Sustainable Aviation Fuels

Roles of Airports & Networks

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Sustainability, Resilience & Health

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

SFO

Overview

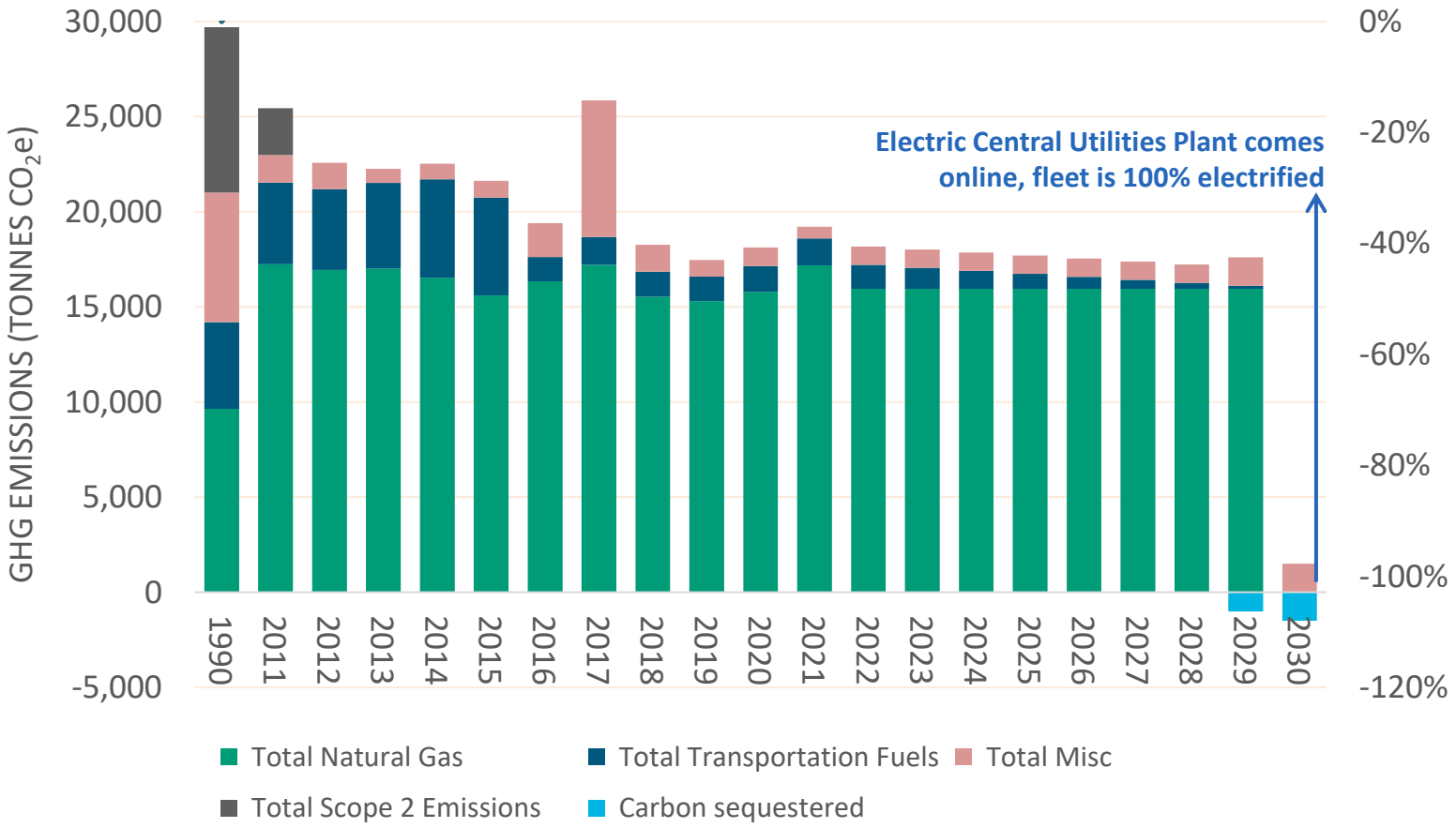
1. Airport Role
   - Baseline the Impact & Forecast the Growth
   - Set the Ambition – Commission Policy
   - Send Demand Signal – (MOU) Aggregate Demand
   - Onboard Airport Stakeholders – Fuel Consortium, Station Staff, Safety
   - Study Areas of Impact – Logistics, Supply Chain, Financing, Advocacy
   - Build Awareness
   - Monitor Competition & Progress – Form Coalitions

