

Carbon Emissions and Managed Travel: Cutting Through the Smog

May 6, 2007

TRX, Inc.

Scott Gillespie, VP & GM, Travel Analytics

Scott Gillespie's Background

- **VP & GM, TRX Travel Analytics since 2006**
- **Founder and CEO of Travel Analytics**
 - **Developed TANGO® and BRAVO® for airline sourcing projects**
 - **Analyzed in excess of \$20 Billion of annual air spend**
 - **Recipient of ACTE's Industry Professionalism and Distinguished Fellow honors**
 - **Named by Business Travel News as one of the travel industry's most influential executives**
- **Previously A.T. Kearney's global expert in strategic sourcing of travel suppliers**
- **MBA, University of Chicago**

Learnings From Past and Current Clients

Agilent

AXA

Baxter

Coca-Cola

Chevron

DaimlerChrysler

Dell Computer

Deloitte

John Deere

Ernst & Young

Ford

Hewlett-Packard

IBM

KPMG

Lockheed Martin

Microsoft

Procter & Gamble

Nortel Networks

Novartis

PricewaterhouseCoopers

Roche

Shell

Tyco

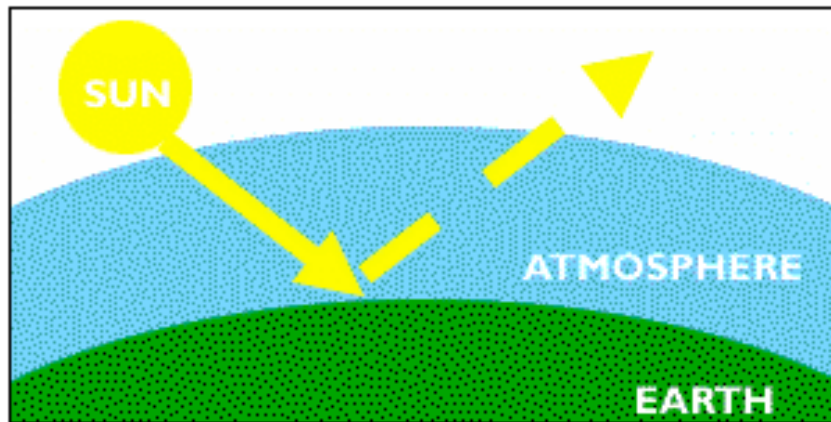
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Today's Agenda

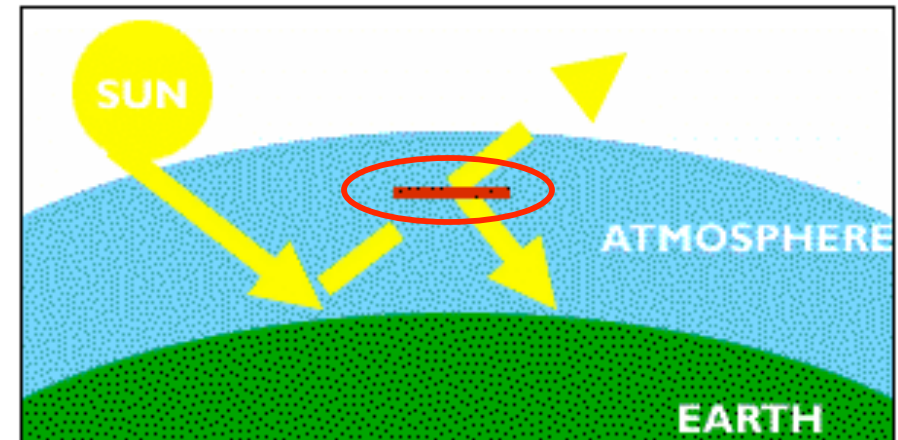
- **Carbon Emissions 101**
- **CO₂ and Airlines – Facts and Factors**
- **Carbon Offsets – What Works, What Doesn't**
- **Going Carbon Neutral? Tips for Travel Managers**
- **Discussion**
- **Additional Resources**

