


**The BC SMART Low Carbon Fuels Consortium- Decarbonizing Long Distance Transport**

This issue of the BC-SMART Newsletter provides an update of recent activities and developments in the "decarbonizing the long-distance transport" area, describing the work of some of the BC SMART low carbon fuel Consortium members as well as other stakeholders. This particular issue of the newsletter is focused on the potential of drop-in biofuels to lower the carbon intensity of the marine sector.

## In this Issue



## From the Secretariat: The impact of COVID-19 on the production and use of low carbon fuels

There is growing optimism that, as vaccines are distributed and mobility restrictions ease, the global economy will recover. However, in the longer term, the more impactful crisis of climate change will continue as an ongoing challenge. As indicated in Figure 1, although the impact of COVID-19 reduced global oil use in 2020, groups such as the IEA expect oil production and demand to rebound in the coming years, despite the recent release of reports such as Net Zero by 2050 – Analysis - IEA which "hopes for" decreasing oil use in the mid-to-longer term. In parallel, although total global biofuel demand for transport declined 8% to 150 billion, it is expected to recover to the 2019 level in 2021, as forecast in the IEA Renewable Energy Market Update (Read more).

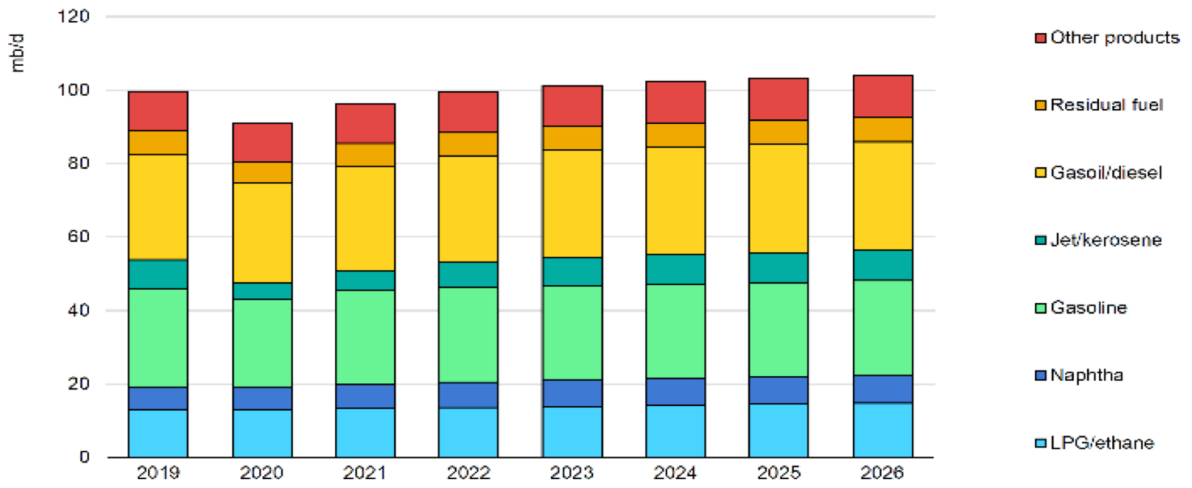


**Figure 1:** Global demand of various oil products
*(From IEA report: Oil 2021 Analysis and forecast to 2026)*

However, hard-to-electrify sectors, such as long-distance transport, will continue to be under pressure to decarbonise, with the severely impacted aviation sector currently-and-aggressively assessing alternatives such as hydrogen (in the longer term) and lower carbon intensive biojet/sustainable aviation fuels (SAF) in the short-to-mid-term.

**The impact of COVID-19 on the marine and aviation and sectors**

Although civil aviation decreased by about 50% (equating to a loss of USD 371 billion) as a result of the COVID-19 pandemic in 2020 (Figure 2), the maritime sector (Figure 3) proved more robust with the 4.1% global decrease in 2020 anticipated to quickly recover to a 4.8% increase in 2021. While the aviation sector is expected to rebound (and will be covered in more detail in future newsletters), this current newsletter highlights the marine sector and ongoing efforts to decarbonise its operations.


**Figure 2:** Civil aviation in 2020 *(Source: ICAO)*

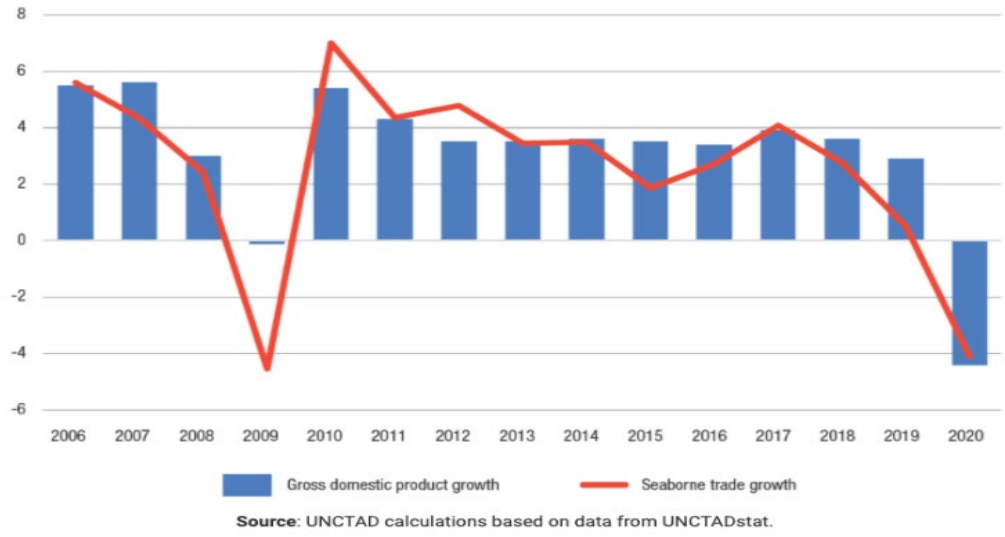


**Figure 3**: The impact of the CoVid-19 pandemic on the International maritime trade *(Source: IMO)*

**The development of lower carbon intensive marine fuels in British Columbia**

British Columbia (BC) benefits from having several major ports at Vancouver, Prince Rupert, Kitimat, Victoria and Nanaimo and its marine sector can be arbitrarily divided into inner-harbour, coastal and trans-oceanic modes of transport. Although BC's abundance of 'low emission/green' electricity and natural gas can be increasingly used to decarbonise more 'local' modes of shipping (e.g. ferries, tugs, etc.), trans-oceanic vessels will likely need some form of low-carbon intensive biofuel if they are to effectively decarbonise. Groups such as the International Maritime Organisation (IMO, https://www.imo.org/) have made good progress in dealing with air quality issues such as decreasing the maximum sulphur in marine fuels. However, they have been slow to emulate groups such as the International Air Transport Association (IATA) and the International Civil Aviation Organization (ICAO) who have been at the forefront of mapping out a decarbonisation strategy for the aviation sector.

