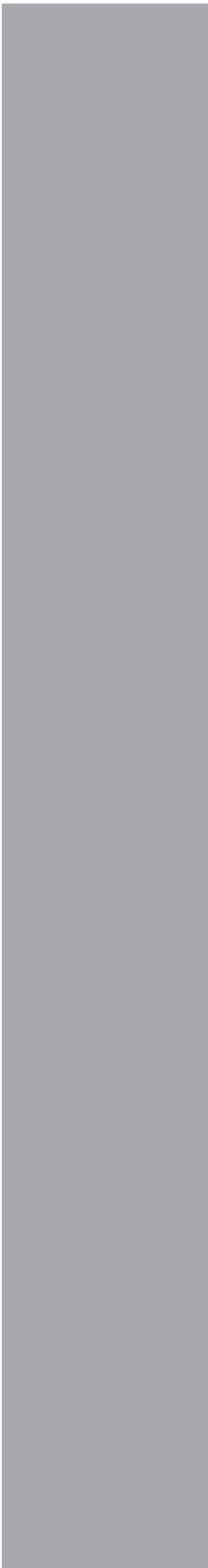# Guidance for Quantifying and Using Emission Reductions from Best Workplaces for Commuters Programs in State Implementation Plans and Transportation Conformity Determinations

United States
Environmental Protection
Agency

Guidance for Quantifying and Using Emission Reductions from Best Workplaces for Commuters Programs in State Implementation Plans and Transportation Conformity Determinations

Transportation and Regional Programs Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

TABLE OF CONTENTS

i

Guidance for Quantifying and Using Emission Reductions from Best Workplaces for Commuter Programs in State Implementation Plans and Transportation Conformity

Section A: Background Information

1.   <u>What is the purpose of this policy?</u>

Best Workplaces for Commuters[SM] (BWC) is a fast-growing partnership program developed by the U.S. Environmental Protection Agency (EPA) and is now administered by the Center for Urban Transportation Research, with private- and public-sector employers throughout the country. Through BWC, the numbers of vehicle trips and miles, and hence, emissions of criteria pollutants and greenhouse gases are reduced in many communities. This has led to an interest on the part of planners in some areas to incorporate these benefits into their state implementation plans (SIPs) or transportation conformity determinations. Therefore, EPA has prepared this guidance to help states or agencies[1] estimate the emission benefits of control measures implemented through BWC and other commuter benefit programs and, under appropriate circumstances, take credit for them in SIPs and conformity determinations.

Like other programs offering incentives or encouragement for people to adopt more environmentally friendly travel choices, BWC-related measures can be incorporated into the SIP as mandatory measures, an Economic Incentive Program (EIP)[2], or as a voluntary mobile source measure. For each of these options, a different entity may administer and evaluate the commuter benefit program's measures. For example, a voluntary measure program may be entirely administered by individual employers. EPA has issued comprehensive guidance documents for each of these types of SIP measures, and you should consult the guidance for the type of SIP submittal in which you are interested, as this guidance does not reiterate all the requirements for each.

To aid in quantifying the benefits of BWC-related measures, EPA is releasing an updated version of the COMMUTER model, the first version of which was released in 2000. The new version has the same look and feel and structure as the first; however, it

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[1]   This document uses "state or agency" to refer to anyone who has authority to submit a SIP or conformity determination, such as a local or state government, regional transit authority, local or regional transportation planning agency or state or regional air quality agency, that takes action to reduce on-road mobile source emissions through a BWC program.

[2]The guidance document for the EIP can be found at: http://www.epa.gov/ttn/ecas/incentiv.html.

has been updated to incorporate newer travel activity data and MOBILE6.2 emission factors, including emission factors for air toxics and particulate matter.[4] Other existing methodologies may also be appropriate for quantifying the emissions benefits from BWC-related measures. See Section B. for more information regarding the basic submission and quantification requirements for BWC-related measures in SIPs and conformity.

This guidance supersedes the 1998 document, "State Implementation Plan Development Guidance: Using Emission Reductions from Commuter Choice Programs to Meet Clean Air Act Requirements" (EPA420-R-98-007). However, the protocols and methods described herein can also be used to quantify benefits the benefits of non-BWC Commuter Choice or other commuter programs.

2.   <u>What is Best Workplaces for Commuters[SM], and how is it addressed by this policy?</u>

BWC is a business/government voluntary initiative offering innovative solutions to commuting challenges faced by employers and employees. Established by EPA and now lead by the Center for Urban Transportation Research, this program provides the tools, guidance, and promotion necessary to help U.S. employers of any size incorporate commuter benefits as part of their standard employee benefits plan. Participating companies earn the designation "Best Workplaces for Commuters[SM]," which is a mark of excellence for environmentally and employee-friendly organizations. Across the country, more and more communities are earning this designation. From urban centers to suburban and even rural settings, each of these areas is taking commuter benefits to a new level, providing a valuable advantage to local businesses and the people who work there.

To participate in the BWC program, employers offer their employees a suite of commuter benefits that meet the BWC "National Standard of Excellence." Employers must complete an online application and agree to several items, including ensuring a minimum level of employee participation, designating a central point of contact for employee questions, providing an Emergency Ride Home for participating employees, and offering a choice of commuter benefits. Best Workplaces for Commuters[SM] are required to offer at least one of the following primary commuter benefit options at each qualifying work site:

- Employer-paid tax-free transit passes

- Employer-paid tax-free vanpool benefits

- Telework

- Parking cash out

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[4] EPA notes that the MOBILE6.2 emissions factors are not applicable to agencies in California, where the latest EMFAC emissions model is used. However, the travel activity component on the COMMUTER model could be considered by California agencies in consultation with EPA and DOT offices as appropriate.

Sometimes outstanding commuter benefits are provided not by the employers themselves, but by another organization such as a business park, downtown district, developer, or property manager. To recognize these areas for their leadership, they have been designated as a "Best Workplaces for Commuters[SM] Districts."

As with other voluntary partnership programs, BWC programs and associated control measures may be initiated without involving a SIP submittal or conformity determination. An employer will implement commuter benefits meeting the BWC standard of excellence to meet the needs of its own employees. With this guidance, EPA intends to further recognize the air quality benefits of BWC-related control measures in conjunction with necessary requirements, but a company can participate as a BWC partner regardless of whether its local area will be preparing a SIP submittal or transportation conformity determination.

Individual BWC employer programs are likely to be considered small scale or local emissions benefits, and will not normally qualify as regionally significant. See Question 9 of this section for further information on quantifying the impacts of BWC-related measures.

3.   How BWC and other Commuter Choice Programs Work

Reducing the frequency that commuters drive alone generates air quality benefits. The following is a partial list of employee benefits (and potential control measures) offered through BWC and other Commuter Choice programs:

- Free or reduced cost passes for public transportation (such as subway cards, bus tokens, or train tickets),

- Transit and vanpool vouchers and subsidies,

- Services to facilitate vanpools and carpools (such as providing vans, ride-matching, and guaranteed ride home services),

- Park and Ride subsidies,

- Telecommuting options (so employees can work at home more often),

- Proximate Commuting: a program that matches employees of multi-site employers (such as banks or chain stores) to the branch office nearest their home,

- Incentives to bike and walk, and

- Parking Cash Out: employees can trade employer-paid parking space for cash or

> **Commuter Choice program** means an organized program to encourage employers to offer flexible commuter benefit options to employees.
>
> **Best Workplaces for Commuters[SM]** is a designation given to employers whose commuter choice programs meet the BWC National Standard of Excellence. ("SM" is the "service mark" that protects rights regarding the designation.)
>
> **Commuter benefit options** are any of a number of flexible commute benefits offered by employers. Basic Commuter Choice alternatives include transit benefits, vanpool benefits, cash, or parking.

other benefits.

With more options, commuters can be expected to use single-occupant vehicles less often. Air quality improves due to the mode shifts that should reduce vehicle miles traveled, and thus reduce emissions.

4.   What does it mean that this is a policy and not a regulation?

The Clean Air Act (CAA) and implementing regulations (including those conformity provisions at 40 CFR Parts 51 and 93) contain legally binding requirements. This policy document does not substitute for those provisions or regulations, nor is it a regulation itself. Thus, it does not impose binding, enforceable requirements on any party, and may not be applicable in all situations. The EPA and state decision makers retain the discretion to adopt approaches for approval of SIP measures that differ from this guidance where appropriate and consistent with applicable law. Any final decisions by EPA regarding a particular SIP measure will only be made based on the statute and regulations in the context of EPA notice and comment rulemaking on a submitted SIP revision.

Therefore, interested parties may raise questions and objections about the substance of this guidance and appropriateness of its application to a particular situation; EPA will, and states should, consider whether or not the recommendations in the guidance are appropriate in a particular situation. This guidance is a living document and may be revised periodically without public notice. However, EPA welcomes public comments on this document at any time and will consider those comments in any future revision of this guidance document. Finally, this document does not prejudice any future final EPA decision regarding approval of any SIP measure.

Section B: Basic Criteria Requirements for Using Emissions Reductions from BWC -related Control Measures

5.   What are the basic requirements for using emission reductions in SIPs?

In order to be approved as a measure that provides additional emission reductions in a SIP, a control measure cannot interfere with other requirements of the CAA, and would need to be consistent with SIP reasonable further progress, attainment, or maintenance requirements. In addition, the control measure must provide emission reductions that meet the requirements described below.

(A) Quantifiable - The emission reductions from a control measure are quantifiable if they can be reliably and replicably measured. Emission reductions must be calculated for the time period for which the reductions will be used. See

Question 9 of this section for more information on quantifying emission reductions from BWC-related measures.

(B) Surplus - Emission reductions are generally surplus and can be used as long as they are not otherwise relied on to meet other applicable air quality attainment and maintenance requirements (i.e., no double-counting of emission reductions). In the event that the measure is used to meet such air quality related program requirements, they are no longer surplus and may not be used for additional credit.

