ITEM # 6

Measuring The Effectiveness of TDM Strategies in Reducing Greenhouse Gas Emissions

A Preview of E^{3}Calc©

The Premise

- TDM's offer businesses an effective and cost efficient means to reduce their employee based greenhouse gas (GHG) emissions.

Project Objectives

- Conduct a literature review of research on how TDM strategies impact vehicle miles traveled and reduce greenhouse gas emissions;
- Evaluate current methodologies in determining the effects of TDM related strategies in reducing GHG emissions;
- Develop a new mechanism (based on research during objectives 1& 2) for documenting the effectiveness of TDM related strategies in reducing GHG emissions;

Project Objectives (continued)

- Test the new methodology ($E^3Calc_©$) to evaluate the effectiveness of the new methodology;
- Conduct a Theoretical Analysis of the Effectiveness of TDM Strategies in Reducing GHG Emissions in the DATA service area; and
- Produce a Final Report that documents the study and provides recommendations for improving TDM strategies and widening their implementation in the public and private sectors.

Research & Literature Review Findings

The overwhelming conclusions from the literature review is that the vast majority of GHG/carbon calculators are designed for individual or personal use – how big is my carbon footprint? There are few working employer-oriented calculators. There are even fewer employer-based carbon-GHG calculators that take into consideration all alternatives to driving alone.

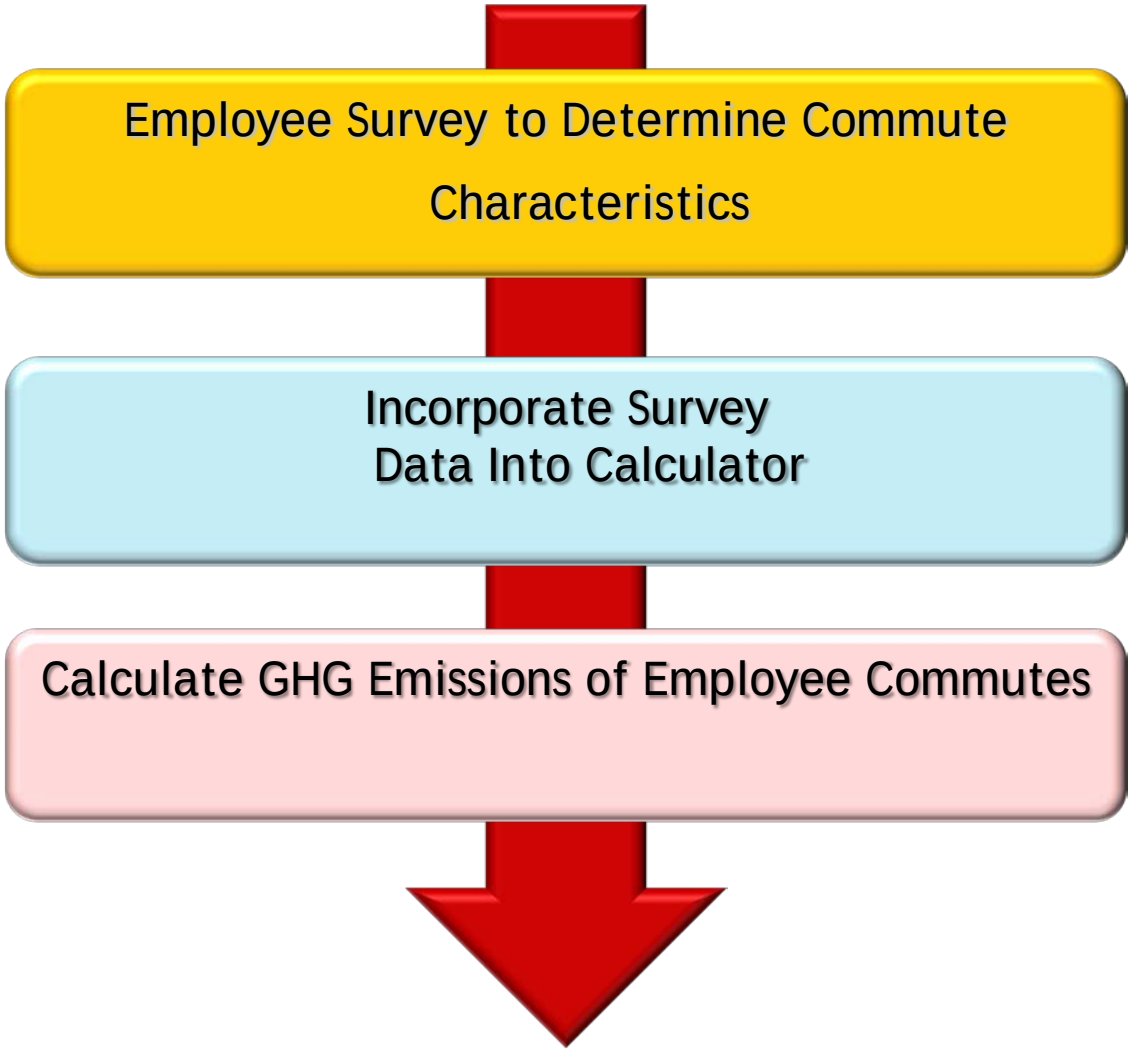
Our Conclusion:

The DATA calculator will be unique.
It will make a contribution to TDM industry.

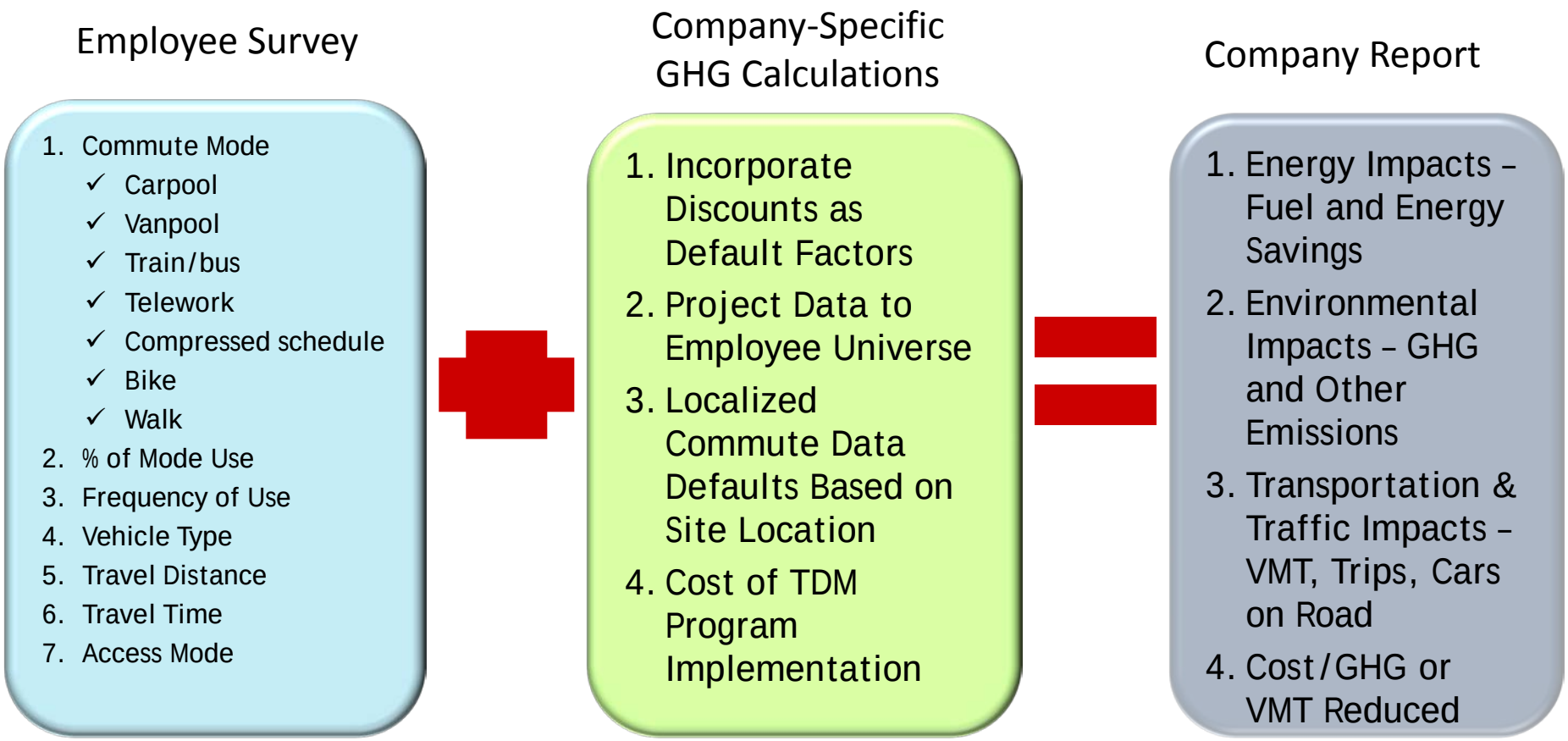
Results of Literature Review & Expert Interviews

