



Canadian consulting engineering awards 2023  
Environmental Remediation

# Pilot plant for sustainable aviation fuel

# Innovation

**BBA helped install and operate the SAF+ pilot plant to convert industrial carbon emissions into new sustainable aviation fuel, with 80% fewer GHG effects than conventional kerosene.**

**This project is part of the Polytechnique Montréal green chemistry and sustainable engineering platform, which is designed to advance energy decarbonization projects, in collaboration with industrial partners such as the SAF+ Consortium.**

This is the first project to be undertaken in Québec to capture and convert CO<sub>2</sub> into a usable product and is a precursor in North America.

Hopes are high, because this type of fuel could transform the future of civil and commercial aviation—along with a host of other industries with various projects and applications—by contributing greatly to the decarbonization effort.

## **An engineering solution**

The CO<sub>2</sub> is captured and recovered by the Polytechnique Montréal plant and then sent to the SAF+ plant to be converted into sustainable fuel.

BBA was mandated to provide engineering, project management and construction management to install the SAF+ plant as well as operate the Polytechnique Montréal CO<sub>2</sub> capture plant and the SAF+ plant.



# Innovation

## Innovation through expertise

The SAF+ solution was largely based on integrating and optimizing existing technologies while also being innovative. The resulting process was also new and, therefore, have never been operated before.

There was a great deal of effort required to integrate, commission and start up the plant, and BBA's operational expertise was used to meet all technical challenges in record time. Remember that SAF+ developed its process from scratch and designed and built the pilot plant in only 18 months.

This required unique team work to find solutions that were adapted to various challenges. In fact, the exceptional cooperation among more experienced members of the team and a new generation of specialists shaped the creative dynamic that was needed to complete the project. BBA has demonstrated sheer inventiveness in bringing the pilot plant into operation and proving its ability to produce clean fuel in a sustainable manner within a tight timeframe.





# Environmental benefits

Successfully starting up the SAF+ pilot plant has established the proof of concept, which is the key step in moving forward with an industrial production plant project, to be completed in 2026.

This plant will be able to convert 300 TPJ of CO<sub>2</sub> into green fuel and represents a tangible concept of large-scale carbon recovery that aligns with the circular economy.

When converted into synthetic fuel, the renewable energy—considered a green energy carrier—can be easily and quickly transported in liquid form, without being connected to a distribution network. Since the carbon footprint of this new fuel is reduced by 80% compared to fossil-based kerosene, it's easy to imagine the enormous potential of deploying this type of technology on a global scale.

## Accelerating decarbonization

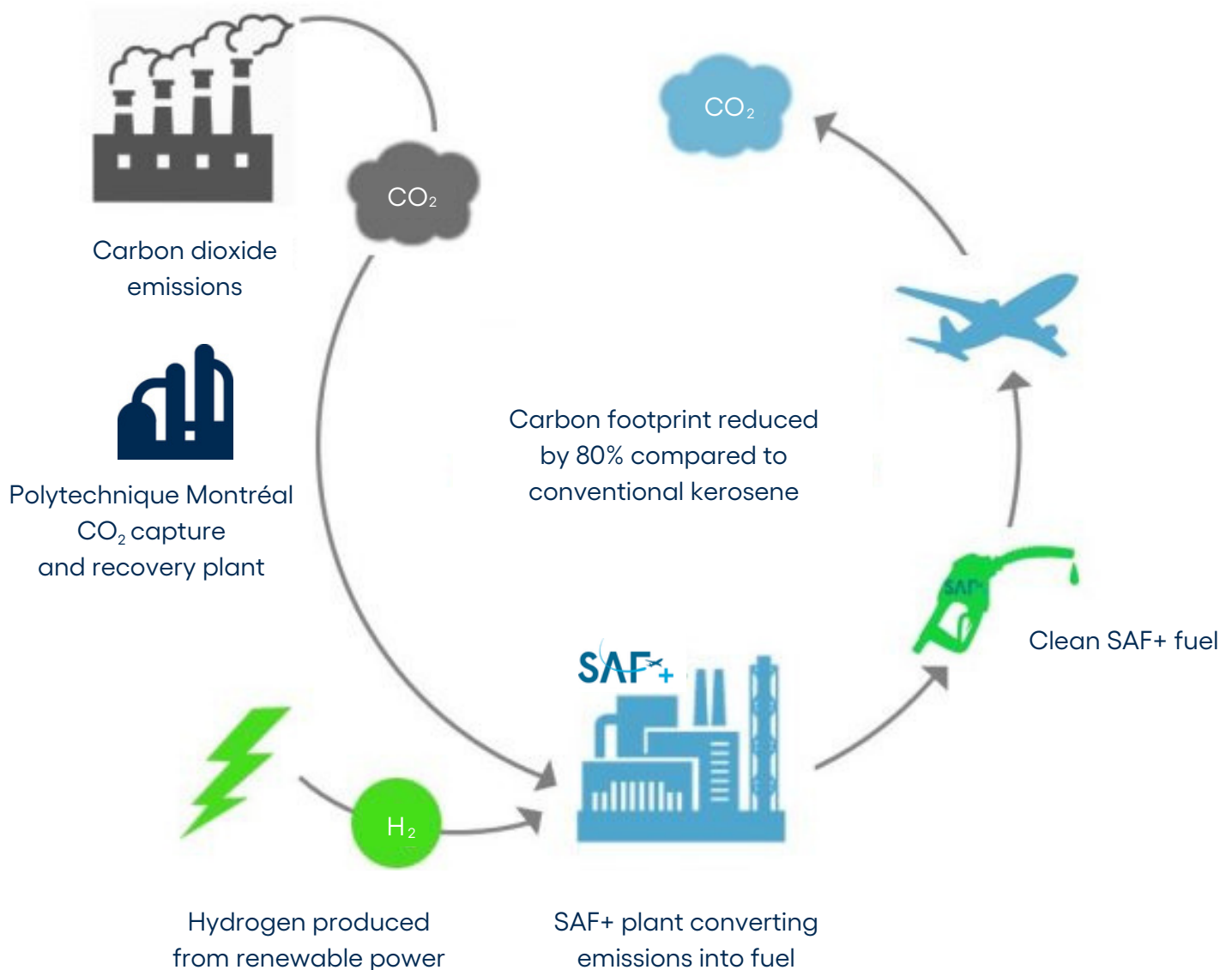
This project is part of a global initiative for the planet. Polytechnique Montréal is proud to be supporting projects that promote the transition to a carbon-neutral economy by using non-conventional raw materials like CO<sub>2</sub> to produce sustainable fuels that won't create additional GHGs in the atmosphere.



