“Green Your Meeting”

An Economic Approach to Reduced Oil Demand, Greenhouse Gas (GHG) Emissions, and Improved Security

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Green Your Meeting Summary

With the Gulf of Mexico filling up with oil, it's time to stop talking and time to start doing something about oil consumption and emissions—in other words, it's time to become more green. This paper outlines the rationale and specific steps behind Green Your Meeting, a green transportation initiative that will reduce oil consumption and emissions. Other benefits of Green Your Meeting include reduced traffic congestion, reduced infrastructure costs, increased global competitiveness, reduced reliance on petroleum, greater security through reduced reliance on unfriendly and undependable energy suppliers, and reduced environmental damage. While we support the efforts of the many individuals and organizations that are looking for technical and legislative solutions that may have an impact on these issues sometime in the future, Green Your Meeting can have a real and measurable impact now.

Approximately 70 percent of the oil used in the United States is used for transportation. Over 50 percent of "personal" oil consumption and emissions—that over which individuals have direct control—are from transportation. On a mile-per-mile basis, public transportation consumes less than half the oil and generates less than half the emissions of private transportation.

In the future, "transit-oriented design" will help stimulate the development of better infrastructure, which will induce higher public transit use. Green Your Meeting's "transit-oriented meetings" will help induce higher public transit use by making public transit a more attractive choice today.

Green meetings are those that generate lower emissions and energy consumption from transportation and other activities. Green Your Meeting is a program to reach organizations and encourage them to hold green meetings. The highest priority organizations for this program are environmental groups. Other targets include associations, corporations, financial and insurance groups, medical professionals, religious groups, and anybody else who holds meetings—which means just about everybody.

Green Your Meeting will do the following:

- Educate individuals and organizations on how they can hold green meetings that don't interfere with their organization's objectives;
- Encourage and help individuals and organizations to hold meetings that are green;
- Support individuals and organizations in their efforts to encourage their meeting participants to be green;
- Develop and make available a model that will allow meeting planners to analyze meeting "transit accessibility," i.e., the relative amount of time and cost required by private versus public transportation;
- Develop "Green Venue" metrics that will measure the greenness of the venue itself; Relevant factors include transportation alternatives, walkability, and support for teleconferencing;
- Develop "Green Meeting" metrics that will measure the meeting based on a variety of factors, including the venue's accessibility, time and day of the meeting, support for carpools, teleconferencing, and other energy / emission-reducing factors.

Green Your Meeting will be supported by sponsorships, donations, meeting fees, and other activities.

Emissions and Global Warming Overview

Carbon dioxide (CO_2) and other greenhouse gases (GHG) are significant factors in the recent and projected increases in global temperature. Figure 1 displays the increase in CO_2 over the past 10,000 years. The present level of CO_2 is approximately 387 parts per million (PPM).

