2024 ICAO REGIONAL SEMINAR ON ENVIRONMENT

In collaboration with

CAAT
สำนักงานการบินพลเรือนแห่งประเทศไทย
The Civil Aviation Authority of Thailand

APAC Region

7 to 8 , August 2024

Bangkok, Thailand

ICAO
ENVIRONMENT

ACT SAF

CORSIA

1 FlyORO Introduction

Our journey
Achievements to date

2 AlphaLite

The world's first SAF modular blending system

3 Analysis

6-months fuel price comparison
Flexible blends price comparison

4 Industry Achievements

From first SAF flight to scaling production and supply chain infrastructure
ACT-SAF

OUR JOURNEY & ACHIEVEMENTS TO-DATE

Jan 2022 — Launched FlyORO Brand

Jul 2022 — IATA Strategic Partner Fuel Technical Group
SGD 565K Investment & Government Grants

Aug 2022 — Shell Startup Engine Programme and
Featured Startup at Singapore International Energy Week

Jan 2023 — Trial & Commissioning of First AlphaLite Unit (TRL 9)

Apr 2023 — Grand Launch with Jet Aviation

Q4 2023 — ISCC Corsia Plus & ASTM Organization Member
USD 1.6M Pre-A Expansion Funds to AU & US

Q1 2024 — Signed First Commercial Deal in Australia

Q2 2024 — Awarded pilot project with Aeroporti di Roma

SINGAPORE
SELETAR AIRPORT, JET AVIATION

BRISBANE WEST, AUSTRALIA
TOOWOOMBA WELLCAMP AIRPORT

TOOWOOMBA WELLCAMP AIRPORT (WTB) BY WAGNER SUSTAINABLE FUELS

AlphaLite on track to be commissioned by Q4 2024.

WAGNER SUSTAINABLE FUELS

BOEING

ROME, ITALY
FIUMICINO AIRPORT, ADR

LATEST PROJECT AWARDED:

LEONARDO DA VINCI FIUMICINO AIRPORT (FCO) BY AEROPORTI DI ROMA

Project on pilot phase to commence in Sep 2024.

AEROPORTI DI ROMA

Proprietary Technology

A revolutionary cost-effective way to blend SAF for airports.

WO2020/145893

Custom Blend

On-Demand

Digital Integrated

ASTM Specification

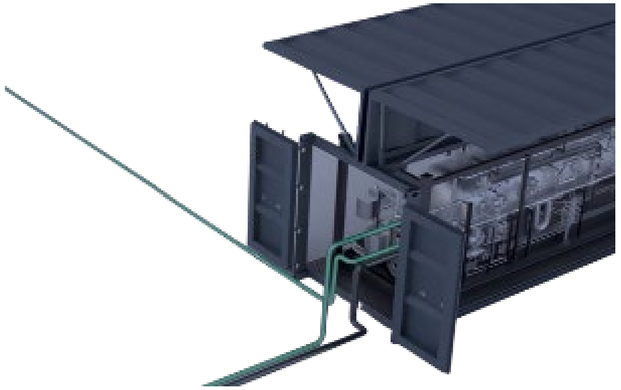
Deploy Anywhere

Flexible Scale-Up

Modular & Easy Tie-in

PROPRIETARY SAF BLENDING TECHNOLOGY

1 Fluid Detection

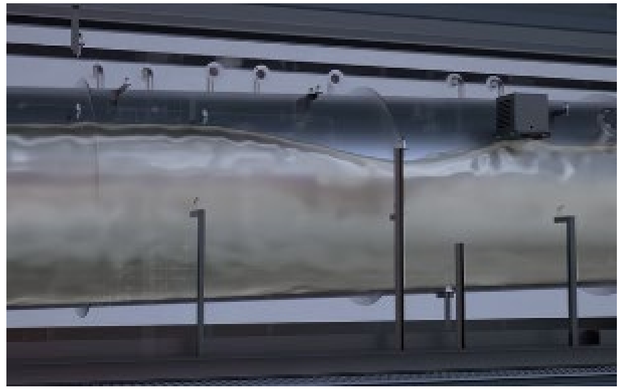


- Fuels charged at precise volume, ratio and charging rates.
- Fluid properties detected along charging line.

2 Automated Blend Recipe

- Feed data sent to control system.
- Auto generate blend recipe specific to fuel type, volume and compositions.

