

MINNESOTA SUSTAINABLE AVIATION FUEL HUB



GREATER
MSP
Partnership

SAF SPOTLIGHT

- SAF is the most promising lever known today to accelerate the aviation industry's progress to net-zero.
- SAF is a safe, drop-in fuel that reduces emissions compared to traditional jet fuel and made from readily available American sources.



Safe and Reduces Emissions: When blended 50/50 with traditional jet fuel, SAF has been certified safe and reduces an aircraft's carbon emissions by up to 80%.

Production: SAF can be produced from numerous feedstock options and existing ag resources including waste wood and energy crops, oil seeds, agricultural residues, and wet wastes such as manures and wastewater treatment sludge.

Existing Infrastructure: SAF production and distribution can safely utilize existing refining infrastructure and pipeline capacity, significantly reducing the upfront cost of scaling.

The Problem? By 2030, US Airlines have committed to use 3 billion gallons of SAF. By 2050, it is projected that 35 billion gallons of SAF will be needed. However, today, there isn't enough SAF in the world to fuel Delta's fleet for a single day – AND it's very expensive.



To decarbonize aviation, SAF production will need to grow exponentially from a small base

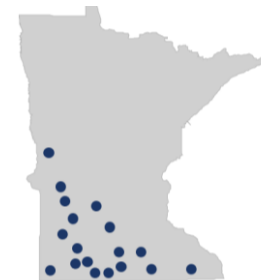
“SAF is the only viable means of meeting net-zero emissions targets [in aviation]” – US DOE

Delta used roughly 3.9 billion gallons of conventional fuel in 2022, and all air travel out of MSP consumes ~280 million gallons



600x

Growth in SAF needed between 2021 and 2030 to meet the “SAF Grand Challenge” – going from 5 million to 3 billion gallons



Minnesota’s 19 ethanol plants produced 1.4 billion gallons of ethanol in 2022

“More than 400 biorefineries and 1 billion tons of biomass and or gaseous carbon oxide feedstock will be needed to produce 35 billion gal/yr by 2050” – US DOE

