Pricing Strategy for Hemp Based Carbon Removal Credits

TAO CLIMATE & NYU STERN

Meet The Team

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Agenda

NYU | STERN

About Tao Climate

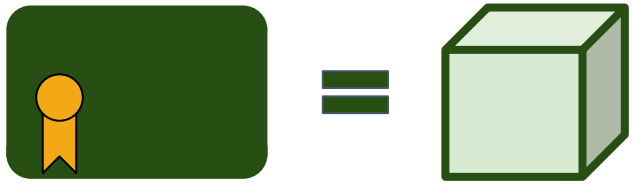
*"At Tao Climate, our philosophy draws from the ancient wisdom of Taoism, where Tao represents **"The Way"**—a path of harmony and balance in all things. Today, **humanity's relationship with nature is out of balance**, driven by excess CO2 in our atmosphere. **Tao Climate** exists to **restore this equilibrium**, uniting the power of hemp and cutting-edge technology to redefine how we approach climate action."*

Gary Byrnes
Founder

Felix Roick
Co-founder

TaoClimate

Carbon Credit Markets



One Carbon Credit

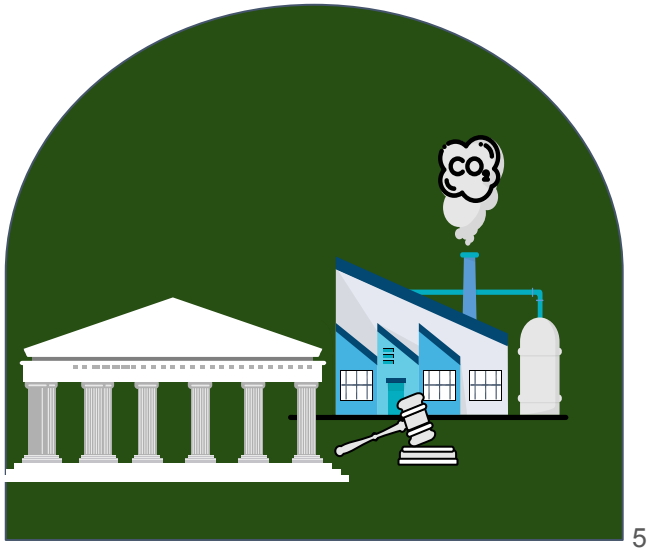
One Metric Ton of GHG Emissions

Voluntary Credit Market

Carbon Credits can be purchased by those that voluntarily want to compensate for their emissions

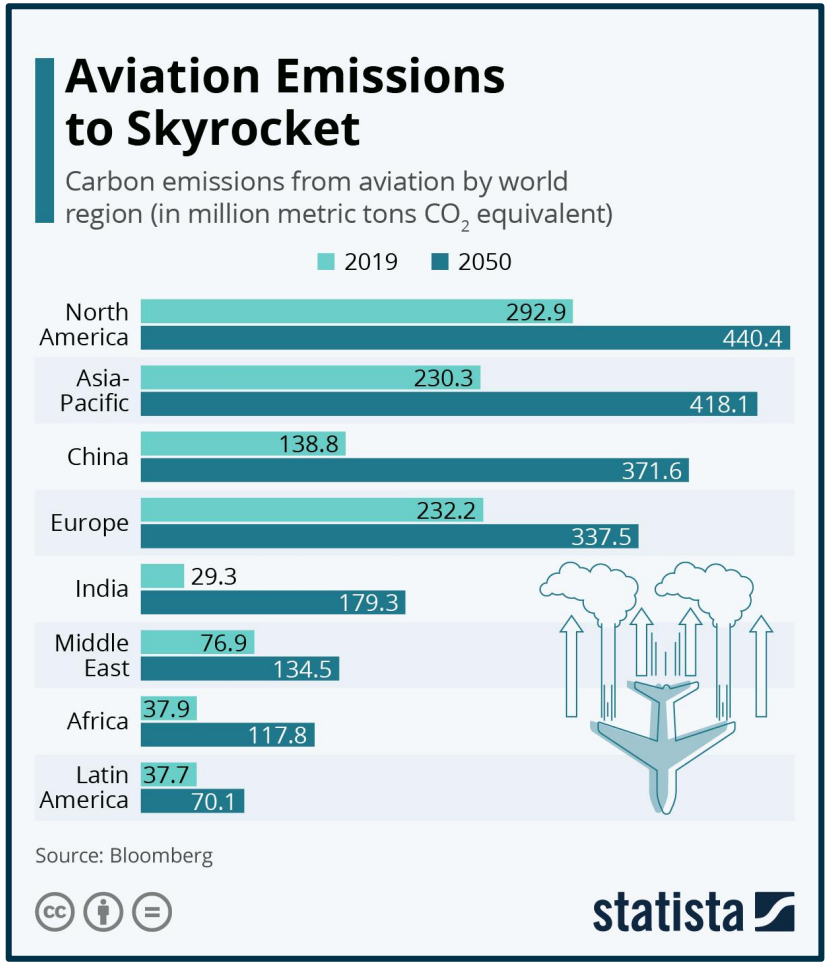
Compliance Credit Market

Mandatory systems regulated by government organizations to cap emissions



Executive Summary

The aviation industry generates 2-3% of global CO2 emissions, with passenger numbers projected to double by 2050. Airlines face significant challenges in achieving their decarbonization commitments using existing infrastructure, as traditional carbon offset solutions lack transparency and real-time verification. To address this challenge, we developed a comprehensive pricing framework for Tao Climate's carbon credits. This strategic pricing structure will enable scalable, transparent, and real-time carbon removal solutions for the aviation industry during these critical decades of implementing effective climate impact management.