Carbon Emissions 101

The Greenhouse Effect



Normal conditions

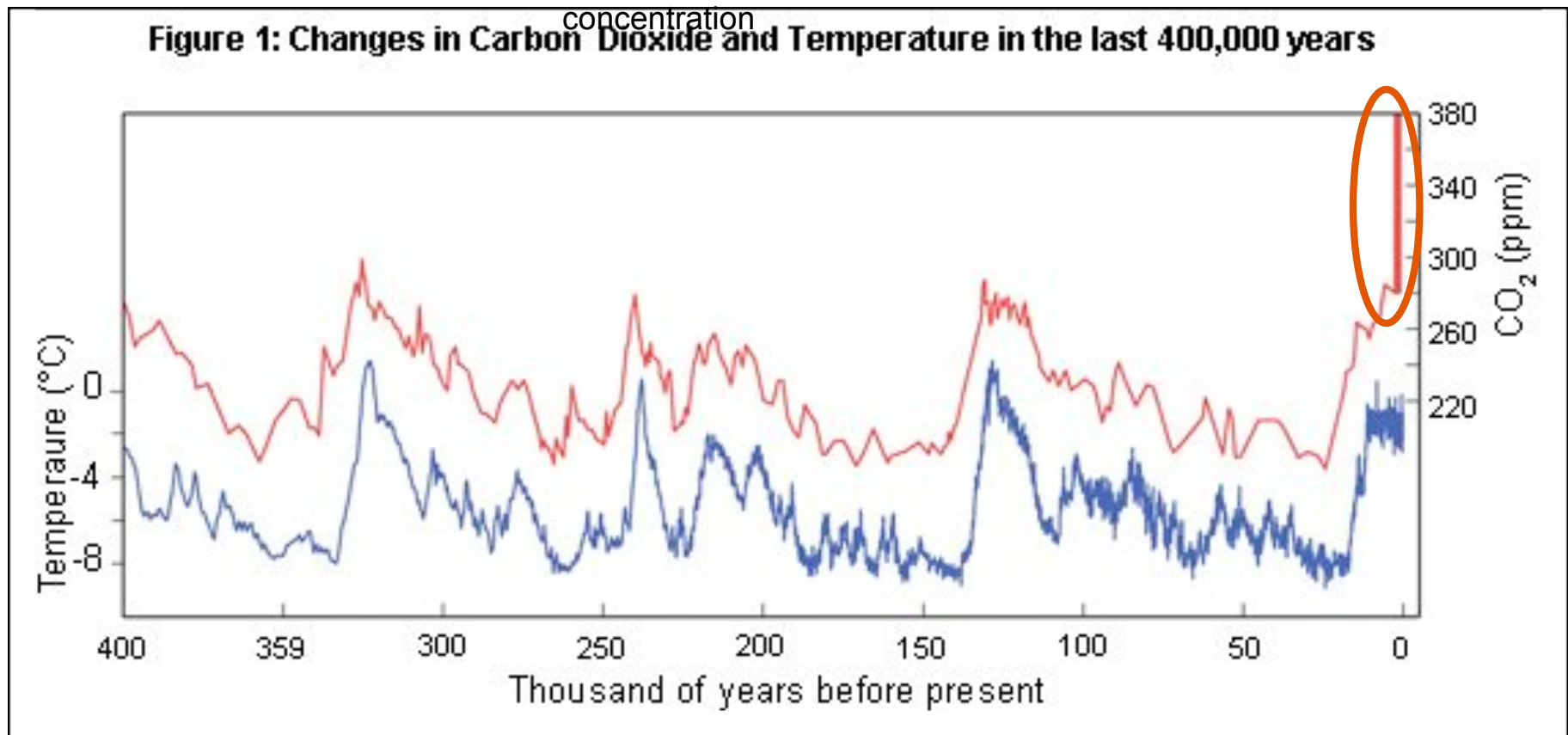


**More CO₂ blocks more rays
of sun and causes warming**

Source: www.ecn.ac.uk/Education/climate_change.htm

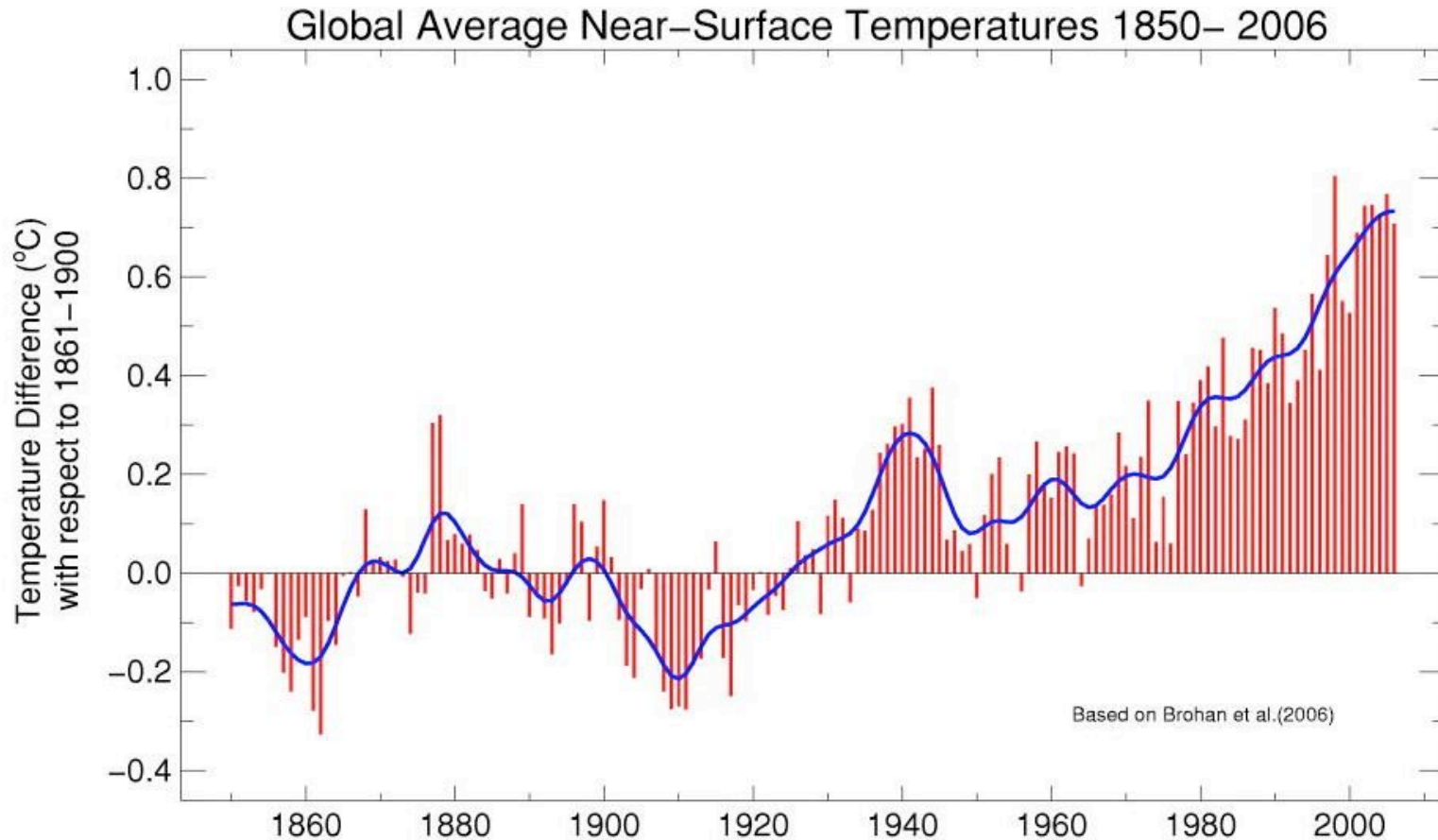
Geologically, Temperature Lags Atmospheric CO₂ Concentrations

Blue line is temperature, red line is CO₂ concentration



From A. V. Fedorov et al. [Science 312, 1485 \(2006\)](#).

Recent Average Temperatures Are Rising



Met Office

Hadley Centre for Climate Change and CRU, University of East Anglia

Global average surface temperature increased over the last hundred years (1906-2005) by 0.74°C with particularly strong warming since the 1970s

Other Indicators of Global Warming

- **Evaporation & rainfall are increasing**
- **Coastal glaciers are retreating**
- **Mountain glaciers are disappearing**
- **Permafrost is thawing**
- **Sea ice is shrinking**
- **Greenland is melting**
- **Sea level is rising**
- **Species are moving**

**Some prefer
“Global Climate Change”**

Source: www.whrc.org/resources/PPT/JPH_MBL_11-03-06_Clim-Chg-Challenge.ppt

The Politically Incorrect Guide to Global Warming, by Christopher Horner, 2007

Human Influences on Global Climate

- Alteration of earth's surface reflectivity by deforestation and other agricultural changes
- Rising concentration of “greenhouse gases” (GHG) from deforestation, agricultural practices, fossil-fuel burning
- Rising concentration of particulate matter from agricultural burning, cultivation and fossil-fuel burning
- Increased high cloudiness from aircraft contrails
 - A strongly-debated issue among scientists