Key Components to GHG Emissions Calculator	
Inputs •Employee mode •% of trips by mode •Frequency of use •Home to work travel distance •**Travel time** •**Type of vehicle**	**Output** •3 Impact Areas (levels reduced based on employees actions) 1. Environmental •Carbon Plus GHG Emissions 2. Transportation/Traffic: •Vehicle Miles Traveled •Cars Off the Road 3. Energy Savings: •Fuel Use *Related Issue: Comparison to baseline (either past data or based on SOV only for all employees) to show benefits and savings.*

How The DATA GHG Calculator Will Work



Calculator Components

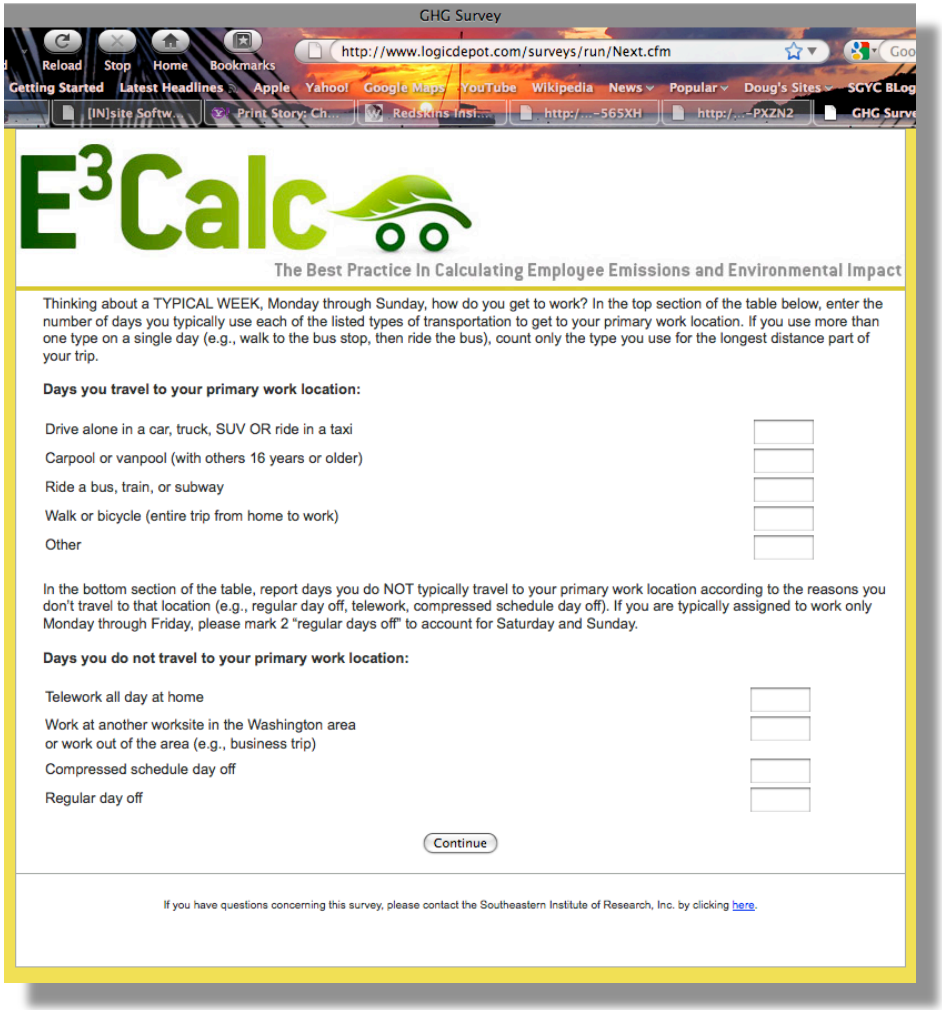


Development of E³Calc©

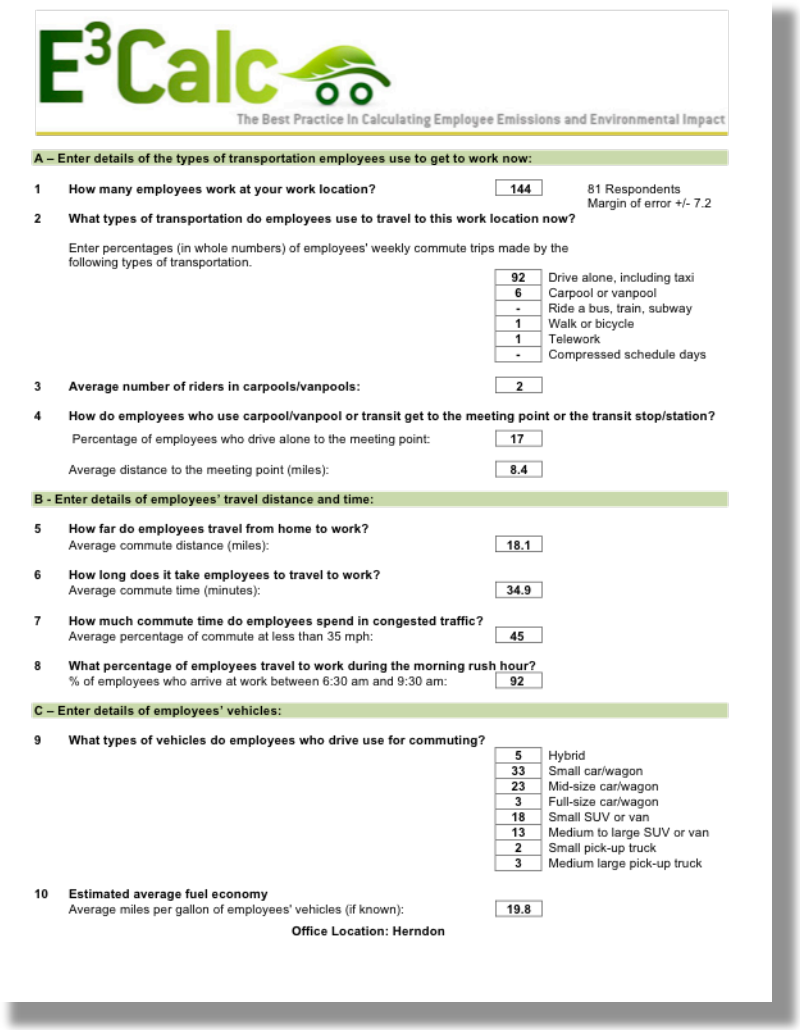
Branding & Simplicity

Informational Website

Employee Survey



Employee Survey Reports



E³Calc
The Best Practice In Calculating Employee Emissions and Environmental Impact

A – Enter details of the types of transportation employees use to get to work now:

1 **How many employees work at your work location?** 144 — 81 Respondents, Margin of error +/- 7.2

2 **What types of transportation do employees use to travel to this work location now?**

Enter percentages (in whole numbers) of employees' weekly commute trips made by the following types of transportation.

92	Drive alone, including taxi
6	Carpool or vanpool
-	Ride a bus, train, subway
1	Walk or bicycle
1	Telework
-	Compressed schedule days

3 **Average number of riders in carpools/vanpools:** 2

4 **How do employees who use carpool/vanpool or transit get to the meeting point or the transit stop/station?**

Percentage of employees who drive alone to the meeting point: 17

Average distance to the meeting point (miles): 8.4

B - Enter details of employees' travel distance and time:

5 **How far do employees travel from home to work?**
Average commute distance (miles): 18.1

6 **How long does it take employees to travel to work?**
Average commute time (minutes): 34.9

7 **How much commute time do employees spend in congested traffic?**
Average percentage of commute at less than 35 mph: 45

8 **What percentage of employees travel to work during the morning rush hour?**
% of employees who arrive at work between 6:30 am and 9:30 am: 92

C – Enter details of employees' vehicles:

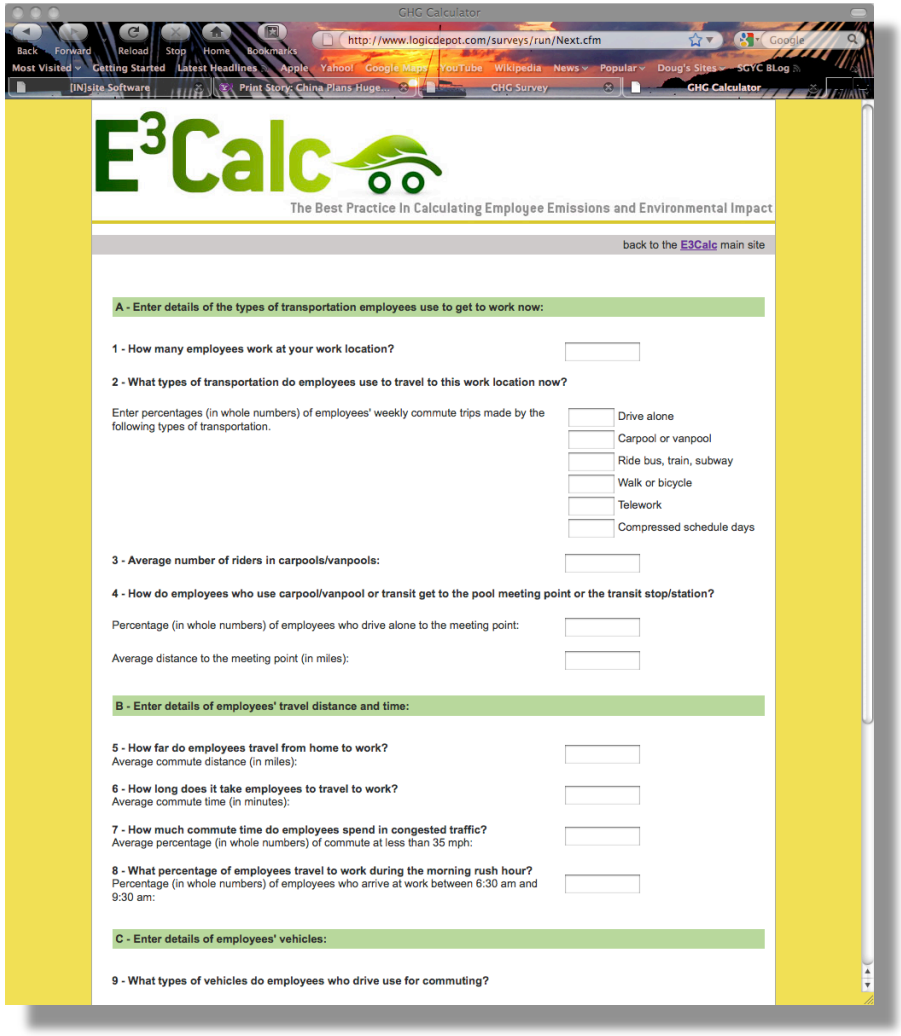
9 **What types of vehicles do employees who drive use for commuting?**

5	Hybrid
33	Small car/wagon
23	Mid-size car/wagon
3	Full-size car/wagon
18	Small SUV or van
13	Medium to large SUV or van
2	Small pick-up truck
3	Medium large pick-up truck

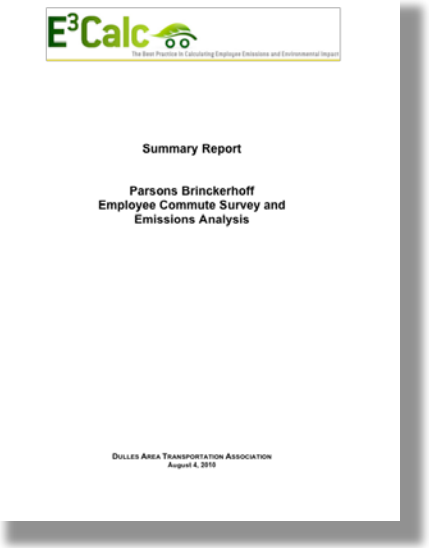
10 **Estimated average fuel economy**
Average miles per gallon of employees' vehicles (if known): 19.8