(C) Federally Enforceable - Depending on how the emission reductions are to be used, control measures must be enforceable through a SIP or SIP revision. Where the emission reductions are part of a rule or regulation for SIP purposes, they are considered federally enforceable if they meet all of the following requirements:

- They are independently verifiable.

- Violations are defined, as appropriate.

- The state or agency and EPA have the ability to enforce the measure if violations occur.

- Those liable for violations can be identified.

- Citizens have access to all the emissions-related information obtained from the responsible party.

- Citizens can file suits against the responsible party for violations.

- Violations are practicably enforceable in accordance with EPA guidance on practicable enforceability.

- A complete schedule to implement and enforce the measure has been adopted by the implementing agency or agencies.

If a SIP revision is approved under EPA's Voluntary Measures Policy, the state is responsible for assuring that the reductions credited in the SIP occur. The state would need to make an enforceable SIP commitment to monitor, assess and report on the emission reductions resulting from the voluntary measure and to remedy any shortfalls from forecasted emission reductions in a timely manner. Further, the total of all voluntary measures (including BWC-related measures) may not exceed 3 percent of the total reductions needed to meet any requirements for reasonable further progress, attainment or maintenance. In the circumstance where the actual emission reductions achieved are more than the amount estimated in the SIP, you may take credit for the additional emission reductions provided it does not exceed the 3 percent cap on voluntary measures and meets the other requirements of the Voluntary Measures Policy. If you wish to have a SIP revision approved under the Voluntary Measures Policy, consult that policy for further information.

(D) Permanent - The emission reduction must be permanent throughout the term that the credit is granted.

(E) Adequately Supported – The state must demonstrate that it has adequate funding, personnel, and other resources to implement the control measure on schedule.

6. <u>What must a state submit to EPA to meet the requirements for incorporating a BWC-related control measure in a SIP?</u>

The state must submit to EPA a written document that:

(A) identifies and describes the BWC-related control measure and its implementation schedule to reduce emissions within a specific time period;

(B) contains estimates of emission reductions attributable to the measure, including all relevant technical support documentation for your estimates (you must rely on the most recent information available at the time the SIP is developed, as described in Question 7);

(C) contains federally enforceable requirements to implement, track, and monitor the measure, as applicable;

(D) enforceably commits to monitor, evaluate, and report the resulting emission reductions of the measure, as applicable;

(E) enforceably commits to remedy any SIP emission shortfall in a timely manner if the measure does not achieve estimated emission reductions, as applicable; and

(F) meets all other requirements for SIP revisions under sections 110 and 172 of the CAA.

7. <u>How can the estimated emission reductions be used for SIP purposes?</u>

For your reasonable further progress, attainment or maintenance SIP, you can use the emission reductions that are produced from the BWC-related measure by applying the following criteria:

(A) Where required, emission reductions must account for seasonality. For example, if your SIP only credits those reductions that take place during the summer ozone season, then only reductions that take place during that season may be credited.

(B) An appropriate baseline must be chosen, so that the reductions are only assumed for measures that are not already accounted for in the baseline estimates. For example, if some employers were offering Commuter Choice measures prior to the start of the BWC program, and such measures were already accounted for in the baseline estimates of the SIP, the emission reductions associated with implementation of those measures (i.e., commuters taking advantage of their employee benefits) cannot be included as surplus emission reductions for the SIP. (Appendix C provides some guidelines for creating and conducting surveys to establish baselines and to assess changes in travel behavior.)

(C) As required by Clean Air Act section 172(c)(3) and EPA's regulation at 40 CFR 51.112(a), states must use the latest planning assumptions available at the time that the SIP is developed. In addition, the emissions model approved by EPA should be used in quantifying reductions from SIP control measures that are under development. Currently, MOBILE6.2 is the latest approved model for use in quantifying motor vehicle emissions in most states; EMFAC2002 is the most recently approved emissions model for use in California.

As always, be sure that any reductions taken for BWC-related measures are not already considered in the SIP to avoid double-counting of emission reductions.

8.   <u>How can the emission reductions be used for transportation conformity purposes?</u>

The transportation conformity regulation (40 CFR parts 51 and 93) describes the requirements for including emission reductions from on-road mobile control measures in a conformity determination for a transportation plan, transportation improvement program (TIP), or transportation project. The conformity rule requires a regional emissions analysis be conducted for the transportation plan and TIP. In the regional emissions analysis, the emissions from the planned transportation system are estimated or modeled, just as they are when creating or revising a SIP's motor vehicle emissions inventory (or "motor vehicle emissions budget"). If credit is obtained for a BWC-related measure in the SIP's motor vehicle emissions budget, transportation agencies should seriously consider including the credit in the transportation conformity determination.

To include emission reductions from a BWC-related on-road control measure in a regional emissions analysis, the appropriate jurisdictions must be committed to the

measure. The appropriate level of commitment varies according to the requirements outlined in 40 CFR 93.122(a), which are described as follows:

(A) If the measure does not require a regulatory action to be implemented, it can be included in an emissions analysis if it is included in the transportation plan and TIP with sufficient funding and other resources for its full implementation.

(B) If the measure requires a regulatory action to be implemented, it can be included in an emissions analysis if one of the following has occurred:

(1) The regulatory action for the measure is already adopted by the enforcing jurisdiction (e.g., a state has adopted a rule to require a control measure);

(2) The measure has been included in an approved SIP; or

(3) There is a written commitment to implement the measure in a submitted SIP with a motor vehicle emissions budget that we have found adequate.

(C) If an on-road mobile measure is not included in the transportation plan and TIP or the SIP, and it does not require a regulatory action to be implemented, then it can be included in the regional emissions analysis if the conformity determination contains a written commitment from the appropriate entities to implement the measures. Section 93.101 of the conformity rule defines what is intended by a "written commitment."

Whatever the case, the emission reductions can only be applied in a conformity determination for the time period or years in which the BWC-related control measure will be implemented. Written commitments must come from the agency with the authority to implement the measure. The latest emissions model and planning assumptions that are available must be used when calculating emission reductions from the measure, according to 40 CFR 93.110 and 93.111.

Areas should utilize the conformity interagency consultation process to discuss the methods and assumptions used to quantify the reductions from the measure. The conformity determination should include documentation of the methodology, assumptions, and models that were used to calculate emission reductions from BWC-related measures, as well any commitments that are necessary for implementation, as described above.

9. What quantification methodologies are available to estimate emission reductions of BWC-related control measures for SIPs and transportation conformity determinations?

If a BWC-related control measure is considered to be regionally significant, then the travel impacts of such a measure should be considered in the context of a nonattainment or maintenance area's regional travel demand forecasting.[5] (See 40 CFR 93.122 for applicable procedures for determining regional transportation-related emissions.) The interagency consultation (see 40 CFR 93.105 (c)(1)(ii)) should be used to determined which projects are considered regionally significant. An example of a regionally significant project may be a BWC campaign that is being implemented throughout a metropolitan area. The COMMUTER model would not be appropriate to use for regionally significant BWC projects developed for SIPs and conformity determinations. State, local, and federal air quality and transportation agencies should consult on what methods and data are appropriate for quantifying the impacts of such BWC-related measures for SIPs and conformity determinations. EPA expects the majority of BWC-related control measures to be considered smaller in scale, with the emission reductions being quantified using modeling techniques other than regional travel models (i.e., "off-model techniques").

The following paragraphs describe currently available tools for quantifying the travel impacts of non-regionally significant BWC-related measures. To estimate the emission reductions due to such BWC-related measures, the recommended approach is to estimate the number of commuters who would change their mode of travel (i.e., single-occupant vehicle (SOV), carpool, vanpool, transit, bicycle, etc.) or trip-making behavior (e.g., telecommuters will no longer be making regular worktrips) in response to incentives, assistance, or encouragement offered through a BWC program. From this, the resultant change in number of trips and miles of travel are calculated, and the change in emissions is derived. Forecasting travel behavior impacts is typically the most challenging aspect of quantifying a BWC-related measure. BWC can have a wide range of effectiveness, based on the details of the particular measures and their implementation context.

Available Tools for Non-regionally Significant Measures

In 2000, EPA released the COMMUTER model to assist worksite transportation coordinators and local planners in estimating the impacts of commuter programs. EPA

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[5]Section 93.101 of the transportation conformity rule defines a "regionally significant project" as applying to a project that is on a facility that serves regional transportation needs (such as access to and from the area outside of the region, major activity centers in the region, major planned developments such as new retail malls, sports complexes, etc. or transportation terminals as well as most terminals themselves) and would normally be included in the modeling of a metropolitan area's transportation network, including at a minimum all principal arterial highways and all fixed guideway transit facilities that offer an alternative to regional highway travel.

has updated this model in 2005 to update data within the model as well as expand its use for estimating emissions for particulate matter (PM_{10} and $PM_{2.5}$) and toxics emissions.

U.S. EPA's COMMUTER model is a spreadsheet-based calculator that estimates the travel and emissions impacts from BWC and similar workplace-based programs. It uses a logit mode-choice model (pivot-point approach) to analyze the effects of several strategies simultaneously on mode share, trips, and VMT. The emissions component is based on MOBILE6.2 and includes look-up tables of emissions factors for several sets of local conditions. The COMMUTER model allows users to input local-specific travel data, and emission factors from a MOBILE6.2 run representing the area. Running the model requires the user to provide information on the number of employees covered and the inducements offered to them. The COMMUTER model and manuals that explain how to use it can be downloaded at: http://www.epa.gov/otaq/transp/conform/policy.htm.

Local travel data needed in the model include starting mode shares and trip lengths, average occupancy for carpools and vanpools, the length of the peak period, and the percentage of work trips that occur in the peak period. Emissions calculations require data on characteristics of the area's vehicle fleet, and on fuel control and I/M programs if in place for a given nonattainment or maintenance area.