2. Coalition Roles
   - Streamline & Share the Roadmap
   - Advocate & Fund to Fill Gaps
   - Broaden Incentives

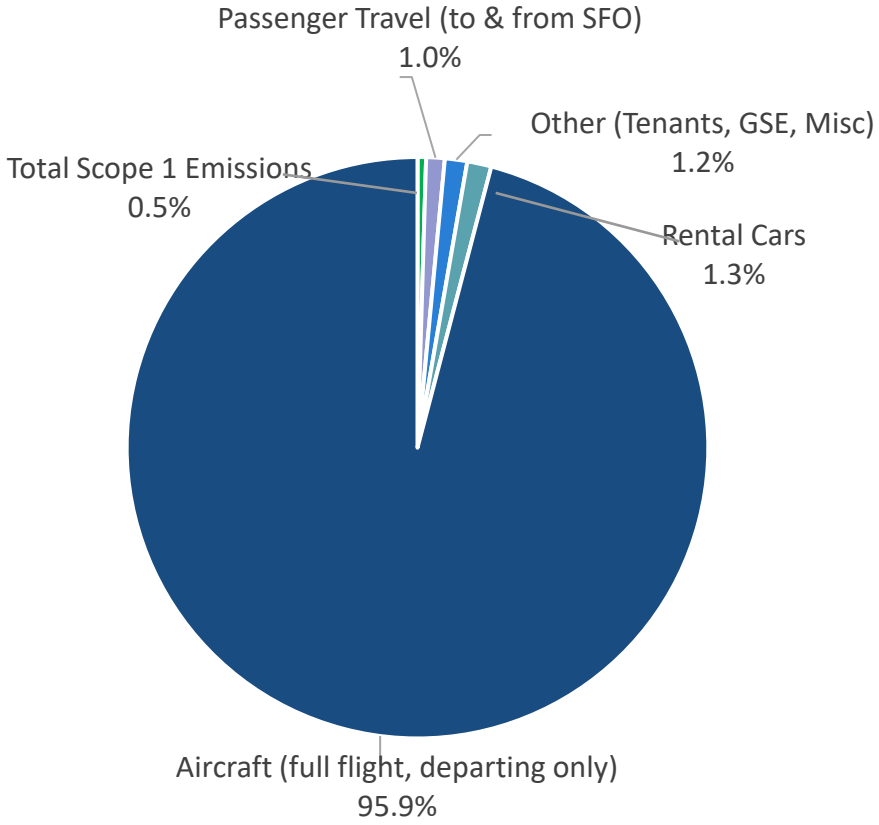
Airport Role

Airports Can… Baseline the Impact

SFO's Path to Net Zero Carbon

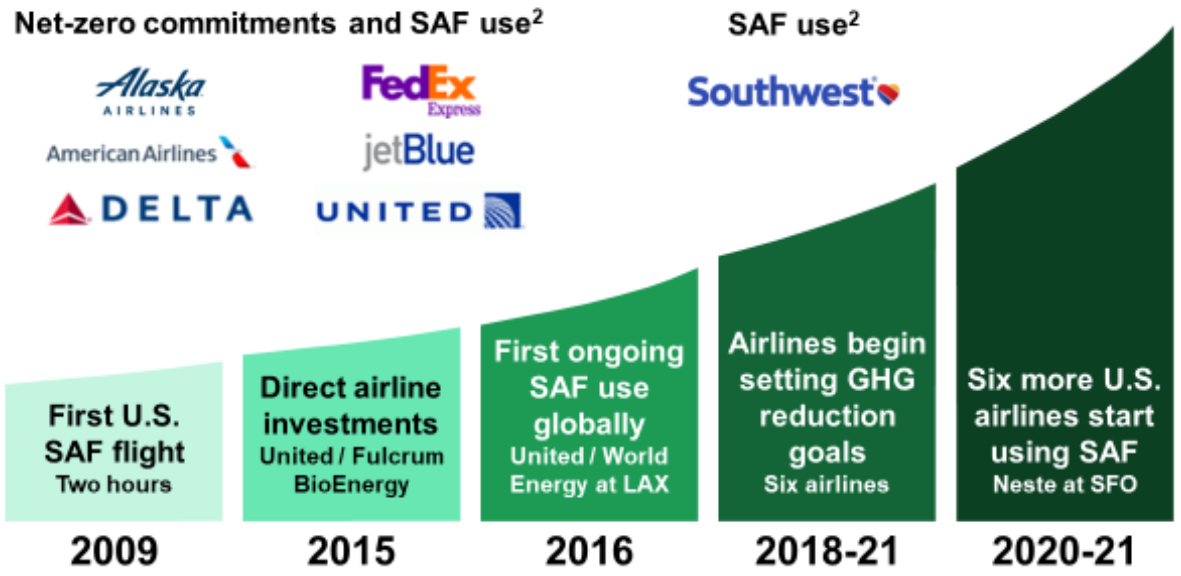


SFO 2021 Emissions



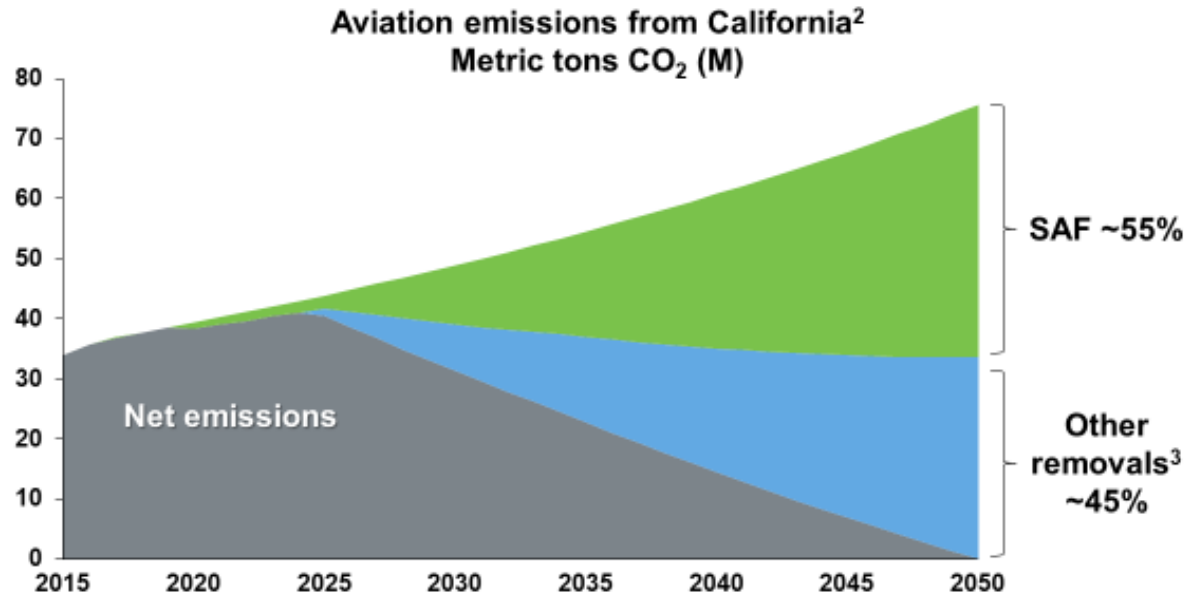
Airports Can…Set the Ambition & Socialize the Impact

80% of U.S. airlines[1] have committed to carbon neutrality, with SAF progress accelerating



[1] As a percentage of 2019 U.S. airline fuel consumption
[1] FedEx and Southwest have SAF purchase agreements with Red Rock Biofuels, which is expected to begin production later this year

SAF is the largest driver to enable aviation decarbonization[1]