Fossil fuels are a key issue

Source: www.whrc.org/resources/PPT/JPH_MBL_11-03-06_Clim-Chg-Challenge.ppt

Fossil Fuels Create Carbon Emissions

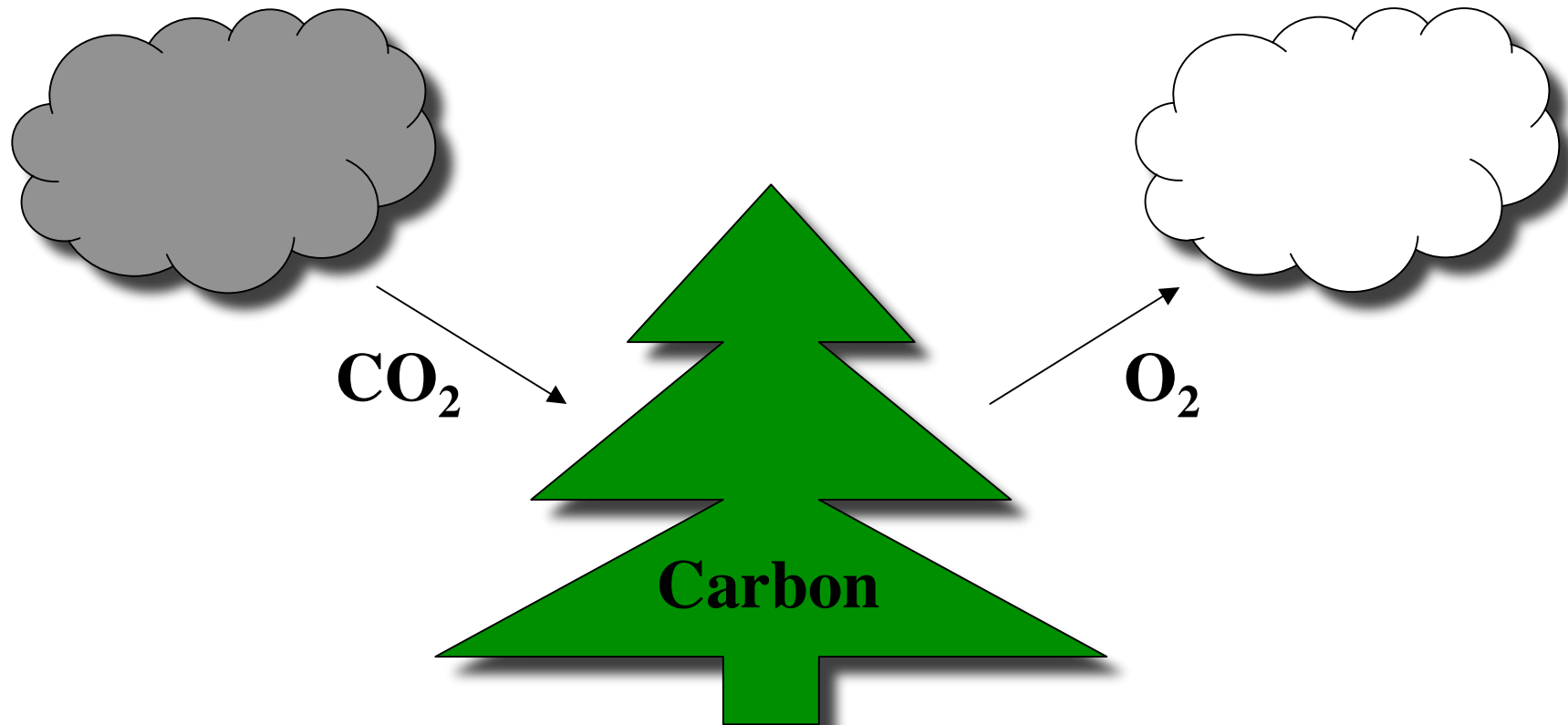
- **Common Fossil Fuels**
 - Gasoline, Kerosene, Aviation Gas, Jet Fuel
 - Heating Oil
 - Diesel (Automotive, Marine)
 - Coal
 - Natural Gas, Propane
- **So cars, trains and planes all create carbon emissions**
- **So do light bulbs, TVs, computers, refrigerators, furnaces – anything that uses electricity generated by a fossil-fuel power plant**
- **Nuclear-powered electrical plants do not emit CO₂, but do have serious hazardous waste issues**
- **Solar and wind energy are emerging as very clean sources**

Fossil Fuels Create a Wide Range of Emissions

- **CO₂ – Carbon dioxide**
- **H₂O - Water**
- **CO – Carbon monoxide**
- **HC – unburned hydrocarbons**
- **O₃ - Ozone**
- **NO_x – various Nitrogen Oxides**
- **SO_x – various Sulfur Oxides**
- **VOC – Volatile Organic Compounds**
- **PM – Particulate Matter**
- **Other pollutants from engine fuels – lead, antioxidants, antistatic agents, corrosion inhibitors, Fuel System Icing Inhibitors (FSII), etc.**