3 Precision Blend Control



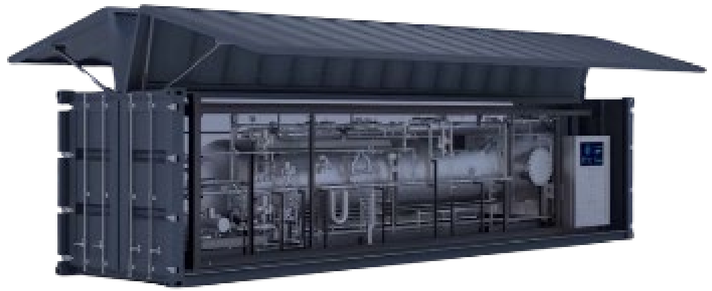
- Based on feed data and computational fluid dynamics for ASTM QA.
- No need for conventional mixer.

4 Data Integrations

- Blend recipe is optimized fit-for-purpose to exact blend product type.
- Short batch cycle of 20-30 mins.

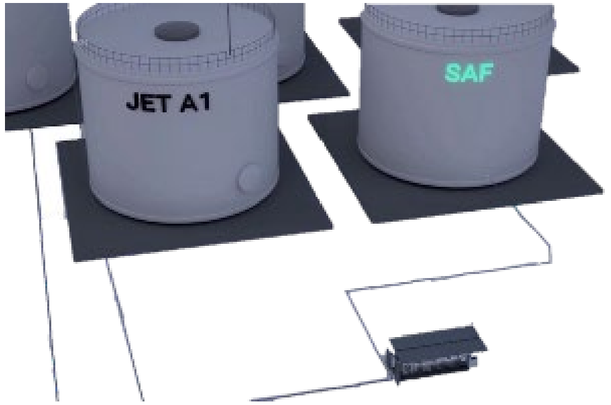
EASY ENGINEERING TIE-IN INTEGRATIONS & OPERATIONS

1 Standalone



Blend throughput
- 2,160,000 litres/day per unit
- Higher capacity can be configured

2 Bulk Tank Integration



Blend throughput
- Depends on tank capacity
- Higher capacity can be configured
- OR multi-units integrated for scaleup

