial and environmental potential of converting existing vessels to future fuel solutions and technology.

Furthermore, since 2019, TotalEnergies' membership in the Ammonia Energy Association – a global industry association that promotes the responsible use of Ammonia in a sustainable energy economy – has enabled us to deepen our investigation of Ammonia within our portfolio of clean energy technologies.

These efforts underscore TotalEnergies' aspiration to be a world-class player in the energy transition to achieve net zero carbon emissions by 2050, together with society. As part of the Company's strategy, we will develop broad energy solutions for mobility to take carbon out of transport.

(11) https://www.itochu.co.jp/en/news/news/2021/210729.html

(12) https://zerocarbonshipping.com/

Joining Forces to Decarbonize the Maritime Industry

Moving shipping into a carbon-free future will require collective action with stakeholders throughout shipping's ecosystem, as well as cross-industry collaborations.

TotalEnergies' active participation in various shipping and cross-industry initiatives and coalitions, underscores our commitment to support shipping's decarbonization goals and to help accelerate the development of future fuels.

EXTERNAL PARTICIPATION

IMO - International Maritime Organization

- Technical Advisor in the French delegation
- Member of the Global Industry Alliance

ISO - International Standardization Organization

- Chair of the ISO Technical Committee 28 / Sub committee 4
- Member of ISO WG6 (Marine Fuel specification)
- Member of ISO WG17 (LNG as Marine Fuel specification)

SEA-LNG

- Board member

SGMF

- Board
- Technical and environmental committees member

Ammonia Energy Association

- Member

Coalitions

- Coalition for the Energy of the Future
- Getting to Zero coalition
- Maritime Eco Energy Transition
- Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping

JOINT STUDY

- Itochu Joint Study Framework on Ammonia Bunkering

Helping You Make an Effective and Successful Energy Transition

The future marine fuels landscape will be made up of a basket of solutions and our leadership in LNG bunkering today is giving us an important foundation for successfully delivering tomorrow's marine fuel mix.

As part of an integrated energy company, TotalEnergies Marine Fuels is committed to support the shipping industry's move towards decarbonization and to provide ship owners and operators with the confidence to reduce their vessels' emissions for the long term.

Our leadership within today's LNG and bio-LNG bunkering market provides us with a strategic footprint and resources that is enabling us to expand the diversity of our fuels portfolio, today and into the future, to better serve our shipping customers' fuel strategies.

Equally important, TotalEnergies' pioneering investments and efforts to build and deliver reliable, technical expertise in handling complex ship-to-ship LNG bunkering operations, will also be useful in guiding the development of safety standards for the bunkering of other future hydrogen-based fuels.

With TotalEnergies' continued, active collaboration with partners across the global marine fuels landscape as well as with leaders in other industries, we will continue to explore all viable options for low and zero carbon marine fuels.

Our team is here to help ship owners and operators make an effective and successful transition to the right marine fuels mix for their operations.

Shipping @ TotalEnergies

One Approach to Achieve More Energies, Less Emissions & a More Sustainable Future for Shipping

Marine Fuels • Lubmarine • Saft • Additives and Fuels Solutions • Solar Installations • Shipping Operations

As part of its aspiration to be a major player in the energy transition, TotalEnergies has brought together its knowledge, resources and expertise across the marine-related business value chain, to deliver a coherent and integrated service offering for the global shipping community.

The Company's full breadth of activities and solutions covers across marine fuels, lubricants, fuel additives and batteries production, as well as its experience in shipping operations.

With a collective purpose and singular mindset, TotalEnergies' marine-related business affiliates are committed to support its shipping customers and industry partners with innovation and excellence.

Importantly, when any stakeholder engages with one of these business affiliates, it is in fact, opening up to an array of solutions that aims to effectively help the shipping sector reduce their overall environmental footprint, and contribute towards achieving its long-term decarbonization goals.

TotalEnergies invites you to learn more about these business affiliates:

TotalEnergies Marine Fuels

With over three decades of market experience, TotalEnergies Marine Fuels is TotalEnergies' dedicated business unit in charge of worldwide bunkering activities. A long-term partner to the global shipping industry, TotalEnergies Marine Fuels serves more than 200 shipping customers across over 120 ports in Europe, Asia Pacific and Africa. Its headquarters is located in Singapore, with two satellite offices in Paris and Geneva.