Today's
focus

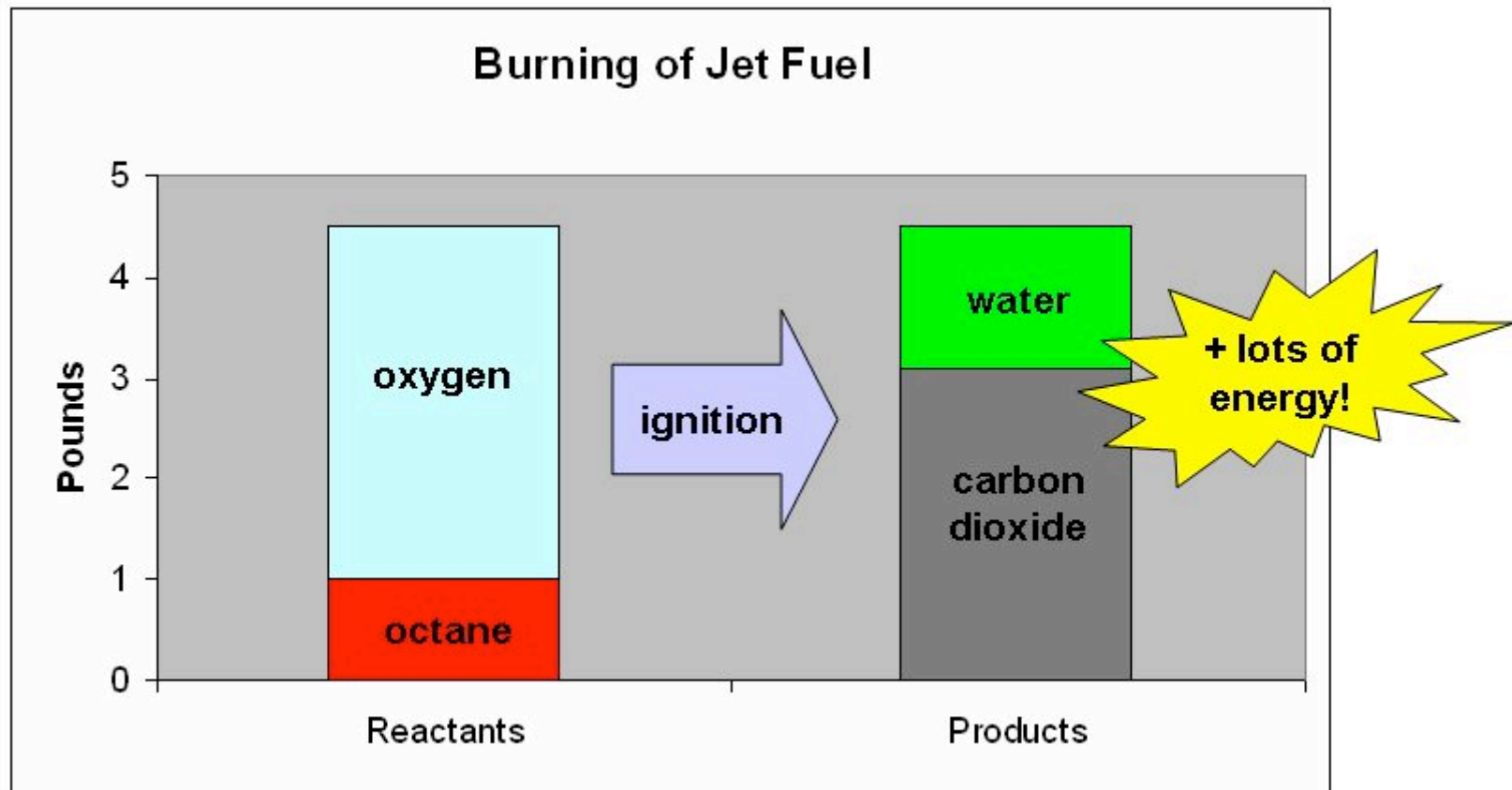
Trees Extract And Hold Carbon, And Produce Oxygen



1 mature tree can absorb roughly $\frac{3}{4}$ of a metric ton of CO₂ over a 40-year period

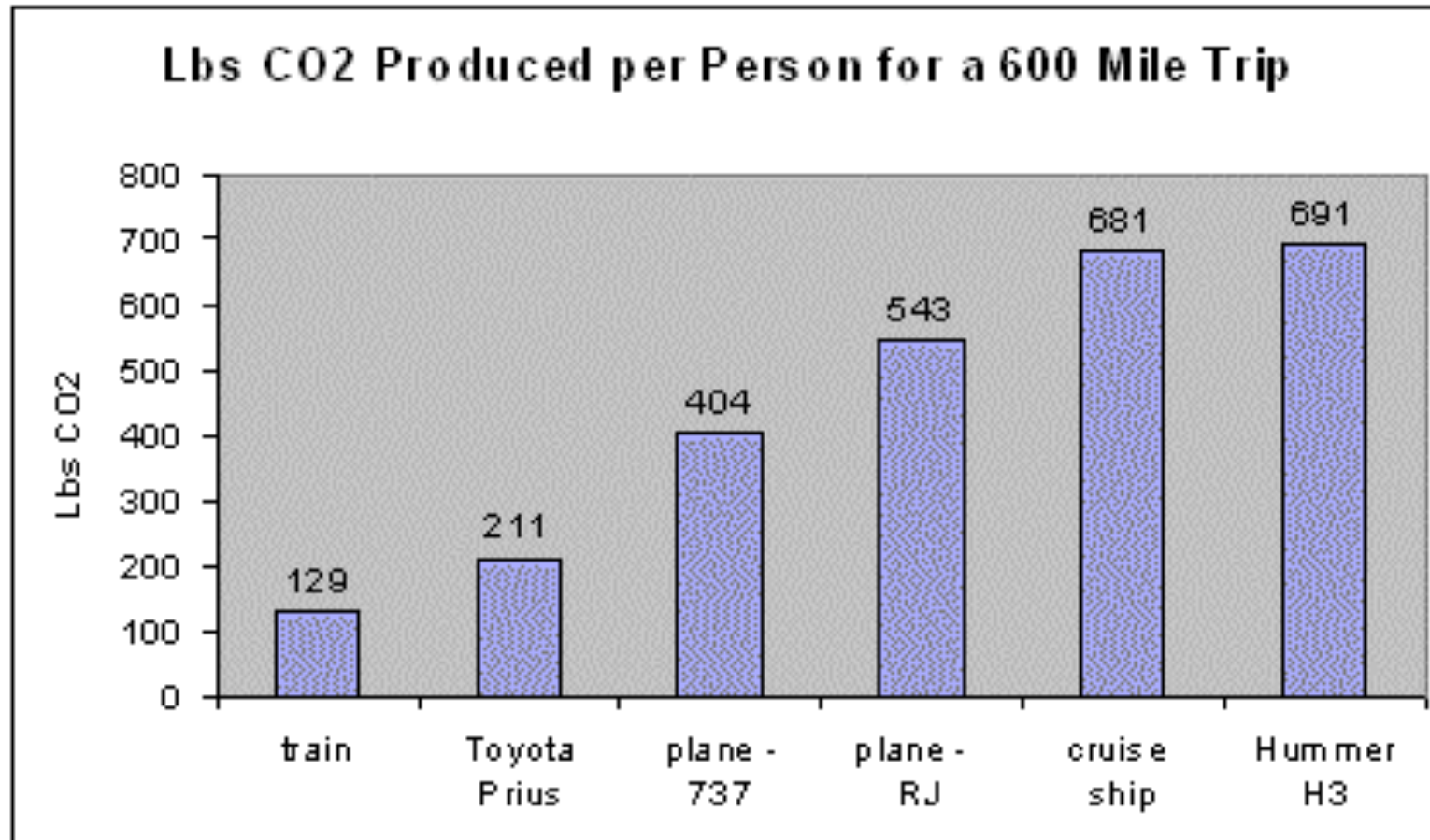
CO₂ and Airlines – Facts and Factors

Burning Jet Fuel Consumes O_2 and Produces CO_2



1 pound of jet fuel creates 3.1 pounds of CO_2
1 gallon of jet fuel creates 21 pounds of CO_2