Flint Hills Pine Bend Refinery processes 375,000 barrels of oil a day



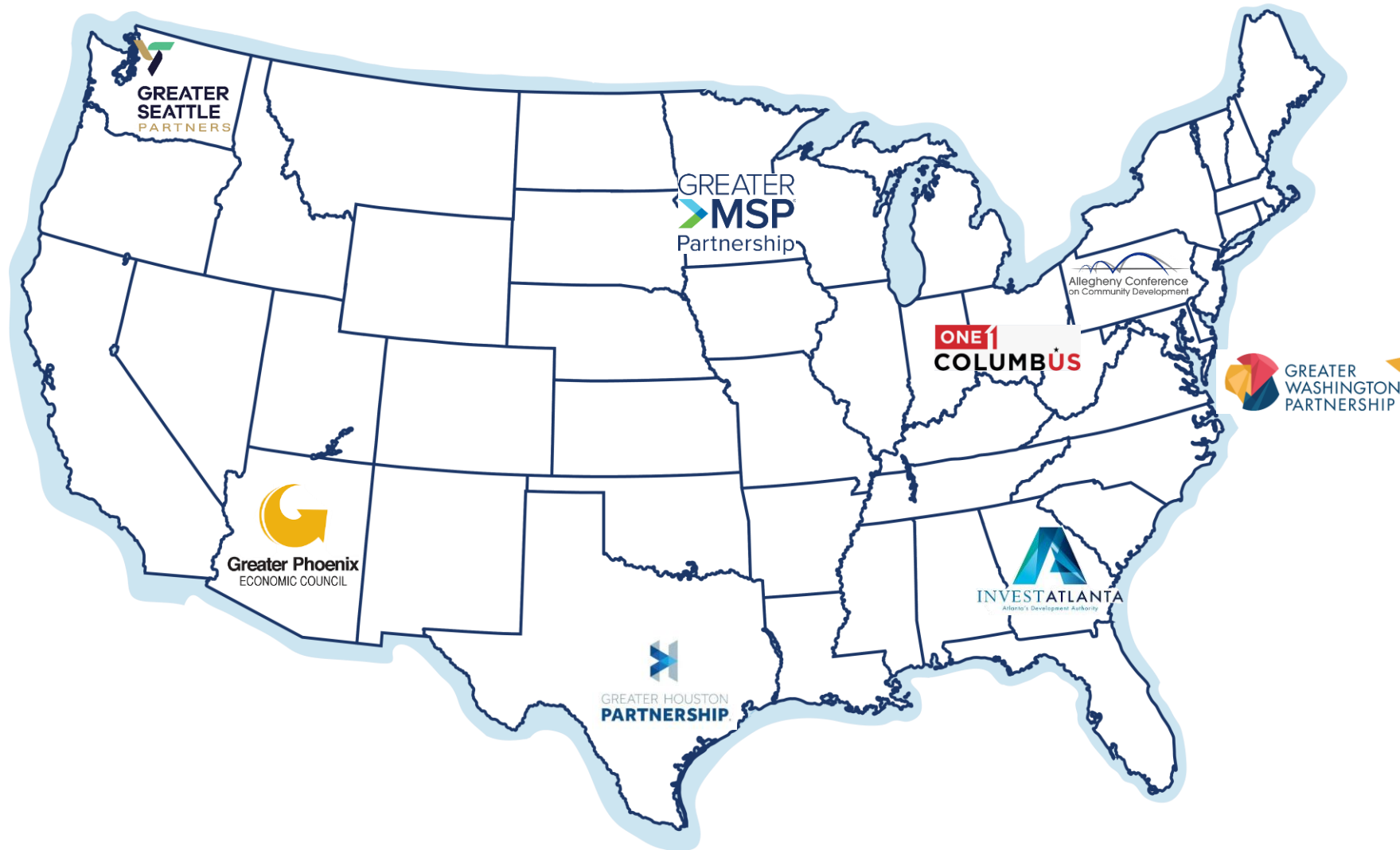


GREATER MSP

One Region. One Team.



GREATER MSP is how we work together to grow the economy



Mission

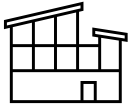
The GREATER MSP Partnership accelerates regional competitiveness and inclusive economic growth.



The Region's Economic Strategy



Capabilities | How We Do It



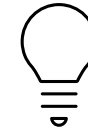
Business
Expansion &
Attraction



Talent
Attraction,
Development,
Retention



New Industry
Building



Innovation
Entrepreneurship,
Capital



Research
& Intelligence



Marketing
& Storytelling



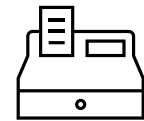
Global Food
& Agriculture



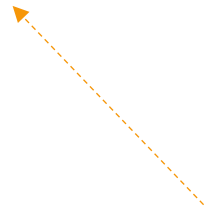
Civic Leadership
Development



Air Service
Expansion



Procurement
Growth



MINNESOTA SUSTAINABLE AVIATION FUEL HUB



Minnesota SAF Advantage

- Large airline demand
And many corporate users
- Research capabilities
Including University of MN
- Clean Power
And a green hydrogen pathway
- Agricultural economy
Including a regenerative future
- Existing biofuels industry
Including talent base

Our Ambition

Together, we are building an industrial-scale value chain for sustainable aviation fuel, anchored in Minnesota.