Although BC has ready access to lower-carbon-intensive 'transition' fuels such as LNG as well as 'low emissions/green' electricity, BC's ports are also key players in Canada's global supply chain for vegetable derived lipids (e.g. canola) which can be used to make 'drop-in biofuels' such as renewable diesel and sustainable aviation/biojet fuel. As well as being able to use lipids/oleochemicals to make drop in biofuels in the mid-to-longer term, biomass (e.g. pellets) can be used to make 'biocrudes' that can be upgraded to a range of low carbon intensive drop-in fuels. BC's ports are major exporters of pellets and, as technologies mature, this feedstock could be used to make the needed biocrudes.

In this issue of the BC-SMART newsletter we have highlighted marine transport and the various initiatives that are being pursued around the world to decarbonise this component of the long-distance transport sector. One of BC-SMART's previous webinars profiled presentations from some of

the key international players involved in decarbonising the marine sector. Although a recording of these talks can be accessed via the BC-SMART website (The BC-SMART Low Carbon Fuels Consortium) this newsletter provides an update of what proved to be an enlightening, prophetic, and very informative session.

## Low carbon fuel use in the marine sector

### Overview of the maritime sector

Although ships transport more than 80% of global commodities, they only contribute to 2-3% of the global carbon dioxide ($CO_2$) emissions. The shipping sector includes more than 85,000 registered vessels which can be divided into small, medium, large, and very large oceangoing ships. Although the two latter groups account for just 20% of the vessels, they constitute 80% of the sectors gross tonnage. Despite being one of the least carbon-intensive means of long-distance transport, shipping has been accused of using 'cheap-and-dirty' heavy fuel oil, of which 350 million tons are consumed annually. This combustion results in about 4-9% of sulphur oxides (SOx) and 10-15% of nitrogen oxides (NOx) of the world's global emissions. However, on 1st January, 2020, the IMO implemented the IMO 2020 mandate, limiting SOx emissions and restricting the maximum sulphur content of marine fuels used in international waters from 3.5 wt. % to 0.5 wt. %. Although the use of low-sulphur containing fuels and the installation of scrubbers on international shipping vessels has provided a partial solution, it is estimated that more than 70% of the marine fuels currently used by the sector still needs to be 'de-sulphurised'.

To date, unlike the aviation sector, the marine sector's GHG emissions (particularly $CO_2$) have been less of a concern. However, as described in this newsletter, this situation is changing rapidly.

### What are the lower carbon intensive fuel options for the marine sector?

While low emission/green' electricity and slightly lower carbon intensive LNG is being used by some of BC's 'harbour' and 'coastal' ships, in the short-to-midterm, trans-oceanic vessels will likely need some form of low carbon, 'drop-in' biofuel if they are to decarbonise. Although agencies such as the American Bureau of Shipping (ABS) project increasing use of LNG/LPG, hydrogen and ammonia (Figure 4), it is more likely that drop-in biofuels such as biodiesel, renewable diesel, alcohols and upgraded-biocrudes will be preferentially used to make use of the current infrastructure and supply chains. As

described by groups such as the IEA, low carbon intensive drop in biofuels fuel options can be used by much of the existing fleets with minimal ship-and-infrastructure modifications.

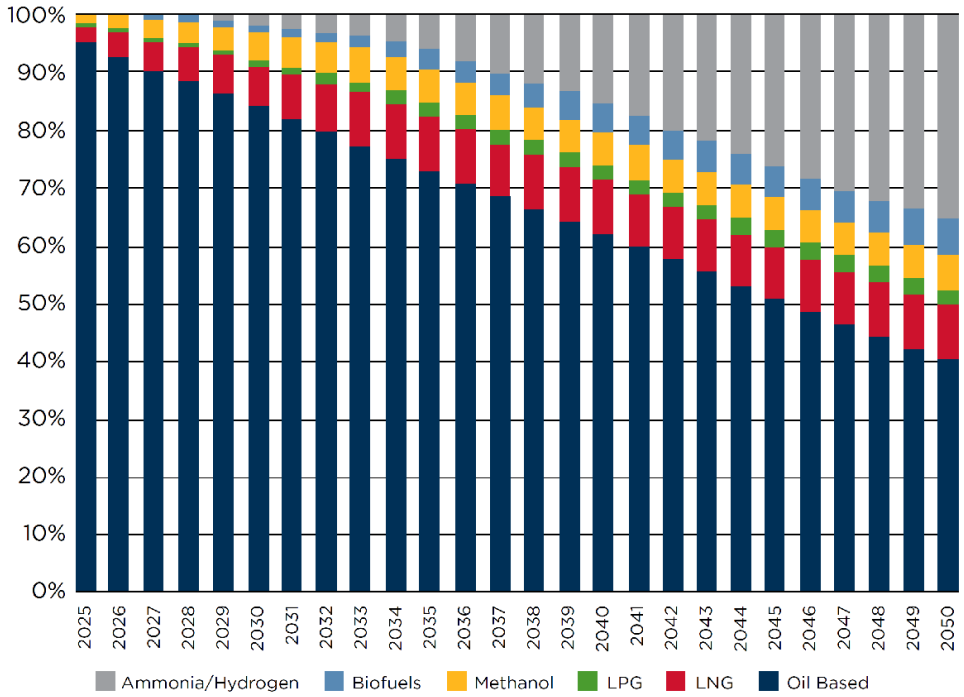


**Figure 4**: Marine fuel use to 2050, projecting the transition from oil-based fuels towards low carbon alternatives
*(Source: the American Bureau of Shipping (ABS) report on sustainability whitepaper biofuels as marine fuel. May 2021.)*