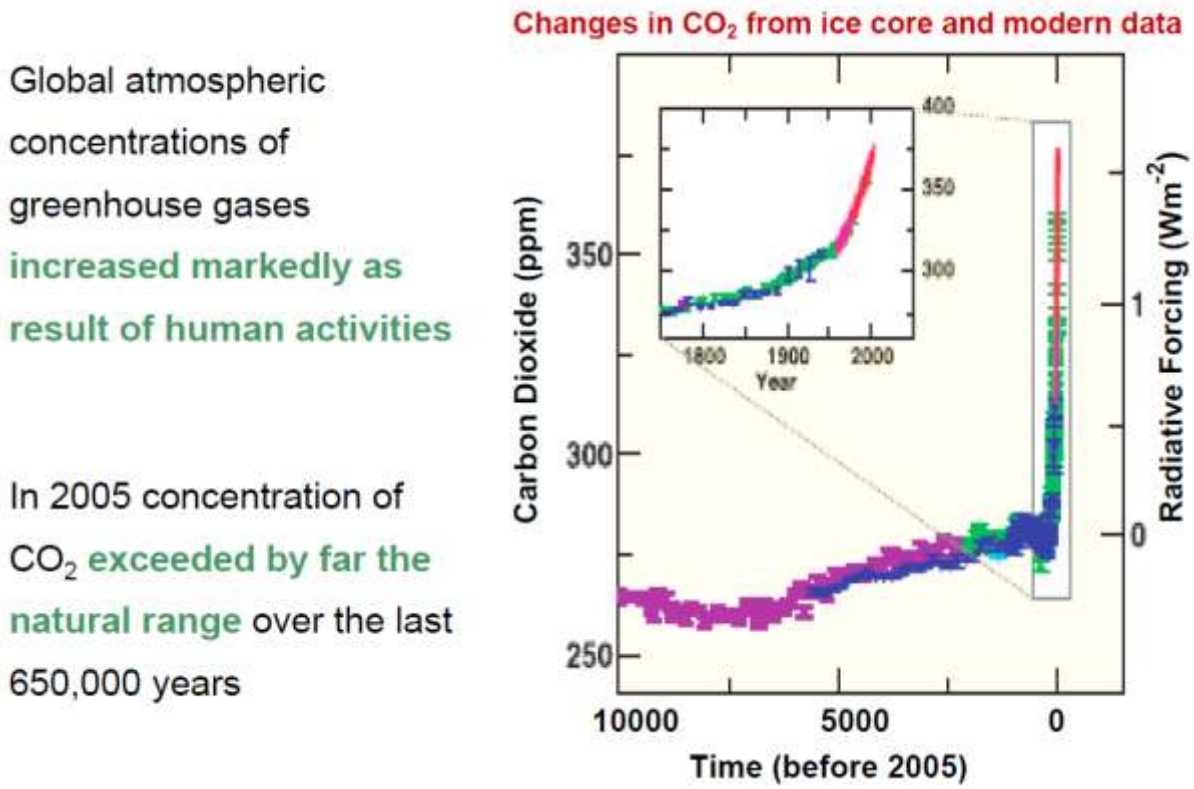

Figure 1: Pachauri, R K, "The IPCC Fourth Assessment Working Group Reports: Key Findings," September 24, 2007

Figure 2 displays the relationship between global mean temperature and GHG concentrations at different CO_2 "equivalent" (CO_2e) concentration levels. There is broad consensus in the scientific community around a target concentration that will produce a temperature increase of no more than 2 degrees Celsius (°C). This means limiting the CO_2e concentration to approximately 500 PPM. Some people, notably Dr. James E. Hansen, advocate reducing the concentration to 350 PPM. Hansen is Director at the NASA Goddard Institute for Space Studies and well known for his 1988 congressional testimony on climate change that helped raise broad awareness of global warming.