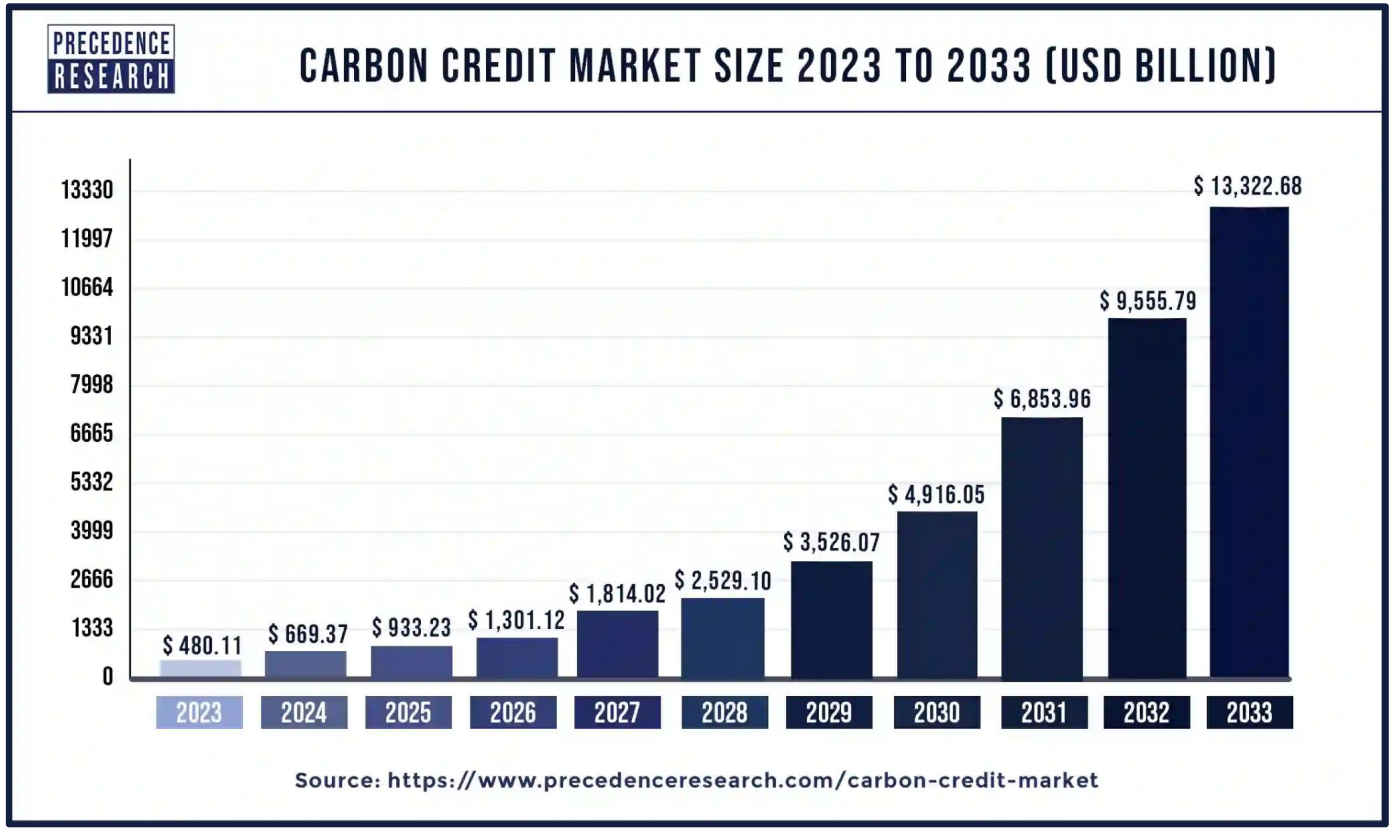
Industry & Market Analysis

$480.11 Billion

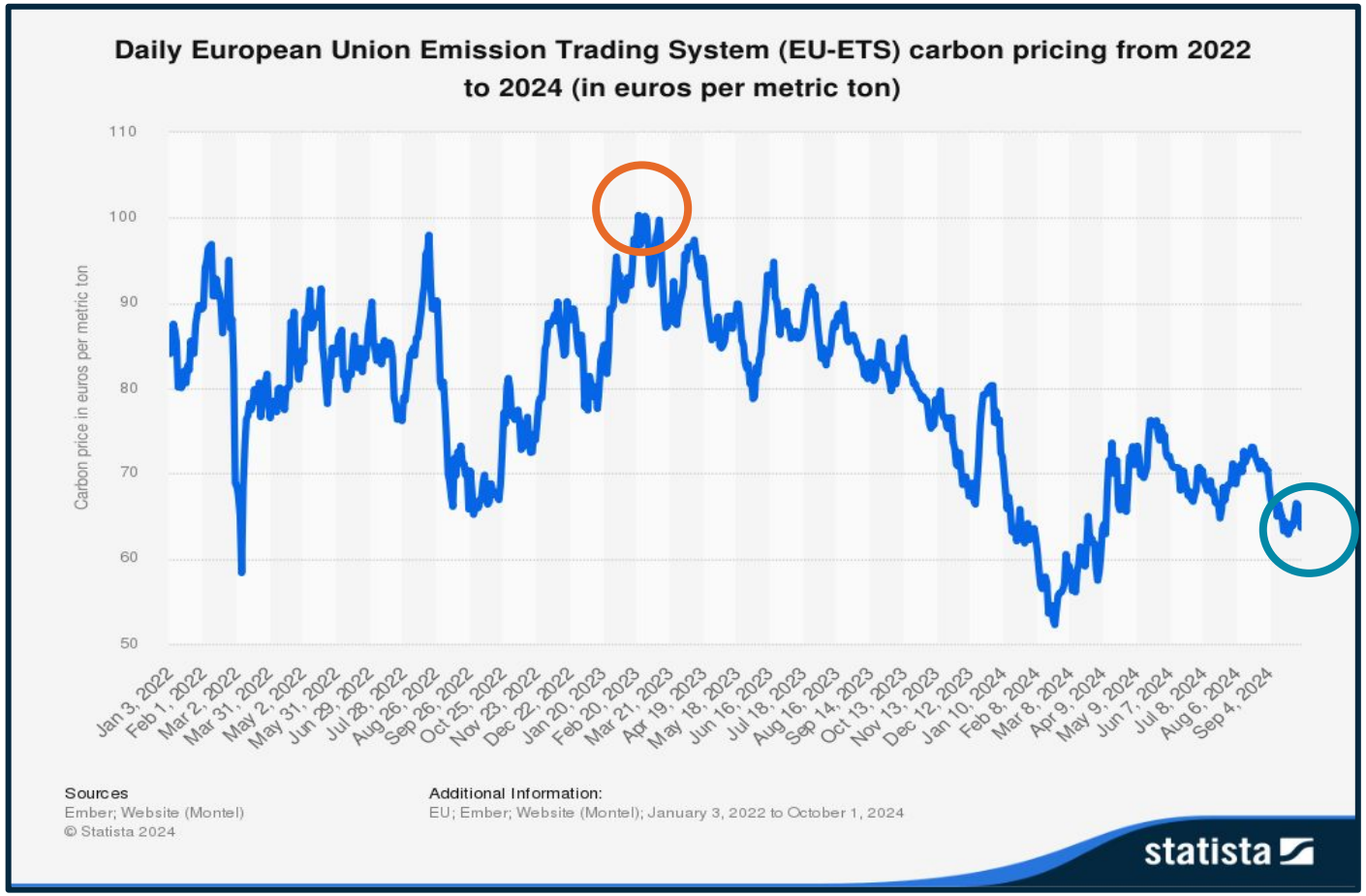
Global Carbon Credit Market Value (2023)

$13.3 Trillion

Projected Growth by 2033



EU ETS (EU Emissions Trading System)



Feb 2023
Record high
~$105.87/mtCO2

Oct 2024
~$66.69/mtCO2

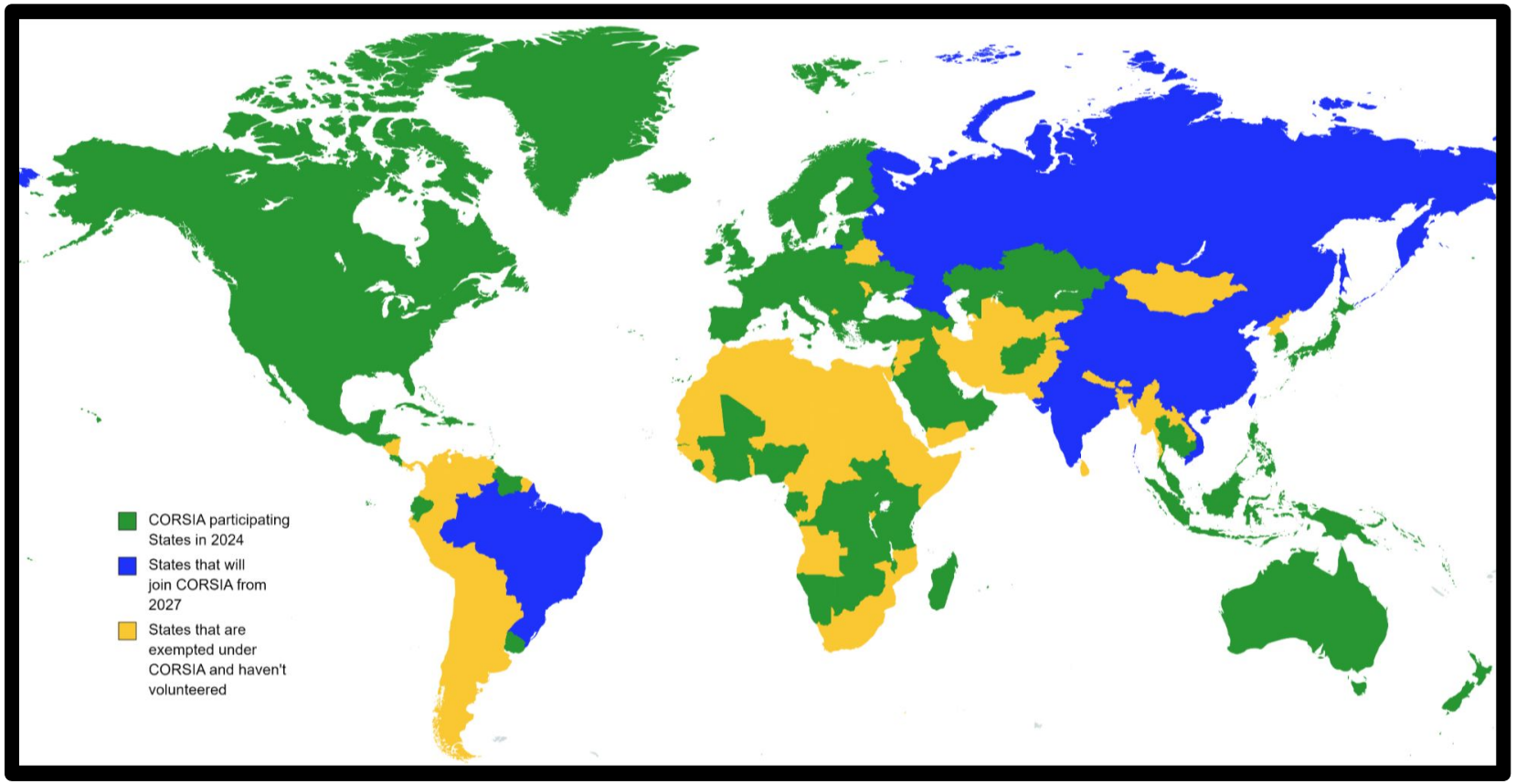
S&P forecasts an average price of $94.86 per tonne for 2024, with a range of $85.54 - $101.10[1]

CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation)

