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**LETTER OF INTEREST
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Fuel & Construction Products Division
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Title - Sujet Low-carbon-intensity fuels for the	
Solicitation No. - N° de l'invitation 24062-210076/B	Date 2020-07-06
Client Reference No. - N° de référence du client 24062-210076	GETS Ref. No. - N° de réf. de SEAG PW-\$\$HL-675-78874
File No. - N° de dossier hl675.24062-210076	CCC No./N° CCC - FMS No./N° VME
Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2020-08-12	
Time Zone Fuseau horaire Eastern Daylight Saving Time EDT	
F.O.B. - F.A.B. Plant-Usine: <input type="checkbox"/> Destination: <input type="checkbox"/> Other-Autre: <input type="checkbox"/>	
Address Enquiries to: - Adresser toutes questions à: Arboleda, Ian	Buyer Id - Id de l'acheteur hl675
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Signature	Date

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PART 1 – PURPOSE AND NATURE OF THE REQUEST FOR INFORMATION

1.1 Purpose of the Request for Information

Public Services and Procurement Canada (PSPC) is launching this Request for Information (RFI) to engage industry, through consultation, on its interest, capacity and ability to supply and deliver the requirements of providing drop-in, low-carbon-intensity liquid fuels from renewable feedstocks for the Government of Canada's air and marine fleets.

In general, a "low-carbon-intensity fuel" is one that releases fewer greenhouse gas emissions over its life cycle – including feedstock processing, fuel production, transportation and use (combustion) – than the conventional fossil-based fuel that it replaces or is blended with. See Annex A for additional information and definitions.

The purpose of this RFI is to achieve the following:

- a) Provide industry with general information on the potential requirement to procure low-carbon-intensity liquid fuels;
- b) Request detailed information and feedback from industry, including production process, fuel types and pricing estimates;
- c) Determine the capability of industry to satisfy the requirements;
- d) Obtain industry feedback on any issues that would impact their ability to supply low-carbon-intensity liquid fuels to Canada;
- e) Gather industry knowledge, expertise and recommendations with regards to best practices with respect to production and delivery of low-carbon intensity fuels;

Respondents are requested to provide answers and feedback related to Part 3 – Preliminary Procurement Strategy, and Part 4 – Related Documents, which contains questions for specific information being sought by Canada. For the purposes of this RFI, the primary target audience is potential suppliers for this requirement, including fuel producers and distributors.

1.2 Nature of the Request for Information

This is not a bid solicitation. This RFI may not result in issuance of a solicitation and will not result in the award of any contract. As a result, interested suppliers of any goods or services described in this RFI should not reserve stock or facilities, nor allocate resources, as a result of any information contained in this RFI. Nor will this RFI result in the creation of any source list. Therefore, whether or not any interested supplier responds to this RFI, this will not preclude that supplier from participating in any future procurement. Also, the procurement of any of the goods and services described in this RFI will not necessarily follow this RFI. This RFI is simply intended to solicit information and feedback from industry with respect to the matters described in this RFI.

Nothing in this RFI will be construed as a commitment from PSPC to issue a solicitation for this requirement. PSPC may use non-proprietary information provided in this review and/or in the preparation of any formal solicitation document.

PSPC will not be bound by anything stated herein and reserves the right to change at any time, any or all parts of the requirement, as it deems necessary. PSPC also reserves the right to revise its procurement approach, as it considers appropriate, either based upon information submitted in response to this RFI or for any other reason it deems appropriate.

PART 2 – RESPONSE INSTRUCTIONS AND INFORMATION

2.1 Nature and Format of Responses Requested

Canada's current view of its requirement for the purchase of low-carbon-intensity fuels, the characteristics of the supply solution it is currently contemplating, and the technical requirements are all detailed in Annex A of this RFI. Canada is seeking input and responses to specific questions in Annex B – Technical and Procurement Questions.

Respondents are invited to provide comments regarding the content of any elements of Part 3 and related annexed documents included in this RFI. Respondents can comment directly on, and return an electronic copy of the applicable Annex(es) listed at Part 4 – Related Documents. Alternatively, Respondents can comment on a different media and format by appropriately referencing the document and section commented on. Respondents should explain any assumptions they make in their interpretation of the requirements.

Respondents are invited to provide the name(s) of the person(s) who will participate to prepare supplier's responses.

2.2 Response Costs

Canada will not reimburse any respondent for expenses incurred in responding to this RFI.

2.3 Treatment of Responses

2.3.1 Use of Responses

Responses will not be formally evaluated. The responses received may be used by Canada to develop or modify procurement strategies or any draft documents contained in this RFI. Canada will review all responses received by the RFI closing date. Canada may, at its discretion, review responses received after the RFI closing date.

2.3.2 Review Team

A review team composed of representatives of PSPC, Treasury Board Secretariat (TBS), Natural Resources Canada (NRCan), the Department of National Defence (DND), the Canadian Coast Guard (CCG), the Royal Canadian Mounted Police (RCMP) and Transport Canada (TC) will review the responses and participate in all industry engagement activities. Canada reserves the right to hire any independent consultant, or use any Government resources that it considers necessary to review any response. Not all members of the review team will necessarily review all responses.