[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

Airports Can…Send the Demand Signal

Aug 2017 Exploratory Workshop

Dec 2017 Commission Resolution

July 2018 Feasibility Study

Sept 2018 Global Climate Action Summit

Sept 2019 SAF Study Complete

Sept 2018 SAF LCFS Advocacy + CAC Update

Jan 2018 LCFS Opt-In SAF Inclusion

Aug 2018 Industry 1st Voluntary MOU

Oct 2018 SAF SOP

July 2019 Asilomar CA Action Plan

Oct 2019+ CA Action Plan Outreach

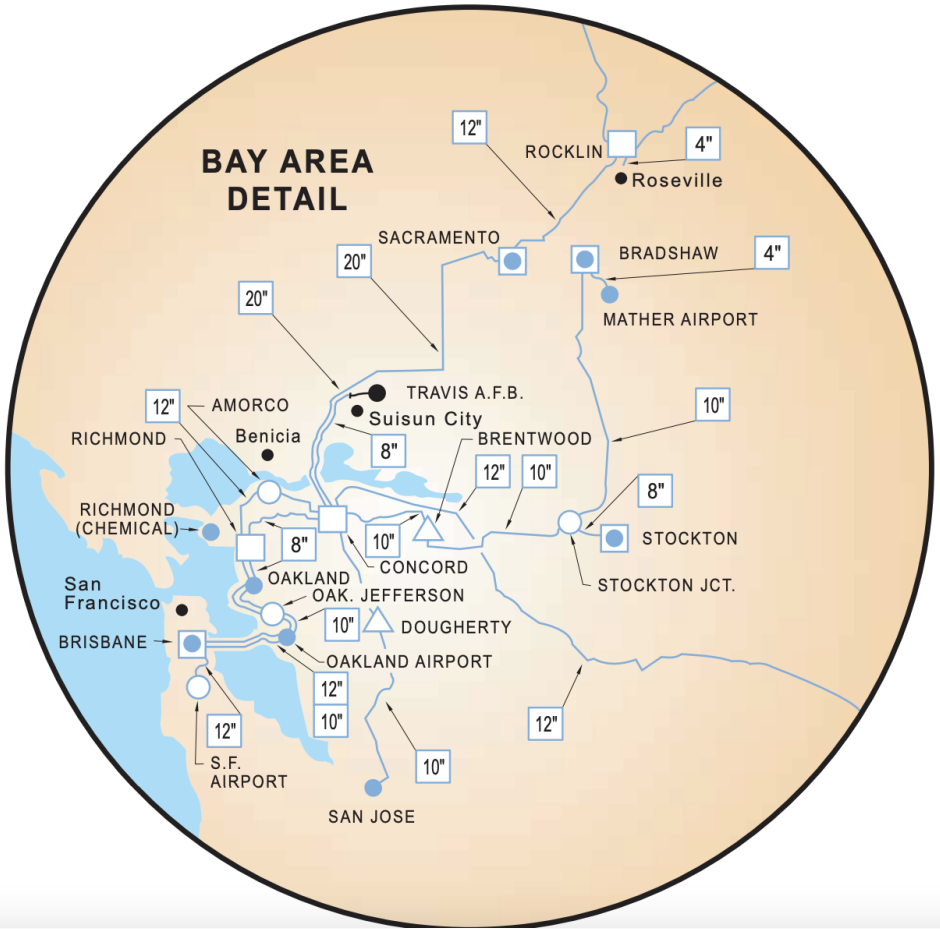
2020 Regular Supply

KEY: SAF Flights @ SFO | Advocacy Activity | Policy

Alaska Airlines
American Airlines
jetBlue
DHL
amazon Prime Air
Signature Aviation
DELTA
United Airlines
Singapore Airlines

ACI North America
Airports Council International

Airports Can… Study and Scale Infrastructure Requirements



SFO Goal: 5% SAF by 2025 – 60MGY ~48MMTCO$_2$e

	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			
Pipeline Delivery to SFO Fuels	KM	New Cross Bay	

Learn more by visiting our [SFO SAF Webpage]

Airports Can… Build Awareness

Airports Can… Benchmark 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

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

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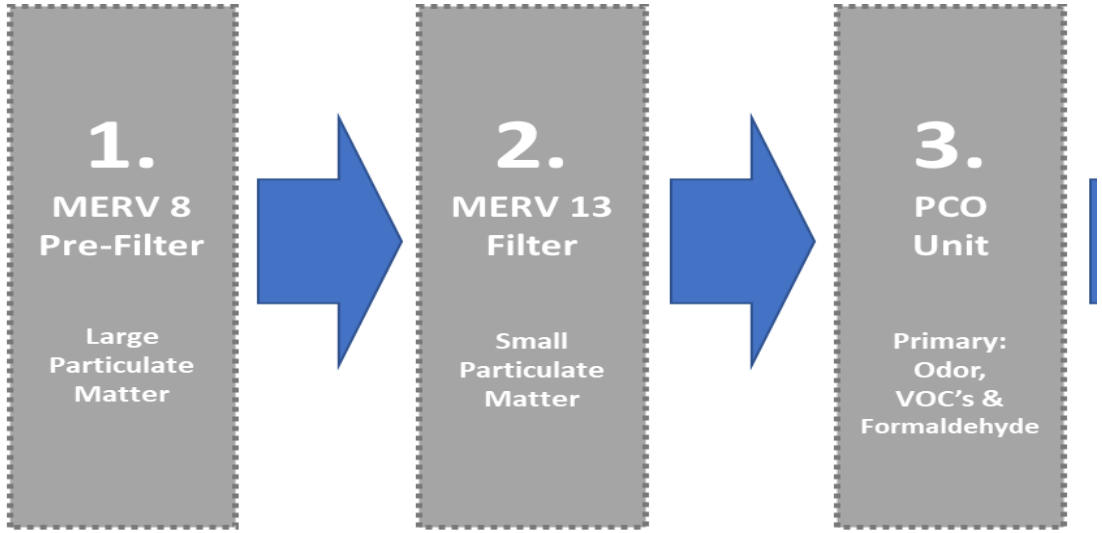
Airports Can… Connect to Co-Benefits



