

Sustainable Aviation Fuels Roles of Airports & Networks

Erin Cooke

Sustainability, Resilience & Health

<https://www.flysfo.com/environment/your-gateway-green-travel>

SFO

Overview

1. Context – About SFO

2. Airport Role

- Baseline the Impact & Forecast the Growth
- Set the Ambition – Commission Policy
- Study Areas of Impact – Logistics, Supply Chain, Financing, Advocacy
- Connect to Co-Benefits
- Build Awareness & Future Buyers
- Monitor Competition & Progress – Form Coalitions

3. Coalition Roles

- Streamline & Share the Roadmap
- Advocate & Fund to Fill Gaps
- Broaden Incentives

Context



By the Numbers



Pre-COVID

- 58 Million Annual Passengers
- 13,000,000 sf facilities
- 210,656 landings
- 48 airlines
- 561,806 metric tons cargo

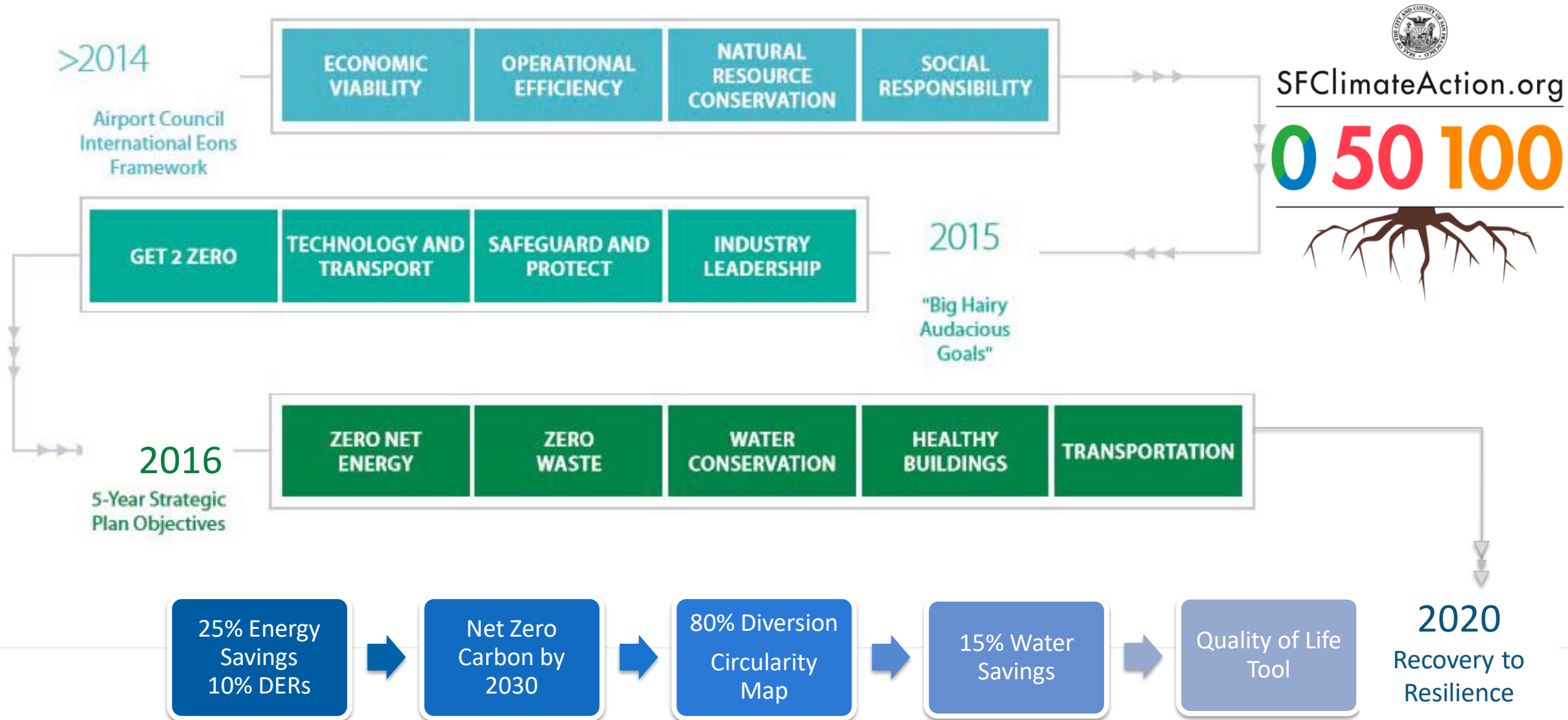
Direct Economic Impact

- \$8.4 Billion in business activity
- 42,800 jobs

Land Use


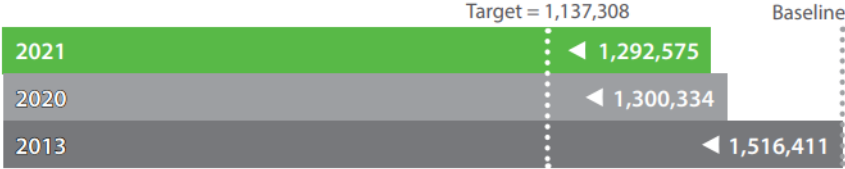


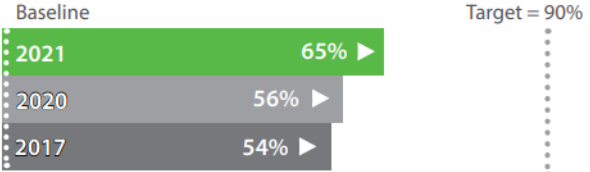


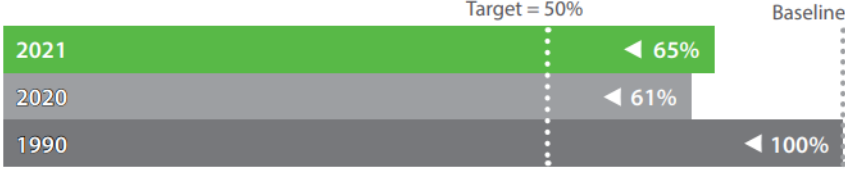





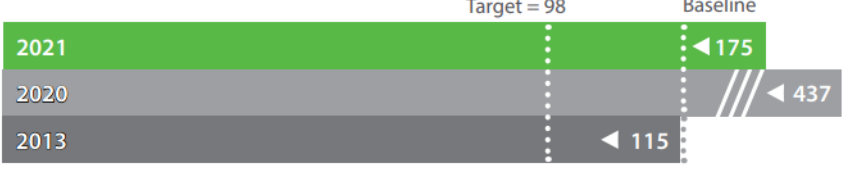

- 5,200 acres total area
- 2,700 acres (Operational use)
- 2,500 acres (Natural tidelands and undeveloped land)