2.3.3 Confidentiality

Respondents should indicate and mark any portions of their response that they consider proprietary or confidential. Canada will handle these portions in a confidential manner in accordance with the Access to Information Act of Canada.

2.3.4 Follow-up Activity

PSPC may, at its discretion, contact any respondents to follow up with additional questions or for clarification of any aspect of a response. PSPC may, at its discretion agree to meet with respondents to provide respondents with the opportunity to present and/or demonstrate their capabilities in relation to this RFI.

Respondents' presentations are at no obligation to PSPC and respondents will be responsible for all costs associated with PSPC's invitation to make a presentation.

2.4 Contents of this RFI

This RFI contains preliminary draft technical requirements and procurement information. Comments regarding any aspect of this RFI are requested. This RFI also contains specific questions addressed to the industry.

2.5 Format of Responses

2.5.1 Response Preparation

PSPC requests that respondents submit their responses electronically in MS Office, PDF or compatible formats. Responses can be provided by email. Medium such as CD, DVD or USB key are acceptable. Hardcopy responses will also be accepted but is not the preferred option.

2.5.2 Response Content

The first page of each document of the response provided should contain:

- a) The RFI number;
- b) The name of the company that the respondent is representing;
- c) The title, the name, and the contact information of the respondent; and
- d) The date of submission of the documents.

All pages should be identified with the company's name along with page numbers.

2.6 Enquiries

PSPC will not necessarily respond to enquiries in writing or by circulating answers to all interested suppliers as this is not a solicitation process. However, respondents who have questions regarding this RFI may direct their enquiries to the Contracting Authority named below:

Name: Ian Arboleda
Division: Logistics, Electrical, Fuel and Transportation Directorate (HL)
Address: Public Services and Procurement Canada
140 O'Connor Street
Ottawa, ON K1A 0R5
Telephone: 343-543-4040
E-mail address: ian.arboleda@tpsgc-pwgsc.gc.ca

2.7 Submission of Responses

2.7.1 Time and Place for Submission of Responses

Suppliers interested in providing a response should deliver it in accordance with section 2.5 to the attention of the Contracting Authority by the time and the date on page 1 of the RFI to the address indicated in Part 2 section 2.6.

2.7.2 Responsibility for Timely Delivery

Each respondent should ensure their response is delivered on time to the correct email address or location.

2.8 Security Requirements

There are no security requirements associated with responding to this RFI. Any future procurement actions undertaken in support of this requirement might require a government security clearance.

Suppliers interested in being sponsored should begin the process to obtain their security clearance by contacting the Contracting Authority.

2.9 Official Languages

Responses to this RFI are requested to be presented in either of the Official Languages of Canada.

PART 3 – PRELIMINARY PROCUREMENT STRATEGY

3.1 Proposed Strategy

Canada is considering a range of possible procurement strategies for low-carbon-intensity fuels, such as the use of National or Regional Master Standing Offers, contracts and/or Supply Arrangements.

Additional background information is provided in Annex A and specific questions related to the procurement strategy are provided in Annex B.

As outlined in section 1.2 above, nothing in this RFI will be construed as a commitment from PSPC to issue a solicitation for this requirement. No timeline has been established for the procurement of low-carbon-intensity fuels; this RFI will inform the development of the potential procurement strategy, requirements, and timelines.

3.1.2 Trade Agreements

Unless specified otherwise, the requirement is subject to the provisions of the World Trade Organization Agreement on Government Procurement (WTO-AGP), the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), the North American Free Trade Agreement, the Canada-United States-Mexico Agreement (CUSMA), the Canada-European Union Comprehensive Economic and Trade Agreement (CETA) and the Canadian Free Trade Agreement (CFTA).

3.2 Background

It is part of PSPC's mandate to plan, execute and manage the procurement of Bulk Fuel on behalf of client departments and agencies.

3.3 Preliminary Requirements and Questions

Annex A provides background information and describes the preliminary technical requirements. Respondents responding to this RFI are requested to answer the questions listed in Annex B: Technical and Procurement Questions.

PART 4 – RELATED DOCUMENTS

See attached files on Buy and Sell:

Annex A – Preliminary Requirements and Background Information

Annex B – Technical and Procurement Questions

ANNEX A – PRELIMINARY REQUIREMENTS AND BACKGROUND INFORMATION

A1. BACKGROUND

The Government of Canada has committed to transition to low-carbon and climate-resilient operations while also reducing environmental impacts beyond carbon. Led by the Centre for Greening Government of the Treasury Board of Canada Secretariat, the Government of Canada will ensure that Canada is a global leader in government operations that are low-carbon, resilient and green.