The updated 2005 COMMUTER model provides MOBILE6.2 look-up tables with emission estimates in pounds per day for HC, CO, NOx, $PM_{2.5}$, CO2, and the following air toxics: acetaldehyde, acrolein, benzene, 1,3-butadiene, formaldehyde, and MTBE. It also provides estimates in tons per day for HC, CO, and NOx, and in metric tons per day for CO2. A user wanting emissions of PM_{10} rather than $PM_{2.5}$ can import a MOBILE6.2 run with emission factors for PM_{10}. The MOBILE6.2 look-up tables in the 2005 COMMUTER model can be employed for using the model as a screening tool. However, if you want to use the COMMUTER model to produce emissions reductions for SIP or conformity purposes, you would use your own locally-generated MOBILE6.2 emission factors to calculate emissions reductions in the COMMUTER model. As stated previously, the COMMUTER model cannot be used for regionally significant projects.

The following list includes other examples of off-model methodologies that EPA may accept for SIPs and conformity purposes, in combination with the latest emissions factor model:
- TDM Evaluation Model
- TCM Analyst (also referred to as "EPA TCM Methodology")
- CM/AQ Evaluation Model
- Center for Urban Transportation Research Average Ridership Model
- TCM Tools
- Off-Net/PAQONE

- ECO/Regulation XV Software
- California Standardized Cost-Effectiveness Methodology
- Regional Air Quality Council (RAQC) Workbook
- Metropolitan Washington Council of Governments Sketch-Planning Methods
- ITS Deployment Analysis System (IDAS)
- Simplified Methods for Analysis of Regional Travel (SMART)

This is not an exhaustive list, and the inputs and outputs of the methodologies vary. The choice of model(s) will depend upon the requirements of each situation and the available data.

Considerations for Data for Quantification of All BWC-related Measures

When quantifying the impacts of BWC-related measures, a state or agency should carefully consider the underlying data utilized to estimate travel behavior, especially if using off-model and sketch planning techniques. The interagency consultation process should be used when deciding the appropriate inputs for quantification. The following items should be considered when quantifying the travel impacts of any BWC-related control measure.

(A)   Reasonable assumptions for employee participation. A state or agency should assume a reasonable level of participation from eligible employees, since not every eligible employee may be expected to take advantage of BWC-related measures. Survey methods can be used to capture the level of employee participation, both before and after a measure has been implemented. For example, a survey of employees at an employment site may be performed to determine how many people expect to use or have actually used employer-subsidized transit passes. Pre- and post-implementation surveys of actual travel behavior are often both feasible and necessary if the effectiveness of BWC is to be evaluated retrospectively.

(B)   Experience from other areas.   In some cases, a state or agency may be able to use input information from other nonattainment or maintenance areas that is applicable, when an area does not have such local information. For example, a study may have found in another area that five percent of office workers will telecommute one day a week if provided the opportunity. It is important to consider whether inputs or other information from another area is applicable for your area.

(C)   Elasticities. Finally, a state or agency should use the most appropriate elasticity assumptions for travel decisions when quantifying BWC-related measures. An elasticity says that an X percent change of an input variable (e.g., the cost of parking)

produces a Y percent change of an output variable (e.g., drive-alone mode share). Elasticities may be developed from direct observation or from coefficients of a model such as a mode choice model. While they can account for different levels of the input variable, they are not necessarily valid outside the range for which they were developed. For example, an increase in the cost of parking from $0.00 to $1.00 is an infinite percentage change, producing meaningless results. Also, elasticities developed in one setting cannot necessarily be assumed accurate in another setting.

Another important consideration is interaction among strategies. Some strategies may complement each other (e.g., parking management and ridesharing incentives), leading to cumulative effects greater than the sum of the effects of the strategies if applied individually. Conversely, in some cases the effects of multiple programs may be smaller than the sum of their individual effects. For example, some BWC measures may compete for the same market of travelers, thus leading to diminishing returns as more measures are implemented.

Section C: Penalties

10.   <u>What types of penalties can be assessed for not complying with CAA requirements?</u>

Use of this guidance does not relieve you of any obligation to comply with all otherwise applicable CAA requirements, including those pertaining to the crediting of emission reductions for your SIP, such as for your attainment demonstration or maintenance plan. Violations of CAA requirements are subject to administrative, civil, and/or criminal enforcement under Section 113 of the CAA, as well as to citizen suits under Section 304 of the CAA. The full range of penalty and injunctive relief options would be available to the federal or state government (or citizens) bringing the enforcement action.

Any person who submits false information to you or fails to implement or comply with provisions pursuant to this guidance necessary to demonstrate compliance with CAA requirements, should be subject to one or more of the following actions, as appropriate:

(A) Disapprove the application for emission reductions.

(B) Void all previously issued emission reductions.

(C) Designate the responsible party to be ineligible to generate emission reductions.

(D) Assess a penalty (see paragraph above).

Section D: Contact Information

11.   <u>Whom should you contact if you have any questions on this policy?</u>

If you are interested in developing programs that may qualify for inclusion in SIP and transportation conformity determinations, contact the EPA Regional Office with responsibility for air quality planning in the area in which the BWC or BWC district is located. A contact list of your EPA Regional Office is available at the following web address:

www.epa.gov/otaq/stateresources/transconf/contacts.htm.

For general questions regarding this Best Workplaces for Commuters, email info@bestworkplaces.org

For questions regarding the COMMUTER model, contact Erik Herzog at (734) 214-4487 (herzog.erik@epa.gov).

For questions regarding using BWC-related control measures in transportation conformity determinations, contact Meg Patulski at 734-214-4842 (patulski.meg@epa.gov).

For more information on Best Workplaces for Commuters, visit www.bestworkplaces.org, or email info@bestworkplaces.org

Appendix A:

Example Quantification: Best Workplaces for Commuters Employer

The simplest way to model commuter benefits programs with the COMMUTER model is at the single worksite level. In this example we model the commuter benefits package offered by the University of Michigan in Ann Arbor. In this example, the default MOBILE6 emission factor look-up tables are used; area-specific MOBILE emission factors have not been imported into the model. Hence, this exercise simulates the preliminary sketch planning a local planner would do to determine whether or not to include the emission reductions from this worksite's program into the area's SIP or TIP. Instructions on how to import area-specific MOBILE6.2 emission factors into COMMUTER can be found in Appendix E. The University began offering free transit passes to employees who agreed to forego the purchase of an annual parking permit in 1997. Approximately 3,000 employees took this benefit annually. The University began a vanpool program in 2001, and then outsourced it in 2003 to a firm that was able to upgrade the program in a number of ways. The University implemented a variety of other support programs during this time-span and was recognized as a BWC in 2003.

The University offers a vanpool subsidy of up to $55 per month, guaranteed ride home, shuttle to transit stations, bicycle facilities, and preferential parking for carpools and vanpools. It also negotiated free transit passes for all students, faculty, and staff. In this scenario we model only the benefits put in place in 2003, when the University was designated as a BWC. For this reason the transit pass in lieu of parking and the preferential parking elements are not modeled.

Step 1: Scenario Information

- Metropolitan Area Size: 3 (Small)
- Analysis Scope: 2 (Site Specific)
- Analysis Area Type: 1 (CBD – Central Business District)
- Employment in the Analysis Area: 27,500 (all assigned to office)
- Programs: 1 (Site Walk Access Improvements) 3 (Financial Incentives) and 4 (Employer Support Programs)

Step 2: Local Data

Mode choice data from the 2000 Census are available from the Southeast Michigan Council of Governments (SEMCOG) for both the City of Ann Arbor, and Washtenaw County, in which Ann Arbor is located.

Mode	City of Ann Arbor	Washtenaw County
Auto - Drive Alone	63.0%	76.0%
Auto - Carpool	7.5%	8.5%
Vanpool	0.5%	0.5%
Transit	7.0%	3.0%
Bicycle	0.0%	0.0%
Walk	16.0%	7.0%
Other	6.0%	5.0%

Because much of Washtenaw County outside of Ann Arbor is rural, the drive-alone share is considerably higher, and the transit share considerably lower than for the City. It would be best in this instance to use starting mode shares that are specific to the U of M work force. Lacking that we will use the County mode shares because the model produces more conservative results; i.e., smaller mode shifts, when these mode shares are used. The reason for this is that when the time or cost of using a mode is reduced, the shift toward that mode predicted by COMMUTER is proportional to the size of that mode's starting share. In other words, a transit subsidy of a given size -- $1.88 per day in this example – will produce a larger shift toward transit if the transit mode share is 7 percent initially than if it is 3 percent.

Step 3: Edit Coefficients

Mode choice coefficients for the Detroit area are selected as these are also applicable to the Ann Arbor area.

Step 4: TCM Specific Data Screens – Site Access and Transit Service Improvements

The shuttles to transit stations are estimated to reduce transit riders' walk time by five minutes.

Mode:	Change in Walk Access Time (min)
Drive Alone	
Carpool	
Vanpool	
Transit	-5.0
Bicycle	
Pedestrian	

Employer Participation Rate:

"Change in Walk Access Time" represents the difference in walking time associated with travel to or from the workplace as a result of worksite access changes. Walking time includes the time taken to walk from a parking lot or a bus stop to the actual worksite. Walk access time can be affected through policies such as preferential parking for carpools and vanpools or through improvements to the worksite or area which make access to transit easier. A decrease in walk access time for any particular mode should be entered as a negative value.

"Employer participation rate" refers to the percent of employers in the analysis area implementing the walk access improvements. (This option is not necessary for site-specific analysis because the "participation rate" is 100%.)

Step 5: TCM Specific Data – Financial Incentives and Parking Costs

A vanpool subsidy of $55 per month works out to $2.75 per day. The employer participation rate is moot, since we are only modeling a single worksite. A monthly transit pass on the Ann Arbor Transit Authority system (AATA) costs $37.50, which works out to $1.88 per day. Three thousand staff persons (11 percent) received transit passes under the previous system where they received a transit pass in lieu of a parking space, so the effective subsidy is reduced by 11 percent in order to estimate the effect of the increment in the benefit. This makes the effective daily subsidy $1.67.