Zero Program Overview



2021 ZERO ANNUAL REPORT

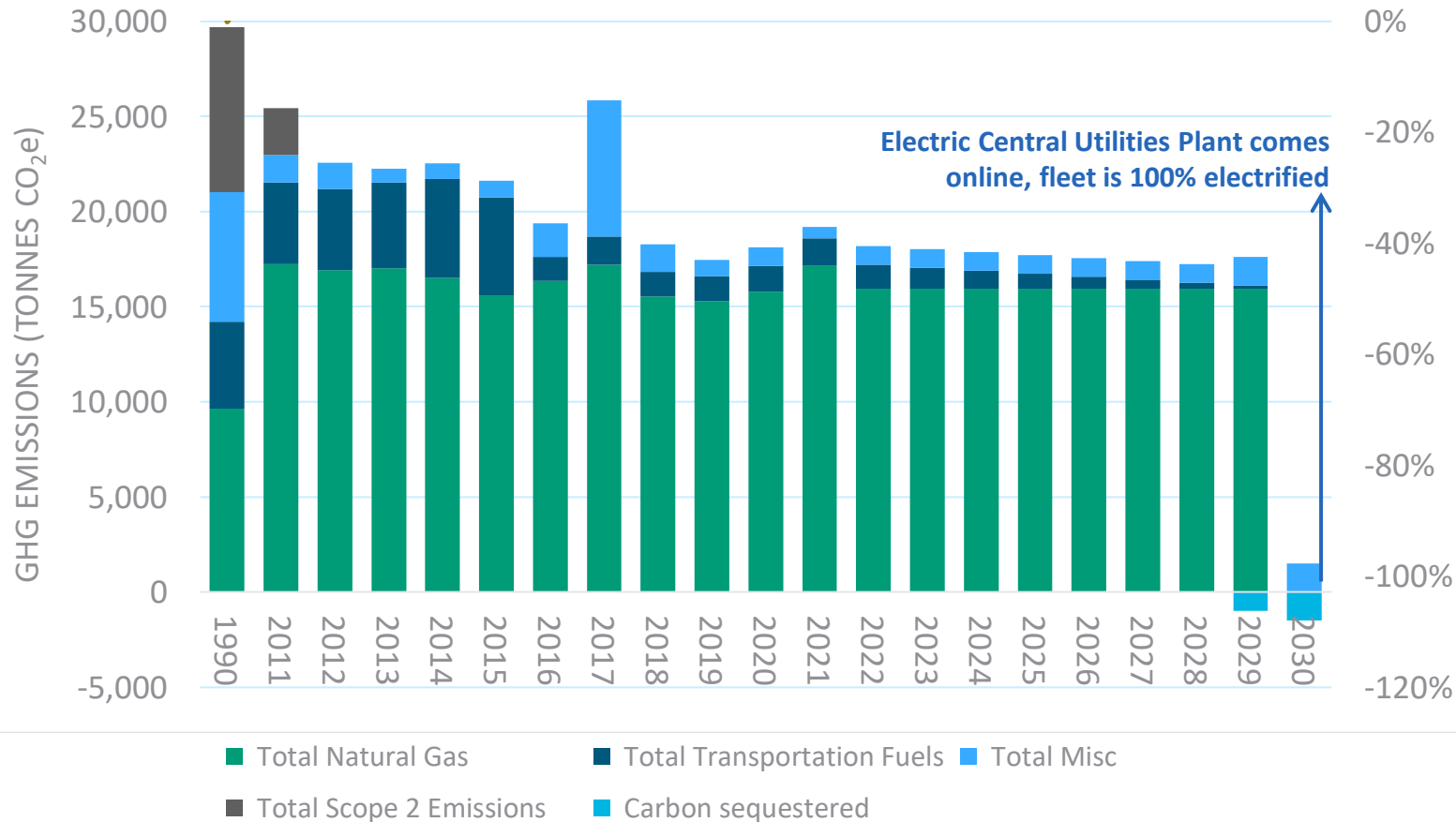


TARGET	ZERO PROGRAM PROGRESS	OVERALL STATUS	ANNUAL PROGRESS (2021 vs 2020)
 <p>Zero Net Energy Reduce energy consumption 25% below 2013 Units: mmbtu</p>		 <p>15% reduction of 25% target achieved</p>	<p>1% energy use reduction</p>
 <p>Zero Waste Divert 90% of terminal waste from landfill each year Units: percent</p>		 <p>65% diversion of 90% target achieved</p>	<p>9% waste diversion rate increase (recycling and composting)</p>
 <p>Carbon Neutrality Reduce scope 1 & 2 GHG emissions by 50% from 1990 Units: percent</p>		 <p>35% reduction of 50% target achieved</p>	<p>4% carbon emissions increase¹</p>
 <p>Healthy Buildings Certify 18 eligible projects from 2017 Units: Green Building Cert.</p>		 <p>17 certifications of 18 target achieved</p>	<p>2 Green Building Certifications achieved</p>