**Carbon emissions of maritime low carbon fuel**

As mentioned earlier, as well as the current focus on decreasing sulphur emissions, the IMO has recommended reducing the carbon emissions of the marine sector by 40% (intensity based) by 2030 and 50% (total reduction based) by 2050, compared to 2008 levels. Recent work by the American Bureau of shipping (ABS) has reviewed how marine GHG emissions could be reduced when different fuels are used (Figure 5). In parallel, strategies such as mandating new ships to increase their overall energy efficiency have been pursued. However, one outcome of not clearly defining an overall strategy is that demand for new ship orders slumped by 10% in 2019 and 50% in 2020. The uncertainty of the types of fuels/engines that these ships might use likely contributed to the decline in demand.

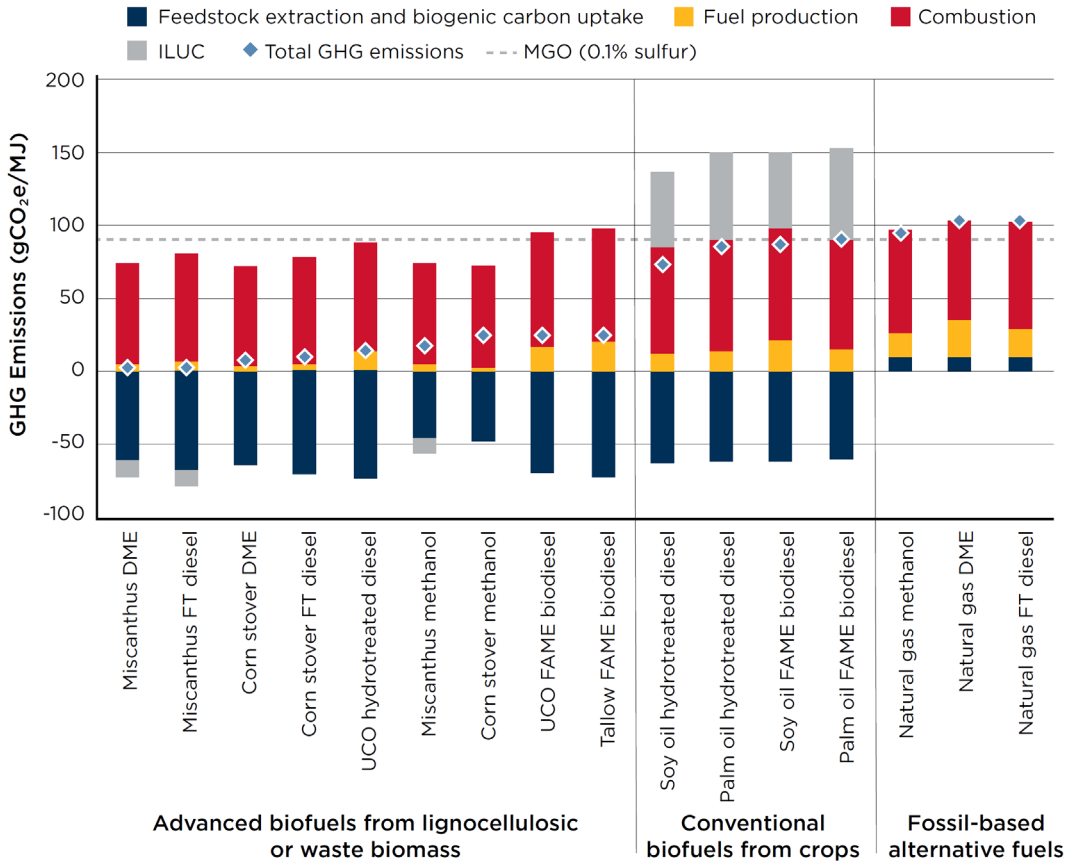


**Figure 5**: Life-cycle GHG emissions of the alternative liquid marine fuels and feedstocks
(*Source: the American Bureau of Shipping (ABS) report on sustainability whitepaper biofuels as marine fuel. May 2021.)*

Other factors that have been confounding marine GHG reductions is the lack of international regulation around carbon emissions, the technical and economic limitations of using these lower carbon intensive fuels, an unwillingness to pay more for lower-emitting fuels and a lack of clarity and consensus in terms of new ship design/propulsion. Typically, any changes to the global shipping emission regulations involve a slow and complex process. Thus, there is concern that local regulations will be the first to be developed, possibly leading to a misalignment with international regulations. This uncertainty has limited investor interest in supporting lower emission solutions and highlights the need to further develop the rapport between key stakeholders such as bunkering providers, ship builders/operators, etc.

**Policy drivers that might motivate the development of low carbon fuels for the marine sector**

Despite the significance of shipping to global trade, the major shipping routes are connected by a relatively small number of ports. Consequently, a large part of global fuel supply and its associated infrastructure is concentrated at a few locations with the likelihood that, similarly, the potential supply of low carbon fuels might be restricted to a few ports such as Rotterdam. Rotterdam is a pioneer in



developing expertise in handling biofuels, integrating biofuels as part of its fuel supply chain and trying to assess the volumes of biofuels that will be needed to supply the marine sector. Although, from a biofuel producer point of view, the less rigorous fuel specifications required compare to aviation fuels might appear attractive, the lack of policy drivers and the significantly higher cost of 'sustainable fuels' are major impediments as are some of the technical and logistic issues that still need to be fully resolved.

**The use of lower carbon intensive fuels by the marine sector**

Despite a lack of effective policies, many of BC's and Canada's marine stakeholders have incorporated lower carbon intensive strategies into their operations. For example, BC Ferries is increasingly using LNG and electricity, Seaspan is developing and using hybrid vessels, and companies such as Canadian Shipping Lines (CSL) are currently assessing the use of lower carbon intensive fuels such as biodiesel. In parallel, BC is at the forefront of developing enabling policies, from the use of a carbon tax to encourage ongoing decarbonisation to further refining the very effective low carbon fuels standard (LCFS) that has been successfully used to 'encourage' the decarbonisation of the various components of the transport sector.