Pilot Phase
2021 - 2023

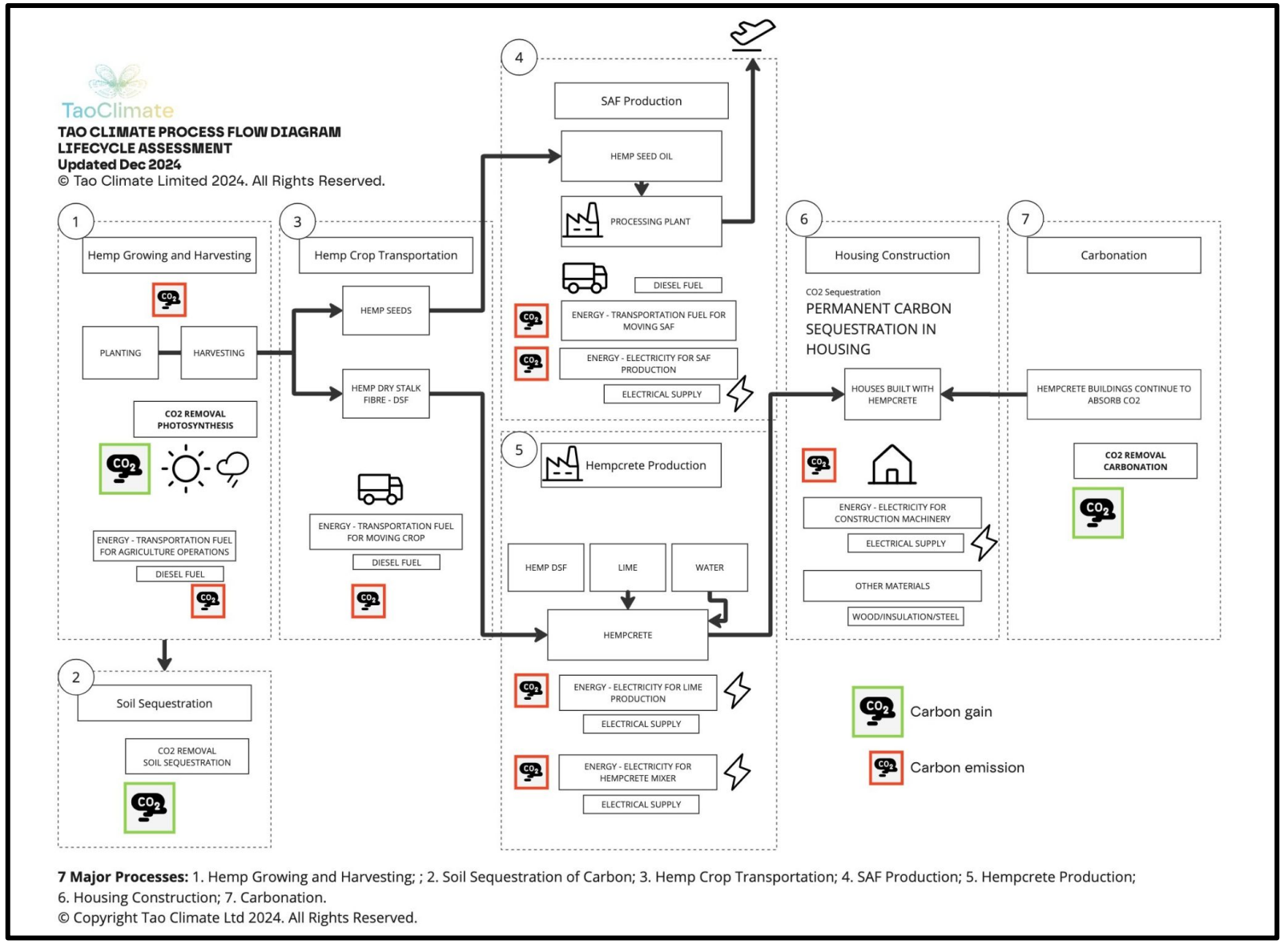
First Phase
2024 - 2026

Second Phase
2027 - 2035



Voluntary **Mandatory**

TAO Climate Process Flow Diagram



7 Major Processes: 1. Hemp Growing and Harvesting; ; 2. Soil Sequestration of Carbon; 3. Hemp Crop Transportation; 4. SAF Production; 5. Hempcrete Production; 6. Housing Construction; 7. Carbonation.

Measurement, Reporting and Verification

Data Processing

Analyze and calculate emissions data to assess trends, identify hotspots, and generate actionable insights.

Measurement

Quantify greenhouse gas (GHG) emissions using standardized methods and tools for various sectors, ensuring accuracy and consistency.

Reporting

Document and transparently communicate emissions data to relevant stakeholders, fostering accountability and informed decision-making.

Verification

Independently review and validate the reported data through accredited third-party assessments to ensure reliability and accuracy.

Feedback and Improvement

Incorporate recommendations to enhance the MRV process, improve data quality, and refine strategies for future emission reductions.

Product-Led Route to Decarbonization

Tao·CX

Channel carbon credit sales to passengers for a delightful, sustainable experience