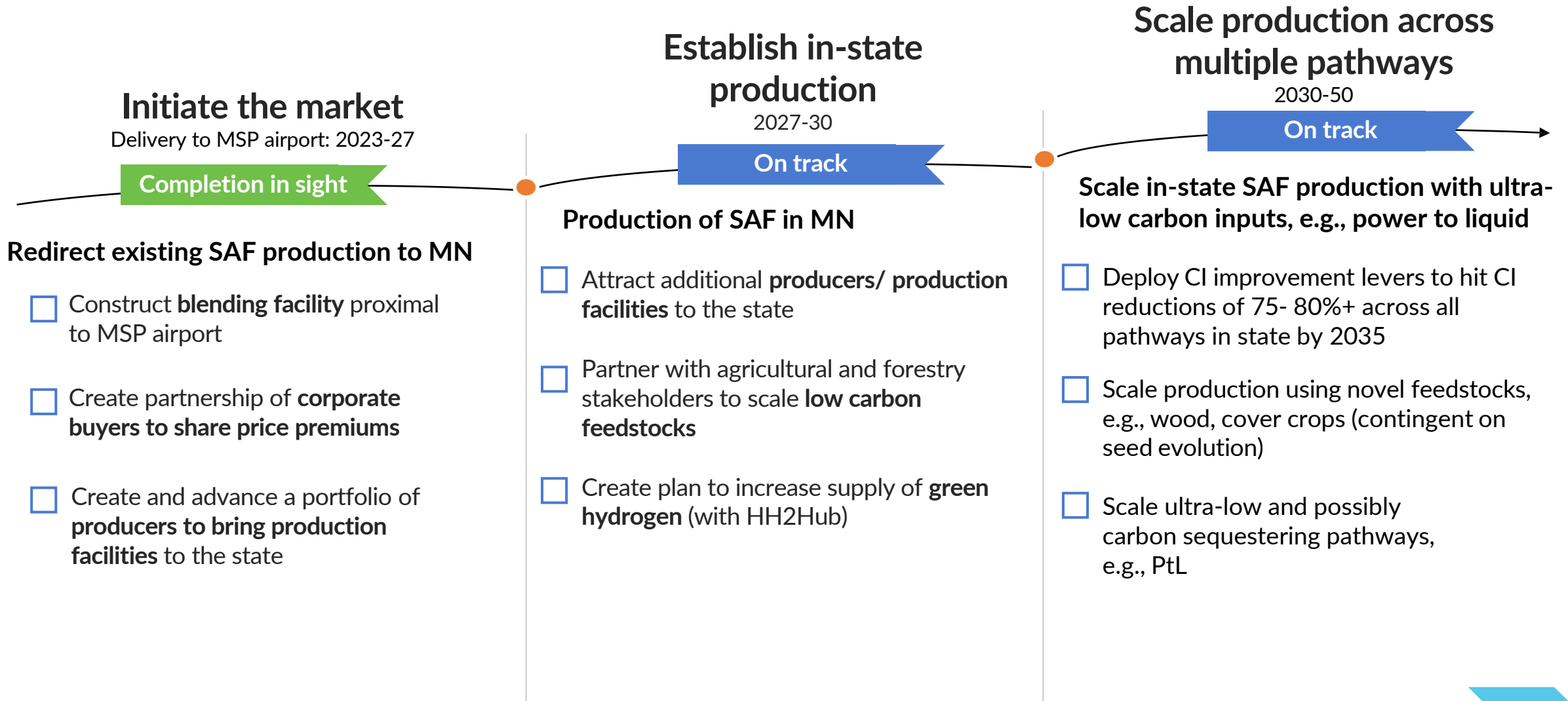
The aim is to deliver affordable, low-carbon SAF to the MSP International Airport as quickly as possible and then scale production to hundreds of millions, possibly billions, of gallons each year.

Our shared success will include helping decarbonize the airline industry, creating great jobs in Minnesota and across the North, and building a sustainable, large-scale market for regenerative agricultural practices and products.



3-Horizon Strategic Framework

Increase scale, lower cost, and improve GHG reduction over time



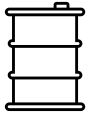
1. Based on Minnesota becoming a national hub for SAF production and exporting SAF to airports out of state