As described in the following sections Canada, particularly BC, has the potential to be a world leader in the development and demonstration of lower carbon intensive marine fuels. However, the likely ongoing lower cost of fossil fuels will mean that international as well as national policies such as the 'evolving' Federal Clean Fuels Standard (CFS), will be required to bridge the current price gap.

## Regional and international progress in decarbonising the marine sector

**The use of low carbon intensive fuels by in-harbour and 'coastal' shipping**

Internationally, in-harbour shipping can be significant with large ports such as Rotterdam, Singapore, Tianjin, and Yokohama including many vessels such as ferries, tugs, tenders, and police/fire/pilots within this cohort. These vessels assist in port and ship operations, including towing barges and supplying bigger ships. Coastal/inland shipping, also referred to as short-sea-shipping, tends to define the marine movement of cargo and passengers along a coast or an inland waterway. This can range from the impressive barge network in Europe, the North American Great Lakes (in which CSL, which is described later, operates), to more 'regional' shipping such as occurs in the Baltic and Yellow seas. This fleet tends to consist of smaller vessels capable of traveling narrow waterways, including rivers, lakes, and oceans, mainly carrying dry and wet bulk cargo. Coastal shipping accounts for approximately 40% of all freight moved in Europe and much of the shipping in Asia, with these fixed routes more

readily lending themselves to electric (low emissions/green) charging infrastructure and the use of drop-in biofuels.

**Potential electrification of in-harbour and coastal shipping**

Increasing electrification of smaller vessels, such as ferries and tugboats, is being adopted in BC with 'community' vessels such as ferries responding to strong customer demand for lower carbon intensive transportation options such as LNG or battery-electric vessels.

In April of 2021, BC Ferries took ownership of its sixth electric-diesel hybrid Island-class ferry which is designed to operate primarily on battery-electric, using BC's 'low emission/green' hydroelectricity (Figure 6). These ferries have a capacity of 47 vehicles plus 400 passengers and crew. The retirement of BC's existing diesel-fueled vessels will result in a significant decrease of BC Ferries carbon footprint.


**Figure 6:** The *Island Discovery*, one of the new electric-hybrid Island class ferries of BC Ferries, will be used to service Powell River – Texada Island route *(Source: BC Ferries)*

**Liquid Natural Gas (LNG) fueled shipping vessels**

Although battery-electric vessels can provide good, low carbon solution for in-harbour and short distance shipping (provided the electricity source is 'low emission/green'), longer marine distances will require higher density types of energies. While LNG is still a fossil fuel, it can serve as a lower-carbon-intensive 'transition fuel' that should produce lower emissions than conventional fuels such as marine diesel. Groups such as Royal Dutch Shell have projected that global LNG demand will almost double to 700 million tonnes by 2040, with Asia expected to account for nearly 75% of this LNG demand. It has been reported that LNG can reduce greenhouse gas emissions by up to 21% in 2-stroke slow speed engines and up to 15% for 4-stroke medium speed engines. Currently, the Fortis LNG facility in Tilbury/Delta, BC, is producing LNG for the BC and Seaspan Ferries while Fortis and the Vancouver Fraser Port Authority are developing the first, North American ship-to-ship LNG marine refueling service. As indicated in Figure 7, Fortis plans to increase its **renewable** natural gas portfolio from 0.3 PJ/yr in 2020 to approximately 30 PJ/yr by 2030 and potentially more than 150 PJ/yr by 2050.

Although lower GHG emission gas will be available to more of BC's marine sector, challenges such as methane storage, leakages, and enhanced production still need to be fully resolved.

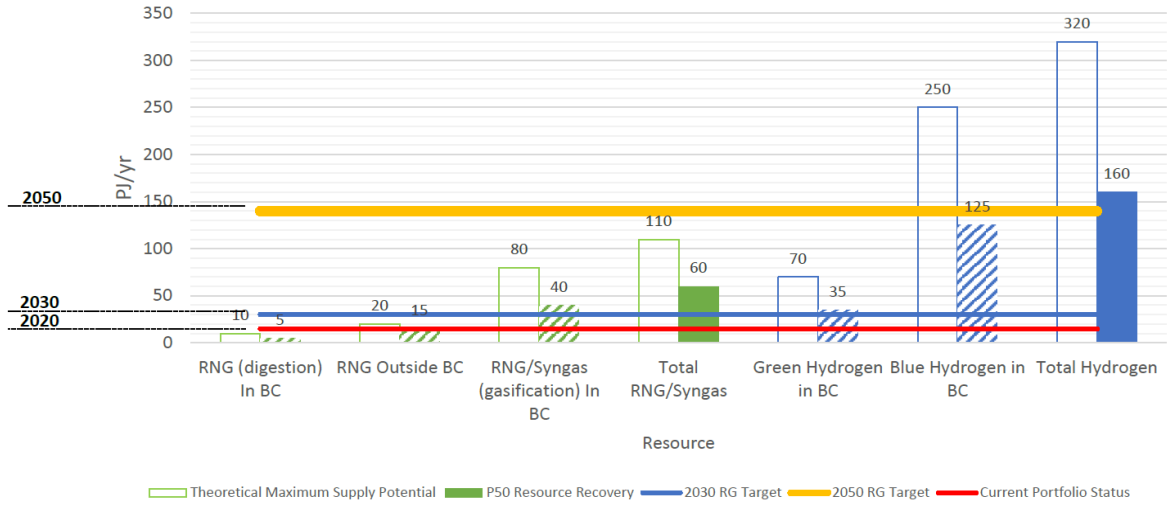


**Figure 7:** Fortis plans to increase its renewable gas portfolio from 0.3 PJ/yr in 2020 to approximately 30 PJ/yr by 2030 and potentially more than 150 PJ/yr by 2050 *(Source: Fortis BC)*

Other initiatives include HaiSea Marine, which is a joint venture between the Haisla Nation and Seaspan. This partnership will build and operate battery-electric and natural gas-powered escort and harbour tugs for the LNG export facility located in Kitimat. Vancouver-based naval architects and marine engineers, Robert Allan Ltd (RAL), have designed the tugboats which will be 28 meters in length with approximately 70 tonnes bollard pull and 5240 kWh of battery capacity. The tugboats will perform ship berthing and unberthing using battery power with the battery-electric **harbour** tugs output 5-10 tonnes greater bollard pull than conventional harbour tugs. The **escort** tugs will be 40 meters long with an output greater than 95 tonnes of bollard pull, operating primarily on natural gas. These tugboats are expected to be built and launched soon. As a fleet, the tugboats are expected to reduce the company's carbon dioxide emissions by up to 10,000 tonnes per year when compared to diesel alternatives.