Tao·Ops

Effective delivery of operational carbon compliance

Tao·SAF

Supplying hemp SAF feedstock where it's needed, at scale

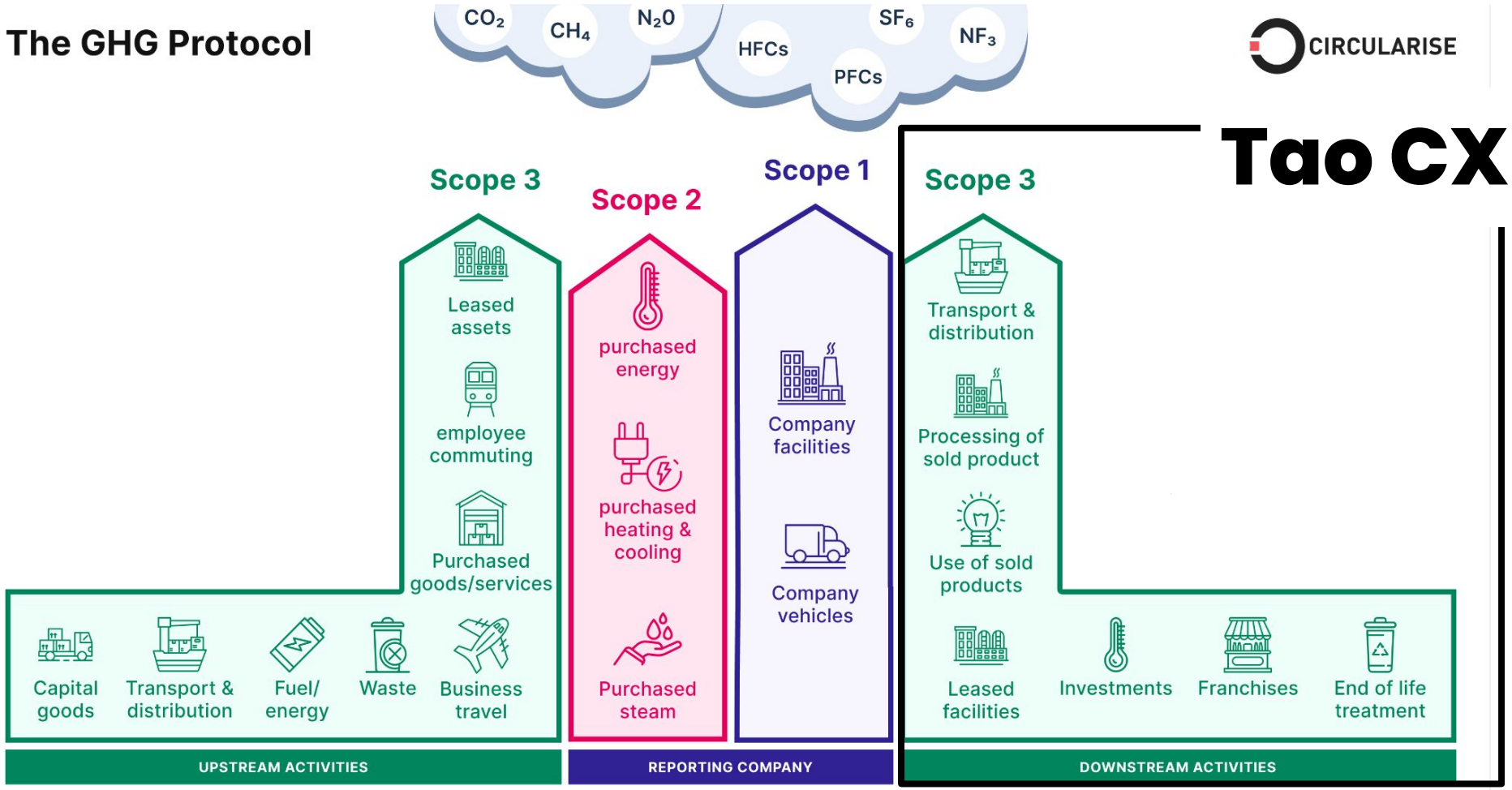
Target Airline & Airport

UNITED AIRLINES

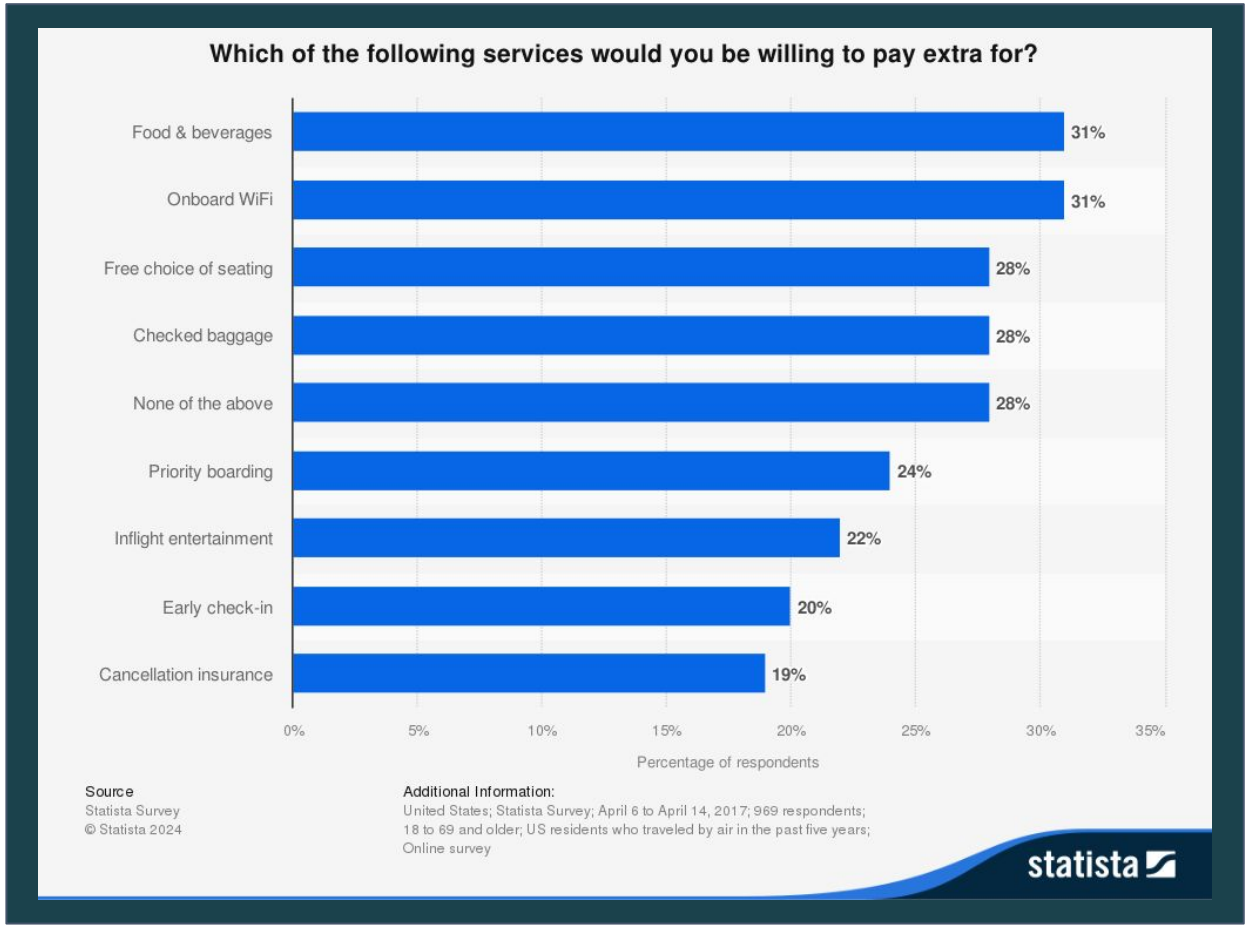
Tao·CX

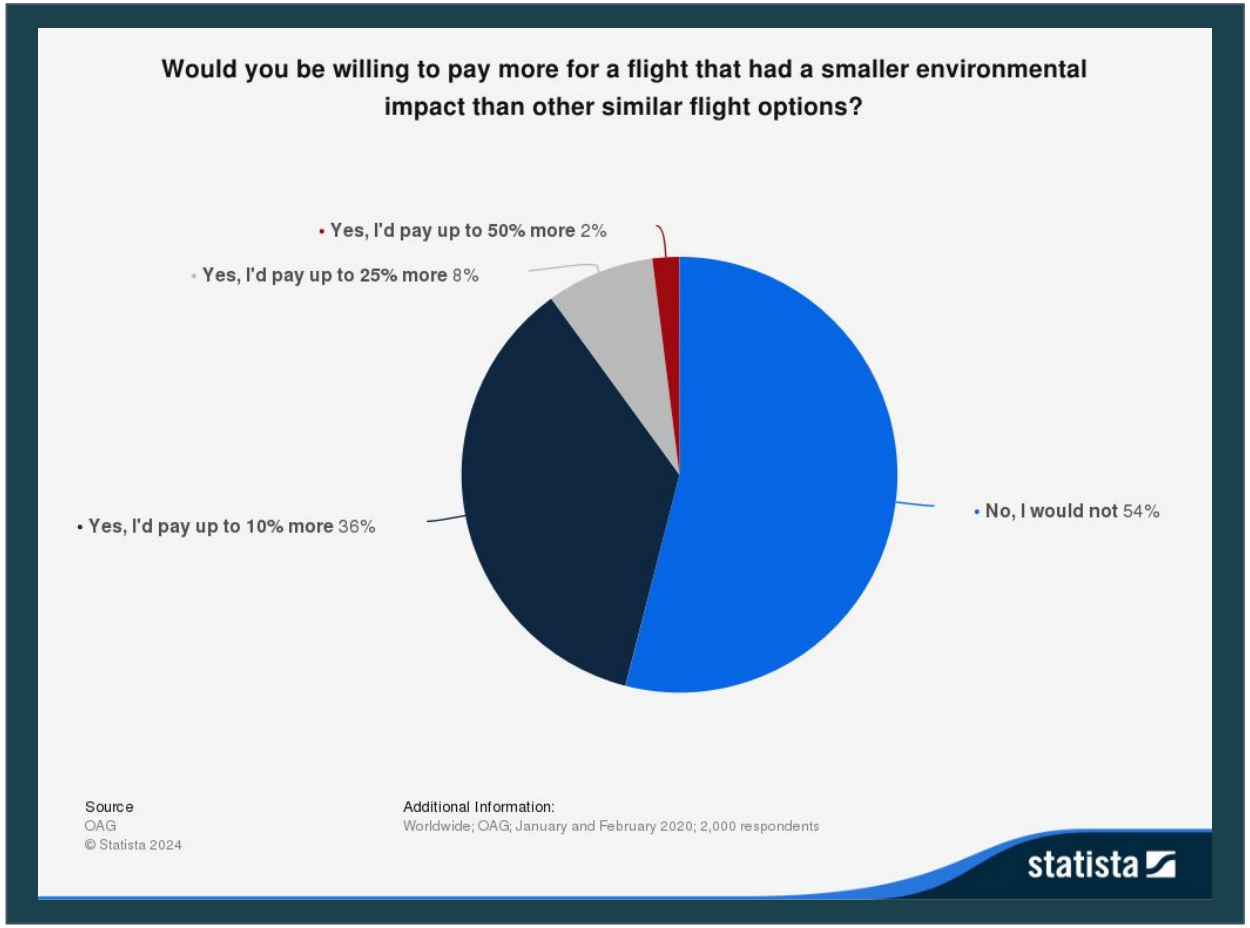
Channel carbon credit sales to passengers for a delightful, sustainable experience

Value Stream Scope



Consumer Willingness to Pay





Tao CX Scope

Scope 3 downstream emissions = 280,218 mt CO2 in 2023

Tao CX can increase airline's total revenue per available seat

	Year Ended December 31,	
	2023	2022
Passengers (thousands) (a)	164,927	144,300
RPMs (millions) (b)	244,435	206,791
ASMs (millions) (c)	291,333	247,858
Passenger load factor: (d)		
Consolidated	83.9 %	83.4 %
Domestic	85.1 %	85.5 %
International	82.4 %	80.5 %
PRASM (cents)	16.84	16.15
Total revenue per available seat mile ("TRASM") (cents)	18.44	18.14
Average yield per RPM (cents) (e)	20.07	19.36
Cargo revenue ton miles (millions) (f)	3,159	3,041
Aircraft in fleet at end of period	1,358	1,338
Average stage length (miles) (g)	1,479	1,437
Employee headcount, as of December 31 (in thousands)	103.3	92.8
Cost per ASM ("CASM") (cents)	16.99	17.19
CASM-ex (cents) (h)	12.03	11.73
Average aircraft fuel price per gallon	$3.01	$3.63
Fuel gallons consumed (millions)	4,205	3,608

Source: United Airlines 2023 Earnings Release

Tao CX Pricing Strategy

1

Key Parameters

- 48 weekly flights
- 4 aircraft models
- 3 passenger classes: Business, Premium Economy, Economy

2

Methodology

- Premium Segments (Business & Premium Economy)
  - Higher pricing reflecting:
    - Permanent carbon removal
    - Soil improvement benefits
    - Satellite verification
    - Anticipated certification
- Economy Class
  - Standard market carbon credit pricing
  - Focus on volume and market penetration
  - Price-sensitive consumer approach

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Tao CX Pricing Strategy

United Airlines: Connecting LHR and EWR with 48 Weekly Flights

Airline	Aircraft Model	Miles (One-Way)	Business Seats	CO_2 Emission by Business Class (kg)	Emission Per Business Class Seat (kg)	Premium Economy Seats	CO_2 Emission by Premium Economy (kg)	Emission Per Premium Economy Seat (kg)	Economy Seats	CO_2 Emission by Economy Class (kg)	Emission Per Economy Seat (kg)
United Airlines	Boeing 767-300ER	3,465	46	92,000	2,000	22	22,000	1,000	99	66,330	670
United Airlines	Boeing 777-200	3,465	50	100,000	2,000	24	24,000	1,000	202	135,340	670
United Airlines	Boeing 777-300ER	3,465	60	120,000	2,000	24	24,000	1,000	266	178,220	670
United Airlines	Boeing 787-9	3,465	48	96,000	2,000	21	21,000	1,000	188	125,960	670

Tao CX Pricing Strategy

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Average Price (Voluntary Market)	**$0.01**
Base Price (Permanent Carbon Removal)	**$0.19**
Premium Pricing (Certification)	**$0.22**

Aircraft Model	Business Seats			Premium Economy			Economy		
	Avg Price	Base Price	Premium Price	Avg Price	Base Price	Premium Price	Avg Price	Base Price	Premium Price
Boeing 767-300ER	$ 13.94	$ 380.00	$ 440.00	$6.97	$ 190.00	$ 220.00	$ 4.67	$ 127.30	$ 147.40
Boeing 777-200	$ 13.94	$ 380.00	$ 440.00	$ 6.97	$ 190.00	$ 220.00	$ 4.67	$ 127.30	$ 147.40
Boeing 777-300ER	$ 13.94	$ 380.00	$ 440.00	$ 6.97	$ 190.00	$ 220.00	$ 4.67	$ 127.30	$ 147.40
Boeing 787-9	$ 13.94	$ 380.00	$ 440.00	$ 6.97	$ 190.00	$ 220.00	$ 4.67	$ 127.30	$ 147.40