 <p>Water Conservation Achieve 15% reduction per passenger per year from 2013 Units: gal/passenger</p>		 <p>0% reduction of 15% target achieved²</p>	<p>2% campus water use reduction² 228% water use per passenger reduction³</p>

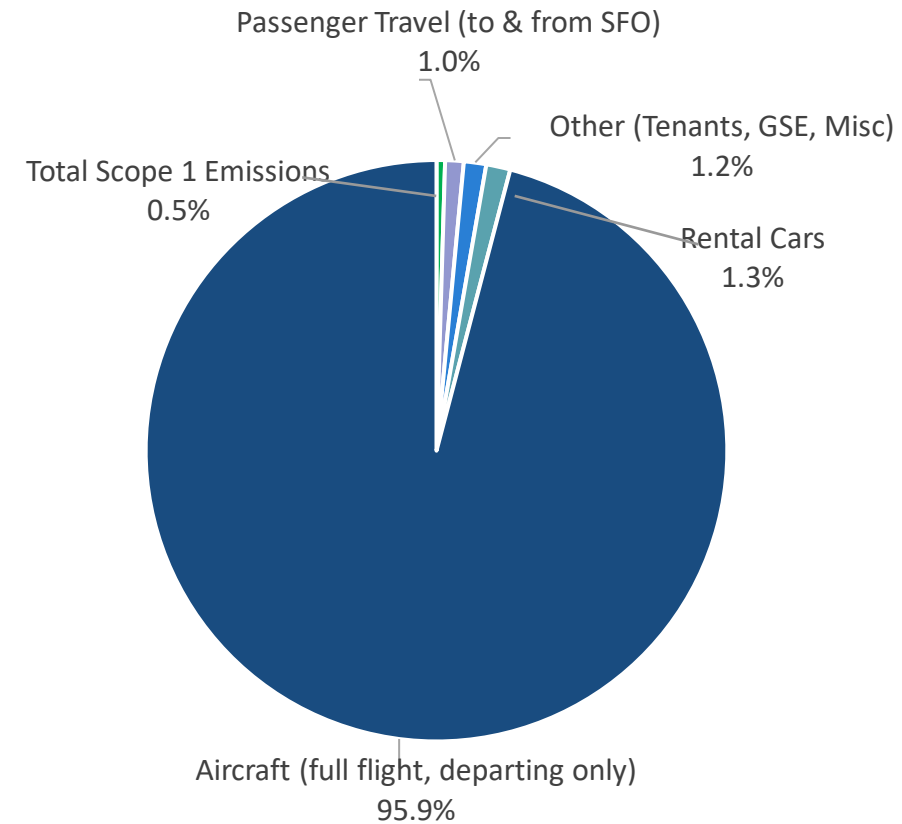
¹2021 greenhouse gas emissions exceeded 1990 baseline due to an additional 32,000sf from Terminal 1 Center and Boarding Area B projects, a gas meter leak at the terminal Central Utility Plant and inclusion of renewable diesel fleet emissions. ²Campus water use is 48% below 2013 levels with 2% reduction seen in 2021. ³2021 water use per passenger exceeded the 2013 baseline primarily due to 2021 passenger traffic is down 46% from 2013.

