



DELTA



JET ENGINE WASHING

Georgia Tech Carbon Reduction Challenge



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PROBLEM:

98.8%

Delta's emissions from mainline and regional jet fuel burn. A necessary emission to move our customers around the world.

- Find a project that addresses this frontline emission
- Start saving the company money right away or with a quick ROI
- Create a project that will spark the interest of executive leaders
- With over 800 aircraft in Delta's fleet, 188 planes with leased engines are not on a wash schedule (MD90, B717, A330-200, A330-300)

COMMITMENT:

While Delta strives to reduce its carbon emissions and has done so with numerous projects, continued growth has led to increased emissions over the past few years. Delta has decided to offset any emissions above the 2012 baseline, a voluntary process that is not required by law.

SAVINGS:

25,888,470.10 lb. CO₂ saved annually
\$1,578,714.63 saved annually
 Equal to 42,701.56 one way flights ATL-LAX annually

PROPOSAL:

- Gathered information from the Propulsion Engineering team
- Calculated assumptions
- Reported findings to the Fuel Council and Propulsion Engineering leadership to encourage the implementation this project

HOW IT'S DONE:

1. Engine is connected to the wash rack
2. A "sock" is put around the engine to prevent waste water from spilling out
3. Pressurized water is sprayed into the engine fan to remove dirt and debris from blades
4. Two hours later, wash equipment is removed
5. Collected water is amended

CALCULATIONS FOR UNWASHED FLEETS:

Fuel Consumed 2016, gallons	752,752,118.75
Fuel Reduction*	0.16%
Fuel savings, gallons	1,204,403.39
Fuel price per gallon*	\$1.60
Avoided Fuel purchase	\$1,927,045.42
Avoided carbon, metric tons	11,742.93
Carbon offset price per metric ton*	\$5.00
Avoided purchase of carbon offsets	\$58,714.67
Total Benefits	\$1,985,760.08
Labor cost	\$292.50
Fuel burned to test engine	\$90.00
Waste water disposal	\$24.55
Total cost per engine wash	\$407.05
Domestic engine washes, 3 per year	936
International engine washes, 1 per year	64
Total engine washes per year	1,000
Total annual engine wash cost	\$407,045.45

1,985,760.08 - 407,045.45 = 1,578,714.63

* Denotes Assumption

Note: All of the information was received from Delta Air Lines and calculated using their estimates from previous ventures and past flight fuel use

Carbon Neutral Growth Since 2012