Tao CX Pricing Strategy

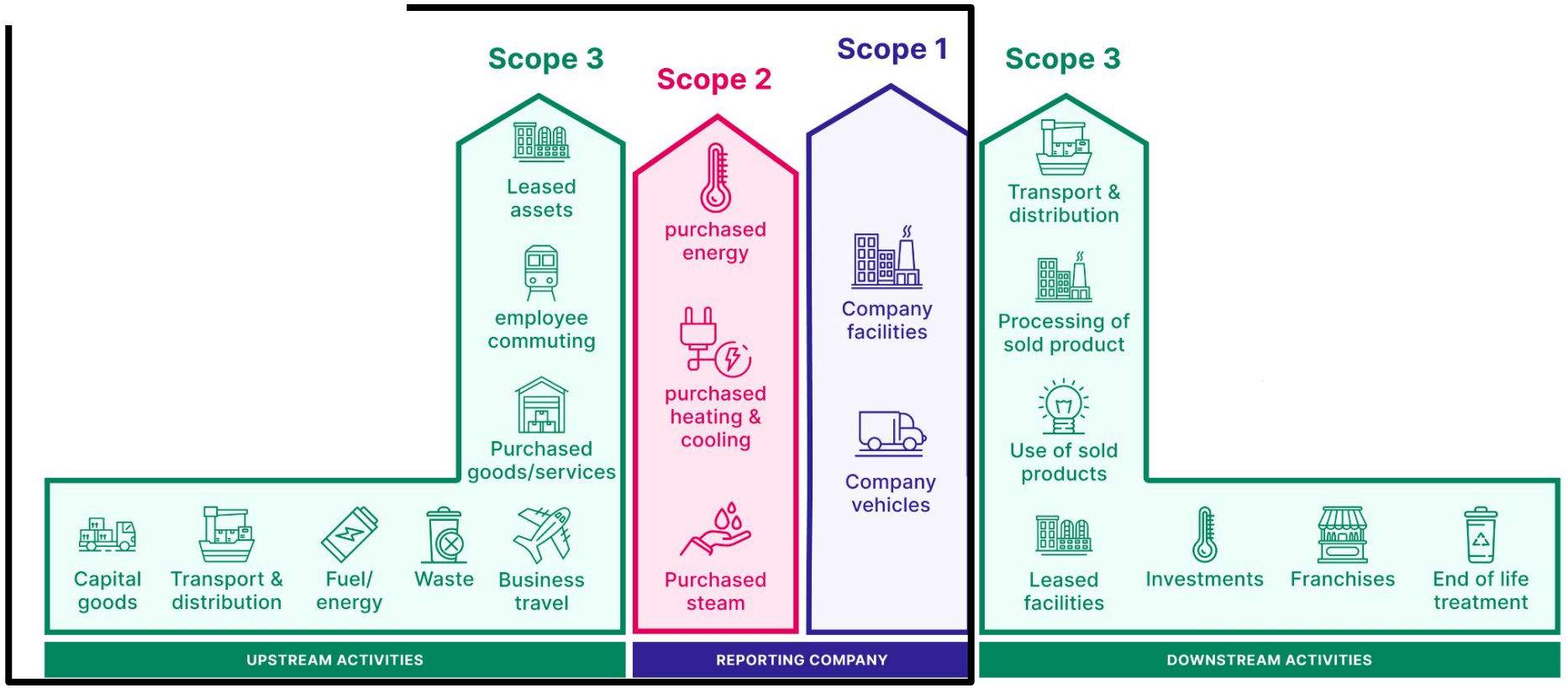
Recommendation	Carbon Credit Pricing	Product Pricing Type
Premium Pricing (Certified project)	$ 440.00	Premium Product - Business Class
Premium Pricing (Certified Project)	$ 220.00	Premium Product - Premium Economy Class
Avg Pricing (Voluntary Market)	$ 4.67	Penetration Pricing Product - Economy Class

Tao·Ops

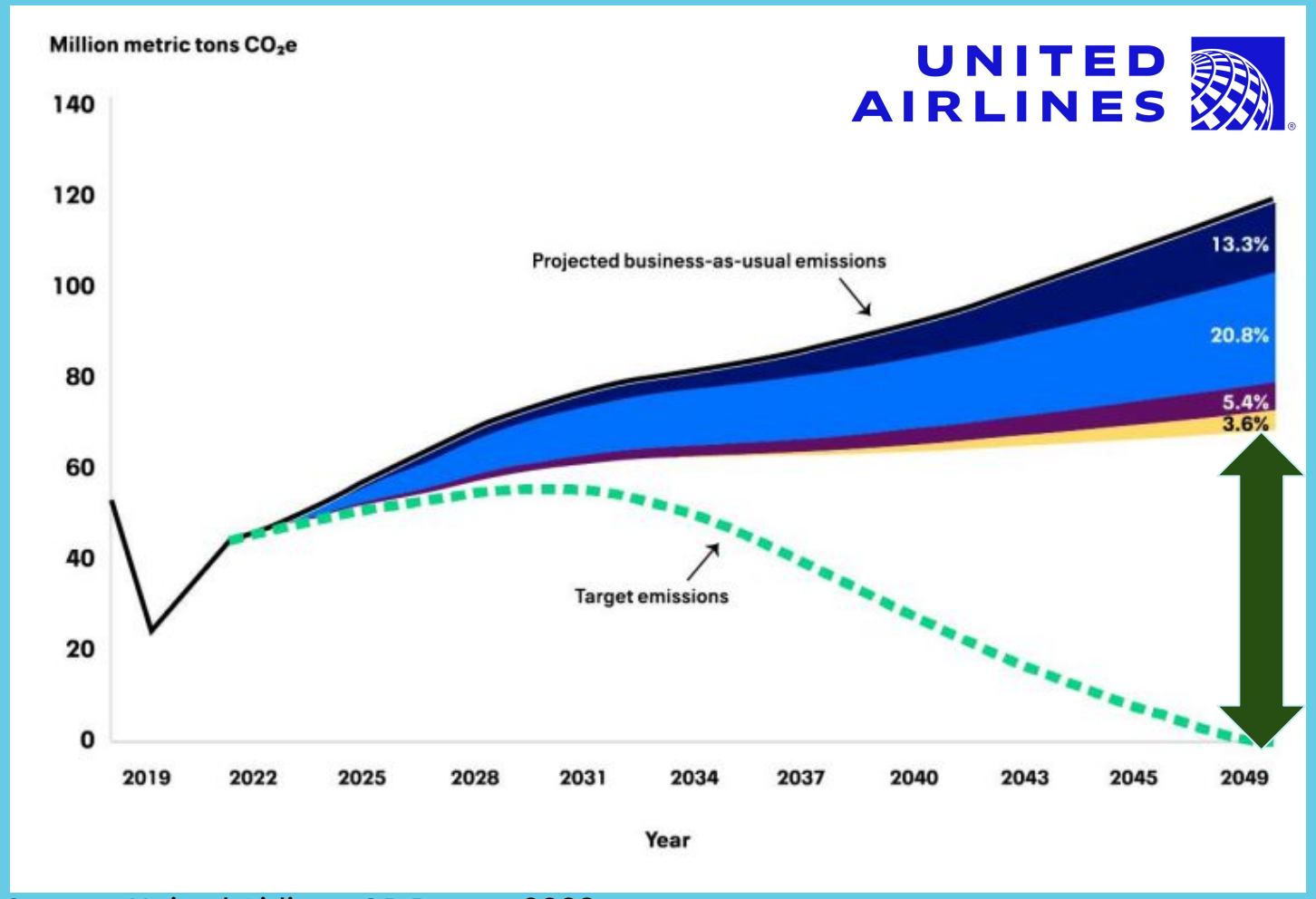
Effective delivery of operational carbon compliance