The Hub > Building the Value Chain

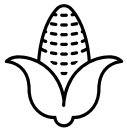
Input production

Processing & Refining

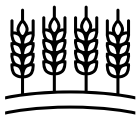
Blending & Fueling



HEFA



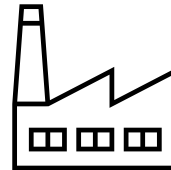
First Gen
ATJ



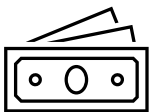
Regenerative
ATJ & HEFA



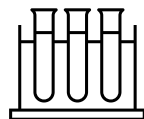
Green Hydrogen
PtL



Farm to Engine, and everything in between



Capital



R&D

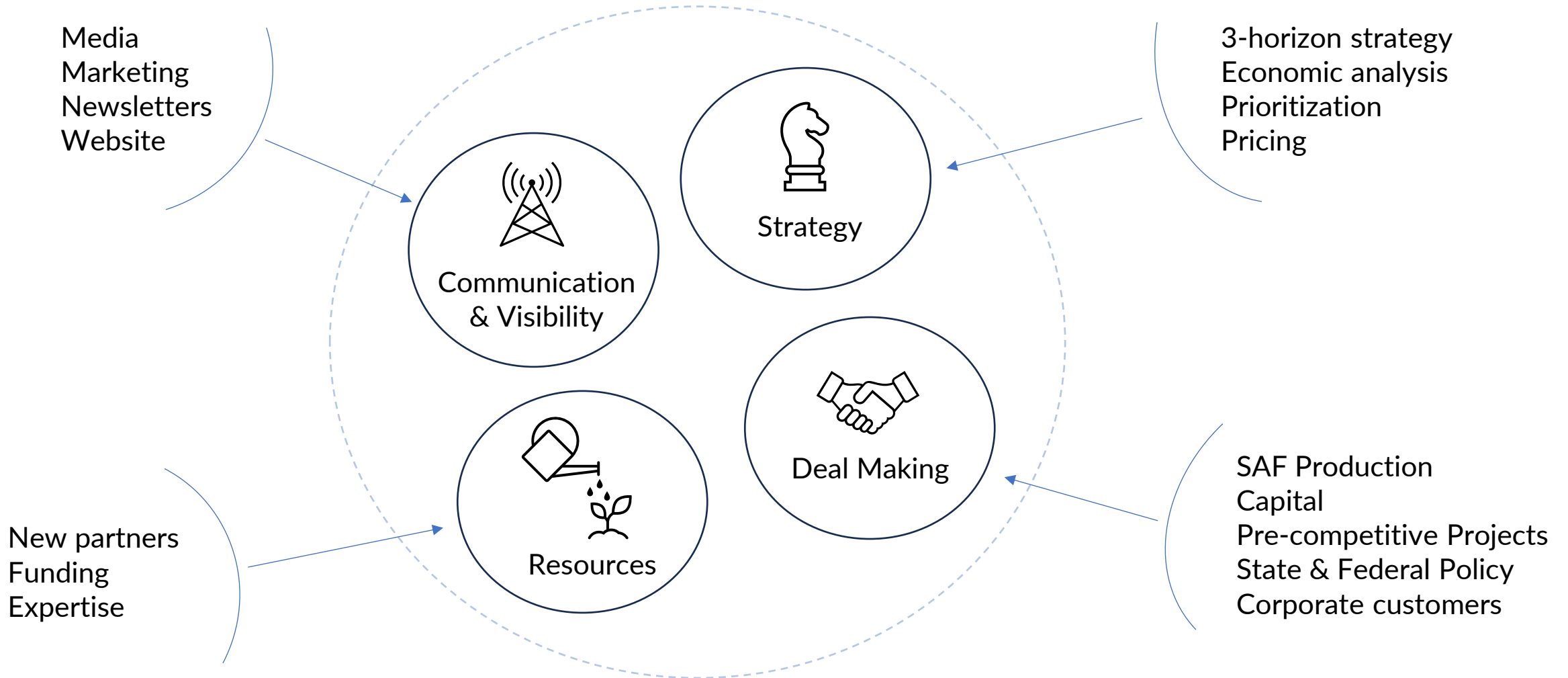


Strategy



Partner Engagement

The Hub > Functions



Learning through our work



We are building a new value chain to make a new market – that requires intense collaboration across company and industry boundaries



We must build demand and supply simultaneously



Technologies exist, it's the economic models that need to be established



Solving the SAF Challenge is an innovation effort & we are innovators



Environment outcomes are the purpose of the SAF solution, and this decarbonization solution must take clean water and biodiversity into account