Zero Carbon: Define Pathway

SFO's Path to Net Zero Carbon



SFO 2021 Emissions

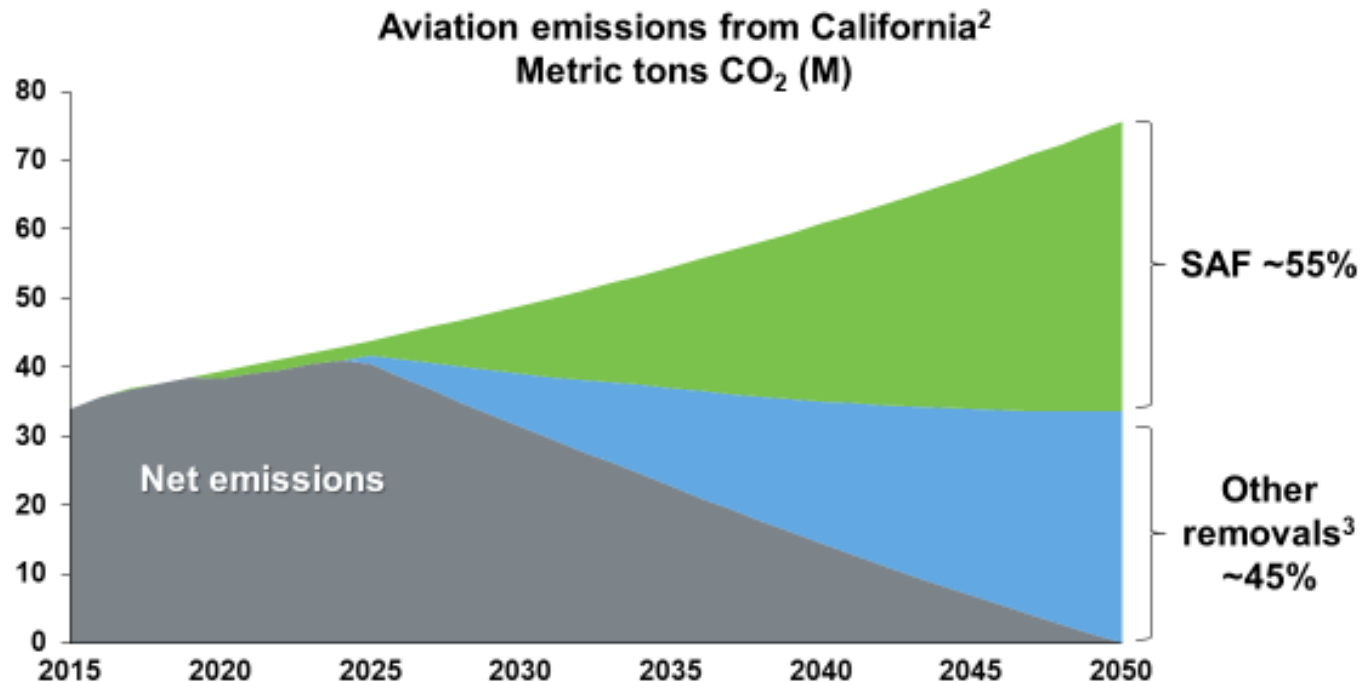


Airport Role



Airports Can... Forecast the Growth

SAF is the largest driver to enable aviation decarbonization¹



¹ World Economic Forum, Clean Skies for Tomorrow, *SAF as a Pathway for Net-Zero Aviation*, November 2020

² Flights departing from California airports, analysis performed pre-COVID

³ Includes carbon capture & sequestration and carbon offsets

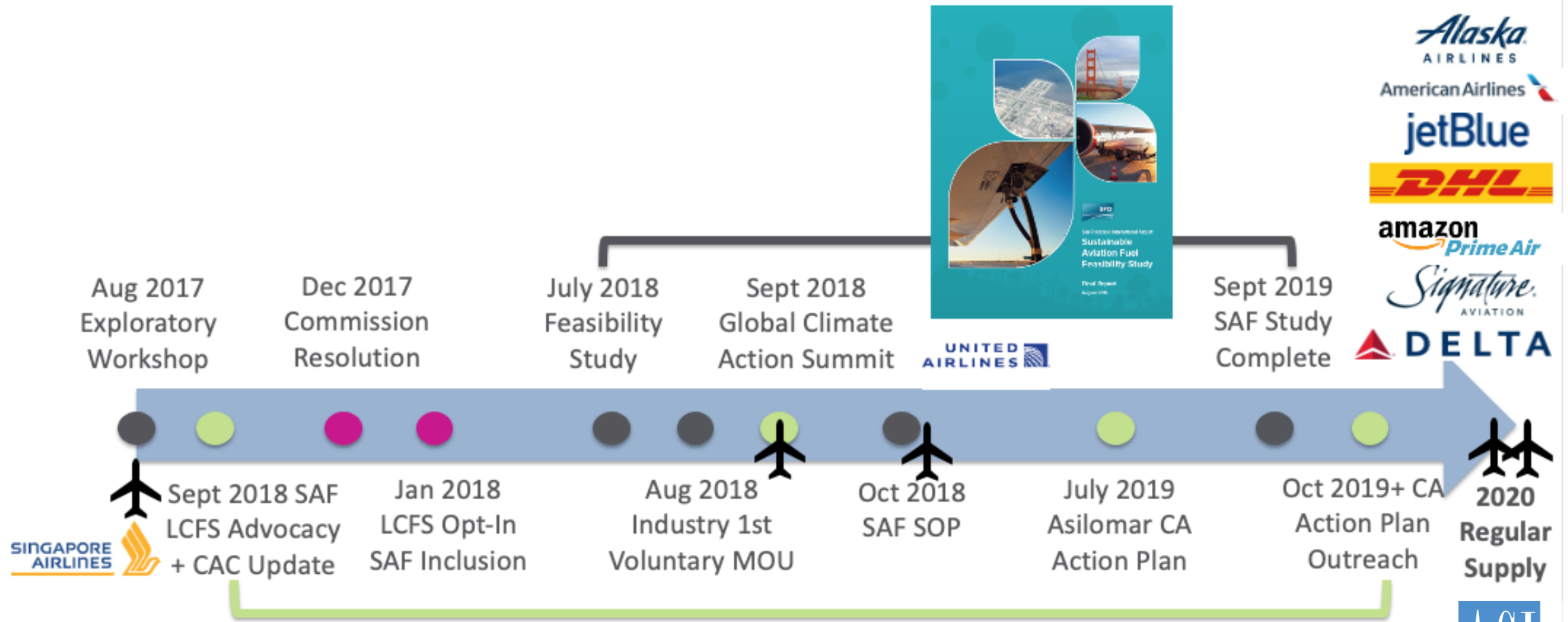
Federal SAF Grand Challenge Targets

- Produce 3BG/yr by 2030
- Develop Support Funding \$4.3B
- Produce 35BG/yr by 2050