Office Location: Herndon

Online Calculator Input



Customized Employer Reports



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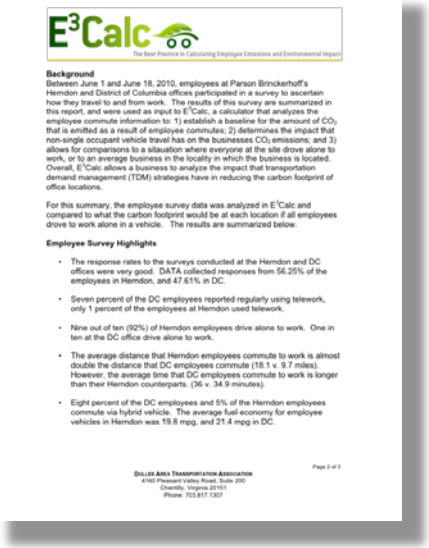
Summary Report

Parsons Brinckerhoff Employee Commute Survey and Emissions Analysis

DULLES AREA TRANSPORTATION ASSOCIATION
August 4, 2010



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Background

Between June 1 and June 18, 2010, employees at Parson Brinckerhoff's Herndon and District of Columbia offices participated in a survey to ascertain how they travel to and from work. The results of this survey are summarized in this report, and were used as input to E³Calc, a calculator that analyzes the employee commute information to: 1) establish a baseline for the amount of CO_2 that is emitted as a result of employee commutes; 2) determines the impact that non-single occupant vehicle travel has on the businesses CO_2 emissions; and 3) allows for comparisons to a situation where everyone at the site drove alone to work, or to an average business in the locality in which the business is located. Overall, E³Calc allows a business to analyze the impact that transportation demand management (TDM) strategies have in reducing the carbon footprint of office locations.

For this summary, the employee survey data was analyzed in E³Calc and compared to what the carbon footprint would be at each location if all employees drove to work alone in a vehicle. The results are summarized below.

Employee Survey Highlights

- The response rates to the surveys conducted at the Herndon and DC offices were very good. DATA collected responses from 56.25% of the employees in Herndon, and 47.61% in DC.
- Seven percent of the DC employees reported regularly using telework, only 1 percent of the employees at Herndon used telework.
- Nine out of ten (92%) of Herndon employees drive alone to work. One in ten at the DC office drive alone to work.
- The average distance that Herndon employees commute to work is almost double the distance that DC employees commute (18.1 v. 9.7 miles). However, the average time that DC employees commute to work is longer than their Herndon counterparts. (36 v. 34.9 minutes).
- Eight percent of the DC employees and 5% of the Herndon employees commute via hybrid vehicle. The average fuel economy for employee vehicles in Herndon was 19.8 mpg, and 21.4 mpg in DC.

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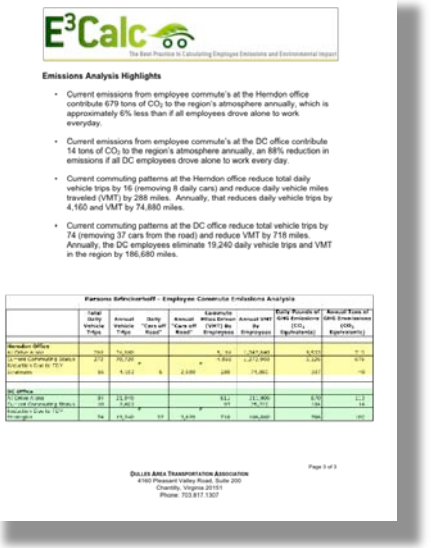

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Emissions Analysis Highlights

- Current emissions from employee commute's at the Herndon office contribute 679 tons of CO_2 to the region's atmosphere annually, which is approximately 6% less than if all employees drove alone to work everyday.
- Current emissions from employee commute's at the DC office contribute 14 tons of CO_2 to the region's atmosphere annually, an 88% reduction in emissions if all DC employees drove alone to work every day.
- Current commuting patterns at the Herndon office reduce total daily vehicle trips by 16 (removing 8 daily cars) and reduce daily vehicle miles traveled (VMT) by 288 miles. Annually, that reduces daily vehicle trips by 4,160 and VMT by 74,880 miles.
- Current commuting patterns at the DC office reduce total vehicle trips by 74 (removing 37 cars from the road) and reduce VMT by 718 miles. Annually, the DC employees eliminate 19,240 daily vehicle trips and VMT in the region by 186,680 miles.

