

KIVERDI 

SAF from CO₂

Hooman Yazhari | CEO

hooman.yazhari@kiverdi.com



WHAT INDUSTRY HAS PROMISED

“Despite the unprecedented industry crisis brought by COVID-19, IATA and its members committed to an ambitious target, **make flying net zero by 2050.**¹”

ADDRESSING SAF CHALLENGES

1. True Sustainability

- We directly convert CO₂ into target products; no byproduct other than H₂O
- Does not require arable land in contrast to ethanol, butanol, and HVO; process scales vertically

1. Path to a Competitive Price

- Producing a drop-in product that's fungible with jet fuel
- Kiverdi's spin-outs (ex. Air Protein) use similar or identical hardware for production

1. Widely Available, Affordable Primary Input

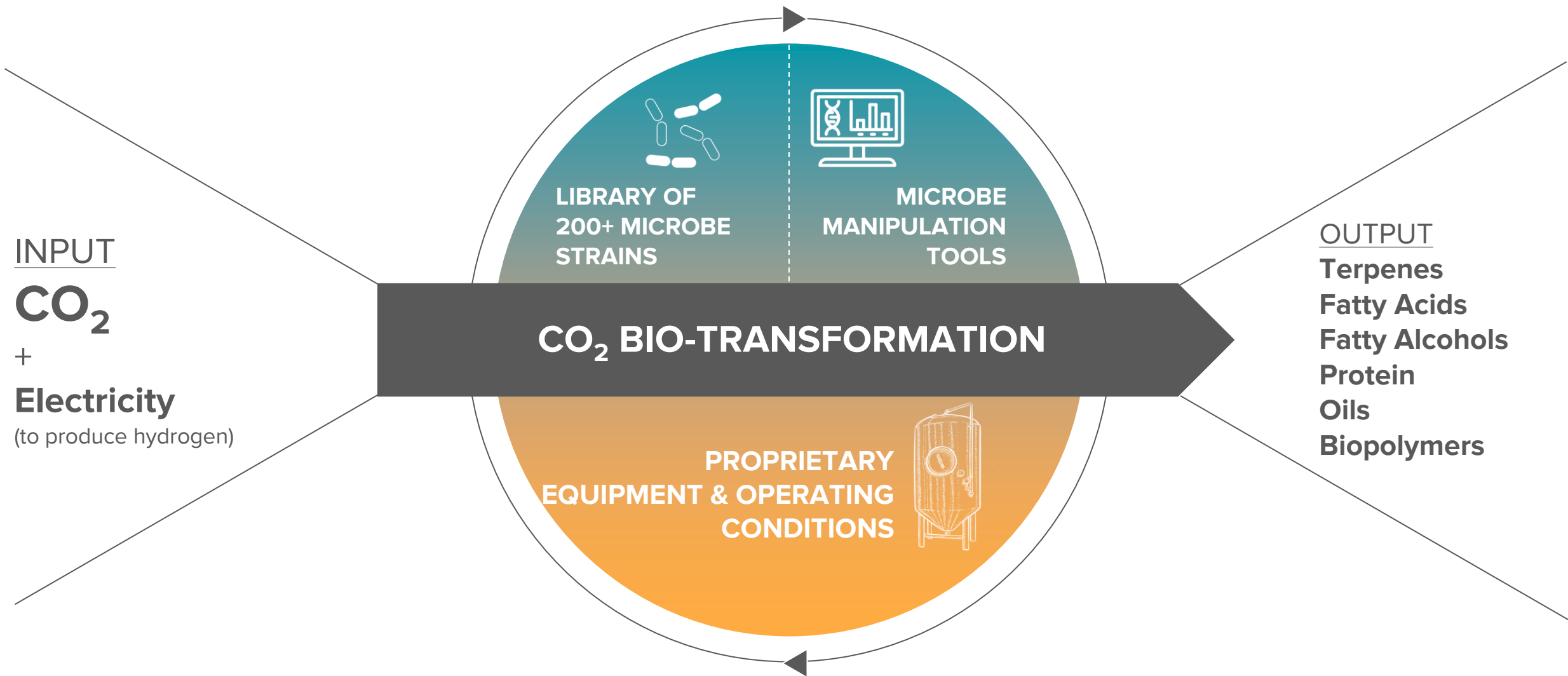
- CO₂ is the key input for production on Kiverdi's platform; available virtually anywhere from a wide variety of sources such as Direct Air Capture and flue gas

1. Flexible & Scalable Solutions

- Low resource use and flexibility of renewable energy creates opportunity to locate production virtually anywhere; enabling non-oil and non-agricultural producing geographies to become SAF producers