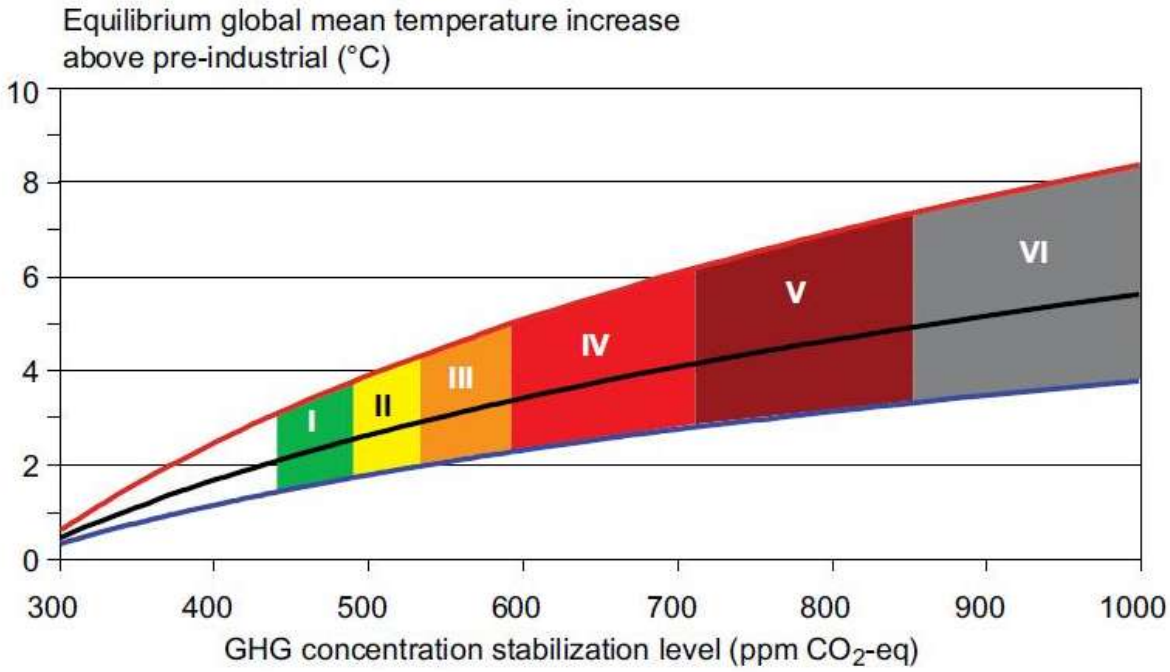

Figure 2: IPCC, 2007: Summary for Policymakers

The IPCC and others have identified specific areas of human activity that, if changes are made, would avoid exceeding the 500 PPM level of concentration. These areas include energy supply, forestry, agriculture, buildings, transport, industry, and waste management. If all the recommended changes in one area were made but none in the others, the emission target would be exceeded. In order to avoid exceeding the target, significant progress must be made in all these areas.

Figure 3 displays the areas where McKinsey & Company (McKinsey) believes changes can be made that would reduce annual emissions in 2030 by 38 gigatons of CO_2 equivalent ($GtCO_2e$) compared to what annual emissions would be under a "business as usual" (BAU) scenario. This 38 $GtCO_2e$ reduction would be sufficient to keep temperatures below the desired temperature increase target. Note that this 38 $GtCO_2e$ figure does not include certain "technical measures" or "behavioral changes" that, if included, would reduce emissions by an additional 9 $GtCO_2e$, for a total reduction of 47 $GtCO_2e$ compared to the BAU scenario.