To address this challenge, the Greening Government Strategy established a target to reduce Scope 1 and Scope 2 greenhouse gas (GHG) emissions from federal government facilities and fleets by 80% below 2005 levels by 2050 (with an aspiration to be carbon neutral).¹

Currently, consistent with practices in other jurisdictions, some GHG emissions are excluded from the Government of Canada's GHG emissions reduction target for safety and security reasons. Examples are emissions from military and Coast Guard marine operations. However, the Government of Canada's Greening Government Strategy has made policy commitments to reduce emissions from these sources as follows:

- Departments will develop a strategic approach and take actions to decarbonize their fleets (including on-road, air, and marine)
- The potential use of alternative energy options in national safety and security-related fleet operations will be examined.

Consequently, the Government of Canada is exploring options for reducing GHG emissions from its air and marine operations through the use of drop-in low-carbon-intensity liquid fuels. The Government of Canada already procures some low-carbon fuels (e.g. biodiesel blends) for use by its land-based fleet (e.g. light duty vehicles, commercial vehicles etc.) and may consider expanding this in the future; however these fuels not included under this RFI.

A1.1 Current fuel use and procurement

The Government of Canada operates a diverse fleet of aircraft and marine vessels that collectively consumed more than 360 million litres of fuel in 2018-19 and generated almost 950 kilotonnes of CO₂ equivalent GHG emissions (kt CO₂e). This includes approximately 237 million litres of aviation fuel and 124 million litres of marine fuel. The primary client departments are the Department of National Defence, the Canadian Coast Guard, the Royal Canadian Mounted Police, and Transport Canada.

For the purposes of this RFI, an approximate breakdown of annual fuel use by fuel type is provided in **Table A1** below, based on 2018-19 federal fuel use reported under the Greening Government Strategy. Table A1 also indicates the fuel types procured in each province and territory in 2018-19.

¹ Scope 1 GHG emissions are the greenhouse gases produced directly from sources that are owned or controlled, for example, from the combustion of fuels in vehicles or in heating buildings. Scope 2 GHG emissions are those generated indirectly from the consumption of purchased energy (electricity, heating and cooling).

Table A1:

	Regional federal fuel procurement in 2018-19?							Approximate Total Fuel Use by Type (Aviation, Marine) in 2018-19*	
	BC	AB	MB & SK	ON	QC	NB, NS, PE & NL	NWT, Nvt & YT	Total (million L)*	Percentage
Aviation Fuel									
Aviation turbine fuel (Grade Jet A-1) CAN/CGSB-3.23-2018	Yes	Yes	Yes	Yes	Yes	Yes	Yes	89	38%
Aviation turbine fuel (Military grade F-34 and F-44) CGSB-3.24-2018	Yes	Yes	Yes	Yes	Yes	Yes		148	62%
Marine Fuel									
Diesel Fuel (Type A and Type B), CAN/CGSB-3.517-2020	Yes						Yes	13	10%
Marine Diesel - ISO.8217:2017, DMA				Yes	Yes			15	13%
Naval Distillate Fuel CGSB-3.11-2017	Yes			Yes		Yes		96	77%

* Includes fuel procured domestically and internationally

A2. LOW-CARBON-INTENSITY FUELS

In general, a “low-carbon-intensity fuel” is one that releases fewer greenhouse gas emissions over its life cycle than the conventional fossil-based fuel that it replaces or is blended with. This can be assessed using life cycle carbon intensity which is a measure of all of the greenhouse gas emissions released throughout the full life cycle of a fuel, from resource extraction and feedstock processing to fuel production, transportation and use (combustion), which is expressed in grams of carbon dioxide equivalents (g CO_{2e}) per unit of energy in megajoules (MJ).²

For the purposes of this RFI, a low-carbon liquid fuel is one that, at standard conditions, has a life cycle carbon intensity that is at least 10% lower than the reference carbon intensity of the fuel it is replacing or with which it is being blended.

The life cycle carbon intensity of a fuel varies depending on the feedstock and the fuel production and feedstock conversion processes (e.g. transesterification, hydroprocessing, pyrolysis). Low-carbon-intensity liquid fuels can be made from non-renewable feedstocks (such as natural gas and coal) or renewable feedstocks such as agricultural primary materials and residues (e.g. animal fats, vegetable oils, sugars) and forestry residues. Examples of life cycle carbon intensities from different methodologies, processes and feedstocks are provided in section A2.3 below.

Low-carbon-intensity liquid fuels can be placed in two categories based on their compatibility with conventional fuels and system: drop-in fuels (synthetic hydrocarbons) and non drop-in fuels.

- **Drop-in low-carbon-intensity fuels** are substitutes for conventional petroleum-based fuels which are chemically similar to their conventional petroleum counterparts and are completely interchangeable and compatible with existing fuel infrastructure, distribution systems and engines when blended with conventional fuel.³ They are typically comprised of synthetic hydrocarbons that

² Clean Fuel Standard Proposed Regulatory Approach (ECCC, June 2019)

³ Definition adapted from the International Civil Aviation Organization (ICAO) Sustainable Aviation Fuels Guide available at <https://www.icao.int/environmental-protection/knowledge/>

are derived from non-petroleum sources such as biomass by processes such as gasification, reforming, Fischer-Tropsch synthesis, hydroprocessing or hydrocracking (including co-processing with petroleum).⁴ Renewable diesel and sustainable aviation fuels are examples of drop-in low-carbon-intensity fuels.