COMMUTER Travel & Emissions Analysis Model - Release 2.0

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FINANCIAL INCENTIVES AND PARKING COSTS

Mode:	Change In Daily Cost:			
	Parking Cost ($/vehicle)	Fare Cost ($/person/RT)	Other Financial Cost ($/person/RT)	Total Change ($/person/RT)
Drive Alone				$ -
Carpool				$ -
Vanpool			$ -2.75	$ -2.75
Transit		$ -1.67		$ -1.67
Bicycle				$ -
Pedestrian				$ -

Employer Participation Rate:	

"Financial incentives and parking costs" may include higher parking charges for single-occupant vehicles, reduced parking fees for carpools or vanpools, transit subsidies such as free monthly passes, or other financial incentives for specific modes. A decrease in cost is entered as a negative number. For example, provision of a transit pass valued at $30 a month would be entered as a change in fare cost of -$1.50 ($30 / 20 days). The cost change inputs are entered on a daily basis.

"Employer participation rate" refers to the percent of employers in the analysis area offering these incentives to their employees. (This option is not required for site-specific analysis because the "participation rate" is 100%.)

Ready   NUM

Start | Commuter Mod... | SIPAppendixA... | RealPlayer: Fla... | Beta Model | N   EN   75°   5:02 PM

Step 5: TCM Specific Data –

The various support programs that the University offers for carpooling, vanpooling, transit, and bicycling, in conjunction with the guaranteed ride home element, are modeled as Level 4 support. However, these programs were in place before the University was designated as a BWC, so both the existing and the new levels of support for these programs are entered as 4.

Step 6: Emissions-Related Input Screens

Six inputs are required for this module:
- Calendar Year of Analysis
- Season
- Climate Type
- I/M Program Type
- Fuel Type
- PADD

Step 7: Other Emissions-Related Data

All defaults are used for this module.

Results:

Below is the output from this COMMUTER run, using all the variable values described in these steps:

COMMUTER Travel & Emissions Analysis Model - Release 2.0

File Edit Inputs Results Help

COMMUTER MODEL RESULTS

SCENARIO INFORMATION

Description	U of M
Scenario Filename	UM_WaCoShares.vme
Emission Factor File	
Performing Agency	EPA
Analyst	
Metropolitan Area	
Area Size	3 - Small (under 750,000)
Analysis Scope	2 - Site or Employer-Based
Analysis Area/Site	
Total Employment	27,500

PROGRAMS EVALUATED

X	Site Walk Access Improvements
	Transit Service Improvements
X	Financial Incentives
X	Employer Support Programs
	Alternative Work Schedules

	User-Supplied Final Mode Shares

MODE SHARE IMPACTS

Mode	Baseline	Final	%Change
Drive Alone	76.0%	73.6%	-2.4%
Carpool	9.0%	8.7%	-0.3%
Vanpool	0.0%	0.0%	+0.0%
Transit	3.0%	6.1%	+3.1%
Bicycle	0.0%	0.0%	+0.0%
Pedestrian	7.0%	6.8%	-0.2%
Other	5.0%	4.8%	-0.2%
No Trip	-	0.0%	+0.0%
Total	100.0%	100.0%	-

TRAVEL IMPACTS (relative to affected employment)

Quantity	Peak	Off-Peak	Total
Baseline VMT	354,972	223,158	578,130
Final VMT	343,609	216,015	559,624
VMT Reduction	11,362	7,143	18,506
% VMT Reduction	3.2%	3.2%	3.2%
Baseline Trips	27,016	16,984	44,000
Final Trips	26,151	16,440	42,592
Trip Reduction	865	544	1,408
% Trip Reduction	3.2%	3.2%	3.2%

Ready

Start | Commuter Mode... | BWCGuidance10... | COMMUTER_v20 | 4:14 PM

COMMUTER Travel & Emissions Analysis Model - Release 2.0

File   Edit Inputs   Results   Help

Type a question for help

COMMUTER MODEL RESULTS

Shifted from Peak to Off-Peak	0.0%

EMISSION REDUCTIONS (positive values are decreases)

lbs/day:

Pollutant	Peak	Off-Peak	Total
HC	14.42	8.64	23.06
CO	197.93	126.88	324.81
NOx	20.11	12.60	32.70
PM2.5	0.30	0.19	0.49
Toxics			
Acetaldehyde	0.047	0.029	0.076
Acrolein	0.006	0.004	0.010
Benzene	0.466	0.282	0.748
1, 3-Butadiene	0.064	0.039	0.103
Formaldehyde	0.160	0.097	0.258
MTBE	0.688	0.411	1.099
CO2	11,457	7,202	18,659

tons/day:

Pollutant	Peak	Off-Peak	Total
HC	0.007	0.004	0.012
CO	0.099	0.063	0.162
NOx	0.010	0.006	0.016
CO2 (metric tons)	5.2	3.3	8.5

GASOLINE CONSUMPTION AND COST SAVINGS

Reduction in gasoline consumption (gallons/day)	954
Gasoline cost savings ($/day)	No Price

Ready

NUM

Start   Commuter Mode...   BWCGuidance10...   COMMUTER_v20   4:15 PM

Appendix B:

Example Quantification: Best Workplaces for Commuters District

A Best Workplaces for Commuters (BWC) District is a geographically defined area in which all employees are offered commuter benefits that meet the BWC National Standard of Excellence. As of May 2005, there are 16 BWC Districts in seven states. Among these 16 are downtown Business Improvement Districts (BIDs), suburban office parks, shopping centers, and a collection of rural neighborhoods on the Vermont/New Hampshire border.

BWC Districts meet the National Standard of Excellence for commuter benefits through a variety of means. Some offer free bus passes to all employees within the district (e.g., Cities of Boulder and Aspen, Colorado). Others subsidize vanpool riders (e.g., Cumberland and Buckhead in Atlanta), or set up free shuttle services to connect local transit stations with worksites (e.g., Emeryville, California, and the South Florida Education Center in Davie, Florida). In addition to these primary benefits, all these districts provide supporting commuter benefits, such as centralized carpool matching, bicycle racks and shower facilities, and employee commuting awards programs.

Following is an example of how a user would incorporate data obtained from a District area into the COMMUTER model (described in Section C) in order to learn what mode share and travel impacts, and emission reductions, would result from BWC-related control measures. In this example, the default MOBILE6 emission factor look-up tables are used; area-specific MOBILE emission factors have not been imported into the model. Hence, this exercise simulates the preliminary sketch planning a local planner would do to determine whether or not to include the emission reductions from this worksite's program into the area's SIP or TIP. Instructions on how to import area-specific MOBILE6.2 emission factors into COMMUTER can be found in Appendix E.

Step 1: Scenario Information

The following basic scenario information is needed to operate COMMUTER:
- Metropolitan Area Size
- Analysis Scope
- Analysis Area Type
- Employment in the Analysis Area
- Programs

For this example, a hypothetical Best Workplaces for Commuters District called "Nosolo Drive Business Park" in suburban San Francisco, California, the following inputs are used:
- Metropolitan Area Size: 1 (Large)
- Analysis Scope: 1 (Area Wide)
- Analysis Area Type: 2 (Other High –Density Commercial)
- Employment in the Analysis Area: 30,000 (25,000 office and 5,000 other)

- Programs: 3 (Financial Incentives) and 4 (Employer Support Programs)

Step 2: Local Data

This portion of COMMUTER requires the following inputs:
- Work Trip Mode Shares
- Work Trip Length
- Vehicle Occupancy
- Length of Peak Period (hours)
- Percent of Work Trips in Peak Periods

For all of these, the model default values are used since this is a hypothetical district
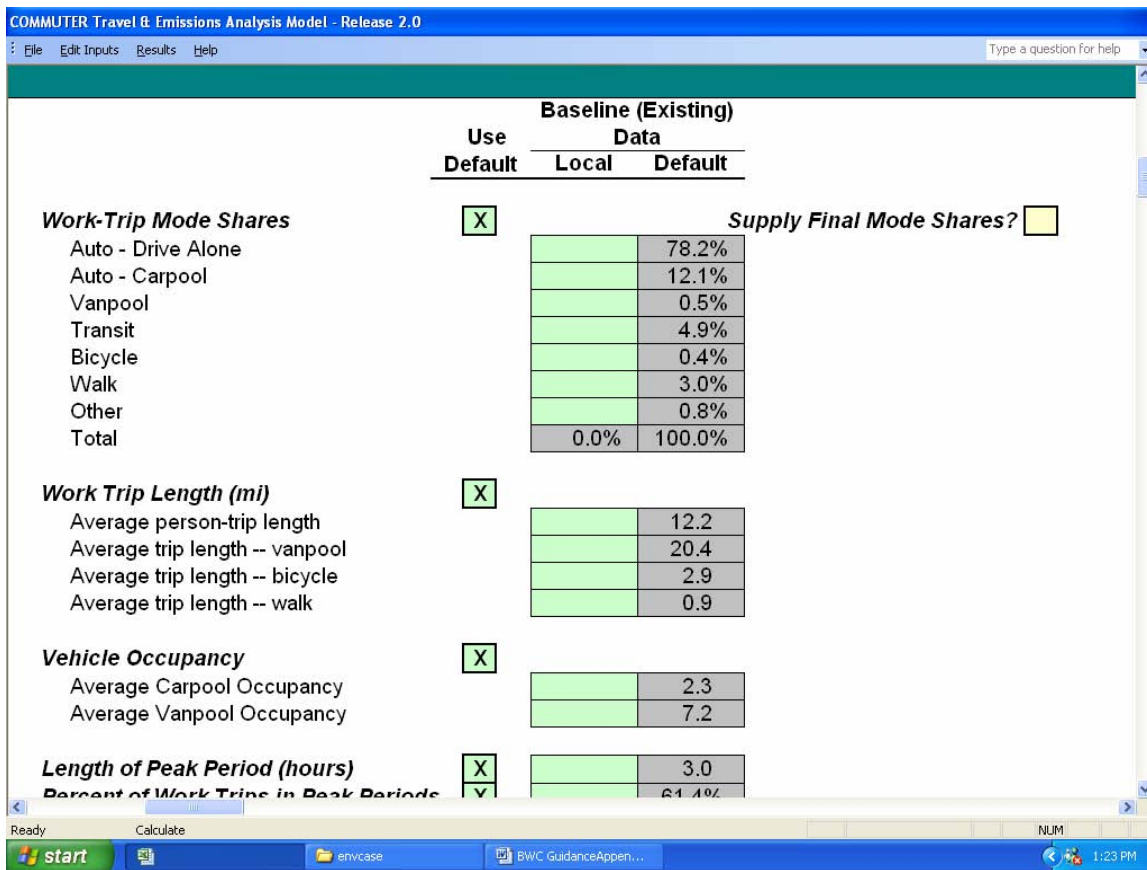
Step 3: Edit Coefficients