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

- Naphthalene: 0.053 µg/m^3
- Formaldehyde: 9 µg/m^3

Advanced Filtration		
	BAB	**T1C**
BENEFIT	Improved Indoor Air Quality	
EUI **IMPACT**	~0.25	

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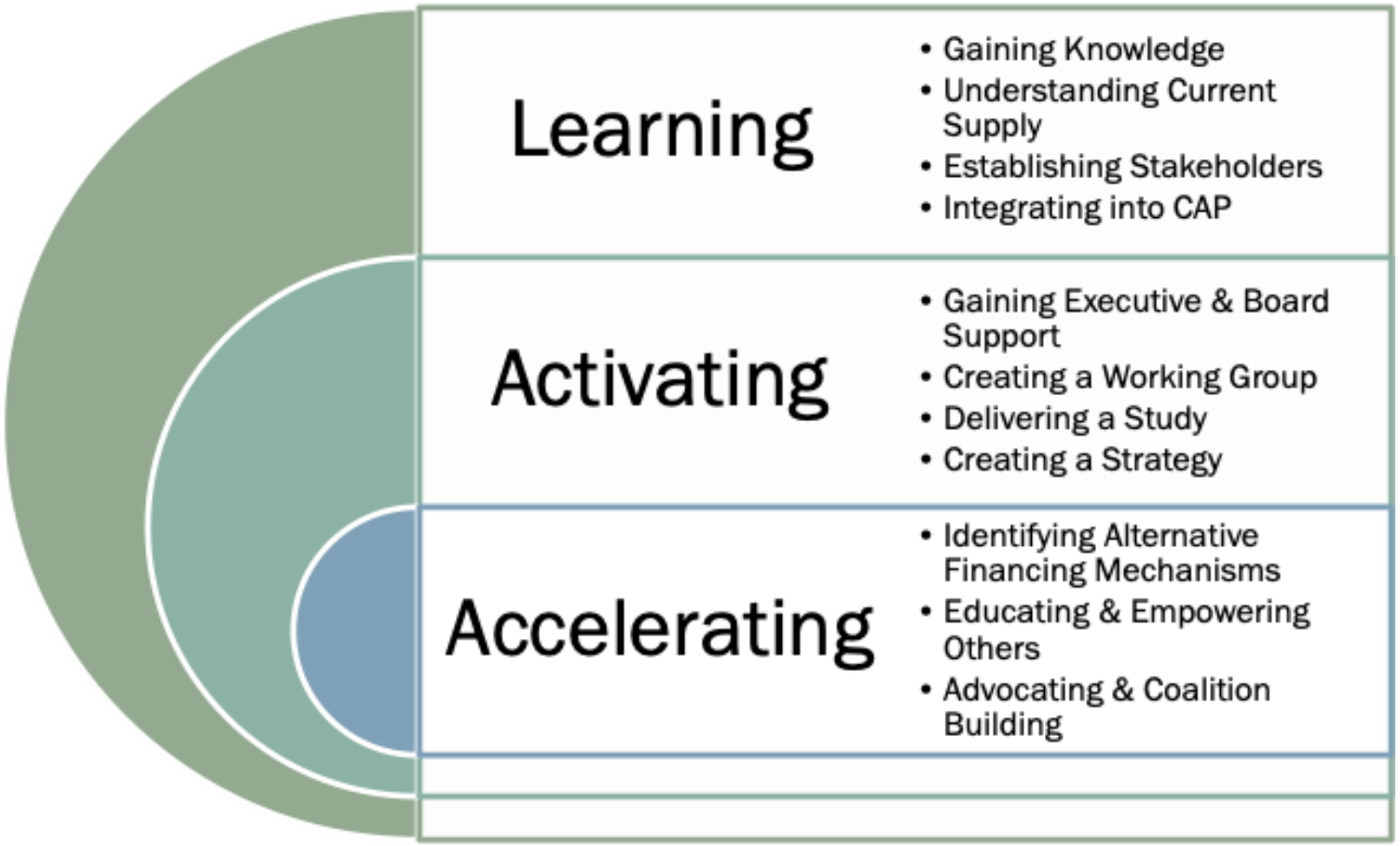
airport carbon accreditation
MAPPING | REDUCTION | OPTIMISATION | NEUTRALITY