Trains Produce the Least CO₂ per Traveler

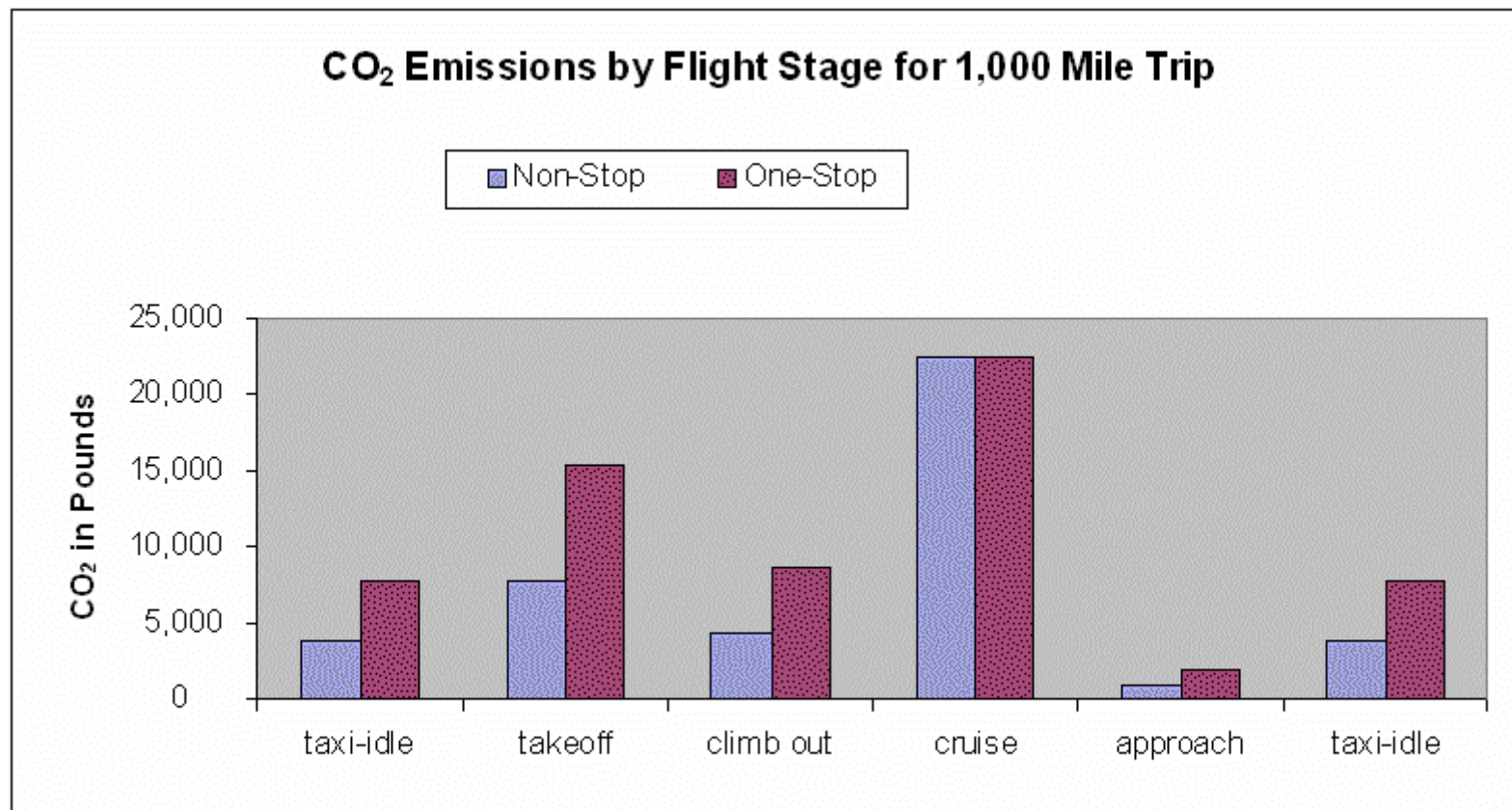


Source: ITM, TRX data and analysis

www.terrapass.com

www.cleancruising.com.au/greener_future.asp

A 1,000 Mile One-stop Flight Emits Nearly 50 % More CO₂ Than a Non-stop Flight

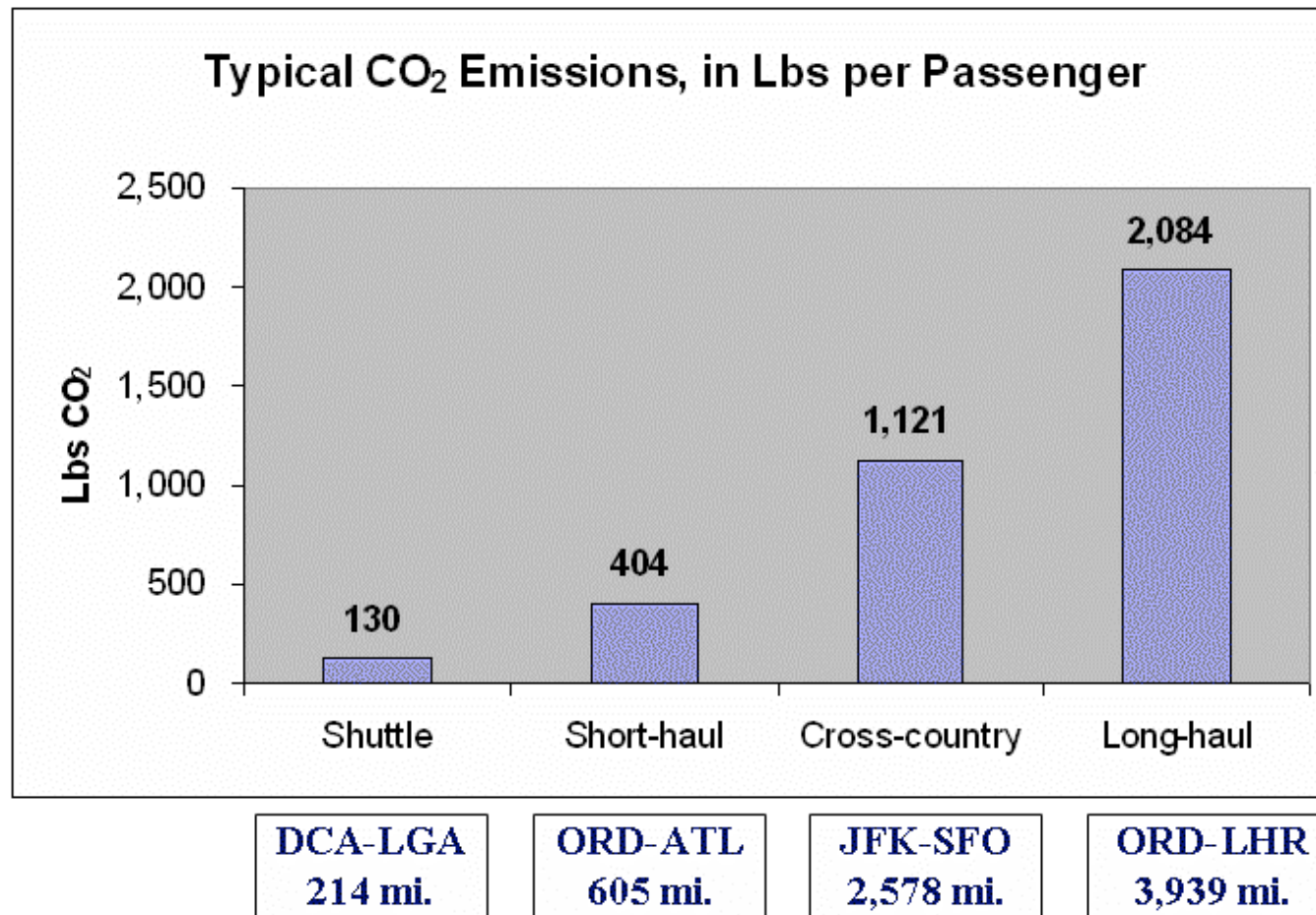


21.5 tons of CO₂ non-stop versus 32 tons from one-stop

Source: TRX data, analysis and estimates

Typical Airline CO₂ Emissions

Other Factors Include Type of Aircraft, Engines & Loads



Source: ITM, TRX data and analysis

**Passenger Airlines
Emitted ~560
Million Tons Of
CO₂ In The Last
12 Months
(May 2006 – April
2007)**

Oper. Carrier Code	May 2006-April 2007 Est. CO2 Emissions Million Tons	Cum. Share of Global Airline Industry's Emissions
AA	31	6%
UA	26	10%
CO	19	14%
DL	18	17%
WN	18	20%
BA	17	23%
LH	16	26%
AF	14	28%
NW	14	31%
JL	11	33%
QF	10	35%
SQ	10	36%
AC	10	38%
CX	9	40%
EK	9	42%
US	9	43%
TG	9	45%
KL	8	46%
NH	8	48%
CA	7	49%
KE	7	50%

21 airlines account for 50% of all airline emissions

Source: Based on OAG's global passenger scheduled flights and TRX's CO2 modeling

How Big A Forest Is Needed To Absorb 560 Million Tons Of CO₂ Emissions per Year?

- A) New York's Central Park**
- B) Florida**
- C) France**
- D) Texas**

Answer: 230,000 square miles, or 10% larger than France or 10% smaller than Texas

Assumptions: 3.75 tons of CO₂ absorbed per acre per year

What Can Be Done To Reduce or Remediate CO₂ Emissions From Airlines?

- **Burn less jet fuel**
 - More efficient aircraft design – less drag
 - More efficient aircraft engines
 - More efficient flights (shorter routes, less taxi time, etc.)
 - Fewer flights (not the same as fewer trips)
- **Find a cleaner fuel for aircraft engines**
 - Requires new fuel and new engine technology
- **Make CO₂ emissions less harmful**
 - Sequestration: Solidify CO₂ and bury it in ground or oceans
 - Sir Richard Branson's prize: \$25MM for practical method for taking 1 billion tons of CO₂ out of the atmosphere per year
- **Protect and regenerate nature's CO₂ scrubbers**
- **Invest in renewable energy sources**

Carbon Offsets – What Works, What Doesn't

Basics of Carbon Offsets

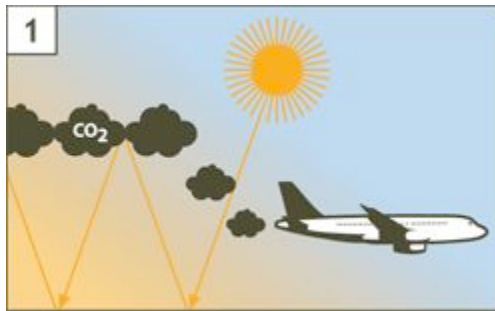
- > A carbon offset is a service that tries to reduce the net carbon emissions of individuals or organizations indirectly via groups who**
 - Reduce their own emissions**