The Edit Coefficients for the San Francisco City Specific defaults are used

Step 4: TCM Specific Data – Financial Incentives

For this example, the Nosolo Drive transit subsidy program is modeled. This program subsidizes the cost of a monthly transit pass by $60, or $3.00 per day (based on 20 work days per month) to all participating employees. Therefore, in the 'Change in Daily Cost' box in the financial incentives input screen, the input value is –3.00 (negative since the cost to the rider is decreased). The employer participation rate is set at 30%, a value that represents the assumed percent of employees within the District that have received information about commuting alternatives from their employers. This measure represents a better reflection of the percent of employees that may consider taking advantage of the transit subsidy (and other commuter benefits described in Step 5 below.)

This information is shown in the following screenshot:
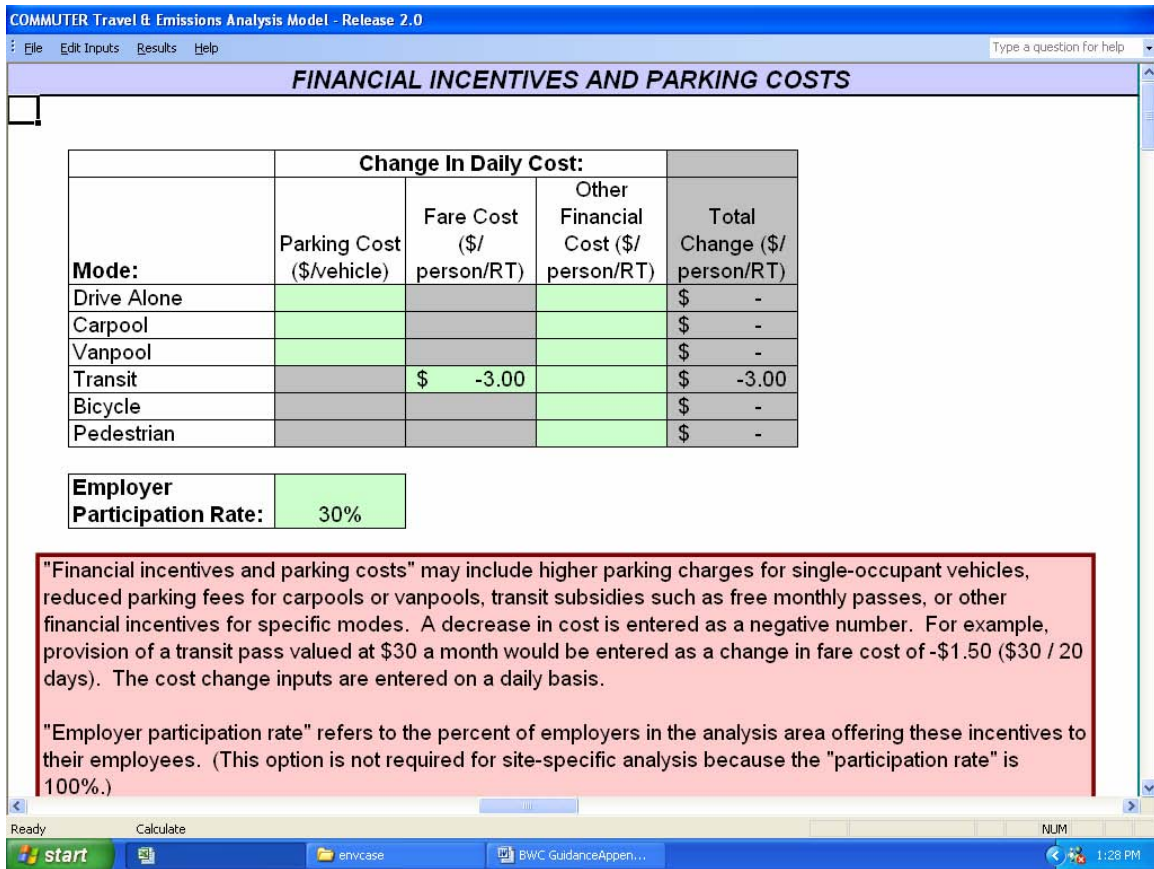
Step 5: TCM Specific Data Screens – Site-Specific Employer Support Programs

In the baseline case in the Nosolo Drive Business Park, additional TCM services are provided to a degree equivalent to the '1' level for all four program components (carpool, vanpool, transit, and bicycle).

The transit subsidy program that forms the basis for this TCM measure is accompanied by an improvement in the Site-Specific (or, in this case, District-Specific) increase in the level of support for all four of these program components, bringing them up to a '4' level.

On the Area-Wide Employer Support Programs Input Screen, the baseline (existing) program levels are set at 30% for all four components at the '1' level. Under the new, TCM program, the program levels are set at 30% for all components at the '4' level.

The reason for using 30%, rather than 100%, is that, as described in Step 4, it is assumed that employees in the District have a 30% level of awareness of the alternate commuter programs available in the district.

Step 6: Emissions-Related Input Screens

Six inputs are required for this module:
- Calendar Year of Analysis
- Season
- Climate Type
- I/M Program Type
- Fuel Type

- PADD

For the first three inputs, 2007 (the earliest available), summer, and moderate are entered. (Moderate because the average temperatures in the summer in San Francisco are between 65 and 85 Fahrenheit).

For I/M (Inspection/Maintenance) type, the city of San Francisco requires an inspection equivalent to the 'Enhanced I/M' level.

Fuel type in San Francisco is 'C', Conventional.

PADD (Petroleum Administration for Defense District) is '5' for the entire West coast.
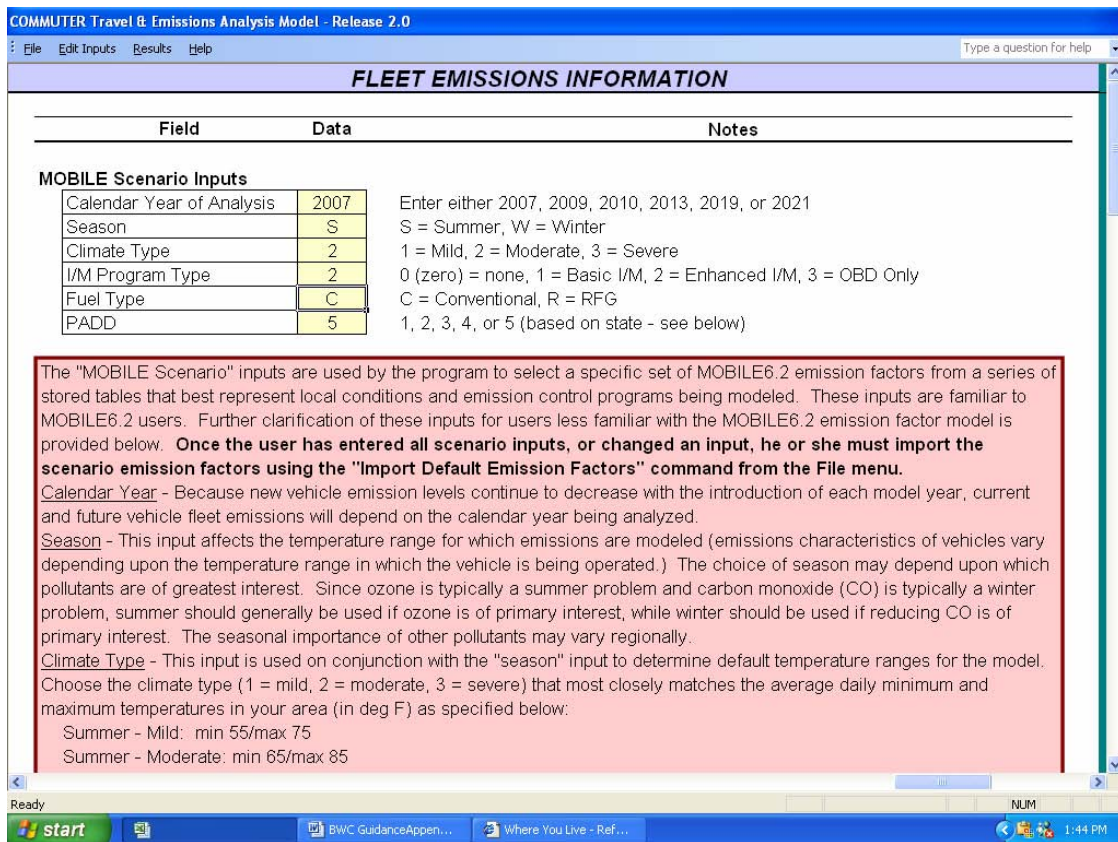
Step 7: Other Emissions-Related Data

All defaults are used for this module.