Value Stream Scope

Tao OPS



Carbon Removal is needed to achieve Net Zero goals

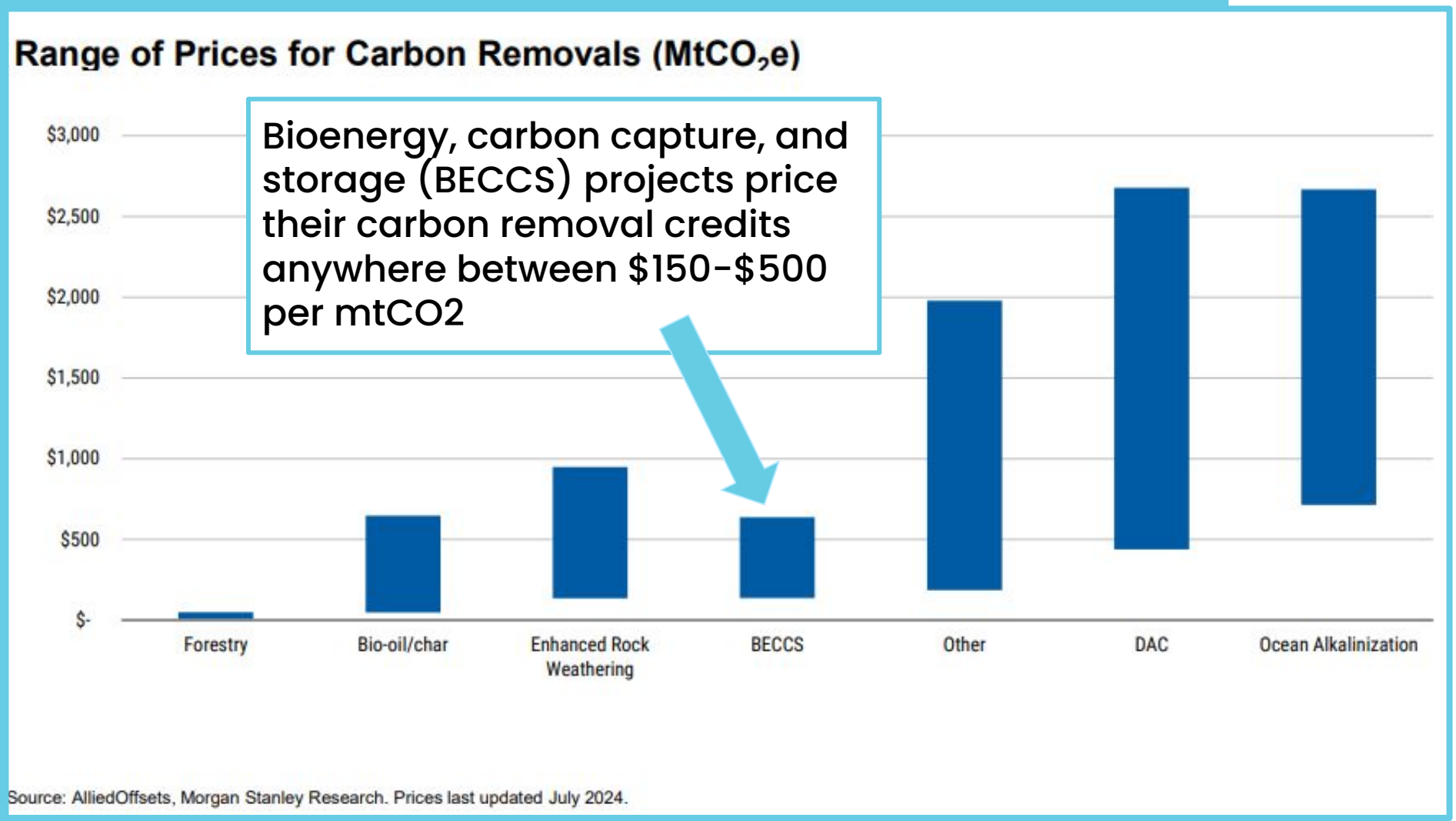


Source: United Airlines CR Report 2023

- Future AC technology
- Fleet renewal
- Ops efficiency
- Alternate propulsion

Tao OPS can address this gap between projected and target net zero emissions

Tao OPS Pricing Strategy

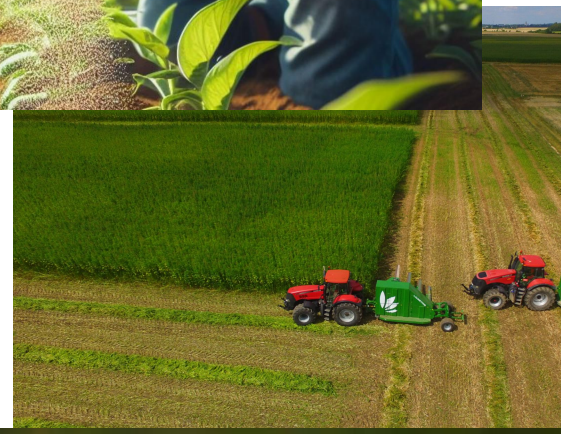


Assumptions

Fixed Costs

- Sowing and Harvesting Infrastructure
- Verification and Certification Costs

Total fixed costs	$1,215,360.30
Total variable costs per 1 mtCO2 removed	$200.23



Variable Costs

- Land
- Diesel
- Sowing
- Harvesting
- Fertilizer
- Pesticide

Tao OPS Pricing Strategy

	mtCO2
Scope 1	36,590,472
Scope 2	144,019
Scope 3 (Upstream)	12,391,292
Total	49,125,783

Input Variables	
Carbon Credit Volume (mtCO2)	49,125,783
Premium Markup	100%

Output Variables	
Breakeven selling price per mtCO2	$200.82

	per mtCO2	Total
Suggested selling Price	$401.67	$19,732,241,373.48
Tao's revenue (33%)	$68.28	$3,354,481,033.49
Grower/Farmer revenue (66%)	$132.55	$6,511,639,653.25

Tao OPS Pricing Strategy

	mtCO2
Scope 1	32,116
Scope 2	0
Scope 3	18,742,184
Total	18,774,300

Input Variables	
Carbon Credit Volume (mtCO2)	18,774,300
Premium Markup	100%

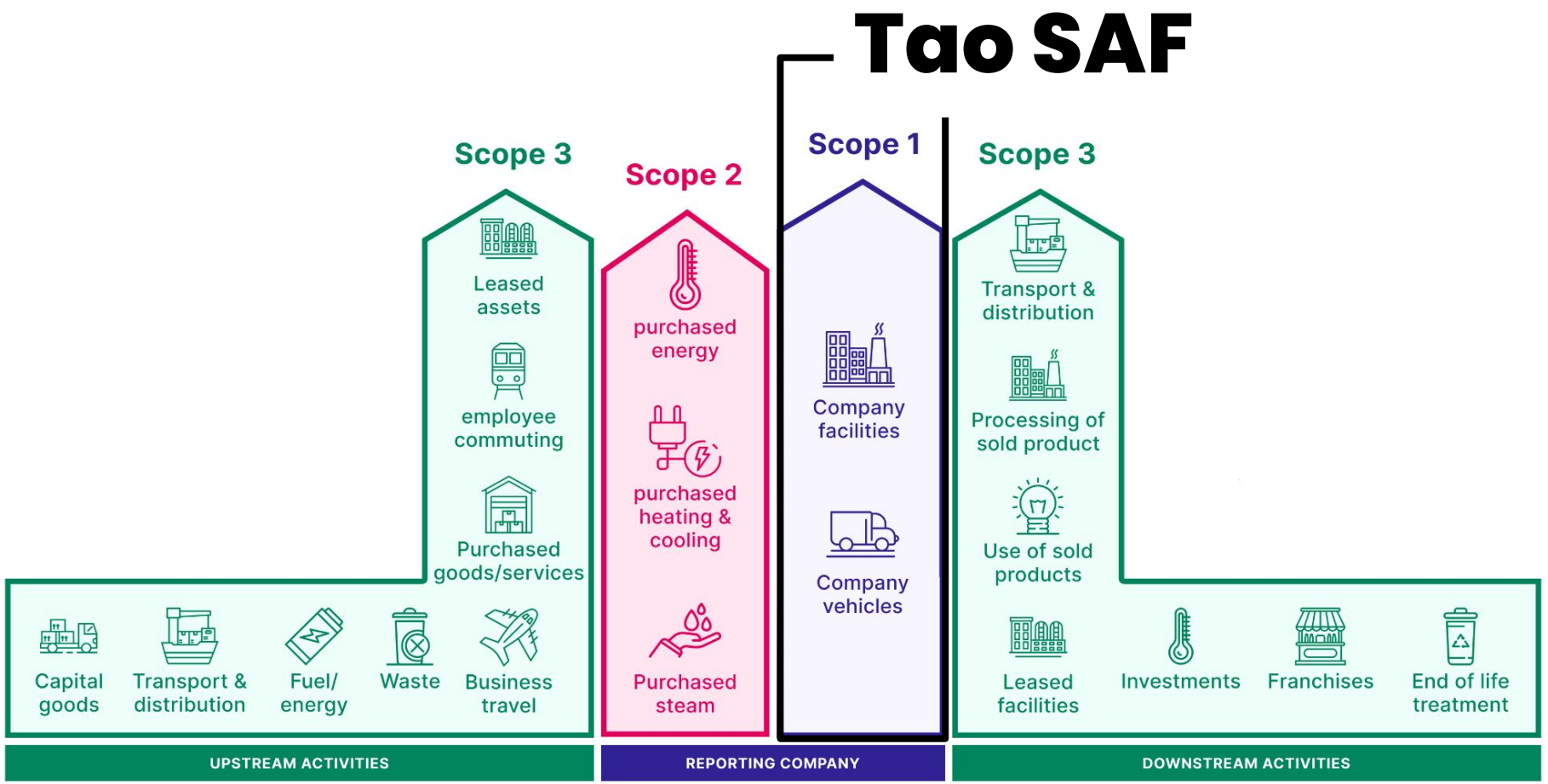
Output Variables	
Breakeven selling price per mtCO2	$200.96

	per mtCO2	Total
Suggested selling Price per mtCO2	$401.98	$7,546,928,807.96
Tao's revenue (33%)	$68.34	$1,282,977,897.35
Grower/Farmer revenue (66%)	$132.65	$2,490,486,506.63