 - And/or increase the absorption of greenhouse gases**

- > A wide variety of offset actions are available**
 - Tree planting is common**
 - Renewable energy and energy conservation offsets are also popular**

Source: www.carbonfootprint.com/carbon_offset.html

www.algore.org/node/516

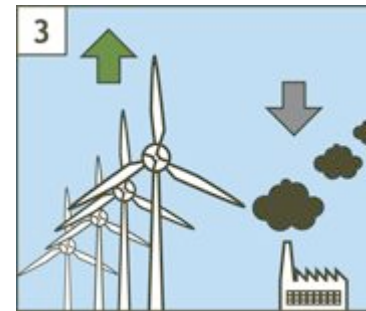
How One CO₂ Offset Program Works (Terrapass.com)



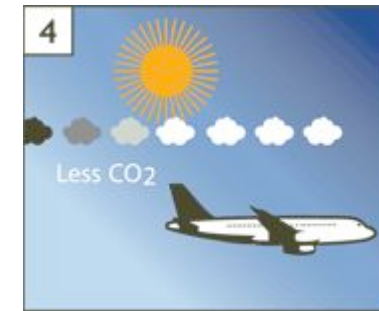
Jets burn a lot of fuel



You buy a Flight Offset Credit for your trip



It helps fund clean energy projects that reduce greenhouse gas emissions.



Your Credit is verified to reduce the equivalent of your air travel's carbon dioxide emission.

Source: www.terrapass.com/flight/howworks.html

www.treehugger.com/files/2007/03/treehugger_inte_1.php

Delta's Recent Offset Effort

- **Travelers booking via Delta.com will be offered the option of purchasing a carbon offset**
 - \$5.50 for a domestic round-trip
 - \$11.00 for an international round-trip
- **Proceeds are channeled through The Conservation Fund**

From British Airways Website (ba.com)

British Airways has launched a scheme where its customers can choose to offset the carbon dioxide emissions created during their flights.

- **Customers can pay via a link from the airline's website for the cost of the emissions created by their journey. For example, a return flight to Madrid will cost £5 and a return flight to Johannesburg will cost £13.30.**
- **The money raised will be used by an organisation called Climate Care to invest in sustainable energy projects that tackle global warming by reducing carbon dioxide levels.**
- **Climate Care's projects include a scheme in South Africa that has distributed 50,000 energy efficient lamps this year via school groups as part of an environmental awareness campaign.**
- **In India, Climate Care's support means schools are able to use stoves that run on renewable energy briquettes made from crop waste rather than liquid petroleum gas.**

Travelocity's Go Zero Program

Bundled carbon emissions for air, car and hotel

- > \$10 offsets an average trip including air travel, a one-night hotel stay, and rental car for one person.
- > \$25 negates air travel, four-night hotel stay, and rental car for two people.
- > \$40 equalizes the effects of air travel, four-night hotel stay, and rental car for four people.