Results:
Below is the output from this COMMUTER run, using all the variable values described in these steps.

COMMUTER Travel & Emissions Analysis Model - Release 2.0

File Edit Inputs Results Help   Type a question for help

COMMUTER MODEL RESULTS

SCENARIO INFORMATION

Description	Nosolo Drive Business Park
Scenario Filename	nosolo1.vme
Emission Factor File	
Performing Agency	
Analyst	
Metropolitan Area	Nosolo Drive Business Park
Area Size	1 - Large (over 2 million)
Analysis Scope	1 - Area-Wide (e.g., MSA, county)
Analysis Area/Site	
Total Employment	30,000

PROGRAMS EVALUATED

	Site Walk Access Improvements
	Transit Service Improvements
X	Financial Incentives
X	Employer Support Programs
	Alternative Work Schedules

| | User-Supplied Final Mode Shares |

MODE SHARE IMPACTS

Mode	Baseline	Final	%Change
Drive Alone	78.2%	74.3%	-3.9%
Carpool	12.1%	12.4%	+0.3%
Vanpool	0.5%	1.4%	+0.9%
Transit	4.9%	7.2%	+2.3%
Bicycle	0.4%	0.8%	+0.5%
Pedestrian	3.0%	3.0%	-0.1%
Other	0.8%	0.8%	-0.0%
No Trip	-	0.0%	+0.0%
Total	100.0%	100.0%	-

TRAVEL IMPACTS (relative to affected employment)

Quantity	Peak	Off-Peak	Total
Baseline VMT	386,923	243,245	630,168
Final VMT	369,511	232,298	601,809
VMT Reduction	17,412	10,947	28,359
% VMT Reduction	4.5%	4.5%	4.5%
Baseline Trips	30,834	19,384	50,218
Final Trips	29,492	18,541	48,033
Trip Reduction	1,342	843	2,185
% Trip Reduction	4.4%	4.4%	4.4%

Ready   Calculate   NUM

start   BWC GuidanceAppen...   Where You Live - Ref...   1:46 PM

COMMUTER Travel & Emissions Analysis Model - Release 2.0

File   Edit Inputs   Results   Help   Type a question for help

COMMUTER MODEL RESULTS

Shifted from Peak to Off-Peak	0.0%

EMISSION REDUCTIONS (positive values are decreases)

lbs/day:

Pollutant	Peak	Off-Peak	Total
HC	25.45	15.11	40.56
CO	343.81	220.63	564.45
NOx	30.89	19.31	50.20
PM2.5	0.46	0.29	0.75
Toxics			
Acetaldehyde	0.071	0.043	0.115
Acrolein	0.011	0.006	0.017
Benzene	1.153	0.693	1.846
1, 3-Butadiene	0.086	0.052	0.138
Formaldehyde	0.199	0.120	0.319
MTBE	0.000	0.000	0.000
CO2	16,935	10,647	27,582

tons/day:

Pollutant	Peak	Off-Peak	Total
HC	0.013	0.008	0.020
CO	0.172	0.110	0.282
NOx	0.015	0.010	0.025
CO2 (metric tons)	7.7	4.8	12.5

Ready   Calculate   NUM

start   BWC GuidanceAppen...   Where You Live - Ref...   1:47 PM

Step 8: Projected effects of an awareness campaign

As a final step, a new hypothetical scenario was developed. In this scenario, all model inputs were maintained as constant except for the employer participation rates (used in steps 4 and 5, and set at 30%.) In this case the managers of the District's commuter benefits program launch a marketing campaign that results in the increase employer participation from 30% to 50%. When these percentages are changed in the appropriate places, the following results are generated:

COMMUTER Travel & Emissions Analysis Model - Release 2.0

File   Edit Inputs   Results   Help   Type a question for help

COMMUTER MODEL RESULTS

Shifted from Peak to Off-Peak	0.0%

EMISSION REDUCTIONS (positive values are decreases)

lbs/day:

Pollutant	Peak	Off-Peak	Total
HC	45.26	26.87	72.13
CO	611.38	392.33	1,003.71
NOx	54.92	34.33	89.25
PM2.5	0.81	0.51	1.33
Toxics			
Acetaldehyde	0.127	0.077	0.204
Acrolein	0.019	0.011	0.030
Benzene	2.051	1.232	3.283
1, 3-Butadiene	0.153	0.092	0.246
Formaldehyde	0.354	0.213	0.567
MTBE	0.000	0.000	0.000
CO2	30,105	18,926	49,032

tons/day:

Pollutant	Peak	Off-Peak	Total
HC	0.023	0.013	0.036
CO	0.306	0.196	0.502
NOx	0.027	0.017	0.045
CO2 (metric tons)	13.7	8.6	22.2

Ready   Calculate   NUM

start   BWC GuidanceAppen...   Where You Live - Ref...   1:50 PM

30

Appendix C:

Guide to Importing User-Generated MOBILE Emission Factors into the COMMUTER Model

COMMUTER has been supplied with 192 sets of MOBILE6.2 emission factors that encompass a range of input conditions throughout the country. Each of these supplied data sets contains emission factors for six calendar years: 2007, 2009, 2010, 2013, 2019, and 2021. Under general circumstances when COMMUTER is used as a screening model, selecting the set of pre-loaded emission factors that best matches your local conditions is adequate. However, if you want to use COMMUTER to produce emission reductions reflecting local conditions, such as for SIP or conformity purposes, you must use your own locally generated MOBILE6.2 emission factors to calculate emission reductions in COMMUTER. The steps for using your own emission factors are explained below.

> Step 1 - Create Properly Formatted Emission Factor Output File - Although you can specify your exact local input conditions, your MOBILE6.2 output emission factors must be generated in a specific format expected by COMMUTER. The sample MOBILE6.2 template input file M6SAMPLE.IN, which is provided with the model, identifies how specific commands in the MOBILE6.2 input file must be set to produce output emission factors in the COMMUTER-required format. In addition, it contains a series of 13 "Scenario" records that produce emission factors over a range of speeds expected by COMMUTER.   These scenario records can be edited to reflect the altitude, calendar year, local ambient temperature, season of interest, and local fuels data. In addition, the user may specify other locality-specific data in the "Run Data" or "Scenario" sections, such as I/M programs, vehicle registration distributions, or alternative Tier 2 phase-in schedules. Speed data files for each scenario are provided with the model and should not be edited.

> In addition, the user must specify the "database output" option with the formats shown in the sample file. In addition, the user must specify calculation of particulate matter as well as air toxics, as shown in the sample file, and provide the fuel parameters and particulate matter emission factor inputs in each scenario record, as required by MOBILE6.2 to calculate particulate matter and air toxics emissions. If these conventions are not followed, the resulting MOBILE6.2 model output will not work properly with COMMUTER.

> ***IMPORTANT***: *Once you've edited the 13 scenario records to reflect your own altitude, temperature, and season inputs, you can copy and paste this block of records to create emission factors for multiple calendar years.*

Once you have set up your MOBILE6.2 input file as described above and in accordance with the required database output options, run MOBILE6.2. You can name the MOBILE6.2 input and output files as you choose.

Step 2 - Process MOBILE6.2 Output - Once you have run MOBILE6.2, an intermediate step is required to process MOBILE6.2 database-format output into the format expected by COMMUTER. You can run this step from inside the COMMUTER model using the "Process MOBILE6.2 Output" command from the "File" menu. This command will allow you to browse for and select a standard MOBILE6.2 database output file (.TB1) extension. It will then convert the data in this file into a text file suitable for import into COMMUTER, with a .TBZ extension. Note that corresponding toxics and PM MOBILE6.2 output files are also read (.TOX and .PM extensions, respectively), and a corresponding VMT file (.VMT) is also generated that contains VMT fractions by vehicle type and facility type. The model user must retain these files in the same directory as the .TB1 and .TBZ files and should not delete them. The routine to process MOBILE output may take a few minutes to run; this is normal.

Step 3 - Activate User-Supplied Emission Factors Option - On the "Fleet Emissions Information" input screen in COMMUTER, you have the option of selecting "User-Supplied Emission Factors." Once you have selected this option and specified a calendar year, you will be reminded to Import User Emission Factors, as described below. It is important that the calendar year you have specified match one of the calendar years included in the .TBZ file you select.

Step 4 - Import User Emission Factors - Once you have generated a .TBZ file, you can import this file into the COMMUTER model using the "Import User Emission Factors" command from the "File" menu. This command will allow you to browse for and select a .TBZ file. You may select any .TBZ file that you already have generated from MOBILE6.2 output, without re-running the "process MOBILE6.2 output" routine described above. Importing the .TBZ file will take a few seconds; you will be notified when the import routine has been successfully completed. These emission factors will be saved within the COMMUTER model until you import a different set of either user-specified or default scenario emission factors.

Sample MOBILE6.2 Input File

MOBILE6 INPUT FILE : M6sample.in
*This is a sample MOBILE6.2 input file, provided for use with EPA's COMMUTER Model v2.0.
*Requirements:
**** The DATABASE OUTPUT option must be used with the format options as shown.
**** The PARTICULATES and AIR TOXICS commands must be used as shown.
**** 13 scenarios must be run, one for each speed range, using the external speed files provided.
**** The user must provide locality-specific fuel parameters in each SCENARIO record,
****   suitable for use with the PARTICULATES and AIR TOXICS commands.
*User options:
**** The user may alter the calendar year, season, altitude, and temperature in the scenario
****   records, and may provide additional local data in the scenario record (e.g., humidity).
**** The user may specify other locality-specific data either internally or in external files
****   (e.g., I/M program, alternative Tier 2 phase-in, vehicle registration distribution).