HOW WE SIMPLIFY FOR AIRPORT FUEL OPERATORS

Sustainable competitive advantage in a fast-growing market

80% ↓

Cheaper VS constructing new tanks

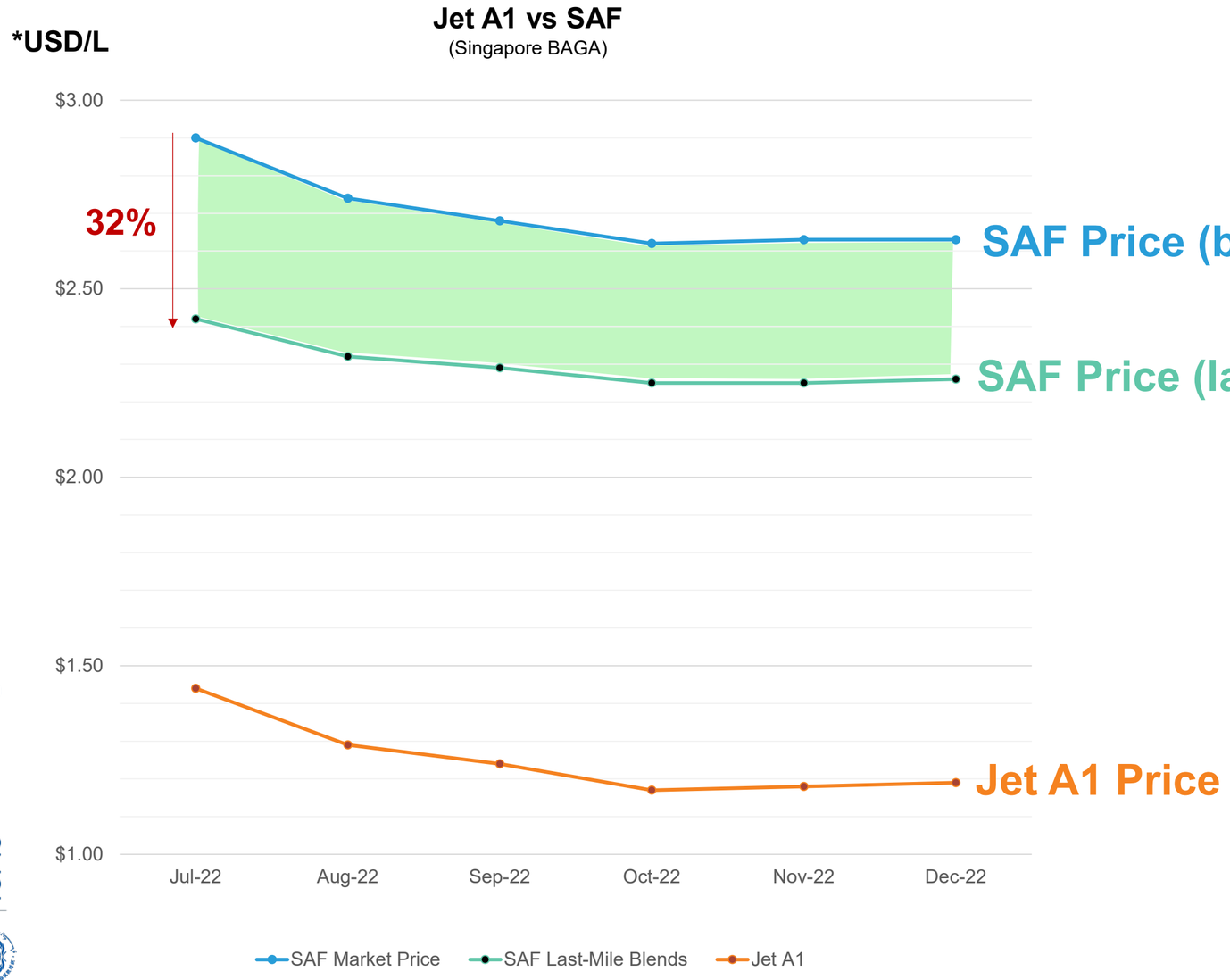
83% ↓

Faster VS constructing new tanks

93% ↓

Faster in blending order fulfilment time

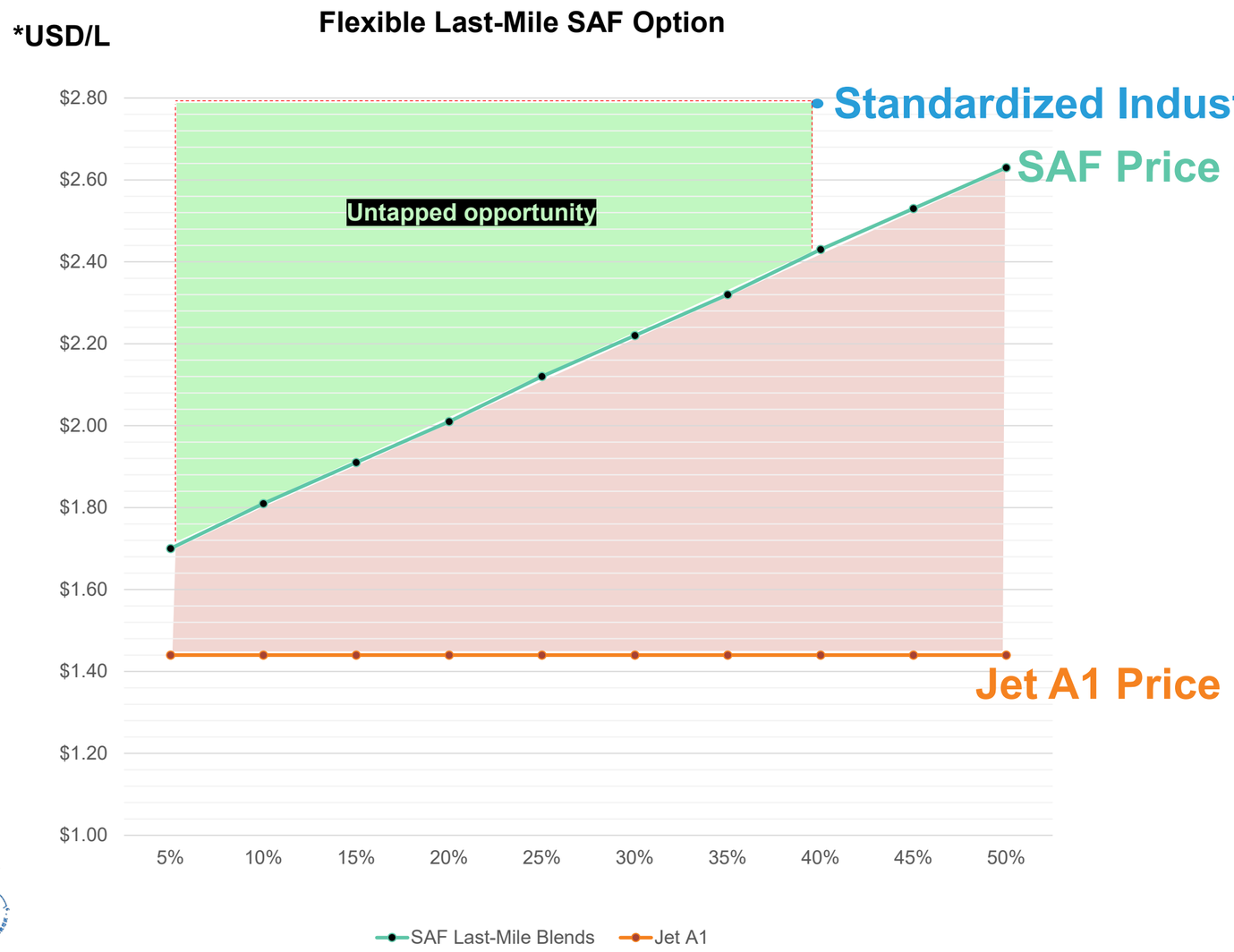
PRICE COMPARISON 6-MONTH ANALYSIS



Assumptions: Batch size 20kL; ASTM USD0.09/L; Uplift USD0.07/L; Blend ratio 40%

1. Average 32% savings in SAF procurement for the same emission reduction attributes.
2. Last-mile blending offers a strategic approach to SAF procurement, enhancing economic viability and industry adoption.
3. Competitive SAF pricing.

FLEXIBLE BLENDS & REDUCED COST OF ADOPTION



Assumptions: Batch size 20kL; ASTM USD0.09/L; Uplift USD0.07/L; Jet A1 USD 1.44/L

1. Scalable SAF adoption according to flyer's appetite.
2. A gradual and acceptable approach to introduce SAF to flyers.
3. Flexibility and control fully managed by flyers directly.
4. Untapped opportunity to scale SAF adoption.
5. An option for lower cost adoption.

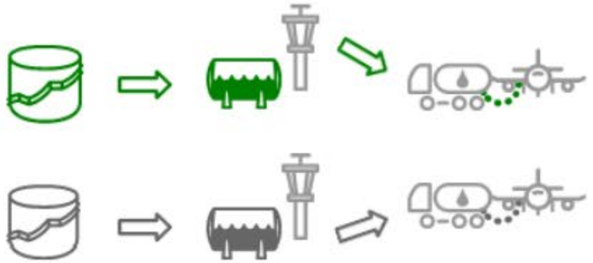
SAF LOGISTICS: CHAINS OF CUSTODY

ACT-SAF #7 SERIES

Examples of chains of custody for SAF

Three distinct supply methodologies are available:

Segregation



Physical segregation to traditional jet fuel all the way to wing tip.

- ⊕ Physical delivery to customer
- ⊕ Variable cost of SAF products and credit generation
- ⊕ Operationally flexible and scalable
- ⊖ Higher cost for separate infrastructure and transport

Mass balance

Co-mingled in airport storage or pre-airport pipelines.

- ⊕ Using existing infrastructure
- ⊕ Enable a Lower carbon footprint than a segregated supply chain