Some Are Skeptical of Carbon Offset's Impact

“The emerging alliance of business and environmental special interests may well prove powerful enough to give us cap-and-trade in CO₂. It would make Hollywood elites feel virtuous, and it would make money for some very large corporations. But don't believe for a minute that this charade would do much about global warming.”

- Wall Street Journal, March 3, 2007

From the Financial Times:

Their have been recent reports of fraudulent carbon offset programs

- **Widespread instances of people and organisations buying worthless credits that do not yield any reductions in carbon emissions.**
- **Industrial companies profiting from doing very little – or from gaining carbon credits on the basis of efficiency gains from which they have already benefited substantially.**
- **Brokers providing services of questionable or no value.**
- **A shortage of verification, making it difficult for buyers to assess the true value of carbon credits.**
- **Companies and individuals being charged over the odds for the private purchase of European Union carbon permits that have plummeted in value because they do not result in emissions cuts.**

Source: www.ft.com/cms/s/48e334ce-f355-11db-9845-000b5df10621.html

Greenhouse Gas Reductions Can Be Traded Like Pollution Credits

- **Companies that under-emit sell their gas reductions**
 - **Creates an incentive for companies to under-emit**
- **Companies that over-emit buy gas reductions**
 - **Creates a hard cost for over-emitting**
- **Companies trade Credits**
 - **Credits require certification and accreditation**
- **These trading actions set the market price for reductions**
- **Greenhouse gas reductions are traded at**
 - **EU ETS (EU Emission Trading Scheme)**
 - **Chicago Climate Exchange**

Greenhouse Gas Reduction Trading Schemes

EU ETS – European Union Emission Trading Scheme – a regulated, non-voluntary market for certain capped sectors.

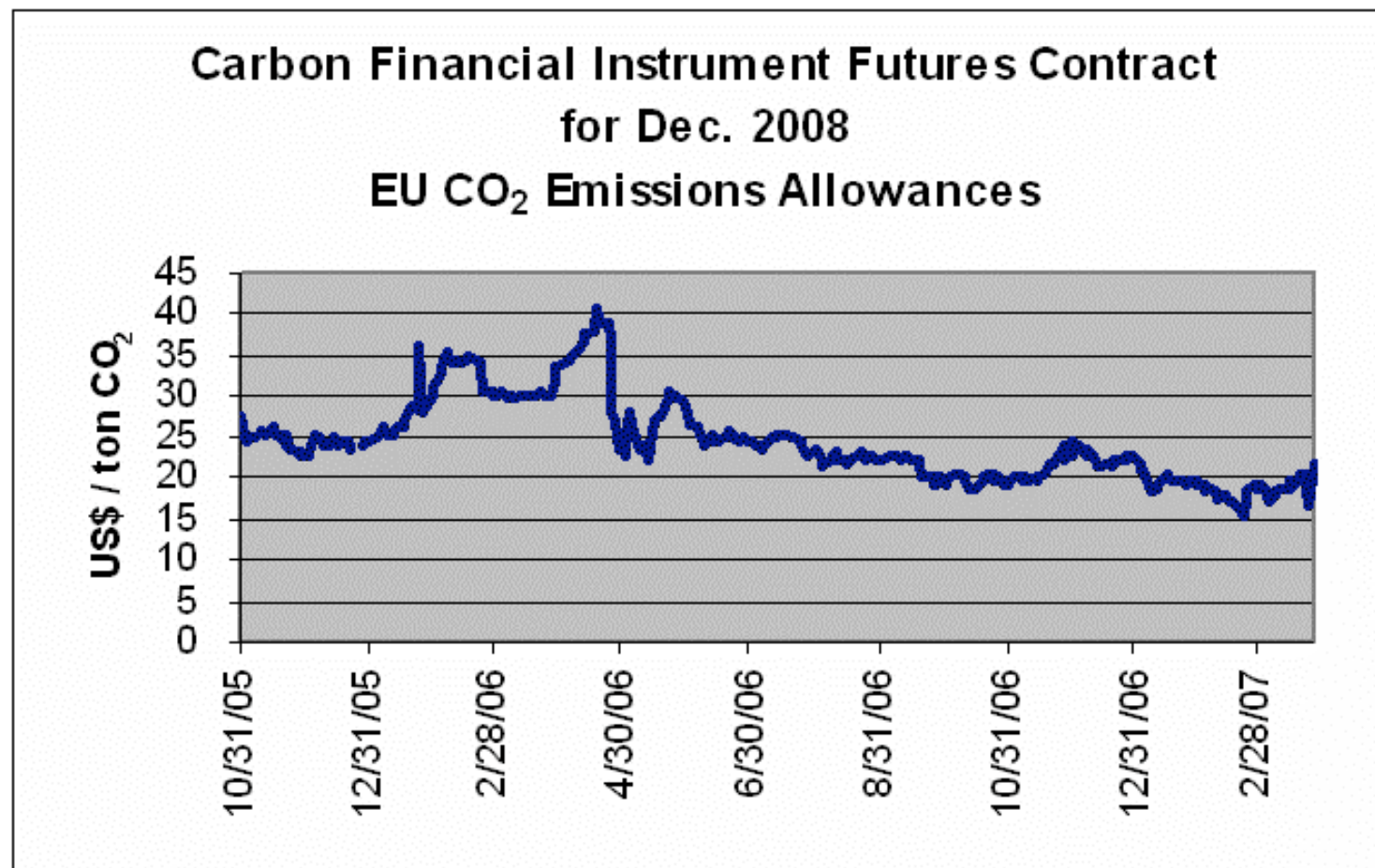
Note: Aviation Emissions will become a capped sector in 2011 (domestic flights) and 2012 (international flights)

CCX – Chicago Climate Exchange – a program that allows companies to voluntarily commit to legally binding greenhouse gas reductions

Source: ec.europa.eu/environment/climat/emission.htm

www.chicagoclimatex.com

In the EU, Recent Futures Prices for CO₂ Reductions Varied Between \$16 and \$42 per Ton



So What is the CO₂ Cost per Traveler?

		one-way miles	Price per ton CO ₂		
			<u>\$5/ton</u>	<u>\$10/ton</u>	<u>\$25/ton</u>
Shuttle	DCA-LGA	214	\$0.29	\$0.59	\$1.47
Short-haul	ORD-ATL	605	\$0.92	\$1.83	\$4.58
Cross-country	JFK-SFO	2,578	\$2.54	\$5.08	\$12.71
Long-haul	ORD-LHR	3,939	\$4.73	\$9.45	\$23.63

TRX's early analyses show CO₂ costing roughly 1-2% of a company's air spend

Going Carbon Neutral? Tips for Travel Managers

What are Corporate Managers Asked to Do?