DATABASE OUTPUT   :
POLLUTANTS   : HC CO NOX CO2
WITH FIELDNAMES   :
DATABASE VEHICLES : 22222 11111111 2 222 11111111 221
DAILY OUTPUT   :

PARTICULATES   : SO4 GASPM LEAD SO2 NH3 BRAKE TIRE
AIR TOXICS   :

* -----------------------------
RUN DATA   :

EXPRESS HC AS VOC :

FUEL PROGRAM   : 4
30 30 30 30 30 30 30 30
30 30 30 30 30 30 30 30
80 80 80 80 80 80 80 80
80 80 80 80 80 80 80 80

I/M DESC FILE   : basic.im

SCENARIO RECORD   : Weekday 2007 Speed01.svt
> NOTE Scenario speed: Speed01.svt

CALENDAR YEAR   : 2007
SEASON   : 1
FUEL RVP   : 8.38
MIN/MAX TEMPERATURE: 55.0 75.0
ALTITUDE   : 1
PARTICULATE EF   : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV
PMDDR1.CSV PMDDR2.CSV
PARTICLE SIZE   : 2.5
DIESEL SULFUR   : 87.75
SPEED VMT   : Speed01.svt

GAS AROMATIC%   : 26.87
GAS OLEFIN%   : 13.23
GAS BENZENE%   : 01.00
E200   : 47.72
E300   : 82.84
OXYGENATE   : MTBE 02.6200 1.00

```
               : ETBE 00.0000 0.00
               : ETOH 00.0000 0.00
               : TAME 00.0000 0.00


* -----------------------------
SCENARIO RECORD    : Weekday 2007 Speed02.svt
> NOTE Scenario speed:      Speed02.svt

CALENDAR YEAR     : 2007
SEASON           : 1
FUEL RVP         : 8.38
MIN/MAX TEMPERATURE: 55.0 75.0
ALTITUDE         : 1
PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV
PMDDR1.CSV PMDDR2.CSV
PARTICLE SIZE     : 2.5
DIESEL SULFUR     : 87.75
SPEED VMT         : Speed02.svt

GAS AROMATIC%     : 26.87
GAS OLEFIN%       : 13.23
GAS BENZENE%      : 01.00
E200            : 47.72
E300            : 82.84
OXYGENATE         : MTBE 02.6200 1.00
               : ETBE 00.0000 0.00
               : ETOH 00.0000 0.00
               : TAME 00.0000 0.00


* -----------------------------
SCENARIO RECORD    : Weekday 2007 Speed03.svt
> NOTE Scenario speed:      Speed03.svt

CALENDAR YEAR     : 2007
SEASON           : 1
FUEL RVP         : 8.38
MIN/MAX TEMPERATURE: 55.0 75.0
ALTITUDE         : 1
PARTICULATE EF     : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV
PMDDR1.CSV PMDDR2.CSV
PARTICLE SIZE     : 2.5
DIESEL SULFUR     : 87.75
SPEED VMT         : Speed03.svt

GAS AROMATIC%     : 26.87
GAS OLEFIN%       : 13.23
GAS BENZENE%      : 01.00
E200            : 47.72
E300            : 82.84
OXYGENATE         : MTBE 02.6200 1.00
               : ETBE 00.0000 0.00
               : ETOH 00.0000 0.00
               : TAME 00.0000 0.00


* -----------------------------
SCENARIO RECORD     : Weekday 2007 Speed04.svt
```

> NOTE Scenario speed: Speed04.svt

CALENDAR YEAR   : 2007
SEASON   : 1
FUEL RVP   : 8.38
MIN/MAX TEMPERATURE: 55.0 75.0
ALTITUDE   : 1
PARTICULATE EF   : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV
PMDDR1.CSV PMDDR2.CSV
PARTICLE SIZE   : 2.5
DIESEL SULFUR   : 87.75
SPEED VMT   : Speed04.svt

GAS AROMATIC%   : 26.87
GAS OLEFIN%   : 13.23
GAS BENZENE%   : 01.00
E200   : 47.72
E300   : 82.84
OXYGENATE   : MTBE 02.6200 1.00
                 : ETBE 00.0000 0.00
                 : ETOH 00.0000 0.00
                 : TAME 00.0000 0.00

* -----------------------------
SCENARIO RECORD   : Weekday 2007 Speed05.svt
> NOTE Scenario speed: Speed05.svt

CALENDAR YEAR   : 2007
SEASON   : 1
FUEL RVP   : 8.38
MIN/MAX TEMPERATURE: 55.0 75.0
ALTITUDE   : 1
PARTICULATE EF   : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV
PMDDR1.CSV PMDDR2.CSV
PARTICLE SIZE   : 2.5
DIESEL SULFUR   : 87.75
SPEED VMT   : Speed05.svt

GAS AROMATIC%   : 26.87
GAS OLEFIN%   : 13.23
GAS BENZENE%   : 01.00
E200   : 47.72
E300   : 82.84
OXYGENATE   : MTBE 02.6200 1.00
                 : ETBE 00.0000 0.00
                 : ETOH 00.0000 0.00
                 : TAME 00.0000 0.00

* -----------------------------
SCENARIO RECORD   : Weekday 2007 Speed06.svt
> NOTE Scenario speed: Speed06.svt

CALENDAR YEAR   : 2007
SEASON   : 1
FUEL RVP   : 8.38
MIN/MAX TEMPERATURE: 55.0 75.0

ALTITUDE   : 1
PARTICULATE EF   : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV
PMDDR1.CSV PMDDR2.CSV
PARTICLE SIZE   : 2.5
DIESEL SULFUR   : 87.75
SPEED VMT   : Speed06.svt

GAS AROMATIC%   : 26.87
GAS OLEFIN%   : 13.23
GAS BENZENE%   : 01.00
E200   : 47.72
E300   : 82.84
OXYGENATE   : MTBE 02.6200 1.00
            : ETBE 00.0000 0.00
            : ETOH 00.0000 0.00
            : TAME 00.0000 0.00

* ------------------------------
SCENARIO RECORD   : Weekday 2007 Speed07.svt
> NOTE Scenario speed: Speed07.svt

CALENDAR YEAR   : 2007
SEASON   : 1
FUEL RVP   : 8.38
MIN/MAX TEMPERATURE: 55.0 75.0
ALTITUDE   : 1
PARTICULATE EF   : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV
PMDDR1.CSV PMDDR2.CSV
PARTICLE SIZE   : 2.5
DIESEL SULFUR   : 87.75
SPEED VMT   : Speed07.svt

GAS AROMATIC%   : 26.87
GAS OLEFIN%   : 13.23
GAS BENZENE%   : 01.00
E200   : 47.72
E300   : 82.84
OXYGENATE   : MTBE 02.6200 1.00
            : ETBE 00.0000 0.00
            : ETOH 00.0000 0.00
            : TAME 00.0000 0.00

* ------------------------------
SCENARIO RECORD   : Weekday 2007 Speed08.svt
> NOTE Scenario speed: Speed08.svt

CALENDAR YEAR   : 2007
SEASON   : 1
FUEL RVP   : 8.38
MIN/MAX TEMPERATURE: 55.0 75.0
ALTITUDE   : 1
PARTICULATE EF   : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV
PMDDR1.CSV PMDDR2.CSV
PARTICLE SIZE   : 2.5
DIESEL SULFUR   : 87.75
SPEED VMT   : Speed08.svt

GAS AROMATIC%   : 26.87
GAS OLEFIN%   : 13.23
GAS BENZENE%   : 01.00
E200   : 47.72
E300   : 82.84
OXYGENATE   : MTBE 02.6200 1.00
              : ETBE 00.0000 0.00
              : ETOH 00.0000 0.00
              : TAME 00.0000 0.00

* ------------------------------
SCENARIO RECORD   : Weekday 2007 Speed09.svt
> NOTE Scenario speed: Speed09.svt

CALENDAR YEAR   : 2007
SEASON   : 1
FUEL RVP   : 8.38
MIN/MAX TEMPERATURE: 55.0 75.0
ALTITUDE   : 1
PARTICULATE EF   : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV
PMDDR1.CSV PMDDR2.CSV
PARTICLE SIZE   : 2.5
DIESEL SULFUR   : 87.75
SPEED VMT   : Speed09.svt

GAS AROMATIC%   : 26.87
GAS OLEFIN%   : 13.23
GAS BENZENE%   : 01.00
E200   : 47.72
E300   : 82.84
OXYGENATE   : MTBE 02.6200 1.00
              : ETBE 00.0000 0.00
              : ETOH 00.0000 0.00
              : TAME 00.0000 0.00

* ------------------------------
SCENARIO RECORD   : Weekday 2007 Speed10.svt
> NOTE Scenario speed: Speed10.svt

CALENDAR YEAR   : 2007
SEASON   : 1
FUEL RVP   : 8.38
MIN/MAX TEMPERATURE: 55.0 75.0
ALTITUDE   : 1
PARTICULATE EF   : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV
PMDDR1.CSV PMDDR2.CSV
PARTICLE SIZE   : 2.5
DIESEL SULFUR   : 87.75
SPEED VMT   : Speed10.svt

GAS AROMATIC%   : 26.87
GAS OLEFIN%   : 13.23
GAS BENZENE%   : 01.00
E200   : 47.72
E300   : 82.84

OXYGENATE   : MTBE 02.6200 1.00
           : ETBE 00.0000 0.00
           : ETOH 00.0000 0.00
           : TAME 00.0000 0.00

* -----------------------------
SCENARIO RECORD   : Weekday 2007 Speed11.svt
> NOTE Scenario speed: Speed11.svt

CALENDAR YEAR   : 2007
SEASON   : 1
FUEL RVP   : 8.38
MIN/MAX TEMPERATURE: 55.0 75.0
ALTITUDE   : 1
PARTICULATE EF   : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV
PMDDR1.CSV PMDDR2.CSV
PARTICLE SIZE   : 2.5
DIESEL SULFUR   : 87.75
SPEED VMT   : Speed11.svt