To be considered drop-in fuels, these fuels must meet requirements such as: miscibility with petroleum fuels, performance specifications, good storability, transportability with existing logistics structures, usability within existing engines, and compatibility with fuel injection systems already in place. Depending on the application, these fuels may be used in their neat form or, more commonly, blended with conventional petrochemical fuels in accordance with the applicable fuel standard.

- **Non drop-in low-carbon-intensity fuels:** Non-hydrocarbon fuels that require different or modified engines, fuel infrastructure systems and/or distribution networks to function (e.g. hydrogen, ammonia, biodiesel, ethanol). Depending on the application, some standards permit the use of low levels of non drop-in fuels in conventional engines when blended with petrochemical fuels (e.g. the use of up to 5% biodiesel in automotive diesel under CAN/CGSB-3.520). However, the use of higher blends of these fuels requires adaptation of the engine, fuel system and/or the fuel distribution network.

For the purposes of this RFI, the Government of Canada is only interested in drop-in low-carbon-intensity fuels that are derived from renewable feedstocks. Additional information on these requirements is provided in section **A3** below. The Government of Canada recognizes that currently there is limited production of drop-in low-carbon-intensity fuels for aviation and marine operations in Canada and across North America; **Annex B** includes questions to proponents on what could be needed to expand production capacity.

The demand for low-carbon-intensity fuels is driven by both domestic and international regulations. Domestically these include the various federal, provincial and territorial greenhouse gas pollution pricing policies, such as the federal Greenhouse Gas Pollution Pricing Act (GGPA), that put a price on the greenhouse gas emissions from fossil fuels such as gasoline and diesel, as well as the Renewable Fuels Regulations, which are responsible for the demand for a renewable content in gasoline and diesel. These policies are reducing the cost difference between conventional fossil fuels and lower-carbon alternatives.

The federal Clean Fuel Standard (CFS) will also drive domestic demand for low-carbon-intensity fuels in the future. As articulated in the *CFS Proposed Regulatory Approach* (June 2019), the CFS regulations will cover all fossil fuels used in Canada, and will set separate requirements for liquid, gaseous and solid fossil fuels. The CFS is being developed in a phased approach starting with the liquid fossil fuel class with final regulations planned by late 2021 that will come into force in mid-2022. The CFS regulations will require those who produce and import liquid fossil fuels in Canada to reduce the carbon intensity of the liquid fossil fuels they produce and import annually. The production or import of low-carbon-intensity fuels will be one of the compliance options available under the CFS.

Internationally, the demand for low-carbon-intensity fuels is driven by a variety of factors, including commitments from industry associations and organizations such as the International Civil Aviation Organization (ICAO), International Air Transport Association (IATA) and the International Maritime Organization (IMO) to significantly reduce greenhouse gas emissions by 2050. The use of low-carbon-intensity fuels is one of the measures identified by these organizations for reducing emissions.

[sharing/Docs/Sustainable%20Aviation%20Fuels%20Guide_vf.pdf](#)

⁴ Canadian General Standards Board CAN/CGSB-3.517-2020

A2.1 Low-carbon-intensity fuels for aviation (sustainable aviation fuels)

Only low-carbon-intensity synthetic hydrocarbon drop-in fuels are approved for use in aviation. These fuels are commonly referred to as sustainable aviation fuels (SAF) by organizations such as ICAO and IATA.

The most commonly used specification of conventional aviation turbine fuel is the American Society for Testing and Materials (ASTM) D1655 (Standard Specification for Aviation Turbine Fuels).⁵ ASTM D1655 allows for alternative fuels that demonstrate their equivalence to conventional jet fuel and are listed in ASTM D7566.⁶ In Canada, aviation turbine fuel is certified under the Canadian General Standards Board (CGSB) CAN/CGSB-3.23 (Grades Jet A and A-1) and CGSB-3.24 (Military grades F-34, F-37 and F-44).

CAN/CGSB-3.23-2019 and CGSB-3.24-2019 permit the use of synthetic hydrocarbons in a blend with conventional hydrocarbons if they meet the requirements of ASTM D7566.⁷ As of May 2020, seven production pathways have been approved under ASTM D7566 to be blended with petroleum-based jet fuels at levels up to 50%.⁸ The seven production pathways are:

- Annex A1: Fischer-Tropsch Synthetic Paraffinic Kerosene (FT-SPK) – Up to 50%
- Annex A2: Hydroprocessed Esters and Fatty Acids Synthetic Paraffinic Kerosene (HEFA-SPK) – Up to 50%
- Annex A3: Hydroprocessed Fermented Sugars to Synthetic Isoparaffins (HFS-SIP) – Up to 10%
- Annex A4: Fischer-Tropsch Synthetic Paraffinic Kerosene with Aromatics (FT-SPK/A) – Up to 10%
- Annex A5: Alcohol to Jet Synthetic Paraffinic Kerosene (ATJ-SPK) – Up to 50%
- Annex A6: Catalytic Hydrothermolysis Synthesized Kerosene (CH-SK, or CHJ) – Up to 50%
- Annex A7: Synthesized Paraffinic Kerosene from Hydroprocessed Hydrocarbons, Esters and Fatty Acids (HC-HEFA SPK) – Up to 10%

The co-processing of up to 5% by volume of renewable lipids (plant and animal fats) with crude oil-derived middle distillates in petroleum refineries has also been approved under Annex 1 of ASTM D1655.