**The use of drop-in biofuels in the marine sector**

As mentioned earlier, although there is no global consensus on the specific low-carbon-intensive fuels that might be adopted by the world's shipping sector, various biofuels are being assessed in North America's Great Lakes. After successfully using B100 biodiesel fuel in 2021 to power the engines of two of its ships, in the coming months the Canada Steamship Line (CSL) will be testing second-generation biodiesel on half of its fleet. The CSL Trillium-class, self-unloading ship, Rt. Hon. Paul J. Martin (Figure 8), was the first vessel fueled by biodiesel and it is part of a new class of "smarter, cleaner and more efficient ships". As stated on their company website, CSL has indicated

its support of Canada's nationally determined contributions to the Paris Climate Agreement by building more efficient ships, investing in R&D, new technologies and biofuel development and use. As one example, a 26,000-dwt diesel-electric self-unloading ship is being built to serve the Windsor Salt Mines Seleine located in the sensitive ecosystem of the Magdalene Islands. Seaspan is also planning a Hydrogenation-Derived Renewable Diesel (HDRD) trail in the fall 2021 in partnership with Parkland and Port of Vancouver to reduce further its carbon dioxide emissions.

**Figure 8:** CSL's vessel, Rt. Hon. Paul J. Martin, fueled by biodiesel, a trillium-class, self-unloading vessel) *(Picture credit: CSL)*

**The need for low carbon drop-in biofuels for the transoceanic sector**

Although 'low emission/green' electricity and lower carbon intensive options such as LNG will be increasingly used by in-harbour, coastal, and some oceanic shipping, it is unlikely they will be viable options for most transoceanic fleets. This is an area where groups such as IEA Bioenergy Task 39 (https://task39.ieabioenergy.com/) expect drop-in biofuels to be a preferred option. For example, the *Stolt Inspiration* vessel, which is a 37,000 dwt chemical tanker, will use biofuels produced by GoodFuels on a Rotterdam-to-Houston voyage with the anticipation that a well-to-exhaust $CO_2$ reduction of 80-90% will be achieved compared to fossil fuel equivalents. Recently, the Japanese container shipping company, *Ocean Network Express* (ONE) completed its second successful trial using sustainable marine biofuel and a three times higher biofuel content than previous tests. In the Port of Rotterdam, the M/V MOL *Experience* (Figure 9) used biofuels for 24 days with the trial performed in collaboration with shipowner, Mitsui O.S.K. Lines. GoodFuels provided the biofuel, which was derived from certified feedstocks labelled as 100% waste or residue, with the company indicating that the growing interest in drop-in biofuels was primarily driven by the need to reduce emissions. Although it is hoped that increasing economies of scale might lead to the eventual reduction in the price of biofuels, bunkering of drop-in biofuels has proven to be somewhat of a challenge as the biofuels tend to oxidize and degrade over long-term storage periods (6-10 months). As a result, Toyota Tsusho Petroleum Private Limited (TTP), who is a bunker supplier at the Port of Singapore, is conducting biofuel bunkering trials so that issues such as oxidation, storage stability and emissions can be

assessed. TTP hopes to supply used cooking oil derived biofuels to bunker barges at the Port of Singapore.

As well as meeting the ISO 8217 standard, other challenges such as possible corrosion, heat and viscosity issues are currently being assessed by groups such as Alfa Laval's Test & Training Centre, located in Aalborg, Denmark. The centre, with MASH Energy and ship owner DFDS and financial support from the Danish non-profit, Shipping Lab, are currently assessing if various biofuels can be bunkered at the DFDS Pearl Seaways and potentially used in auxiliary engines.

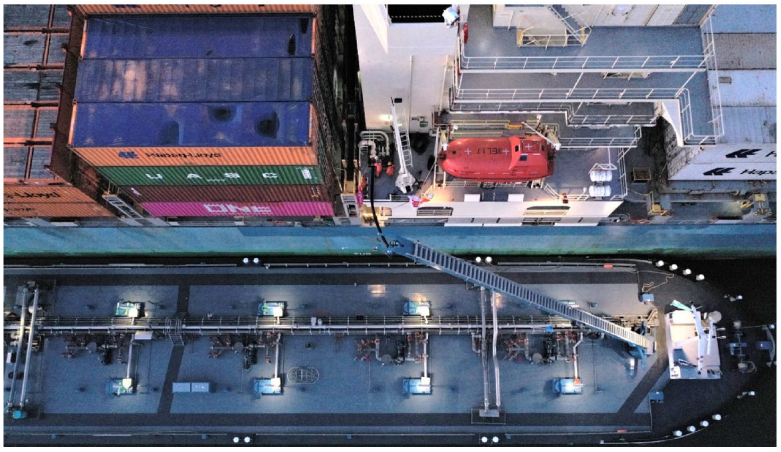

**Figure 9:** Supplying the advanced biofuel to MOL EXPERIENCE
*(Picture credit: Ocean Network Express)*

**An example of a global shipping company (Maersk) working towards carbon neutrality**

Maersk was one of the companies highlighted in the previous BC-SMART sponsored Biomarine Webinar (The BC-SMART Low Carbon Fuels Consortium). Maersk is a Danish-based global container shipping and logistics company that has a goal of reaching carbon neutrality by 2050 and who plans to develop a commercially viable carbon neutral vessel by 2023 (Figure 10).