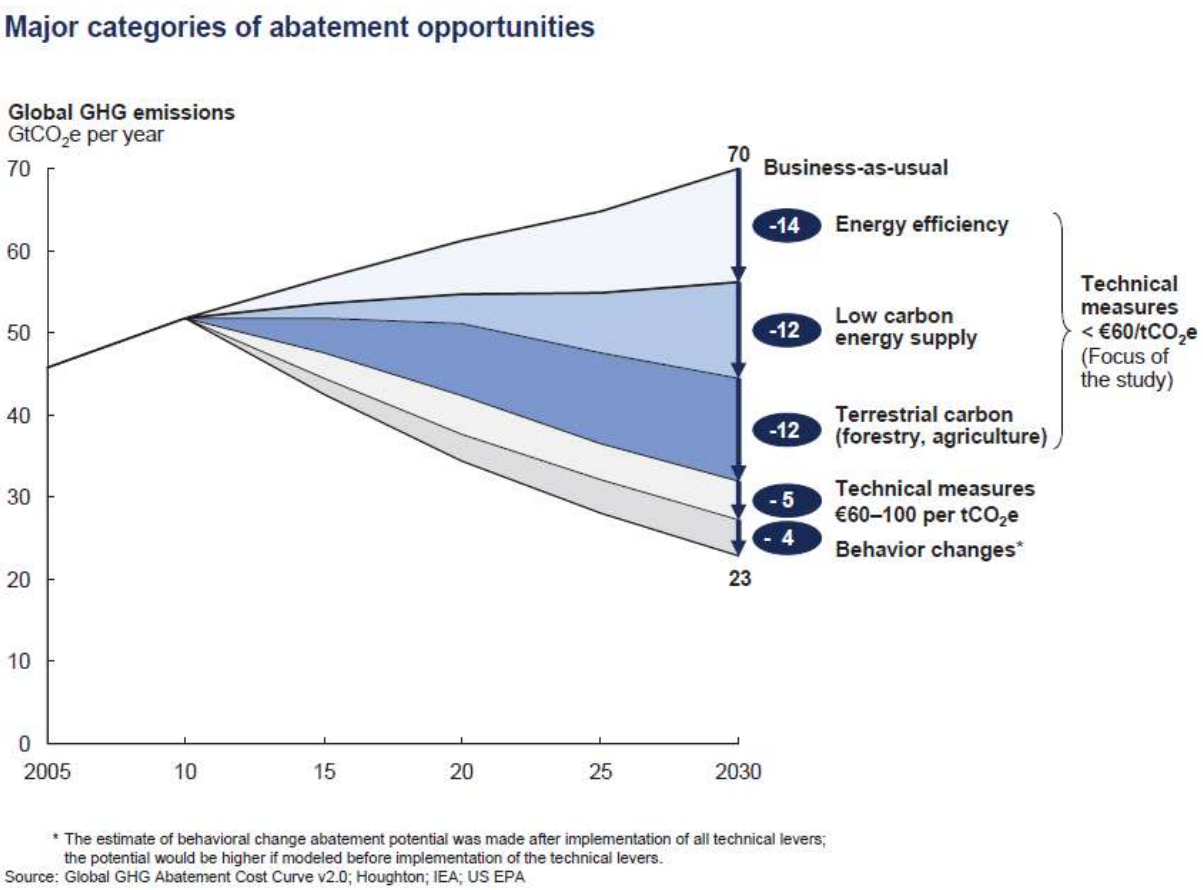

Figure 3: Abatement Potential Categories, McKinsey & Company, "Pathways to a Low-Carbon Economy, Version 2 of the Global Greenhouse Gas Abatement Cost Curve," 2009

Figure 4 provides further detail, by sector and region, of the emission abatement opportunities. While McKinsey suggests that transportation offers approximately 10 percent of the total emission abatement opportunity, the transportation abatement opportunity is greater if behavioral changes are included.

It is important to note that McKinsey's analysis was published in 2009 and states explicitly that its estimates assume these changes begin now. Any delay in implementation makes achieving the 2030 targets more difficult or may cause us to miss those targets altogether.