To meet our SAF delivery goals to the MSP airport, Minnesota will need SAF produced from multiple inputs and multiple production facilities

Minnesota is “in flight” on SAF



Accomplishments

- Established working partnership & launched Hub
- Created shared ambition, strategy & analysis
- Secured State SAF tax credit & construction incentive
- Recruited potential producers



Working on it

- Blending solution
- Travel demand consortium
- Site feasibility: AtJ
- Producer agreements
- Site identification
- Environmental guardrails
- Demonstration of Horizon 2 / 3 pathways



On the horizon

- Financing, capital & new investment funds
- Horizon 3 strategy roadmaps for clean hydrogen, novel feedstocks
- Research & Development agenda
- Connections to other industrial decarbonization opportunities
- Talent & workforce pipeline

Highlighted at Davos 2024

The Minnesota SAF Hub was recognized by the World Economic Forum this month as one of the top global solutions in motion for decarbonizing air travel – one of the world’s hardest to solve climate challenges.



discovery. ELYSIS, a Rio Tinto-Alcoa joint-venture, produces zero-emission primary aluminum refined with hydropower and smelted using a GHG-free inert anode technology. This breakthrough has been made possible by a \$13M (CAD) investment and technical support from FMC member Apple, plus additional investment of \$80M (CAD) from the Canadian and Quebec governments. Apple plans to produce the new iPhone SE from 100 percent low-carbon aluminum as soon as ELYSIS begins commercial shipments in 2024.⁵

To read more about the latest FMC news in the aluminum sector, visit the latest agenda blog: [Aluminum demand will rise 40% by 2030. Here's how to make it sustainable.](#)

Aviation

Six new members have joined the First Movers Coalition and made commitments within the aviation sector in 2023: Qatar Airways, Lufthansa, Boom, Chooose, Eni, and the University of Michigan. Members with an aviation commitment have set a target of replacing at least 5% of their jet fuel demand with sustainable aviation fuels (SAFs) that reduce life-cycle emissions by 85% or more when compared with fossil jet fuel, and / or use zero-carbon emitting propulsion technologies. FMC aviation members have already started translating their commitments into offtake and action with 23 offtake agreements and investments since 2022, including the below achievements:

Minnesota SAF Hub: FMC members Delta, Bank of America, and EcoLab have partnered in the development of the Minnesota SAF Hub, the world’s first large-scale SAF Hub. Through this initiative, Delta

⁵ [Apple / ELYSIS Announcement](#)
⁶ [Minnesota SAF Hub](#)

aspires to use SAF for more than 10 percent of its fuel at Minneapolis-Saint Paul International Airport (MSP) by 2027, and 50 percent by 2035. Together, the coalition aims to achieve progress as quickly as possible, while accelerating the technologies with the greatest carbon reduction potential.⁶

United Airlines Sustainable Flight Fund for SAF Investment: FMC members BCG, Boeing, Amex GBT, and Bank of America all joined the United Airlines’ Sustainable Flight Fund, helping the fund grow to \$200M in just its first five months since its inception. The fund invests in startups working on SAF research, technology advancement, and production. In doing so, the fund’s members simultaneously gain first access to SAF offtakes that advance their own decarbonization goals, while simultaneously investing in the growth of companies and technologies that actively increase global SAF supply. This collaborative approach sends a strong demand signal to future suppliers, encouraging add-on investments, and advancing the aviation industry’s pathway to achieve net zero goals.⁷

Airbus: Airbus has announced a strategic partnership with DG Fuels to advance SAF production. DG Fuels’ system, based on cellulosic waste and renewable energy sources like wind and solar power, aims for an initial production of 120M US gallons of SAF annually by 2026, potentially reducing CO₂ emissions by 1.5 Mt each year. This initiative is part of the U.S. government’s SAF Grand Challenge, seeking to significantly boost domestic SAF production and reduce greenhouse gas emissions.⁸

Avelia: Amex GBT and Shell’s SAF program, Avelia, has continued to grow – recently adding FMC member Bank of

⁷ [United Airlines Sustainable Flight Fund](#)
⁸ [Airbus / DG Fuels SAF Partnership](#)