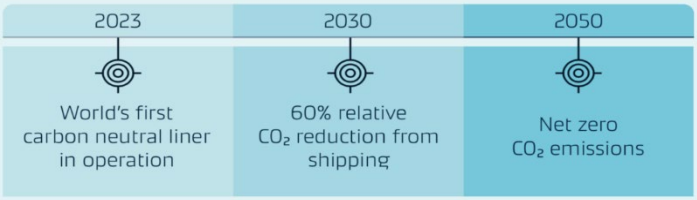


**Figure 10:** Maersk's timeline to reaching carbon neutrality by 2050
*(Source: Maersk)*

Global stakeholders such as Maersk have the potential to pave the way for the rest of the sector. For example, Maersk has been 'slow-steaming' its vessels since 2007 as one way of reducing its fuel consumption and associated emissions. This resulted in a reduction in bunker fuel consumption of 22% in 2007. Newer hull and engine designs have been optimized for slower sailing speeds, further contributing to emission reductions. As this practice was increasingly adopted throughout the shipping industry, it resulted in a carbon intensity reduction of 0.6% in 2012. These actions exemplify how the shipping sector can adapt relatively quickly when large players demonstrate alternative solutions that are both economically and environmentally beneficial. Maersk is part of the 'Getting to Zero Coalition', which includes more than 70 public and private organizations, including Shell and Cargill, and has published

a summary of potential carbon-neutral fuels that the marine sector might use (Figure 11). The coalition has the shared ambition of making deep-sea zero-emission vessels commercially viable by 2030.

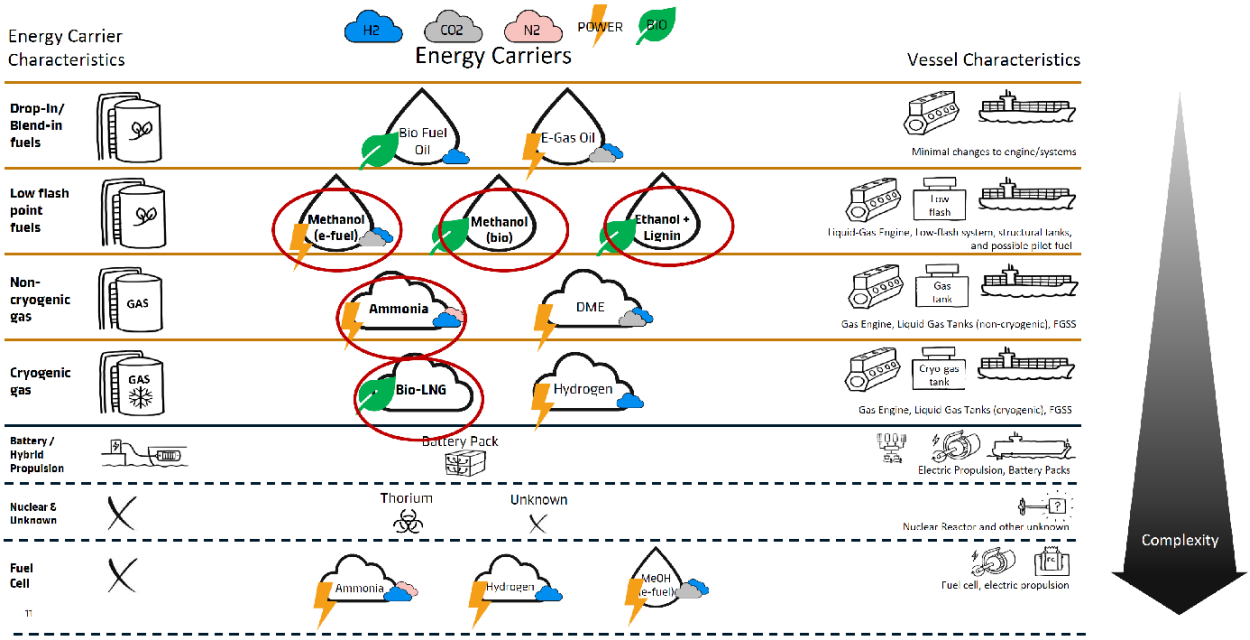


**Figure 11**: A summary of potential carbon-neutral fuels for marine sector *(Source: Maersk)*

## Brief news of low carbon fuel use in the aviation, long-distance trucking, and rail sectors

### Aviation

Although annual volumes of biojet fuel have increased from less than 10 million litres in 2018 to likely more than 1 billion litres by 2023, the vast majority of this volume will be derived from lipids/oleochemicals via the HEFA (hydrotreated esters and fatty acids) pathway. Currently, World Energy and Neste (the two biggest SAF/biojet fuel suppliers) primarily make renewable diesel, driven by incentivizing policies. However, other 'renewable diesel' facilities could readily make about 15% of this renewable diesel as SAF/biojet fuel, provided some additional infrastructure was built at the refinery, and the right incentives were in place (IEA Bioenergy Task 39 biojet report, June 2021). As

summarised below (Figure 12), much of the world's renewable diesel capacity could be repurposed to harder-to-decarbonise markets such as aviation by encouraging isomerisation.

In other news, Natural Resources Canada announced a C$2,890,000 investment in the University of Alberta's biojet technology. The UofA, along with project partners Alberta Innovates, FORGE Hydrocarbons Inc., Western Economic Diversification Canada, Future Energy Systems, CanmetENERGY Devon and Edmonton International Airport, are working on this $7.4-million project. In the USA, the Sustainable Aviation Fuel Act was recently introduced with the goal of incentivizing the production of sustainable aviation fuel (SAF), including the establishment of an aviation-only Low Carbon Fuel Standard. Shell and British Airways recently joined founding investors, Suncor Energy Inc., Mitsui & Co., Ltd. as additional investors in LanzaTech/Jet. In France, Total has begun producing sustainable aviation fuel (SAF) made from used cooking oil at its La Mède biorefinery in southern France and its Oudalle facility near Le Havre. A recent flight from Paris-Charles de Gaulle airport's to Montreal had its tanks filled with sustainable aviation fuel produced in Total's French plants.