Parsons Brinckerhoff - Employee Commute Emissions Analysis

	Total Daily Vehicle Trips	Annual Vehicle Trips	Daily "Cars off Road"	Annual "Cars off Road"	Roundtrip Miles Driven (VMT) By Employees	Annual VMT By Employees	Daily Pounds of GHG Emissions (CO_2 Equivalents)	Annual Tons of GHG Emissions (CO_2 Equivalents)
Herndon Office								
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DC Office								
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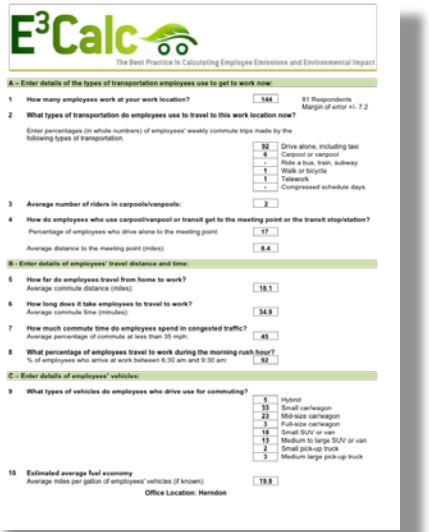

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Average miles per gallon of employees' vehicles (if known): 19.8

Office Location: Herndon

GHG Calculator http://run.logicdepot.com/SurveysrunNext.cfm

E³Calc
The Best Practice In Calculating Employee Emissions and Environmental Impact

back to the E3Calc main site

Calculator Results for Your Worksite

These results represent typical commute characteristics based on 144 employees commuting to work in your area.

How many vehicle trips do your employees take?

Current daily vehicle trips to and from your location:	272
Daily one-way vehicle trips by your employees:	136

Commute Vehicle Miles Traveled (VMT)

Current daily commute miles driven by your employees:	4896

Ozone Pollutant Emissions (daily pounds)

NOx (Oxides of Nitrogen) emissions, in pounds:	4.49
VOC (Volatile Organic Compounds) emissions, in pounds:	2.66
CO^2 equivalent emissions (includes CO2 and other greenhouse gases):	5226

Continue

If you have questions about how to use this calculator, please contact the Southeastern Institute of Research, Inc. at [illegible]

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GHG Calculator http://run.logicdepot.com/SurveysrunNext.cfm

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back to the E3Calc main site

Calculator Results For Your Worksite

These results represent typical commute characteristics based on 144 employees commuting to work in your area.

How many vehicle trips do your employees remove from the roads?

Current daily vehicle trips to and from your location:	272
Comparison daily vehicle trips to and from your location:	288
Daily one-way vehicle trips reduced by your employees:	16
Percent of daily one-way vehicle trips reduced by your employees:	6%
Daily "cars off the road":	8

Commute Vehicle Miles Traveled (VMT) Reduced

Current daily commute miles driven by your employees:	4896
Comparison daily commute miles driven by your employees:	5184
Percent daily commute miles driven by your employees:	6%
Daily commute miles reduced by your employees:	288

Ozone Pollutant Emissions Reduced (daily pounds)

NOx (Oxides of Nitrogen) reduced, in pounds:	0.26
Percent NOx (Oxides of Nitrogen) reduced:	6%
VOC (Volatile Organic Compounds) reduced, in pounds:	0.15
Percent VOC (Volatile Organic Compounds) reduced:	6%
CO2 equivalent emissions (includes CO2 and other greenhouse gases) reduced:	307.4
Percent CO2 equivalent emissions (includes CO2 and other greenhouse gases) reduced:	6%