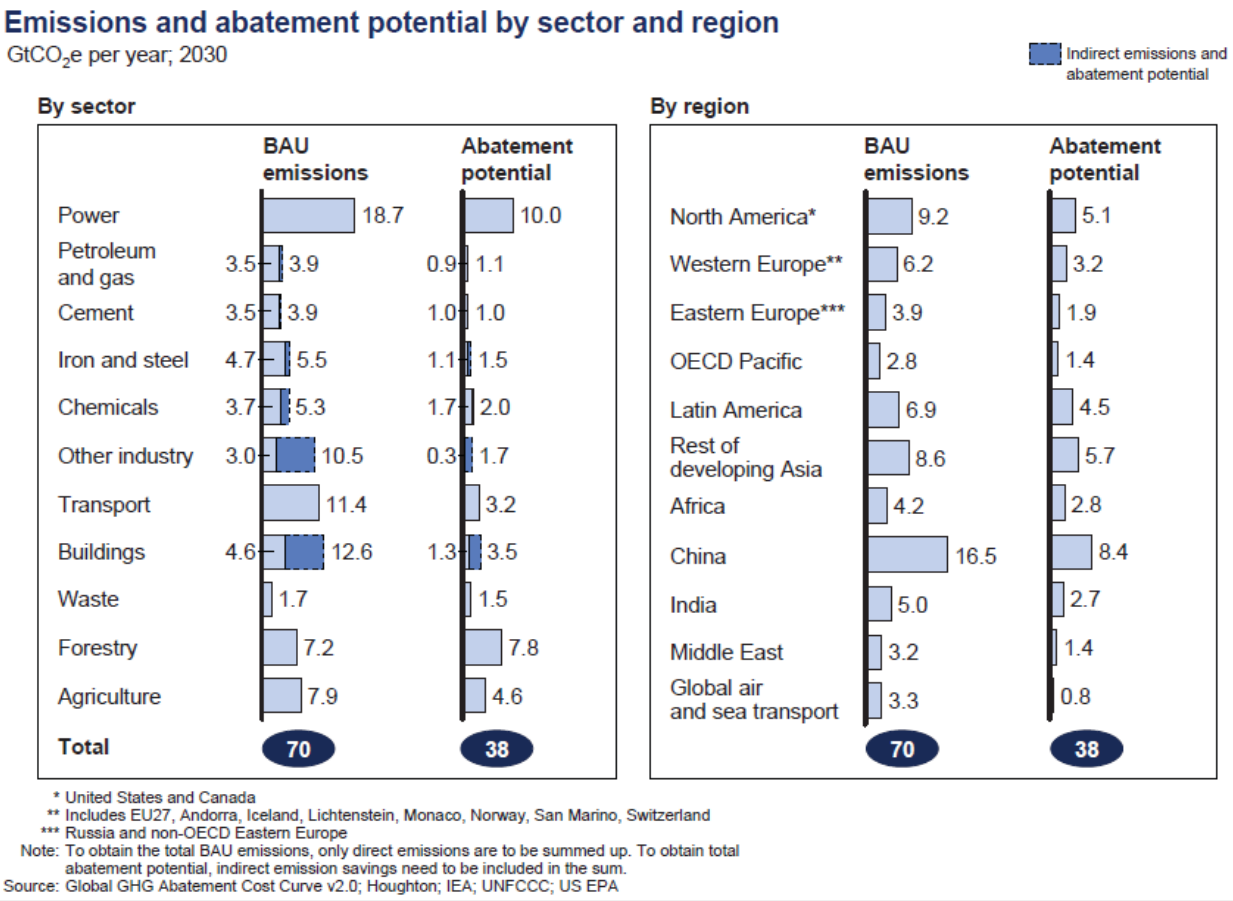

Figure 4: Abatement Potential Detail, McKinsey & Company, "Pathways to a Low-Carbon Economy, Version 2 of the Global Greenhouse Gas Abatement Cost Curve," 2009

Per Capita Contribution and Responsibility

On a per capita basis, US CO_2 emissions, at 19.3 metric tons (mt), far exceed the global per capita average of 4.3 mt. Of the US 19.3 mt per capita amount, 9.4 mt is attributed to personal activities, e.g., transport, HVAC use, and other. Transport, at 5.7 mt, represents well over half the total personal emissions (United Nations, World Bank).

Much of the climate change legislation in the United States, and much of the effort by environmental organizations, is focused on supply side issues. This includes the supply of electricity from renewable sources, the supply of high-mileage automobiles, the supply of compact fluorescent light bulbs (CFLs), and the supply of high-efficiency appliances.

Our focus is predominantly on the demand side in general and on transportation in particular.

Transportation

Significant opportunities exist on the demand side that are under-recognized, such as opportunities for behavioral change that McKinsey specifically excludes from its calculations. The present supply side focus has limitations that a demand side focus can ameliorate.

Automobiles illustrate the limitations of the supply side emphasis. Despite the supply of high-mileage vehicles, many auto manufacturers have struggled to meet Corporate Average Fuel Economy (CAFE) standards as consumers bought SUVs and vans, and many manufacturers have opposed raising the mileage standard because they didn't feel that there was adequate demand for higher-mileage vehicles. While raising CAFE standards reduces emissions and oil consumption per mile, the price elasticity of demand—the increase in the amount of a good that is consumed as the price of that good declines—results in an increase in the total miles driven as miles per gallon increase, so the net per capita impact on emissions and oil consumption from higher mileage vehicles is not as great as it would be if miles driven remained unchanged while miles per gallon increase.

Increased public transit use offers a number of benefits when compared to increased private vehicle efficiency. First, CO_2 emissions from buses, at 1.68 mt / 10,000 miles, and from subways, at 1.26 mt / 10,000 miles, are even lower than emissions from a 2009 Toyota Prius, at 2.14 mt / 10,000 miles. Second, public transit doesn't experience the same elasticity of demand that we see with higher-efficiency vehicles. Third, public transit is associated with greater public health. Fourth, public transit avoids the concern that continued private transportation development provides improved access to affluent commuters while leaving the less affluent with longer commutes.