CA Targets

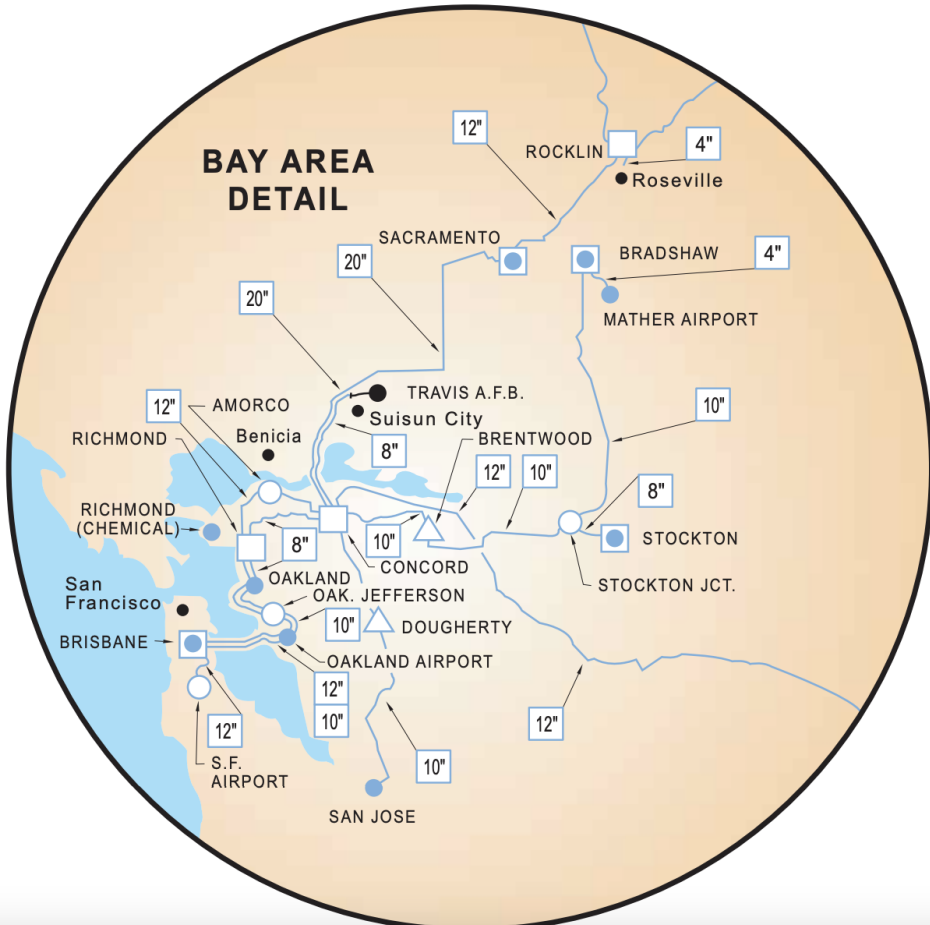
- Currently 17% US Jet Fuel Demand
- 2022 SAF Supply = 13MG
- 2030 SAF Target (17%) = 510MGY
- 2045 SAF Garget = 5.95BGY

Airports Can...Invite All Players & Host the Dance



KEY: SAF Flights @ SFO Advocacy Activity Policy

Airports Can... Study Areas of Impact



SFO Goal: 5% SAF by 2025 – 60MGY ~48MMTCO₂e

	Short Term 3-5 Years	Mid Term 5-10 Years	Long Term 10+ Years
Conventional Jet Volumes Per Year	1.2–1.4 billion gallons	1.4–1.8 billion gallons	1.8+ billion gallons
SAF Volumes Per Year	0–30 million gallons	30–300 million gallons	300+ million gallons
SAF Production Source	Existing and Planned Facilities (US, Global)	Demand/Price Induced (West Coast, Global)	Mainstream Production (California)
SAF Neat Delivery Modes to Blending	Truck, Ship	Ship, Truck	Truck, Pipeline
Pipeline Delivery to SFO Fuels	KM	New Cross Bay	Pipeline

Learn more by visiting our [SFO SAF Webpage](#)