Continue

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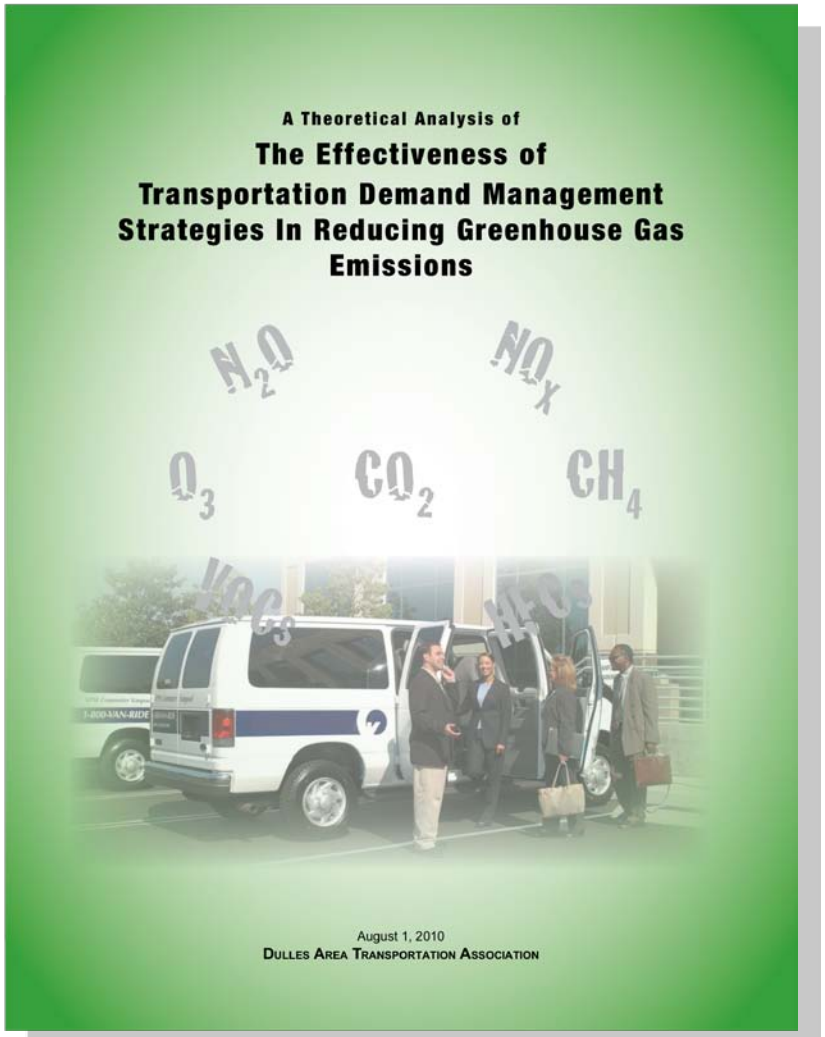
Theoretical Analysis



Theoretical Analysis

- Used E^3Calc to determine the impact that TDM strategies have on reducing GHG emissions in the DATA service area.
- Used local commuter and employment data.
- Analyzed TDM impacts on approximately 16,000 businesses in DATA service area that employ almost 300,000 employees (comprising over 34% of No. Va. jobs).

Theoretical Analysis Findings

TDM strategies and alternative SOV use in DATA's Service area:

- Remove 390,000 tons of GHG emission annually;
- Reduce DAILY Vehicle Miles Traveled (VMT) by 2.85 million miles;
- Remove 180,000 vehicle trips, a DAY; and
- Take more than 89,000 cars off of Northern Virginia roads, DAILY, or over 23.3 million vehicles annually.

Theoretical Analysis Findings

The collective impact that TDM strategies have in DATA's service area is equivalent to:

- Removing the emissions from the daily use of almost 69,000 passenger cars;
- Removing the number of cars that would fill all four lanes of the Beltway (56 miles) EVERY DAY;
- Annually filling a four lane highway with vehicles that stretches around the earth's equator one and a half times; or
- Removing the CO_2 emissions generated by the electricity used in more than 43,000 homes.

Conclusion

- TDM related strategies seem to be a very effective means of reducing the region's GHG emissions.
- E^3Calc is a tool that demonstrates the effectiveness of TDM strategies in reducing GHG emissions.
- As the E^3Calc is introduced as another tool in the TDM toolbox, businesses will be able to benchmark, monitor and manage their carbon footprint as it pertains to employee commutes and travel.
- E^3Calc will be an important tool for TDM professionals in demonstrating the effectiveness of these strategies and their overall importance to a business' operational viability.

Beta Testing

- DATA is currently beta testing at three sites
- Will be soliciting new participants this fall
- Plan a wider distribution this winter and next spring

Thank You!

Contact Information

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