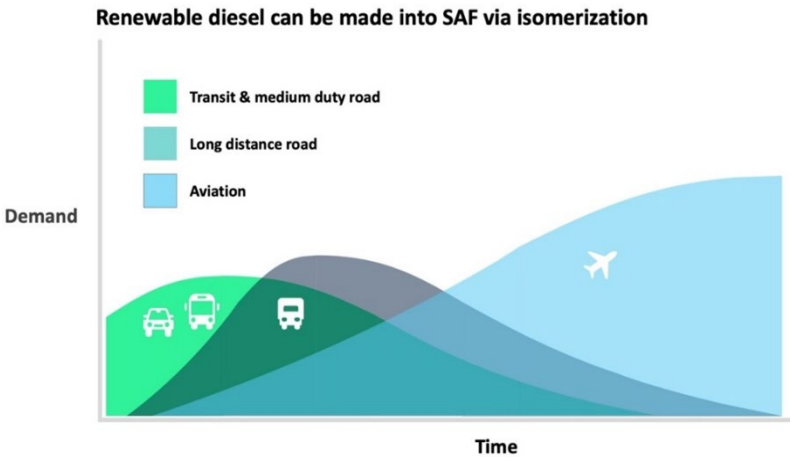


**Figure 12:** The potential to repurpose renewable diesel capacity to harder to decarbonise markets such as aviation *(Source: DOE)*

**Long-distance Trucking**

Unlike the marine and aviation sectors, there are several Canadian and BC policies either evolving or in place that are aimed at reducing carbon emissions in the ground transport sector. In 2018, close to 2.5% (711 million litres) of Canada's diesel pool was supplied by biodiesel or hydrogenation derived renewable diesel (HDRD) as the results of effective federal and provincial regulations. Further reductions are anticipated as the result of BC's-Low Carbon Fuels Standard (LCFS), with the Clean BC strategy targeting a carbon intensity reduction of 20% by 2030.

The Governments of Canada and the United States recently announced the "greening government initiative", which should encourage the increased use of low carbon fuels in the trucking sector of both countries (Read more). The U.S. Department of Energy recently unveiled funding opportunities, totalling greater than $162 million (US), to improve the efficiency and reduce carbon emissions of cars,

trucks and off-road vehicles. The funding will also encourage electrification of long-distance trucking and plug-in hybrid trucks fuelled with either renewable biofuels, hydrogen or fuel cells.

Although President Joe Biden was seen 'putting the pedal to the metal' on the new electric Ford F-150 Lightning pickup, the wider electrification of freight trucks is likely some years away. However, the new Lightning pickup offers the potential to decarbonize the most popular consumer vehicle market in the US as it has a battery range of 230-300 miles, similar to a full tank of gasoline in a conventional F-150. It is projected that, after federal tax credits, the electric F-150 will be priced at approximately $5,000 (US) higher than the conventional F-150. However, it is likely due to factors such as the long distances covered, heavy loads and the tight delivery deadlines typically required by the freight trucking sector, that the electrification of freight trucks will not be as easy as the F-150. For example, the need to decarbonise and better use its existing fleet of freight trucks has led companies such as Titan Freight Systems to switch to renewable diesel.

**Figure 13:** Ford F-150 Lightning (EV Truck)
*(Source: Ford)*

**Rail**

Of all the land-based transport modes, rail is the least carbon intensive (https://ourworldindata.org/). About 90% of all passenger rail networks are concentrated in a few countries (China, the European Union, Japan, India and Russia). Thus, changes within the passenger rail networks are in the hands of relatively few countries. High-speed rail typically occurs over longer distances, operating at maximum speeds greater than 250 km/h. High-speed rail is recognized as a low-carbon alternative to aviation for short distance trips with France recently banning short-haul internal flights with the aim of cutting down 1990 $CO_2$ emission levels by 40%. This domestic flight ban is supplemented by the country's electrified rail network, which is almost fully electrified with 70% of the electricity coming from nuclear energy. The rail network in France is relatively dense and primarily serves passengers. In contrast, the electrification of the Canadian rail network will be challenging due to long distances, the relative efficiency of diesel-powered engines for the transport of freight and Canada's low population density. However, Canada's rail network is the backbone of the Canadian economy, consisting of 41,465 route-kilometers of track and transporting more than $328 billion worth of goods per year (https://www.railcan.ca/). The network is primarily based on the transportation of freight over long distances as opposed to passengers over short distances. It is a vital mode of transport for lipid-containing crops such as canola and wood pellets, two feedstocks that can be used to produce biofuels

(Figure 14). However, one way of decarbonizing the Canadian rail network could be the Siemens Vectron Dual Mode train (Read more), which allows the use of both electric and diesel power, thus providing an alternative for rail networks where electrification is challenging.

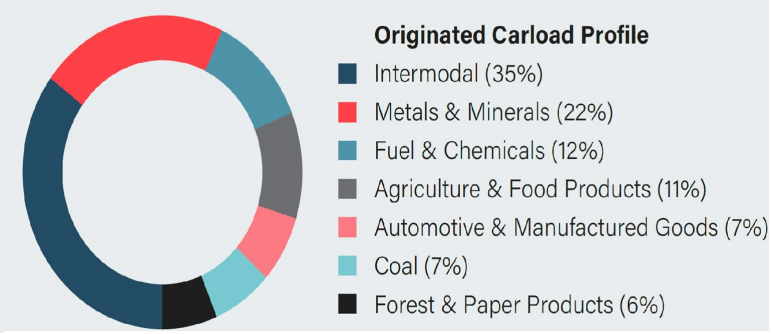


**Figure 14:** Canadian Railways distribution based on carloads *(Source: Railway Association of Canada 2020)*

## Closing comments

The IEA's recently released report entitled "Net Zero by 2050 A Roadmap for the Global Energy Sector" has suggested that most of the world's reductions in $CO_2$ emissions that will be achieved by 2030 will come from technologies that are already in the marketplace. However, by 2050, almost half the reductions will come from technologies that are at the demonstration or prototype phase today. The report recognizes the rapid growth of 'low emission/green' electricity, primarily from solar or wind, and its considerable contribution to lowering carbon emissions. However, the transportation sector will have to compete for this electricity while components, such as the long-distance transport sector, will be difficult to electrify. British Columbia is fortunate to have ready access to lower-carbon-intensive 'transition' fuels such as LNG, as well as 'low emission/green' electricity, vegetable-derived lipids (e.g. canola) and forest biomass that can be made into biocrudes which can subsequently be upgraded to 'drop-in biofuels' such as renewable diesel and sustainable aviation/biojet fuel. In parallel, the Province is home to two refineries, one (Parkland) that is already routinely co-processing low-carbon intensity lipids and another (Tidewater) who recently announced its plans to build renewable diesel and renewable hydrogen facilities at its Prince George Refinery. Tidewater indicated that the 3,000-barrel-per-day stand-alone complex would cost between $215 million and $235 million to build.