Airports Can... Connect to Non-CO2 / Co-Benefits

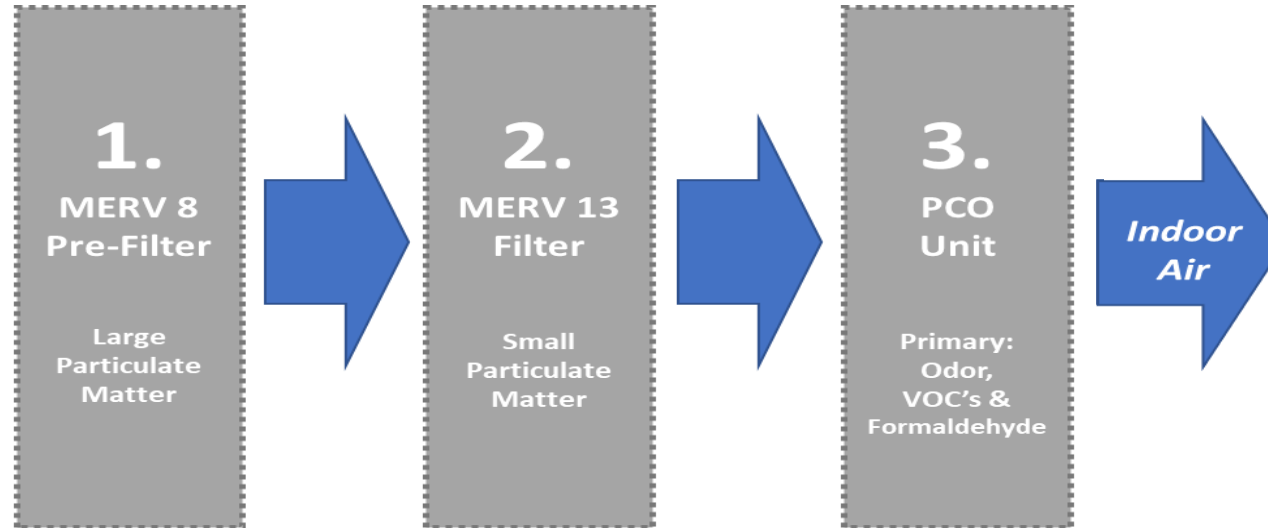


fitwelSM

Parksmart



LIVING BUILDING CHALLENGESM



Notes:

PCO = Ultra-Violet Photocatalytic Oxidation
 BPS = Bonded Particulate Structure
 VOC = Volatile Organic Compound

- Naphthalene: 0.053 $\mu\text{g}/\text{m}^3$
- Formaldehyde: 9 $\mu\text{g}/\text{m}^3$

Advanced Filtration		
	BAB	TIC
BENEFIT	Improved Indoor Air Quality	
EUI IMPACT	~0.25	



Final Report
 Air Quality Report for San Francisco International Airport

Randy Maddalena, Ling Jin, Srinandini Parthasarathy
 Lawrence Berkeley National Lab

Jasenka Rakas
 University of California, Berkeley

October 10, 2015

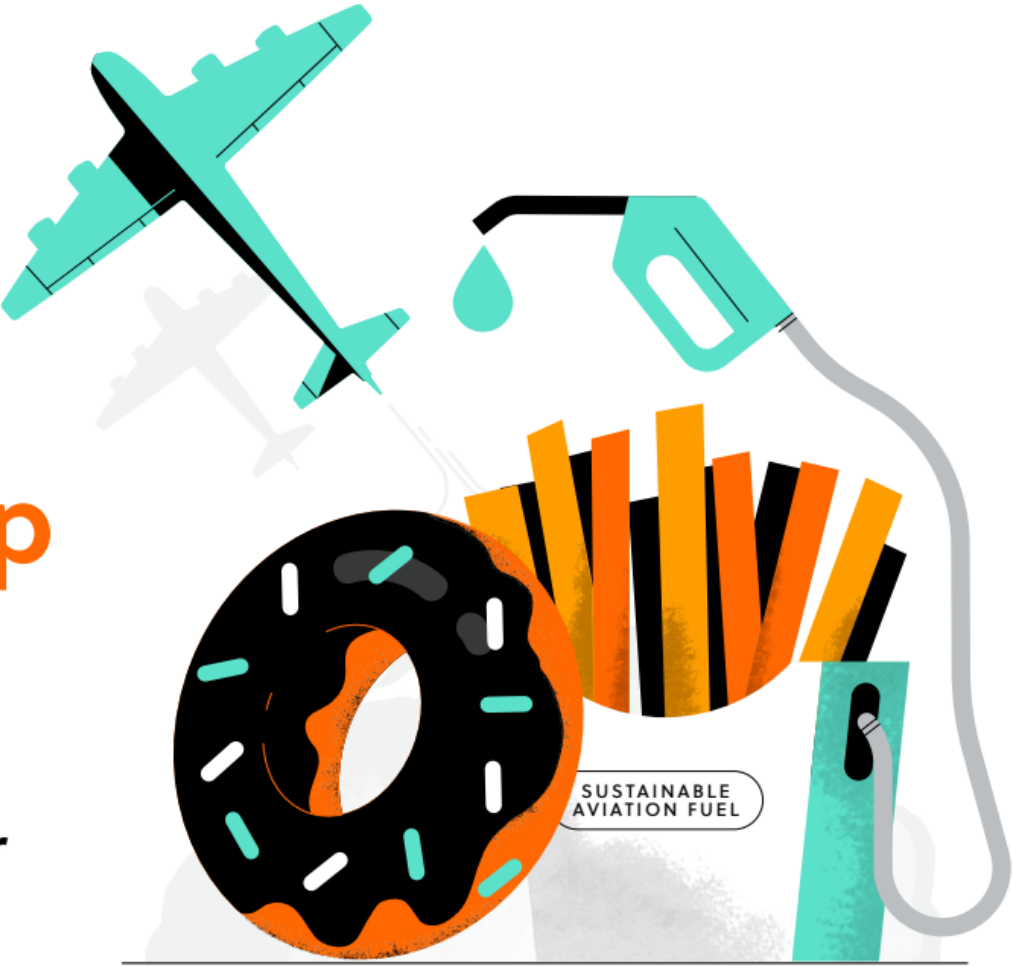
University of California at Berkeley
 National Center of Excellence for Aviation Operations Research (NEXTOR II)
 Institute for Transportation Studies
 107B McLaughlin Hall
 Berkeley, CA 94720
 Tel: (510) 642-9064 Fax: (510) 642-1246

Airports Can... Build Awareness & Future Buyers



We're fueling up sustainably.