The plant's daily production alone will eliminate the carbon equivalent of 222 return flights between Montréal and Paris!

# Complexity

Thanks to BBA's multidisciplinary know-how, all phases of designing the pilot plant's interconnections, construction and operation were completed in fewer than eight months. The expertise of BBA's teams in carrying out large-scale projects proved to be instrumental in achieving the objectives for this mandate, which exceeded initial expectations.



# Complexity

## Inventing connections

The main challenge was in integrating the various processes required to operate the production line.

Since this type of an assembly had never been carried out before, solutions had to be developed as the project progressed, along with all the unknowns this would entail.

In particular, BBA had to design a catalytic reactor needed for the SAF+ process. This is just one example of the challenges encountered when interconnecting the various production line components.

Since this was a pilot plant, the system had to be calibrated manually, adding an additional level of difficulty.





# Social and economic benefits

A successful project like this will have tremendous benefits for our communities. As the climate crisis worsens, low-carbon emission aviation fuel is a key asset in preserving international economic and socio-cultural ties.

Supported by leading partners, this significant advance in energy transition is also an excellent showcase for Québec know-how. It positions Québec as a pioneer in developing green technologies, demonstrating our exceptional abilities in research, development and implementation of cutting-edge concepts.

## **Putting our “green electrons” to good use**

Economically, producing this synthetic fuel on a large scale will make our renewable energy resources even more profitable. Transforming it in this way makes it easier to transport and export our electricity. It will be extremely profitable to develop this sector, both in terms of jobs created and the share of profits that can be given back to society.

## **A vehicle for passing on knowledge**

Beyond the economic aspect, the SAF+ project also encouraged a vital transfer of expertise and knowledge among generations. These interactions were evident among the teams, where experienced engineers worked alongside and mentored their colleagues who were just starting their careers.

The project team also welcomed young students from Cégep Maisonneuve, who were invited to discover what daily life is like on site and become familiar with their future profession.



# Meeting client needs

Implementing the pilot plant was a significant strategic challenge. Not only were we reaching the crucial stage of proof of concept and operability of the two plants, but achieving this goal was the prerequisite for commercial operation.

Having been entrusted with this responsibility, BBA succeeded in making the pilot plant operational in the long term, ahead of schedule and with results beyond initial expectations.

SAF+ was extremely satisfied with the performance of this production unit and was quick to entrust BBA with the mandate for the next step: transitioning to large-scale production with the construction of a \$375 million plant scheduled to be commissioned in 2026.

For its part, Polytechnique Montréal continues to develop its green chemistry platform by installing and operating another CO<sub>2</sub> conversion plant, supported by the BBA team. A new sustainable fuel is on the way!

## Concerted efforts

Teams from BBA, the SAF+ Consortium and Polytechnique Montréal got to know each other well during this project and the established trust contributed significantly to the quality of results.

BBA is extremely proud to have participated in this success, marking an important milestone in efforts to reduce the environmental footprint of the aviation sector and many other industries.



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MONTRÉAL**



# About BBA

BBA has been providing a wide range of consulting engineering services for over 40 years. Today, its engineering, environmental and commissioning experts team up to quickly and accurately pinpoint the needs of industrial and institutional clients. The firm's expertise is recognized in the Energy and Natural Resources industry. With 16 offices in Canada and internationally (Chile), offering clients local support and field presence, BBA is recognized for providing some of the industry's most innovative, sustainable and reliable engineering solutions.



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