The life cycle carbon intensity of SAFs depends on how they are produced and what feedstocks they use; in November 2019 the ICAO established default life cycle emissions for different feedstocks, currently covering five out of the seven ASTM D7566 production pathways with values for the two newer pathways to come.^{9,10} Most of the SAF production pathways include renewable diesel as a co-product.

A2.2 Low-carbon-intensity fuels for marine vessels

Fuels used by the federal marine fleet vary by vessel, department and region based in part on supplier and market availability. As presented in Table A1 above, the three primary fuels are: i) Diesel Fuel (Type A and Type B) that complies with the Canadian General Standards Board (CGSB) standard CAN/CGSB-3.517

⁵ Also called jet fuel

⁶ http://www.caafi.org/focus_areas/fuel_qualification.html

⁷ CGSB-3.24-2019 is available at http://publications.gc.ca/collections/collection_2019/ongc-cgsb/P29-4-3-24-2019-1-eng.pdf and CAN/CGSB-3.23-2019 is available at http://publications.gc.ca/collections/collection_2019/ongc-cgsb/P29-003-023-2019-1-eng.pdf

⁸ http://www.caafi.org/focus_areas/fuel_qualification.html

⁹ See International Civil Aviation Organization (2019). *CORSIA Implementation Elements - CORSIA Eligible Fuels: CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels*. Available at <https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-Eligible-Fuels.aspx>

¹⁰ See International Civil Aviation Organization (2019). *CORSIA SUPPORTING DOCUMENT: CORSIA Eligible Fuels – Life Cycle Assessment Methodology*. Available at <https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-Eligible-Fuels.aspx>

(Diesel fuel)¹¹; ii) Marine diesel that complies with the DMA grade of the International Standards Organization's ISO.8217 (Specifications of Marine Distillate Fuel); and iii) Naval Distillate Fuel that complies with CGSB-3.11 (Naval distillate fuel).

Fuels used in DND vessels must comply with the applicable standard above for the specific vessel and also with the North Atlantic Treaty Organization (NATO) specification for F-76 naval distillate fuels as articulated under AFLP 1385.

Globally, a variety of drop-in and non drop-in low carbon fuels have been used for marine fleets. For the purposes of this RFI, the Government of Canada is primarily interested in **drop-in synthetic hydrocarbon fuels** for diesel engines, also known as synthesized paraffinic diesel (SPD).

As with other synthetic hydrocarbons, SPD fuels can be produced from various feedstocks and production pathways, each with different costs and life cycle carbon intensity values.¹²

- SPDs produced from non-renewable sources include coal-to-liquid diesel and gas-to-liquid diesel.
- SPDs produced from renewable sources are generally referred to as renewable diesel (or green diesel) and include biomass-to-liquid (BTL) diesel, hydrogenation-derived renewable diesel (HDRD), hydrotreated vegetable oil (HVO), renewable hydrocarbon diesel (RHD), lignocellulosic or Fischer-Tropsch (FT) renewable diesel and hydroprocessed esters and fatty acids (HEFA) diesel.

Each fuel standard has its own requirements for the use of synthetic hydrocarbon fuels:

- **CAN/CGSB-3.517-2020** permits the use of synthetic hydrocarbons in any concentration in diesel fuel complying with the standard.
- **ISO 8217:2017** allows marine distillate fuels meeting its standard to include hydrocarbons from synthetic or renewable sources that are similar in composition to petroleum distillate fuels. It also allows fuels derived from the co-processing of renewable feedstocks with conventional petroleum hydrocarbons.
- **NATO's AFLP 1385 Ed B Version 1 March 2017** specification for F-76 naval distillate fuels allows the use of synthesized paraffinic diesel derived from Fischer-Tropsch (FT) or Hydroprocessed Renewable Diesel (HRD) methods at blends of up to 50% and provides the following definitions:
 - FT- A catalysed chemical reaction in which synthesis gas, a mixture of carbon monoxide and hydrogen, is converted into liquid hydrocarbons of various forms
 - HRD - Fuel produced from mono-, di- and triglycerides, free fatty acids and fatty acid esters from plant, algae oils or animal fats that have been hydroprocessed to remove essentially all oxygen.

Note that the next revision of AFLP plans to also include Synthesized Isoparaffins (farnesane) produced by obtaining farnesene from the fermentation of sugars, and sequentially hydro-processing and fractionation to farnesane. They can be used as drop-in fuels at blends of up to 20%.

- **CGSB-3.11-2017** does not reference synthetic hydrocarbons; however, updates are being proposed for the next revision to include synthetic component requirements.