Fuel made from fat creates 80% cleaner skies. Thanks for your service, food grease!



Airports Can... Monitor (Global) Progress

Facility	Location	Capacity (t)	Gallons	Online
Redrock	Lakeview OR	46,000	34,410,389.61	Planned
Indaba RE Fuels	CA	267,000	199,729,870.13	Planned
Phillips 66	Rodeo, CA	220,000	164,571,428.57	Planned
Aemetis	Riverbank, CA	129,000	96,498,701.30	Planned
Gevo	Lake Preston, SD	129,000	96,498,701.30	Planned
Fulcrum	Reno, NV	33,000	24,685,714.29	Planned
Neste	Rotterdam	500,000	374,025,974.03	Planned
World Energy	Paramont, CA	430,000	321,662,337.66	Expanding
Neste	Porovo	100,000	74,805,194.81	Operating
TOTAL			1,386,888,311.68	

Sustaining Leadership

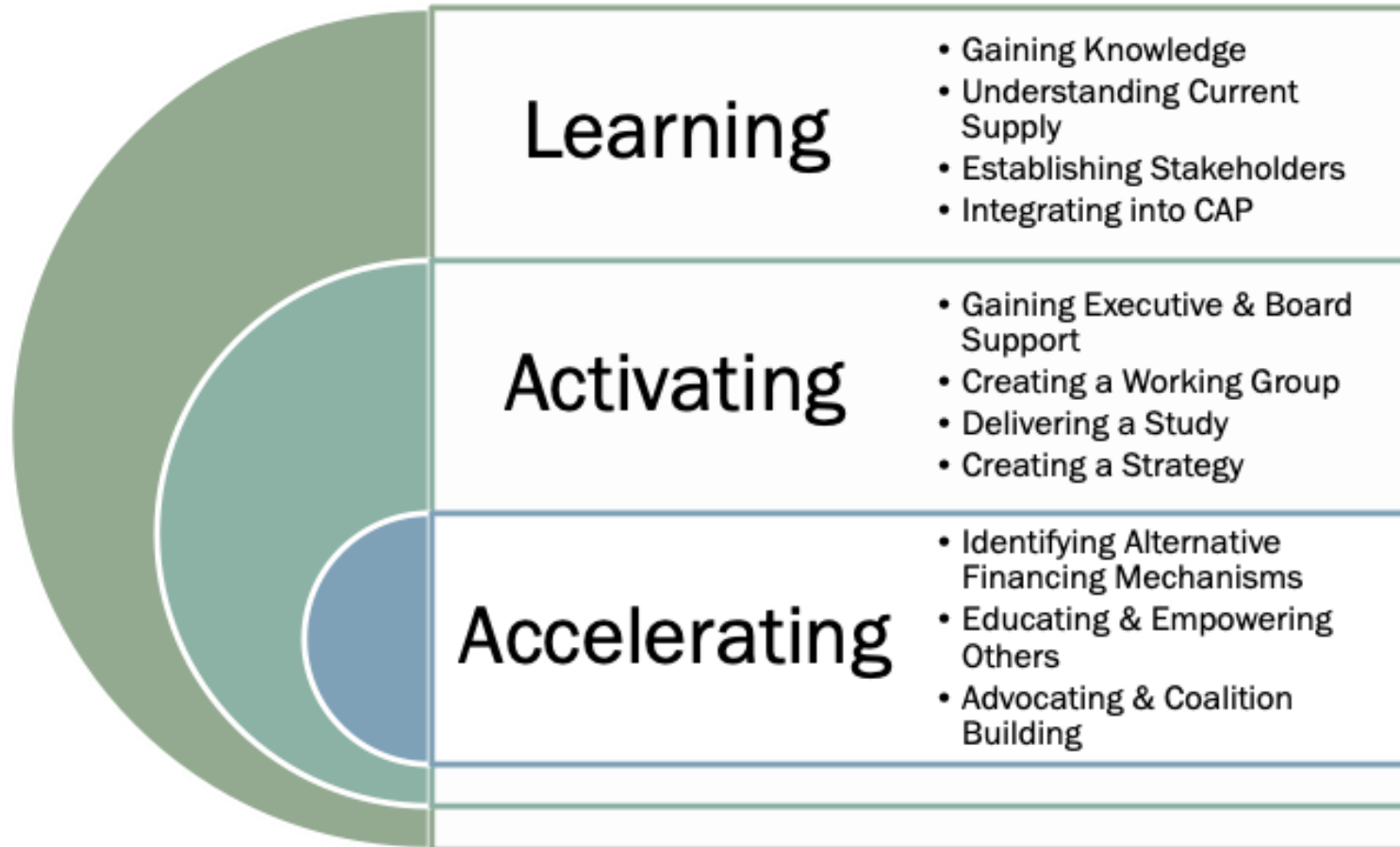
- Europe Competition— Incentives/Mandates
- Getting to 100% SAF - Infrastructure
- Innovative Financing – LCFS, Co-Benefits



Coalition Role



Coalitions Can... Streamline & Share the Roadmap



Navigation

- Executive Summary
- Background
- Airport Engagement Models
- Resource Toolkit
- Case Studies