Consumer Interest

While some consumers are eager and willing to go green, there should be no illusion about the difficulties of mustering broad consumer support and involvement. A number of surveys illustrate some of the challenges:

- Nielsen reported in 2009 that 80 percent of households surveyed said their primary motivation for conserving energy is to "cut energy costs and save money," while only 9 percent said they wanted to "save the Earth" and another 9 percent said they wanted to "fight global warming."
- The Pew Research Center reported that the number of Americans who believe the Earth is warming has dropped from 71 percent to just 57 percent in the last 18 months.
- Public Agenda reported that the public may not be ready for the tradeoffs and challenges to achieve energy efficiency, reduce gasoline usage, and support alternative energy.
- Gallup reported in May, 2010 that 50 percent support while 46 percent oppose increased drilling for oil and gas off US coasts.

Public versus Private Travel Time

Recognizing consumer attitudes about sustainability generally and about costs in particular, we decided to examine the relative costs of public versus private travel. In order to do so, we examined the time and the cost of public versus private transportation in Fairfax County, Virginia. Fairfax County has a population of over 1 million and is part of the Washington, DC, metropolitan area.

The Washington Metropolitan Transit Authority (WMATA) serves the Washington, DC, metropolitan area, and we started by examining tools available on their Web site. One tool is a "trip planner" that provides point-to-point routing and fare information. Another tool is a "savings calculator" that estimates the cost of public versus private transportation considering miles driven, parking costs, and WMATA's fare. Missing from this calculator is an opportunity cost variable—which may reflect wages, billable hours, or the value of personal time—associated with the choice between public and private transportation.

We used Google Maps to obtain distance and private transportation time estimates.

To illustrate the relative amount of time required for public versus private transportation, we examined public versus private transportation time required for nine trips, each originating at the Fairfax Country Government Center, 12000 Government Center Parkway, Fairfax, and terminating at the office of each of the nine geographically elected county supervisors. The originating and terminating locations were chosen because, ideally, these locations should be readily accessible to all Fairfax County citizens. Trips were evaluated with an arrival time at 12 noon on a weekday. The 12 noon arrival time was chosen in the belief that it represents a time at which the offices and the transit system are in full swing. Two of these nine trips serve to illustrate both the relative difference in accessibility between private and public transportation and the relative difference in accessibility of the nine county offices themselves.

The first trip, of 10.2 miles, terminates at the Hunter Mill District office, 12000 Bowman Towne Dr., Reston. This trip takes 21 minutes by private vehicle and 61 minutes by public transit. This trip had the lowest ratio of public-to-private travel time, at 2.9.

The second trip, of 7.3 miles, terminates at the Sully District office, 4900 Stonecroft Boulevard, Chantilly. This trip takes 13 minutes by private vehicle and 152 minutes—2 hours and 32 minutes—by public transit. This trip had the highest ratio of public-to-private travel time, at 11.7. See Figure 5 below.

Origination	12000 Government Center Parkway Fairfax, VA 22035	12000 Government Center Parkway Fairfax, VA 22035
Origination Description	Fairfax Government Center	Fairfax Government Center
Destination	12000 Bowman Towne Dr. Reston, VA 20190	4900 Stonecroft Boulevard Chantilly, VA 20151
Destination Description	Hunter Mill District Government	Sully District Government Office
Distance (Miles)	10.2	7.3
Desired Arrival Time	12:00 PM	12:00 PM
Day	Weekday	Weekday
Transit Departure Time	10:59	9:28
Total Public Travel Time (Minutes)	61	152
Total Private Travel Time	21	13
Public / Private Travel Time	2.9	11.7

Figure 5: Sample Fairfax County Government Trips

Private versus Public Travel Cost

Regardless of whether opportunity cost considerations are conscious or unconscious, we believe they are significant factors in transportation decisions. Opportunity costs differ significantly between individuals and according to the purpose of the travel. Low-wage workers and people taking personal trips may calculate a $5.00 per hour opportunity cost, while high-wage workers may calculate a $50.00 per hour opportunity cost, or more. When the opportunity cost is factored into the total transportation cost, individuals with higher opportunity costs are significantly more sensitive to relative travel time than are individuals with lower opportunity costs.