In order to help its shipping customers adopt the cleanest available marine fuels today, TotalEnergies Marine Fuels has made key investments to supply marine LNG, bioLNG and biofuels at strategic bunker hubs. As part of its ongoing work in various maritime coalitions and cross-industry R&D initiatives, TotalEnergies Marine Fuels is also helping to shape the production of decarbonized future fuels for shipping.

https://marinefuels.totalenergies.com/

Lubmarine (marine lubricants & services)

Lubmarine provides a range of sustainable and proven lubricants for all shipping sectors with presence in more than 100 countries and 1,000 ports.

Its lubricants range is based on pioneering chemistry to ensure compatibility with all IMO2020 compliant fuels including LNG, 2-stroke and 4-stroke engine technologies, and vessel types, to help ship operators achieve safer operations, and higher levels of performance in a more complex environment. Lubmarine takes into consideration not only engine and equipment characteristics, but emission control and energy saving systems, as well as operating conditions so the teams can create solutions designed to help further reduce CO_2 emissions. Lubmarine's technical expertise is focused on ensuring all Lubmarine customers use lubricants and monitoring tools that deliver optimal engine performance and engine cleanliness. Lubmarine's Environmentally Acceptable Lubricants (EAL) - known as 'bio-lubricants' - are helping customers transition to cleaner methods of operation.

https://lubmarine.totalenergies.com/

Saft (Batteries)

Saft is the battery maker of choice and a subsidiary of TotalEnergies, with 4,000 employees focused on research through to manufacturing and sales. Its high-performance batteries are increasingly being incorporated into the design of hybrid and fully electric marine vessels. Saft's technology is also used in electrified ground-support equipment in airports and seaports as part of efforts to reduce carbon emissions, fuel consumption and noise.

https://www.saftbatteries.com/market-sectors/transportation/marine

TotalEnergies Additives and Fuels Solutions

TotalEnergies Additives and Fuels Solutions provides innovative solutions for refiners, fuel distributors, equipment manufacturers as well as sea and land transport players. Its teams develop cutting-edge additive formulations to improve fuel quality and engine efficiency for all types of marine fuels. The scope of its high technology solutions encompass asphaltenes and crystallization issues as well as engine efficiency and protection through improved combustion and cleanliness. It also proposes tailor-made solutions adapted to the problems encountered.

https://acs.totalenergies.com/en

TotalEnergies Renewables Distributed Generation

The B2B affiliate of TotalEnergies Renewables finances, installs and operates solar installations on customers' facilities, including roofs, carports and free fields. By signing long-term power purchase agreements for the green electricity produced, customers reduce their carbon emissions and energy bill.

TotalEnergies Renewables Distributed Generation has proven experience in providing solutions throughout the shipping value chain. For example, in Jebel Ali Port in Dubai, it has offered on-site solar solutions to logistic companies such as Agility, Kuehne Nagel, GAC and Tristar, maritime services groups such as Seven Seas, and a global market leader in maritime and offshore safety, Viking.

https://renewables.totalenergies.com/en

TotalEnergies' Shipping Operations

As a leading, integrated energy player, TotalEnergies is active in 130 countries where it deals with all aspects of oil and gas exploration, production, trading and distribution. With more than 90 time-chartered vessels and 4,000 sea voyages every year, TotalEnergies teams arrange shipping from production areas to consumer hubs worldwide under optimal safety conditions and in a timely, cost-effective way.

In line with the Company's climate ambition, TotalEnergies has been actively working to reduce its shipping emissions to build a low-carbon trading & shipping future. Through the deployment of more efficient and modern vessels into its fleet, as well as the use of new fuels, the Company has significantly improved the carbon intensity of its fleet operations.

In 2020, TotalEnergies signed pioneering agreements to charter its first two LNG-powered VLCCs (Very Large Crude Carrier) and four new LNG-powered Aframax vessels, which will be delivered over the period of 2022 and 2023. In 2020 and 2021, TotalEnergies also entered into agreements to charter 6 LNG carrier newbuildings, which incorporate the most fuel-efficient LNG carrier design and implement the latest GHG reduction technologies such as air lubrication system and shaft generator.

Concurrently, TotalEnergies is a founding member of the Sea Cargo Charter, a pioneering initiative dedicated to establishing a transparent and consistent GHG emissions reporting approach. The Company is also working closely with the industry through its participation in several coalitions, including the Getting to Zero Coalition, the Coalition for the Energy of the Future and the Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping to investigate the potential of adopting new low and zero-carbon fuels for its fleet. TotalEnergies is determined to find new ways to strengthen its operational excellence, and to actively contribute strategic direction and technological innovation to the global reduction of emissions for shipping.

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