- ⊖ Higher carbon footprint than **book** and **claim**

Book and claim

Most efficient supply chain used. Product does not get delivered to customer location.

- ⊕ Using existing infrastructure
- ⊕ Enables reduction in logistics cost and carbon emissions
- ⊖ Not eligible for most local incentive schemes or regulatory measures

Renewed capability to optimise physical supply chain and credit generation

SAF JOURNEY: FROM VISION TO REALITY

2008

SAF is introduced to aviation with the first flight

2017

Growing contributions from airports to partake in SAF efforts

2018

Feasibility studies for on-site production and blending

2020

book and claim gain traction in addressing supply shortages

2024

IATA SAF Handbook highlighting the viability of blending at airports

2024 & beyond

Scaling production and enhancing supply chain readiness across more markets

CATALYST TO MORE SAF PROJECTS

Supply chain infrastructure readiness

- Airports develop capability in SAF blending, storage and supply
- Administrative and physical tracking of SAF becomes available for airlines

Regional SAF production capacities

- Incentivising suppliers to prepare for production at supply chain ready markets
- Building SAF value chain within a single market
- Custom SAF blends can be tailored to the airport ecosystem

Mass SAF adoption

- More suppliers readily available will lead to better cost economics leading to higher offtake
- Mutually beneficial for the aviation industry

Creating a robust SAF supply chain can be cost-effective for aircraft operators and flyers


FLYORO
UNLOCKING
THE FUTURE OF BLENDS
T-5201
CRUDE OIL
T-5201

Thank You

ICAO