The 4 B's

- **Baselining**
 - Calculate recent travel program's carbon costs for CSR baseline and initiatives
- **Buying**
 - Use Corporate Social Responsibility (CSR) criteria as part of supplier selection process
- **Booking**
 - Provide carbon cost information per flight at point of sale
 - Apply a "carbon tax" for each flight booked
- **Bettering**
 - Propose initiatives for reducing the company's carbon footprint
 - Participate in carbon offset programs
 - Participate in trading of greenhouse gas reductions

Establishing A Company's Carbon Inventory Is Difficult; Must Consider Direct and Indirect CO2

- **Travel**
 - **Air (Indirect)**
 - **Hotel (Direct and Indirect)**
 - **Car and Fleet (Direct)**
- **Office utilities (Direct)**
- **Manufacturing facilities – owned or controlled are Direct**
- **Supply chain's carbon footprint is mostly Indirect**

What Analytics Are Needed For The Air Category?

- **How much CO₂ did our air travel program emit in the past?**
- **How much did we emit by region, country or carrier?**
- **How does our air travel program emissions compare to**
 - **Best-case** emissions for the same travel footprint?
 - **Industry average** for the same travel footprint?
- **What are the options for reducing our air travel program's CO₂ emissions?**
 - Reducing travel
 - Avoiding unnecessary connections
 - Booking “greener” carriers
- **How will booking the greenest carriers impact our total costs and preferred contracts (e.g., market share goals)?**

Carbon Offset Programs Should Be Sourced Just Like Other Purchases

- **Carbon offset providers are a fragmented, immature and largely unregulated industry**
- **Buyers should apply rigorous procurement principles, just as done in other spend categories**
 - Establish criteria, use RFPs and evaluate carefully
- **Attend Monday's Session**
 - **Sustainable Procurement: What is the Green Question?**

Discussion

- **What are travel buyers doing in this area?**
 - To what extent are carbon emissions becoming a supplier criteria?
 - Are travelers being asked to reduce travel specifically in order to reduce carbon emissions?
 - How are travel managers expected to contribute in this area?
- **What are travel suppliers and TMCs doing?**
 - Publishing their carbon inventories?
 - Advising travelers of the carbon emissions per trip?
- **Other discussion items?**

Additional Resources

- **Nike and Delta's effort**
- **Germany and Brazil corporate efforts**
- **Selected Carbon Offset programs and prices**

Carbon Offset Examples

- **Nike and Delta Airlines set up a fund with the Oregon Climate Trust to offset the emissions generated by Nike employee travel. The Trust will invest in an expanding portfolio of offset projects, including cogeneration of electricity at industrial sites, building and transportation efficiency, and improvements to low-greenhouse-gas construction materials.**
- **Companies also are integral to the agreements between nations participating in the Kyoto Protocol. For instance, under a deal struck between Germany and Brazil at the World Summit on Sustainable Development, German companies will subsidize purchases by Brazilian consumers of cars that run on ethanol. The credits German companies earn from the program will help Germany meet targets set under the Kyoto protocol, while Brazil aims to profit from the deal by reducing its dependence on imported oil, as well as reducing its greenhouse gas emissions.**

Source: www.climatebiz.com/sections/backgrounder_detail.cfm?UseKeyword=Carbon%20Offsets

More Carbon Offset Programs

- **Climate Neutral Network** is an alliance of companies and other organizations committed to developing products and enterprises that eliminate their climate impacts. Among the group's core offerings is assistance in building a portfolio of offset investments.
- **The Climate Trust** was created to administer funds from utilities mandated by Oregon State law to offset the impact of new projects. The trust also runs a **Partnership Program** to provide businesses with offset expertise gained through its work with local utilities.
- **The World Bank Community Development Carbon Fund** links small-scale carbon projects with companies looking to fund offset projects. The fund became operational in **July 2003** and is currently reviewing potential project in least-developed countries and in poorer communities of all developing countries.
- **The Climate Care** web site provides quick access to illustrative case studies and a list of company participants, divided into three groups: purchases for sale to consumers; purchases to cover all or part of ongoing operations; and occasional purchases.
- **The Carbon Footprint** web site has a carbon footprint calculator, ways of minimizing your carbon footprint, and offsetting your carbon footprint.

Source: www.climatebiz.com/sections/backgrounder_detail.cfm?UseKeyword=Carbon%20Offsets

Carbon Offset Pricing

Ecobusinesslinks.com Carbon Offset Survey						
Carbon Offset Provider	Price (US\$/Metric ton CO2)	Non-profit	Projects Types	Project Choice	Offset Types	Product Certification/ Verification
AtmosClear Climate Club US	\$3.56 ^a - \$25.00	No	Methane	No	Car, Home	Environmental Resources Trust
Carbonfund.org US	\$4.30 ^b - 5.50	Yes	Renewables, Efficiency, Reforestation	Yes	Home, Car, Air, Events, Business	Green-e, Chicago Climate Exchange, Environmental Resources Trust
e-BlueHorizons US	\$5.00	No	Renewables, Reforestation	No	Home, Car, Air	Chicago Climate Exchange, Environmental Resources Trust

Carbon Offset Pricing

Ecobusinesslinks.com Carbon Offset Survey						
Carbon Offset Provider	Price (US\$/Metric ton CO2)	Non-profit	Projects Types	Project Choice	Offset Types	Product Certification/ Verification
DriveNeutral.org US	\$6.93 & up	Yes	Efficiency	No	Car	Chicago Climate Exchange
Terrapass US	\$7.35 ^c - 11.00	No	Renewables, Efficiency	No	Car, Air, Events, Business	Green-e, Chicago Climate Exchange, Center for Resource Solutions
Native Energy US	\$13.20	No	Renewables	Yes	Home, Car, Air, Events, Business	Green-e

Carbon Offset Pricing

Ecobusinesslinks.com Carbon Offset Survey						
Carbon Offset Provider	Price (US\$/Metric ton CO2)	Non-profit	Projects Types	Project Choice	Offset Types	Product Certification/ Verification
The CarbonNeutral Company	\$14.00-18.00	No	Renewables, Efficiency, Reforestation	Yes	Business, Home, Car, Air, Events	KPMG, Edinburgh Centre for Carbon Management, Independent Advisory Committee
UK			Methane			
Climate Friendly	\$16.00-19.00	No	Renewables	No	Home, Car, Air, Business	Office of the Renewable Energy Regulator, NSW Government, Ernst & Young.
Australia						
Sustainable travel International	\$18.00	Yes	Renewables	No	Air, Car, Home, Hotel	See Myclimate
US, Switzerland						

For More Information Please Contact

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