It is important to note that **renewable diesel** is distinct from **biodiesel** which is a non drop-in low-carbon-intensity fuel. Biodiesel consists of esters derived from vegetable oils (e.g., palm oil, soybean oil, rapeseed

¹¹ Any CAN/CGSB 3.517 fuel purchased for marine use has to have a 60 degree Celsius minimum flash point or the appropriate waivers to comply with Transport Canada regulations – see <https://laws-lois.justice.gc.ca/eng/Regulations/SOR-90-264/index.html>

¹² See Fu, J. and Turn, S. (2018). Characteristics and stability of biofuels used as drop-in replacement for NATO marine diesel. Elsevier Ltd. Available at <https://doi.org/10.1016/j.fuel.2018.09.042>; Hannu Jääskeläinen (2020). Renewable Hydrocarbon Fuels. DieselNet Technology Guide » Alternative Fuels. Available at https://dieselnet.com/tech/fuel_renewable-diesel.php; and Douvartzides et al. (2019). Green Diesel: Biomass Feedstocks, Production Technologies, Catalytic Research, Fuel Properties and Performance in Compression Ignition Internal Combustion Engines. Energies 2019, 12, 809. Available at <https://www.mdpi.com/1996-1073/12/5/809/pdf-vor>

oil), animal fats (e.g., tallow oil) and waste material that are often referred to as Fatty Acid Methyl Esters (FAME) and covered by the FAME specifications EN 14214 and ASTM D6751.

Biodiesel is currently used in the marine sector under a variety of standards, such as ISO.8217 which permits blending levels of up to 7% by volume under the DF (Distillate FAME) grades DFA, DFZ and DFB. However, FAME content is restricted to less than 0.5% by volume for the ISO.8217 DMA grade used by the Government of Canada fleet. Similarly, FAME content is restricted under AFLP 1385 and CGSB-3.11 to 0.1% volume contamination limits and under CAN/CGSB-3.517 to concentrations below 1%. For diesel fuels containing 1% or more biodiesel refer to CAN/CGSB-3.520 and CAN/CGSB-3.522.

A2.3 Carbon intensity values of conventional and low-carbon-intensity fuels

Low-carbon-intensity fuels can be produced from various feedstocks and production pathways, each with different costs, life cycle carbon intensity values and environmental considerations. The carbon intensity of a fuel also varies depending on the methodology used to calculate it. For example, some methodologies use the high heat value of a fuel while others use the low heat value. There is also considerable debate around how to calculate induced land use change (ILUC) emissions for biofuels.

The methodology used for federal procurement will be determined at the time of any future related procurement process: for the purposes of this RFI, respondents are asked to not include ILUC and use either the ICAO CORSIA methodology or the British Columbia Low Carbon Fuel Standard methodology to estimate the carbon intensity of their fuel. **Table A2** below presents sample lifecycle carbon intensities drawn from these two sources and methodologies.

Table A2:

Source	Sample fuels and production pathways	Sample life cycle carbon intensity estimates for different feedstocks or suppliers, not including ILUC (g CO _{2e} /MJ)
ICAO CORSIA program^a	Conventional jet fuel benchmark	89 ^a
	SAF jet fuel - Fischer-Tropsch Synthetic Paraffinic Kerosene (FT-SPK)	Agricultural and forestry residues: 7.7 ^a Poplar (short-rotation woody crops): 12.2 ^a
	SAF jet fuel - Hydroprocessed Esters and Fatty Acids Synthetic Paraffinic Kerosene (HEFA-SPK)	Used cooking oil: 13.9 ^a Rapeseed oil: 47.4 ^a
	SAF jet fuel - Hydroprocessed Fermented Sugars to Synthetic Isoparaffins (HFS-SIP)	Sugar beet: 32.4 ^a
	SAF jet fuel - Alcohol to Jet Synthetic Paraffinic Kerosene (ATJ-SPK)	Agricultural residues: 29.3 ^a Corn grain: 55.8 ^a
British Columbia Renewable & Low Carbon Fuel Standard^b	Diesel-class fuel default carbon intensity	98.96 ^b
	Gasoline-class fuel default carbon intensity	88.14 ^b
	Hydrogenation-derived renewable diesel (HDRD)	From 9.133 to 93.28 ^b
	Biodiesel	From 0.84 to 37.46 ^b
Sources: ^a See ICAO CORSIA publications available at https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-Eligible-Fuels.aspx : <ul style="list-style-type: none"> - CORSIA Implementation Elements - CORSIA Eligible Fuels: CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels. - CORSIA Supporting Document: CORSIA Eligible Fuels – Life Cycle Assessment Methodology. ^b See British Columbia Clean Fuel Standard publications available at https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/transportation-energies/renewable-low-carbon-fuels/fuel-lifecycle-assessment : <ul style="list-style-type: none"> - Carbon Intensity Records under the Renewable and Low Carbon Fuel Requirements Regulation. - Approved carbon intensities (Updated March 20, 2020). 		

A3. ANTICIPATED LOW-CARBON-INTENSITY FUEL PROCUREMENT REQUIREMENTS

To meet its GHG emissions reduction targets, the Government of Canada is investigating the ability of industry to supply blends of conventional and low carbon fuels for aviation and marine use. A range of possible procurement strategies will be considered based on the information gathered from this RFI, as well as departmental operational requirements and procurement planning cycles.