**OUR BIOTECH PLATFORM
ENABLES MICROBES TO PRODUCE
FOOD & MATERIALS FROM CO₂**

NOVEL CARBON NEGATIVE PRODUCTION PLATFORM



Proven Science

- Identified and continuously improving methods for gas fermentation productivity
- Completed studies proving out capabilities on multiple fuel pre-cursors (and other ingredients such as protein)
- Created proprietary engineering tools to metabolically engineer our microbe
- Scaling fermentation infrastructure from lab scale to pilot and demonstration scale systems
- Developed a solid IP estate on the conversion technology and organism

Next Steps

- Looking for partners across the aviation fuel industry; specifically airlines, catalyst developers, OEMs, and/or refiners
- Implement proprietary tools to engineer and optimize strains to produce fuel pre-cursors

Kiverdi has partnered with 3 DOE National Labs to optimize its platform microbe for sustainable chemical production

Strain Engineering Platform

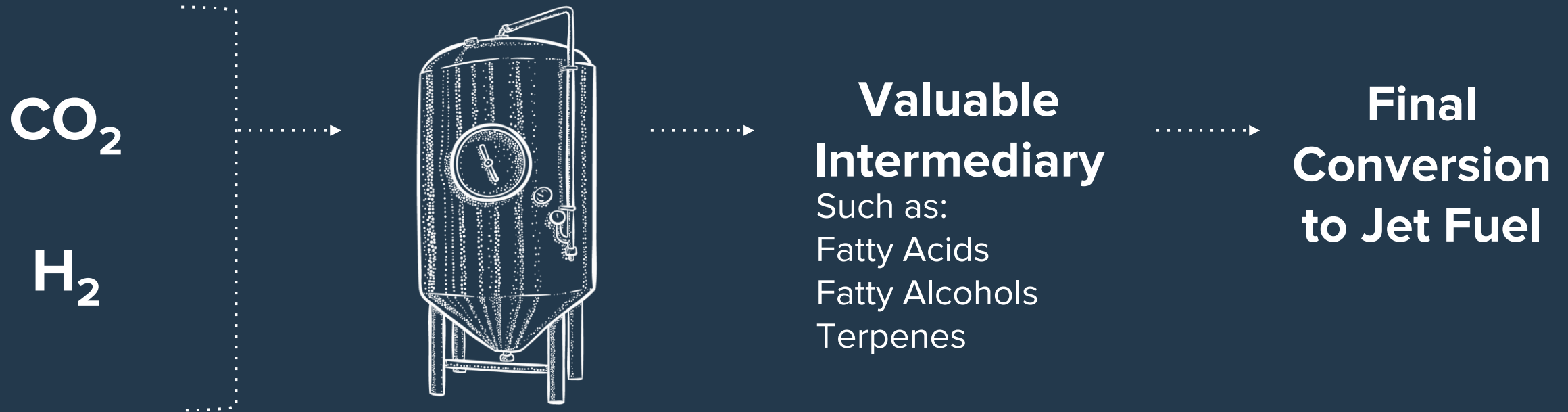
- An annotated host genome sequence
- Genome-scale metabolic modeling to guide flux engineering
- Bioinformatics for enzyme candidate discovery from genomes
- Synthetic biology tools and gene libraries
- Combinatorial operon construction and screening

AGILE Biofoundry Project

- 3-year DOE project Kiverdi expanded the genetic toolset to improve DNA transformation, chromosomal integration and tunable gene expression
- Gene transcription control; Strain-specific vectors, promoter libraries



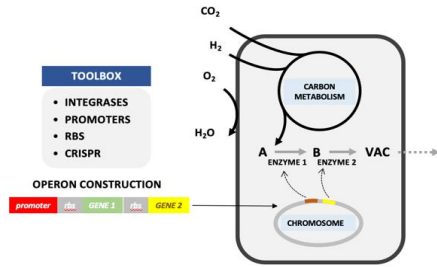
KIVERDI APPROACH TO SAF



Kiverdi process proven in proteins and multiple other ingredients

Known Technology: process developed on other SAF types

NEXT STEPS



Metabolic Engineering

- Select intermediate molecule
- Engineer pathways to produce target molecule
- Produce candidate strains

Strain Development

- Identify 3 production strains
- Increase yields to production targets
- Test at 20L scale

Pilot & Demonstration Scale Testing

- Move to 500L, then to 30,000L scale fermentation
- Complete tests with downstream partners at scale
- Profile and adjust to meet targeted fuel standards

Complete Regulatory & Scale

- Complete ASTM/OEM certification
- Scale operations to 1ML+ facility
- Begin test flights

Gate 1: Engineer & Select Strains | Target: \$5-7m
Timeline: 2 - 2.5 years

Gate 2: Scale

Gate 3: Launch

CONTACT US



Hooman Yazhari
hooman.yazhari@kiverdi.com