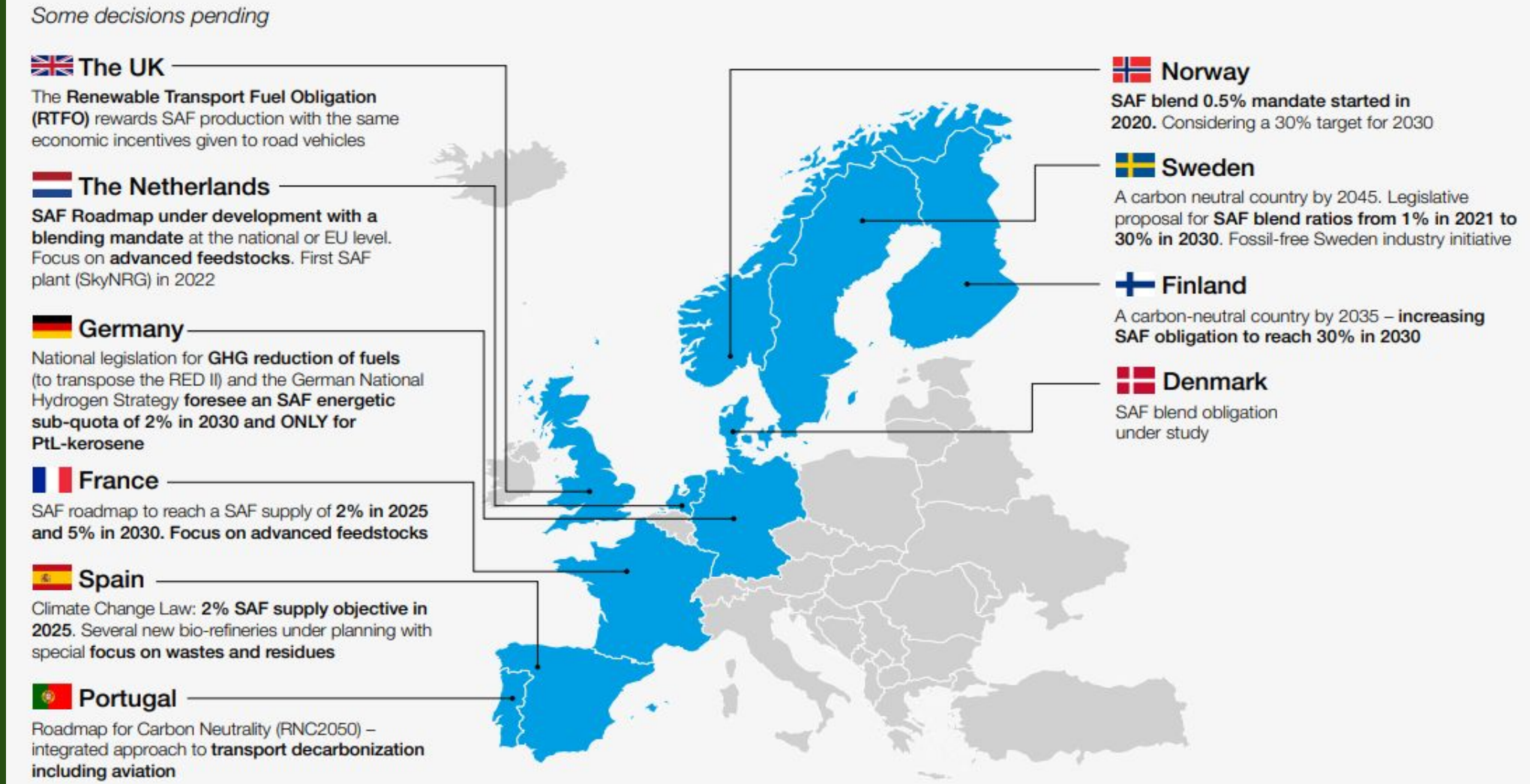
Tao·SAF

Supplying hemp SAF feedstock where it's needed, at scale

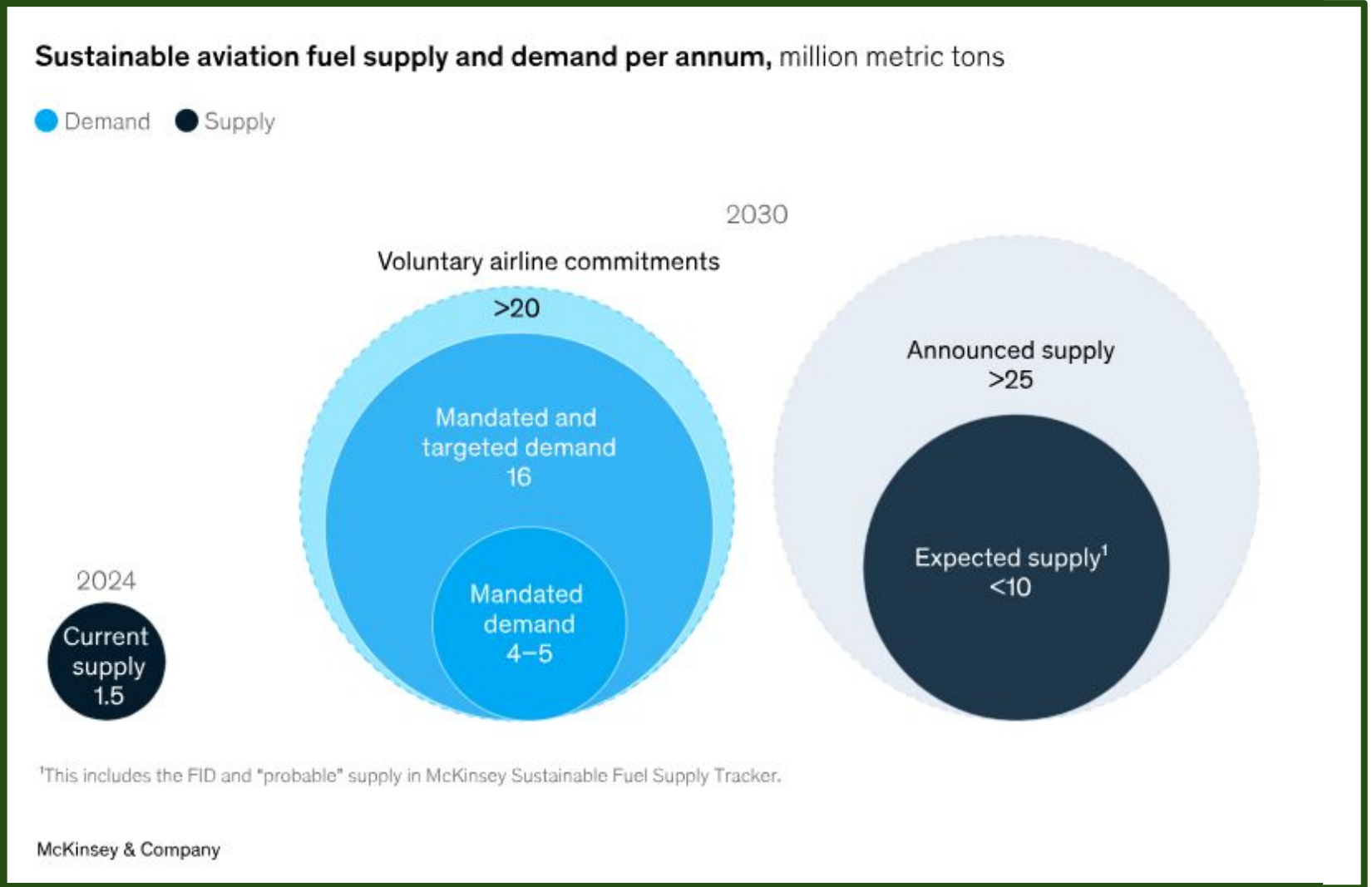
Value Stream Scope



European SAF Legislature Landscape



SAF – Demand vs Supply



SAF Price Range – US

Figure 6: SAF costs are 2-10 times more than fossil jet fuel, although estimates vary across the industry.

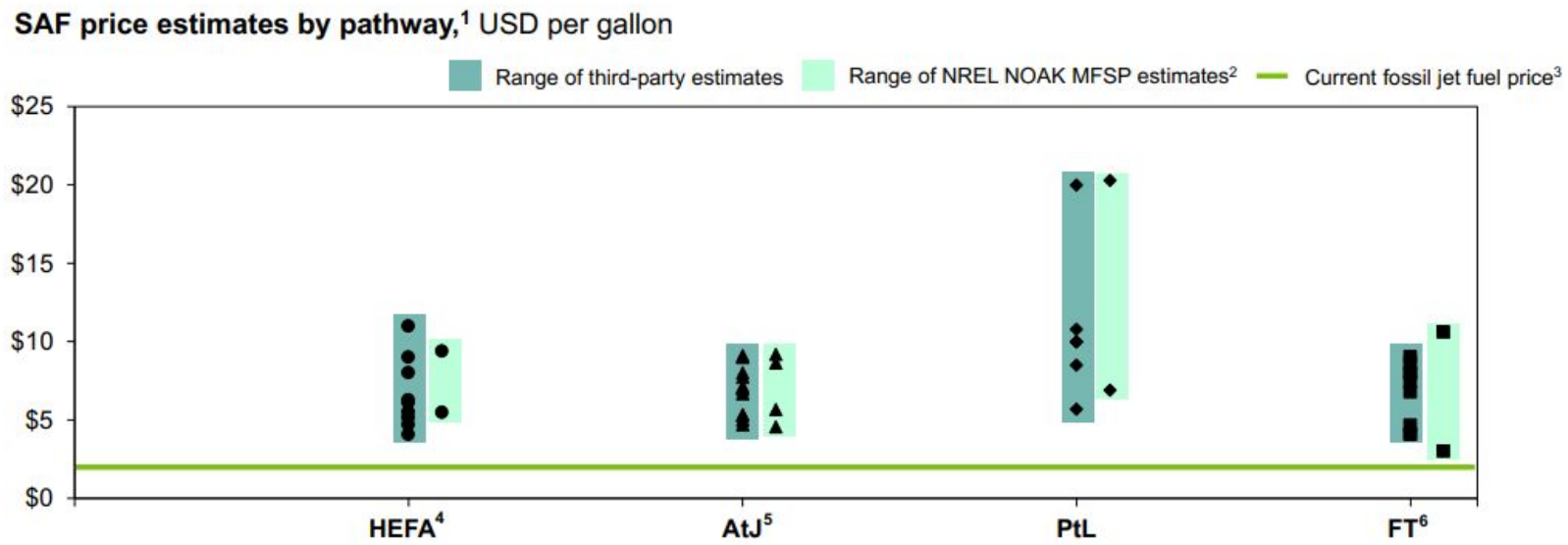


Figure Footnotes: *1. Prices are based on a range of production facility designs, inputs, and assumptions, including year, inflation, and NOAK vs. FOAK deployment. Delivered cost, or the price of SAF to airlines, includes blending, transportation and storage costs, which vary; 2. Minimum fuel selling price (MFSP) is the lowest possible price a producer could sell at to financially support operations; these estimates assume NOAK deployment; 4. Estimates pull multiple feedstocks, including FOGs (lower end of range) and virgin oils and crops (higher end of range); 5. Estimates pull both starch and cellulosic feedstocks. The high end of the cellulosic AtJ range ($9.6 per gallon) exceeds the high end of the starch-based range ($8.60 per gallon) although the low ends of these ranges are similar ($4.50-4.60 per gallon); 6. Although FT prices appear lower than HEFA and AtJ, the gasification technology of these feedstocks is nascent and will require more time (e.g., after 2030) to validate these estimated ranges.*

Data Sources: *Fueling the Future;[21] IATA;[22] Industry input; NREL;[23] NREL input; Reuters[24]*

Assumptions

- Production Cost: $1,000 per metric ton (Total Cost + Variable Cost).
- Average Jet Fuel Price: $3 per gallon.
- SAF Price Range: Typically 1.5–6x higher than jet fuel due to:
  - Varying industrial and technological maturity of SAF pathways.
  - Uncertainty in production costs for certain methods.
- Additional Costs:
  - Verification and certification: 10% of Fixed Costs.
  - Transportation to facility: 10% of production cost.

- Quantity of fuel (gallons):

$$Quantity\ of\ fuel\ (gallons) = Scope\ 1\ emissions\ (mtCO2) * \left(\frac{1\ metric\ ton\ jet\ fuel}{3.16\ metric\ ton\ CO2\ emitted}\right) * \left(\frac{330.22\ gallons\ jet\ fuel}{1\ metric\ ton\ jet\ fuel}\right)$$

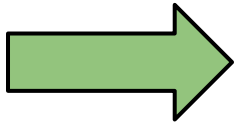
- Hemp-Based SAF Pricing: $3450 per metric ton as a premium sustainable option.