Canada is considering a range of possible procurement strategies for low-carbon fuels, such as the use of National or Regional Master Standing Offers, contracts and/or Supply Arrangements. Annex B includes hypothetical purchasing scenarios to allow for the collection of information from industry and do not represent a commitment to purchase low-carbon-intensity fuels or to use a particular procurement strategy.

For the purposes of the RFI, the Government of Canada has identified the following preliminary requirements for the procurement of low-carbon-intensity fuels:

- The fuels would need to be provided as a blend of conventional and low-carbon-intensity fuels: the blend requirements may be specified as either a percentage (e.g. 5% renewable diesel: 95% diesel blend) or as the net carbon intensity for the blended fuel (e.g. a blended aviation fuel with a net carbon intensity of 80 g CO₂e/MJ);
- The low-carbon-intensity component of the fuel would need to be derived from renewable feedstock sources. For the purposes of this RFI, this includes all of the renewable fuel feedstocks listed under Canada's Renewable Fuel Regulations¹³ as well as fuels derived from carbon capture. This would include fuels derived from co-processing renewable feedstocks with conventional petroleum hydrocarbons as long as the renewable source is introduced before the production of the fuel;
- The blended fuel would need to meet all relevant Canadian and international standards and certifications for use as a drop-in fuel; as noted above, some of these standards are currently being reviewed to consider additional provisions for low-carbon-intensity fuels;
- Supporting documentation would need to be provided demonstrating percentage blend, the carbon intensity of the low-carbon-intensity fuel component and the associated GHG emissions reductions. For the purposes of this RFI, the carbon intensity calculation should be based on the methodology of either the BC Low carbon fuel standard or ICAO CORSIA. Any future procurement of low-carbon-intensity fuels would require proponents to use a specific methodology that aligns with federal policies, such as the Clean Fuel Standard; and
- The life cycle carbon intensity of the low-carbon-intensity fuel component would need to be at least 10% lower than the baseline or reference life cycle carbon intensity of the fuel it is replacing as shown through a lifecycle assessment analysis. Note that the Government of Canada is interested in achieving significant emission reductions from the use of low-carbon-intensity fuels and may prioritize the purchase of fuels with lower carbon intensities (e.g. more than 10% lower than the baseline) through mechanisms such as raising the reduction threshold above 10% and/or providing a price differential based on the carbon-intensity of the fuel.

If the Government of Canada decides to move forward with the procurement of low-carbon-intensity fuels, it will consider factors such as the cost, carbon-intensity, sustainability, and availability of fuels in the market when developing its procurement strategy. The amount and blend of low-carbon-intensity fuels purchased could vary by region and fuel type. Similarly, the delivery method could vary based on region and fuel type.

¹³ The Renewable Fuels Regulations (SOR/2010-189) is available at <https://laws-lois.justice.gc.ca/eng/regulations/SOR-2010-189/page-1.html#h-760429>

ANNEX B – TECHNICAL AND PROCUREMENT QUESTIONS

1) Overall requirement

- a. Would your organization be interested in, and capable of, providing low-carbon-intensity fuels to the Government of Canada? Why or why not? If no, what would be the conditions needed by your organizations to be interested?
- b. Overall, what are the potential impacts to doing business with the Government of Canada if these types of low carbon fuel requirements were implemented?

2) Hypothetical purchase scenarios for low-carbon-intensity fuels

The Government of Canada is seeking industry feedback on two hypothetical purchase scenarios (1-Low, 2-High) for low-carbon-intensity fuels for aviation (sustainable aviation fuels) and marine use that meet the requirements outlined in Annex A. Fuel would have to be provided as a blend of conventional and low-carbon-intensity fuel that meets relevant standards and certifications for use as a drop-in fuel. Each scenario covers an eight-year period between April 1, 2022 and March 31, 2030, and assumes that the annual procurement would start at a lower volume and increase over time:

- 1- **Low:** Purchasing a total of **144 million litres** of low-carbon-intensity fuels for aviation (sustainable aviation fuel) and marine use, an average of **18 million litres/ year**. At least 30% of the fuels procured would be sustainable aviation fuels.
- 2- **High:** Purchasing a total of **576 million litres** of low-carbon-intensity fuels for aviation (sustainable aviation fuel) and marine use, an average of **72 million litres/ year**. At least 30% of the fuels procured would be sustainable aviation fuels.