Consider a hypothetical 10-mile trip that requires 15 minutes by private vehicle, and assume the cost per mile of private travel to be $0.50 per mile (this is actually lower than the IRS's current allowance of $0.55 per mile).

If the opportunity cost is $5.00 per hour, then the total cost of a private trip is the opportunity cost of the trip, $1.25 ($5.00 per hour opportunity cost times 15 minutes divided by 60 minutes), plus the vehicle cost, $5.00 ($0.50 per mile times 10 miles), for a total cost of $6.25. If the opportunity cost is $50.00 per hour, then the opportunity cost of the trip is $12.50, the vehicle cost is $5.00, and the total cost of the trip is $17.50. See Figure 6 below.

Opportunity Cost / Hour	5.00	50.00
Miles	10	10
Cost / Mile	0.50	0.50
Total Vehicle Cost	5.00	5.00
Trip Opportunity Cost	1.25	12.50
Total Trip Cost	6.25	17.50

Figure 6: Sample Private Travel Cost, 15 Minute Trip

Individuals taking a 15-minute public trip over this same distance incur the same opportunity cost per trip as individuals taking a private trip. If the transit fare were set at equal to the vehicle cost of $5.00, the public and private travel costs would be the same regardless of the opportunity cost per hour that individuals face. See Figure 7 below.

Opportunity Cost / Hour	5.00	50.00
Trip Opportunity Cost	1.25	12.50
Transit Fare	5.00	5.00
Total Trip Cost	6.25	17.50

Figure 7: Sample Public Travel Cost, 15 Minute Trip

Public travel times are, however, usually longer than private travel times (though bus priority systems and traffic congestion can improve absolute and relative public travel times and even make public travel times shorter than private travel times). We have calculated the total travel costs for 10-mile trips at three different opportunity costs: $5.00, $25.00, and $50.00. In each of these scenarios, we examine the total cost for fares ranging from $0.00 to $6.00 and for public travel time at multiples of private travel time from 2/3x (10 minutes) to 4x (60 minutes)

Consider the $25.00 opportunity cost scenario in Figure 8 below. The private trip cost is $11.25 ($5.00 vehicle cost plus $6.25 opportunity cost) regardless of changes to public cost or time.

We see that varying the fare from $0.00 to $6.00 has less of an impact on the total public travel cost than varying the trip time. Even at a $0.00 fare, a 30-minute trip costs $12.50, more than a private trip, and a 60-minute trip costs $25.00, which is $13.75 more than the cost of a private trip.

While we have not included a parking fee in the cost of private travel, any parking fee of less than $13.75 would still leave private travel less costly than a 60-minute public trip even with a $0.00 fare. Any parking fee of less than $19.75 would leave private travel less costly than a 60-minute public trip with a $6.00 fare. The absence of parking fees, as is common in suburban areas such as Fairfax County, gives private travel a significant advantage over public travel.

As we saw in the Sample Fairfax County Government Trips example above, public travel can take over 11x times longer than private travel, far more than the 4x times figure used in the scenarios below. The higher the public-to-private travel time ratio becomes, the less competitive public travel becomes.