Coalitions Can... Study & Broaden Incentives

Airport



Region



Market

Pollutant	Emission Factor (lb/10 ³ gallons)	AP-42 Table	Publication Date
CO	4.8	1.3-1	09/98
NO _x	17.4	1.3-1	09/98
SO ₂	41.1	1.3-1	09/98
VOC	0.7	1.3-3	09/98
PM10 (Filterable)	1.08	1.3-7	09/98
PM2.5 (Filterable)	0.83	1.3-7	09/98
PM Condensable	1.3	1.3-2	09/98



Monetized Value of SAF benefits

	Lbs./10k gallons	Lbs./facility	tons/facility	Value
SO ₂	41.1	205500	102.75	\$ 1,695,375
PM (all)	3.21	16050	8.025	\$ 132,413
PM 80%*	2.568	12840	6.42	\$ 105,930.0
Subtotals	44.31	221550	110.775	\$ 1,801,305
			per gallon	\$ 0.36

Sustainable Aviation Fuel:

Greenhouse Gas Reductions from
Bay Area Commercial Aircraft

October 2020

Prepared for:



Prepared by:



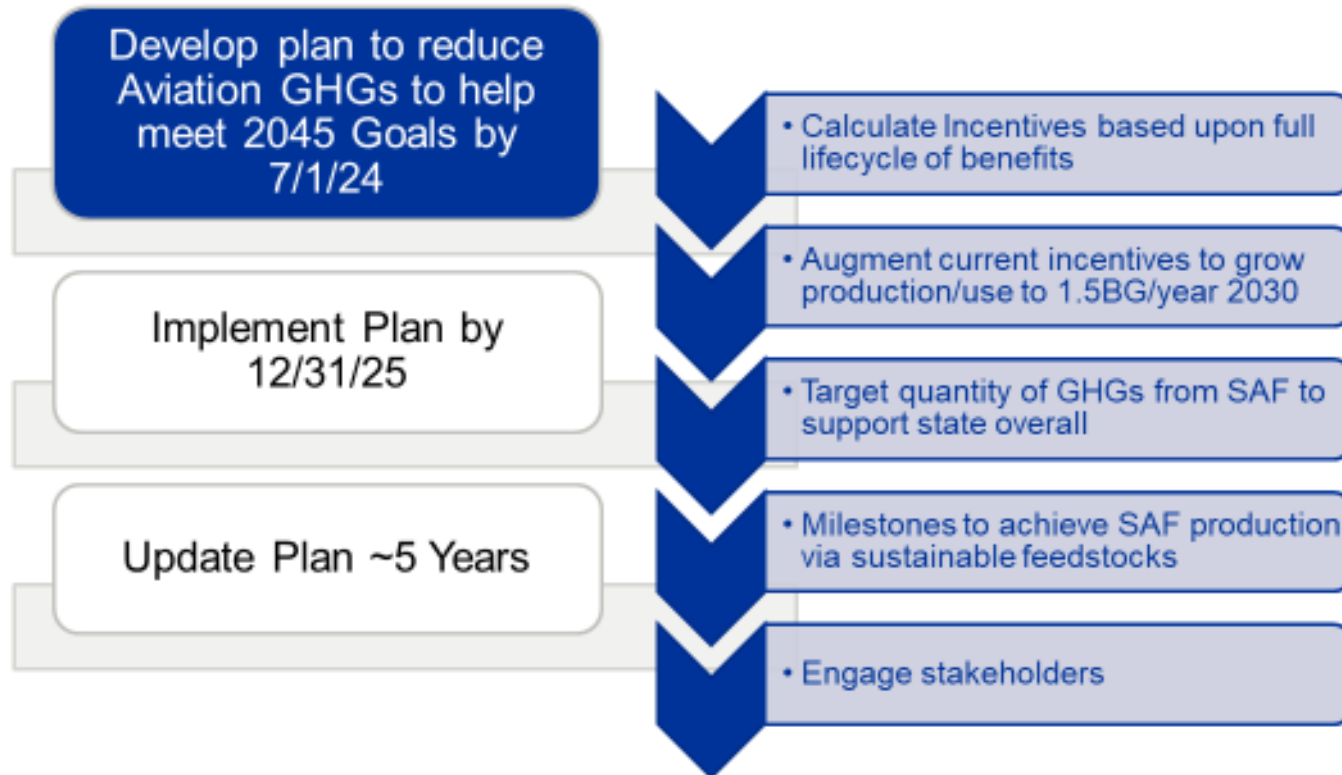
- 100% elimination of Sulfur and 80% reduction in PM
 - PM and SO_x \$16,500 value per ton in California
- https://www.epa.gov/sites/production/files/2015-07/documents/fullreport_rev_a.pdf

<https://www.baaqmd.gov/~/media/files/planning-and-research/research-and-modeling/saf-report-final-for-distribution-to-baaqmd-pdf.pdf?la=en>

SFO

Coalitions Can... Advocate & Fund to Fill the Gaps

AB1322: California Global Warming Solutions Act of 2006: Aviation GHG Reduction Plan



Governor's Exec Order

Achieve 20% non-combustion in aviation sector by 2045, with the remaining demand met with SAF

CARB 2022 Scoping Plan

20% aviation demand with electricity & hydrogen in 2045, most or rest of aviation fuel demand with SAF

Thank you.