Tao SAF Pricing Strategy

SAF is 1.5x-6x more than jet fuel. This calculation assumes selling price of $12/gal SAF

Description	Price	
Production cost	$1,000	per mt fuel
Premium markup - Hemp based SAF	$2,312	per mt fuel
Selling Price	$3,312	per mt fuel

Scope 1 Emissions	36,590,472	mtCO2
Emissions in 1 metric ton of Jet fuel	3.16	mtCO2
Quantity of Fuel	3,823,648,988	gallons

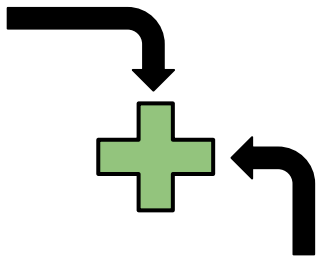


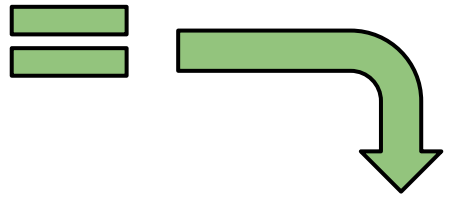
Profit Calculation	
Revenue from SAF	$45,883,787,850
Production cost	$11,579,263,291
Misc Cost	$2,315,852,658
Total Profit*	$31,988,671,901

* Assuming 100% replacement of Jet Fuel volume with SAF

Example: Jet Fuel with 30% SAF Blend

Inputs		
1 gallon jet fuel emits	9.57	kg CO2
SAF Emission Reduction factor	0.8	Range is between 50 - 80%
Cost of Jet Fuel	$3.00	per gal
Cost of SAF	$12.00	per gal





	Baseline (100% Jet Fuel)	Jet Fuel w/ SAF Blend
SAF Blend	0%	30%
Gallons of SAF	0.00	1,147,094,696.26
$ Cost of SAF	0.00	$13,765,136,355.14
Gallons of Jet Fuel	3,823,648,988	2,676,554,291
$ Cost of Jet Fuel	$11,470,946,962.62	$8,029,662,873.83
Total $ cost of Fuel	$11,470,946,962.62	$21,794,799,228.98
Emissions from SAF (mtCO2)	0.00	2,195,428.32
Emissions from Jet Fuel (mtCO2)	36,590,472.00	25,613,330.40
Total Emissions (mtCO2)	36,590,472.00	27,808,758.72

Emissions Reduction using SAF (mtCO2)	8,781,713.28
Price Differential (Jet Fuel w/SAF blend-Cost of Baseline Jet Fuel)	$10,323,852,266
Cost per mtCO2 reduced	**$1,176**

* This is the cost for the airline to reduce 1 mtCO2 of emissions using 30% SAF blend

Summary

	Tao CX	Tao OPS	Tao SAF
Pricing Potential	**$152.94 per seat**	**$402 per mtCO2**	**$12 per gallon**

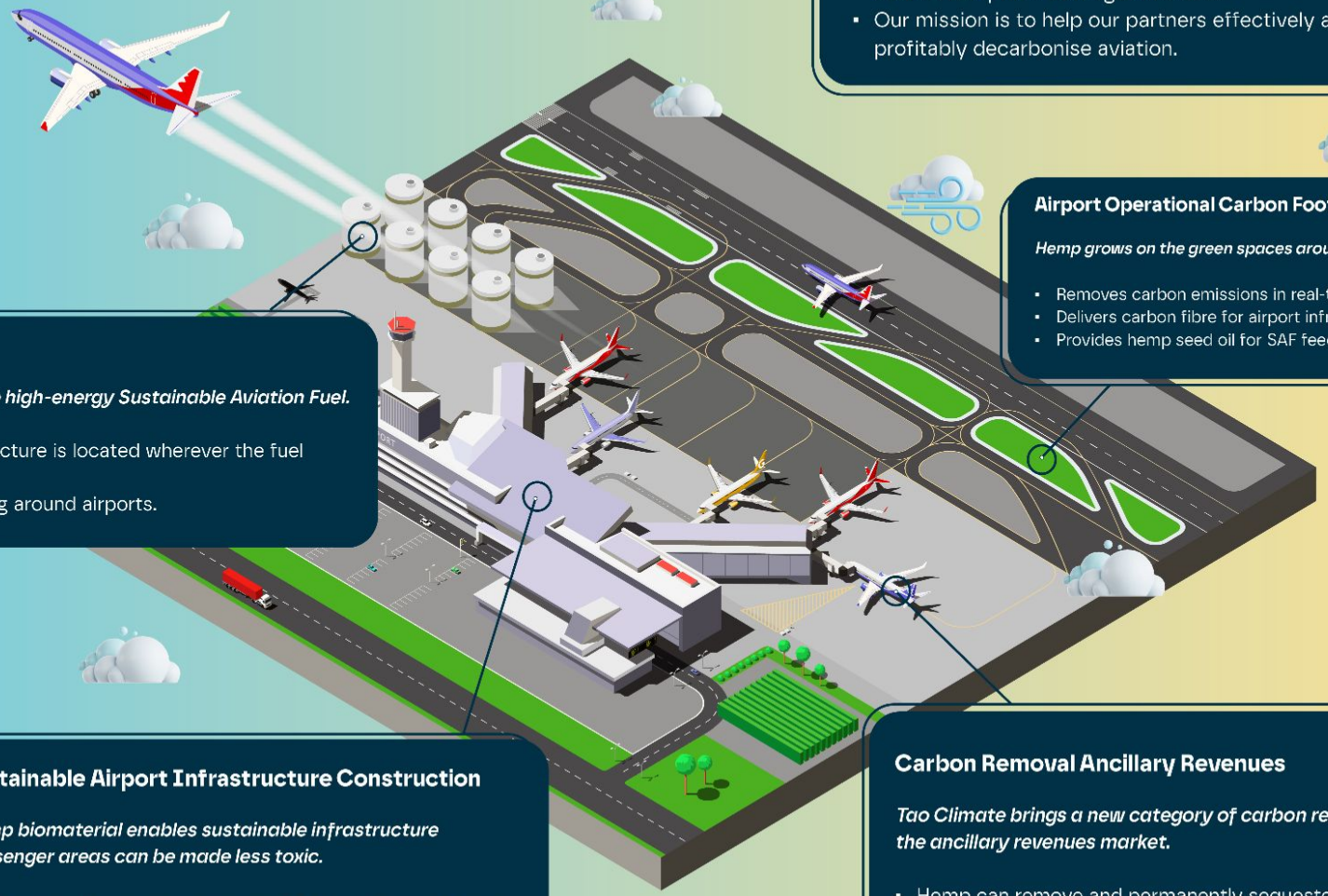
Note: Numbers do not consider shared benefits between products

The Way
to Decarbonise Aviation

Carbon Removal MRV

Delivering decarbonised air operations at scale.

- Fully verified, science-based and data-driven impacts.
- Nextgen MRV platform for airlines and airports to manage carbon footprints at megaton scale.
- Our mission is to help our partners effectively and profitably decarbonise aviation.



Airport Operational Carbon Footprint Removal

Hemp grows on the green spaces around runways

- Removes carbon emissions in real-time.
- Delivers carbon fibre for airport infrastructure construction.
- Provides hemp seed oil for SAF feedstock.

SAF

Hemp can be used to make high-energy Sustainable Aviation Fuel.

- SAF production infrastructure is located wherever the fuel is needed.
- Hemp is ideal for growing around airports.

Sustainable Airport Infrastructure Construction

Hemp biomaterial enables sustainable infrastructure Passenger areas can be made less toxic.

- Hangars will continue to absorb CO2 through carbonation.
- Perfect for interiors and exteriors.

Carbon Removal Ancillary Revenues

Tao Climate brings a new category of carbon removal credit to the ancillary revenues market.

- Hemp can remove and permanently sequester CO2 in 4-5 months.
- We're using hemp carbon in sustainable construction, locking the carbon away for centuries.

TaoClimate

Tao Climate's Lift Decarbonisation Programme with nextgen MRV tech

Future Trends

Market Evolution

Shift towards durable, technology-based removals (TBR)

Technological Advancements

Satellite and remote sensing technology integration

Regulatory Developments

Stricter verification standards implementation

Industry Transformation

Increased focus on permanent carbon storage solutions

Strategic Recommendations

Immediate Priorities

- Obtain verification from certified carbon registry (ACR, Gold Standard)
- Strengthen validation standards through third-party partnerships
- Expand airline integration capabilities

Strategic Actions

- Build strategic partnerships with major airlines
- Enhance MRV platform capabilities
- Highlight carbon **REMOVAL** as a key differentiator

Thank You!

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Q&A

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Appendix

Tao OPS Pricing Assumptions

Fixed or Variable Cost	Description	Cost (euros or euro/ha)	cost per mtCO2 removed	Assumptions
Fixed	Sowing Infrastructure	$580,574.50	N/A	Assume the cost is the same as harvesting infrastructure Infrastructure only needs to be bought one time
Fixed	Harvesting Infrastructure	$580,574.50	N/A	Given by Tao Climate Infrastructure only needs to be bought one time
Fixed	Verification Cost	$29,028.73	N/A	5% Infrastructure cost
Fixed	Certification Cost	$29,028.73	N/A	5% Infrastructure cost
Variable	Land Cost	$475.02	$37.68	Extrapolated from Tao Field data for 12 hectares
Variable	Cost of seed	$1,055.59	$83.74	Extrapolated from Tao Field data for 12 hectares
Variable	Diesel for prep/sowing	$131.42	$10.43	Extrapolated from Tao Field data for 12 hectares
Variable	Sowing cost	$79.17	$6.28	Assume cost is linear (900 euros for 12 hectares)
Variable	Diesel for harvesting	$262.84	$20.85	Extrapolated from Tao Field data for 12 hectares
Variable	Harvesting Cost	$211.12	$16.75	Extrapolated from Tao Field data for 12 hectares
Variable	Fertilizer Cost	$211.12	$16.75	Assumed based on research
Variable	Pesticide Cost	$105.56	$8.37	Assumed based on research
			$0.00	
Total fixed costs		$1,219,206.45		
Total variable costs per 1 mtCO2 removed		$200.86		

SAF Production

Components of typical well-to-wing LCA for fossil-based jet fuel and biofuel