However, none of these initiatives would likely be happening if not for policies such as the carbon tax and the Low Carbon Fuel Standard (LCFS) which are designed to decarbonize the BC economy. Thus, with advantages such as access to feedstocks, the right enabling policies and innovative companies BC (and Canada) are well-positioned to help the world meet the net zero by 2050 goal, as targeted by the International Energy Agency (IEA).



## Webinars and Conferences

- The Green Tech Environmental Virtual Conference, 2-4 June 2021 (Read more)
- IEA Renewable Energy Market Update Webinar, 25 May 2021 (Read more)
- Getting to Net-Zero: The Role of Canada's Transportation Sector, 27 May 2021 (Read more)
- IEA Bioenergy webinar on biojet, planned for the 6 July 2021 (Read more)

## In the news

- **Neste, NuStar expand renewable fuel hub in Northern California**
    - The NuStar Selby Terminal expansion near San Francisco, California, will increase access to sustainable aviation fuel and renewable diesel. This collaboration between Neste and NusStar will provide a continuous supply of sustainable aviation fuel to San Francisco's International Airport (SFO) from NuStar's Selby terminal using an existing pipeline. NuStar has handled conventional jet fuel at its Selby Terminal for decades. In parallel, renewable diesel will be supplied to freight trucks, emergency vehicles, tractors, construction equipment and other heavy-duty road vehicles. To improve the availability of renewable diesel to this fleet, Neste plans to expand its renewable diesel fueling network across the U.S. West Coast. (Read more)
- **Parkland's recent announcement on co-processing**
    - Parkland set a new low carbon fuel production record at its Burnaby Refinery. It also targets 125% annual production growth in 2021. The refinery co-processed approximately 44 million liters of Canadian-sourced canola and tallow feedstocks in 2020 with the goal of increasing production to 100 million liters in 2021. (Read more)
- **Northwest Ports (Vancouver, Seattle Tacoma, and the Northwest Seaport Alliance) Clean Air Strategy (NWPCAS) Renewal**
    - NWPCAS is a collaboration between west coast ports to reduce port-related emissions that impact air quality and contribute to climate change. The newly drafted strategy includes a vision to phase-out emissions by 2050. It includes guiding principles to inform decision-making, shared objectives to support the transition to zero emission operations, actions that will be needed by port authorities, industry, governments, and other surrounding actors to support the transition. (Read more)
- **Projected increase in the oilseed crushing capacity in Canada**
    - Canada's current canola-crushing capacity of 11 million tonnes will increase by 4.6 million tonnes (almost 42%) by 2024, thanks to two new plants and a third announced in Saskatchewan. In March, Richardson International announced the doubling of its capacity at its crushing plant in Yorkton to 2.2 million tonnes per year. On April 22, Cargill announced plans to build a 1 million tonne canola crusher in Regina. On April 26, Viterra announced the construction of the world's largest canola-crushing plant in

Regina with 2.5 million tonnes capacity. A higher domestic crush capacity means potentially increased demand for canola, higher canola prices for farmers and a boost to the Canadian economy. (Read more)

- **Denmark, Norway, and the United States to Lead Zero-Emission Shipping Mission**
    - The Mission aims to accelerate international public-private collaboration to scale and deploy new green maritime solutions, setting international shipping on an ambitious zero-emission course. The Mission will also be supported by the governments of India, Morocco, the U.K., Singapore, France, Ghana, and South Korea. (Read more)
- **Mitsui O.S.K. Lines, Ltd. Plans to procure a new Panamax bulker to transport woody biomass for use as feedstock for biofuels**
    - The new vessel's specifications are in pre-compliance with the Energy Efficiency Design Index (EEDI) phase 3 environmental regulations that are to be adopted in 2025. The specifications call for increased efficiency of cargo handling that is more suitable for the transportation of woody biomass. It will provide low carbon intensity feedstock for Japanese power companies. (Read more)
- **The Port of London Authority (PLA) looks to biofuels as part of its zero-carbon strategy**
    - PLA contracted Royal HaskoningDHV to model the future energy demand and supply on the tidal Thames. This model sets out options available for reducing air and carbon emissions, including biofuels, battery-electric, and fuel cell-electric. The study concluded that a mix of energy provisions will be needed to suit the different operational needs on the tidal river. The second phase of this model will assess the feasibility of delivering the identified solutions, including cost, spatial, and ancillary infrastructure needs. (Read more)
- **Sustainable Skies Act plans to enact blenders credit for SAF**
    - The Act will create a tax credit to encourage blending of sustainable aviation fuel (SAF). The credit is based on GHG emissions reductions and should be in place by the end of 2031. The credit will start at $1.50 per gallon and will be available to blenders of SAF that can demonstrate a 50% or greater lifecycle GHG emissions reduction compared to conventional jet fuel. An additional 1 cent per gallon could be claimed for each percentage the fuel reduces emissions over 50%. The maximum credit would be $2.00 per gallon. (Read more)



The BC SMART Consortium membership which include feedstock suppliers, low carbon fuels producers, low carbon fuels users, government bodies, engineering companies, etc.

BC SMART was established in 2019 with the overall goal of facilitating the decarbonization of the long-distance transport sector by catalysing the formation of the "coalition-of-the-willing" which includes key-stakeholders from industry and government. (Source: BC-SMART)

If you would like to be part of the **"Coalition of the Willing"** and continue to receive our newsletter and occasional updates about BC-SMART consortium

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