Would your organization be interested in providing these fuels? If so, please answer the following questions:

- a. **Please describe your anticipated source(s) of low-carbon-intensity fuels, including:**
 - i. The fuel production process(es), the type of fuels you could provide (e.g. sustainable aviation fuel, renewable diesel) and the key co-products and/or by-products and their ratio to each other,
 - ii. The production and refining facilities and their capacity and location,
 - iii. The feedstock(s) used, including sources and supply chains,
 - iv. The estimated life cycle carbon intensity of the fuel(s) in g CO₂_e/MJ and the methodology for calculating it (e.g. ICAO CORSIA or BC Low carbon fuel standard methodology),
 - v. The percentage blends you could provide and how the blended fuels would comply with relevant standards and meet the Government of Canada's performance requirements.
- b. **The two hypothetical scenarios above (1-Low, 2-High) illustrate the potential range of federal procurement of low-carbon-intensity fuels for aviation and marine use. For each of the scenarios please answer the following questions:**
 - i. Do you think this purchase scenario is feasible?
 1. Why or why not?
 2. If it is not feasible, what would you propose as an alternative scenario?
 - ii. What is the approximate volume of blended fuel you could supply each year between 2022 and 2030 (in millions of litres per year for each type of fuel)?

1. When could you start supplying fuel, and would the amount of fuel you could provide remain constant or increase over time?
2. Would a long-term, advance purchase commitment from the federal government be required to secure this supply? Explain why or why not.
- iii. What is the anticipated price structure and/or an estimate price range for the low-carbon-intensity fuel (in Canadian \$ per litre) you would supply?
 1. Would you be able to commit to firm unit prices per litre or estimate price range that will be subject to a price adjustment using Reference Markers?
 2. Are you aware of current Reference Markers for your proposed type of low-carbon-intensity fuel? Currently, PSPC's Bulk Aviation Fuel Standing Offer prices are subject to one of the following Reference Markers: New York Harbour (NYH), United States Gulf Coast (USGC), or LA Pipeline, while PSPC's Marine Fuel Standing Offer prices are subject to the following Reference Markers: (ULS) Diesel No. 1 and (ULS) Diesel.
 3. Would a weekly price adjustment be acceptable?
 4. Would the price range decrease over time and with increasing volumes?
 5. Include a breakdown of costs if possible (e.g. production, transportation, blending, delivery, cartage).
- iv. What geographic regions of Canada could you supply fuel to and how would that affect the price?
- v. What key barriers or issues do you anticipate with meeting this requirement currently and in the future?
- vi. Any other comments or observations, including alternative procurement scenarios?

3) Business and market considerations

Currently there is limited production and use of low-carbon-intensity fuels for aviation and marine operations in Canada and across North America. The Government of Canada recognizes that companies may need to invest in developing new and expanded production capacity in order to meet the future demands of the federal fleet and the Canadian transportation sector as a whole. Given this context, the Government of Canada is seeking industry feedback on the key business and market considerations related to the procurement of low-carbon-intensity fuels.

a. Please describe the key market and investment factors that may impact your organization's ability to provide low-carbon-intensity fuels to the Government of Canada, including:

- i. The scale and range of capital investments that would be needed to meet the low-carbon-intensity fuel purchase scenarios described above.
- ii. Financing considerations, such as the percentage of total production that must be sold in advance in order to finance a project.
- iii. The current market conditions (e.g. barriers, opportunities, interest, drivers) for investing in low-carbon-intensity fuels for aviation and marine use.
- iv. Any other key factors that may influence the investment, production and/or price of low-carbon-intensity fuels.

b. Please describe how different procurement approaches could impact the pricing and/or quantity of low-carbon-intensity fuels provided by your organization, including:

- i. **National versus regional procurement:** For example, the impact of national requirements for a low volume blend of low-carbon-intensity fuels (e.g. 5%) versus one or more regional requirements for higher-percentage blends (e.g. 25%)?
- ii. **Standing Offer versus Contract:** For example, Standing Offers are on an "as-and-when requested" basis with a well-defined requirement and pre-established pricing and terms and conditions. The quantities and delivery dates are unknown. A contract is a binding legal

agreement with established terms and conditions to provide a well-defined requirement with a specified delivery location and date(s), pricing and estimated quantities.

- iii. **Purchase volume:** For example, the impact of procuring a constant volume each year versus an increasing volume over time?
- iv. **Duration and format:** What would be the impact of a shorter or longer purchase agreement term (e.g. 2 year, 5 year, 8 year)? Would it be desirable to have a contract in place before production starts, similar to an offtake agreement?
- v. **Fuel type:** If you are able to provide both aviation and marine fuels, is there any benefit or disadvantage to creating a single supply arrangement to purchase both types of fuels?
- vi. **Pricing:** What would be the impact of establishing differential pricing based on the carbon intensity of the fuel (e.g. a higher price for fuels with lower carbon intensities) versus establishing a single price based on a minimum threshold for performance (e.g. at least 10% below a reference carbon intensity)?
- vii. **Alternative approaches:** The Government of Canada would like to explore options for leveraging the procurement of low-carbon-intensity fuels to stimulate the market and generate environmental benefits including reducing greenhouse gas emissions. The geographic location of government facilities may result in logistical or other issues that could significantly increase the cost of producing and delivering fuels for use in our equipment at these sites.
 - 1. Would the production of these fuels for use by third parties in the commercial fuel market at any location within Canada reduce the costs of production and delivery?
 - 2. Are there alternative procurement approaches or arrangements that could be used in this situation which could demonstrate the environmental benefit of this action?
- viii. **Other:** Any other comments or suggestions on the procurement approach?

c. Other comments or considerations?