Coalition Role

Coalitions Can… Streamline & Share the Roadmap

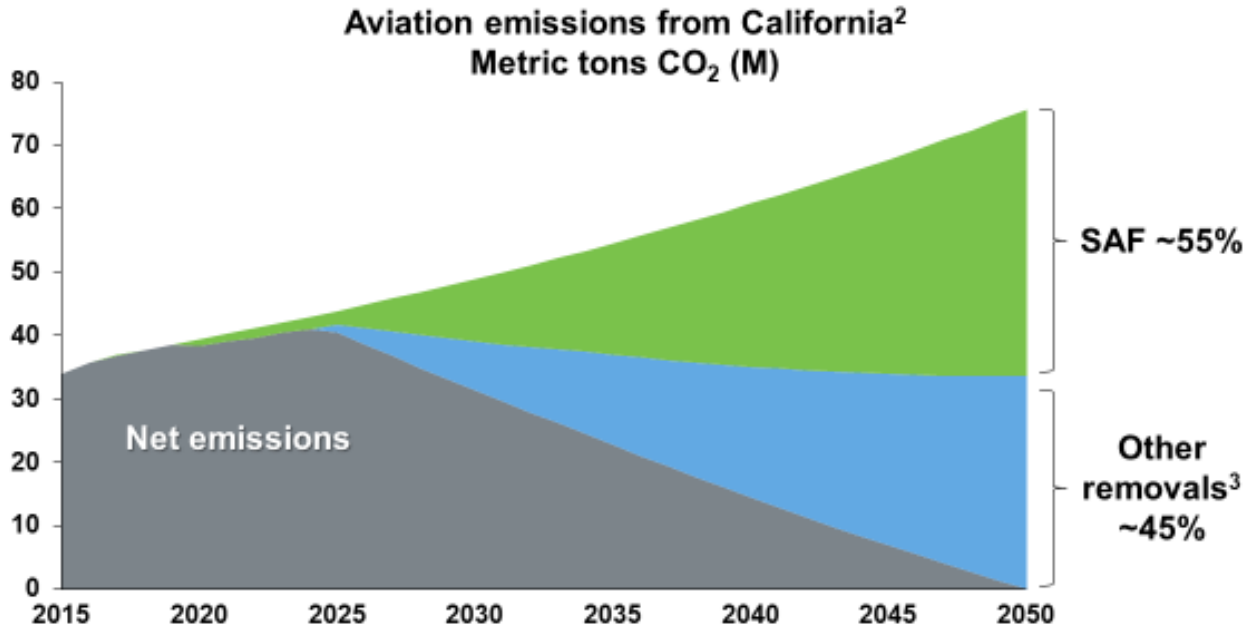


Navigation

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

Coalitions Can… Advocate & Fund to Fill the Gaps

SAF is the largest driver to enable aviation decarbonization[1]



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

Develop plan to reduce Aviation GHGs to help meet 2045 Goals by 7/1/24

- Calculate Incentives based upon full lifecycle of benefits
- Augment current incentives to grow production/use to 1.5BG/year 2030

Implement Plan by 12/31/25

- Target quantity of GHGs from SAF to support state overall

Update Plan ~5 Years

- Milestones to achieve SAF production via sustainable feedstocks
- Engage stakeholders

Coalitions Can… Study & Broaden Incentives

Airport

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
SO2	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

- 100% elimination of Sulfur and 80% reduction in PM
- PM and SOx $16,500 value per ton in California

https://www.epa.gov/sites/production/files/2015-07/documents/fullreport_rev_a.pdf

Region

Sustainable Aviation Fuel:

Greenhouse Gas Reductions from Bay Area Commercial Aircraft

October 2020

Prepared for: Bay Area Air Quality Management District

Prepared by: gna Gladstein, Neandross & Associates

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

Market

SABA
SUSTAINABLE AVIATION BUYERS ALLIANCE

RSB CERTIFIED 000000/000000/000/000

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Thank you.