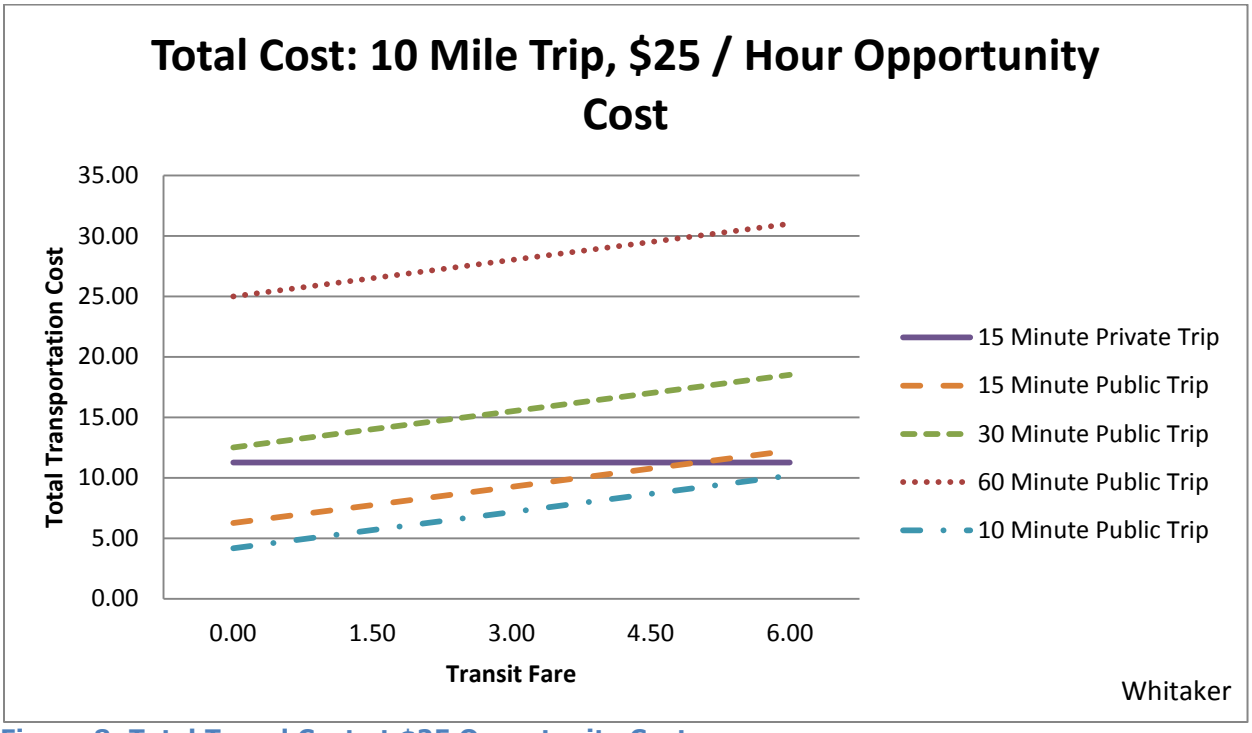

Figure 8: Total Travel Cost at $25 Opportunity Cost

With a $5.00 / hour opportunity cost, the transit fare determines whether a 10-mile public trip costs more or less than a 10-mile private trip, regardless of whether the public trip takes 2/3x or 4x times the length of the private trip. See Figure 9 below.

Figure 9: Total Travel Cost at $5 Opportunity Cost

With a $50.00 / hour opportunity cost, if a 10-mile public transit trip takes more than 1.4x times as long as the private trip—just 21 minutes—the public transit trip cost exceeds the $17.50 private trip cost ($5.00 vehicle cost plus $12.50 opportunity cost) even if the fare is set to $0.00. See Figure 10 below.

Figure 10: Total Travel Cost at $50 Opportunity Cost

Changing Travel Behavior: Green Your Meeting

In the long term, development of a better transportation infrastructure, transit-oriented design, Neighborhood Electric Vehicles (NEVs), passage of federal legislation, and other associated developments will help to reduce transportation-related emissions.

While most of us as individuals can't change the infrastructure or the public transit schedule, we can make changes to our transportation behavior. Green Your Meeting will help bring about those changes today by developing the following:

- Partnerships with commercial organizations that are interested and may benefit from increased use of public transit, such as transit-oriented property owners (hotels and restaurants), real-estate developers, transportation product and service providers (Zipcar, NextBus), transportation unions, and legal and other service firms with sustainability practices;
- Partnerships with other environmental organizations;
- Relationships with green public officials;
- Partnerships with civic and other organizations;
- Social media, such as Facebook and Twitter;
- Personal contacts and networking;
- Public relations.

Commercial partners stand to benefit from this program by attracting more customers and generating more revenue. Public officials can benefit by demonstrating their support for sustainability. We all stand to benefit from a better environment, a stronger economy, and a more secure world.