GAS AROMATIC%   : 26.87
GAS OLEFIN%   : 13.23
GAS BENZENE%   : 01.00
E200   : 47.72
E300   : 82.84
OXYGENATE   : MTBE 02.6200 1.00
           : ETBE 00.0000 0.00
           : ETOH 00.0000 0.00
           : TAME 00.0000 0.00

* -----------------------------
SCENARIO RECORD   : Weekday 2007 Speed12.svt
> NOTE Scenario speed: Speed12.svt

CALENDAR YEAR   : 2007
SEASON   : 1
FUEL RVP   : 8.38
MIN/MAX TEMPERATURE: 55.0 75.0
ALTITUDE   : 1
PARTICULATE EF   : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV
PMDDR1.CSV PMDDR2.CSV
PARTICLE SIZE   : 2.5
DIESEL SULFUR   : 87.75
SPEED VMT   : Speed12.svt

GAS AROMATIC%   : 26.87
GAS OLEFIN%   : 13.23
GAS BENZENE%   : 01.00
E200   : 47.72
E300   : 82.84
OXYGENATE   : MTBE 02.6200 1.00
           : ETBE 00.0000 0.00
           : ETOH 00.0000 0.00
           : TAME 00.0000 0.00

* -----------------------------

SCENARIO RECORD   : Weekday 2007 Speed13.svt
> NOTE Scenario speed: Speed13.svt

CALENDAR YEAR   : 2007
SEASON   : 1
FUEL RVP   : 8.38
MIN/MAX TEMPERATURE: 55.0 75.0
ALTITUDE   : 1
PARTICULATE EF   : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV
PMDDR1.CSV PMDDR2.CSV
PARTICLE SIZE   : 2.5
DIESEL SULFUR   : 87.75
SPEED VMT   : Speed13.svt

GAS AROMATIC%   : 26.87
GAS OLEFIN%   : 13.23
GAS BENZENE%   : 01.00
E200   : 47.72
E300   : 82.84
OXYGENATE   : MTBE 02.6200 1.00
           : ETBE 00.0000 0.00
           : ETOH 00.0000 0.00
           : TAME 00.0000 0.00

* -----------------------------
SCENARIO RECORD   : Weekday 2007 Speed14.svt
> NOTE Scenario speed: Speed14.svt

CALENDAR YEAR   : 2007
SEASON   : 1
FUEL RVP   : 8.38
MIN/MAX TEMPERATURE: 55.0 75.0
ALTITUDE   : 1
PARTICULATE EF   : PMGZML.CSV PMGDR1.CSV PMGDR2.CSV PMDZML.CSV
PMDDR1.CSV PMDDR2.CSV
PARTICLE SIZE   : 2.5
DIESEL SULFUR   : 87.75
SPEED VMT   : Speed14.svt

GAS AROMATIC%   : 26.87
GAS OLEFIN%   : 13.23
GAS BENZENE%   : 01.00
E200   : 47.72
E300   : 82.84
OXYGENATE   : MTBE 02.6200 1.00
           : ETBE 00.0000 0.00
           : ETOH 00.0000 0.00
           : TAME 00.0000 0.00

                    END OF RUN   :

Appendix D:

Best Workplaces for Commuters Program Evaluation Guide

Surveying Employees

Q: What questions should I ask employees in the survey?
A: To make program evaluation simpler for you, we have provided a sample Employee Survey to illustrate the minimum information you should capture when surveying employees to evaluate a SIP program. You must conduct a separate survey for each of your registered worksites.

If you are already administering a survey as part of a mandatory trip reduction ordinance or for other purposes, you might be able to use the information collected through that survey for this purpose. Contact your EPA Regional office.

In some communities, a transportation agency (such as a regional planning agency or transportation management association) may be able to administer a survey that not only reports on mode share but also helps better understand the commuting needs of your employees. Employers may wish to add questions to the survey about other commuting services or options that employees desire, or benefits that would be useful in encouraging employees to try transit, ridesharing, walking or bicycling, or flexible work arrangements.

Q: What are the steps for surveying employees?
A: There are seven basic steps to conducting an employee survey:

1. Determine when to conduct the employee survey
2. Establish how the survey will be distributed
3. Decide which employees to survey
4. Determine how many employees to survey
5. Inform employees of the survey and distribute survey to all eligible or sampled employees
6. Collect the employee surveys and contact non-responders
7. Compile the results of the employee survey

Please see below for detailed information about each of these steps.

Q: When should I conduct the survey?
A: Employees should be surveyed about their commuting trips following a *typical workweek*. Surveys should not be distributed to employees the week following a holiday, after a group of employees have not been present at the worksite (e.g., during a corporate retreat), or after other circumstances that could affect employee commuter patterns.

In addition to deciding when to conduct the survey, a deadline should be set for collecting surveys from employees. This deadline should be set to allow sufficient time to contact non-responders and determine the survey results. In general you

should start surveying employees several months in advance of the date you have selected for reporting to EPA.

Q: How should the survey be distributed?
A: Surveys should be distributed in the manner that best suits your organization's culture. Distribution options include the following:

♦   Electronic distribution (e-mail) – appropriate for companies that regularly communicate in this manner
♦   Mass distribution – sent to employees along with their paychecks, through a company newsletter, or via a special mailing
♦   Internet – an increasingly popular option, the questionnaire is accessed and filled out via the web. Responses can be automatically transferred to a database for analysis. If you can't perform such a survey over your own network, EPA can host the questionnaire and capture and analyze the data for you.
♦   Group administration – distribution at an employee meeting where the employees fill out the survey during the meeting
♦   Individual administration – dissemination by an individual assigned to administer the survey to employees (most appropriate for smaller organizations)

Electronic and mass distribution require less administration on the front-end, but often require more follow-up to ensure good results. Group or individual administration reduces the problems of non-responders and waiting for employees to submit their surveys, but requires additional administration time.

Q: How do I decide which employees to survey?
A: Employees who should be surveyed fall in any of the following categories:

♦   Employees who are on your organization's payroll and assigned to your worksite, including night shift, or teleworking employees OR
♦   Employees who have an assigned workstation at your site OR
♦   Part-time employees who work half time or more (you are encouraged to include all part-time employees in order to get more accurate and useful information) OR
♦   Contractors at your worksite who are not on your organization's payroll but are allowed to take part in your organization's benefits

Q: How do I determine how many employees to survey?
A: The number of employees to survey depends on the size of the work force at your worksite.

If your worksite has fewer than 750 eligible employees:
All eligible employees should be surveyed.

If your worksite has 750 or more eligible employees:
You may survey a *random sample* of eligible employees. The goal of a random sample is to create unbiased results that can be generalized to the worksite as a whole without surveying each employee. Use the table below to determine the sample size required for a given number of eligible employees:

Number of Eligible Employees	Required Sample Size
750 to 999	635
1,000 to 1,249	706
1,250 to 1,499	742
1,500 to 1,999	813
2,000 to 2,999	885
3,000 to 3,999	956
4,000 to 4,999	1,028
5,000 to 9,999	1,063
10,000 to 19,999	1,135
20,000 or more	1,170

You should pick the sample through ***random means of drawing names***.

Examples of survey methods that are **NOT** random samples include:
- Distributing surveys to only employees who are in one business unit or on one floor of a building
- Distributing surveys to 50 employees in each business unit or to 50 employees on each floor of a building
- Handing out surveys to people who happen to be in the cafeteria on a given day or at a staff meeting on a given day

The following methods may be used to create a random sample.

If you have 750 to 1,625 eligible employees:

Step 1: First, create a list of all survey-eligible employees. The list can be compiled using names organized alphabetically or by social security number. Do not use arrangements such that a recognizable group is divided into standard intervals. For example, do not use an arrangement where supervisors and staff members alternate.

Step 2: Using the table above, determine how many eligible employees need to be surveyed. Calculate the number NOT to be surveyed by subtracting the number to be surveyed from the number of eligible employees.

Step 3: Calculate the correct "interval" for removing names. This is done by dividing the number of eligible employees by the number of employees NOT to be surveyed. Round this number up to the nearest whole number, n.

Step 4: Choose a starting number between 1 and n at random. For example, the numbers from 1 to n can be written on pieces of paper and put into a hat, and then one of these numbers is selected from the hat.

Step 5: Using the number n calculated in step 3, count off each "nth" employee starting at the starting number calculated in step 4, with each of the "nth" employees taken out of the sample. The remaining employees will be surveyed.

For example, with 800 employees, a survey of 635 employees is needed, and so 800 – 635 = 165 employees who do not need to be surveyed. Dividing 165 employees by 800 employees produces the number 4.8, which rounds up to 5. The starting number selected in step 4 might be 2, so starting from the second employee, remove every 5th employee from the list. Survey the remaining employees.

If you have 1,626 or more eligible employees:

Step 1:   First, create a list of all survey-eligible employees. The list can be compiled using names organized alphabetically or by social security number. Do not use arrangements such that a recognizable group is divided into standard intervals. For example, do not use an arrangement where supervisors and staff members alternate.

Step 2:   Using the table above, determine how many eligible employees need to be surveyed.

Step 3:   Calculate the correct sampling "interval." This is done by dividing the number of eligible employees by the number of employees who must be surveyed (as indicated in the above table). Round this number <u>down</u> to the nearest whole number, n.

Step 4:   Choose a starting number between 1 and n at random. For example, the numbers from 1 to n can be written on pieces of paper and put into a hat, and then one of these numbers is selected from the hat.

Step 5:   Using the number n calculated in step 3, count off each "nth" employee starting at the starting number calculated in step 4, with each of the "nth" employees selected to be surveyed.

For example, if the employer has 2,000 eligible employees, the table says that 885 employees should be surveyed. The result of step 3 produces the number 2.26, which rounds down to 2. The starting number selected in step 4 might be 2. This means that every second employee in the employee list, starting with the second employee, should be selected for surveying.

Because of the rounding down of the sampling interval, this method can produce random samples of more employees than the minimum required. If the employee list is organized by a factor expected to be unrelated to potential commuting patterns, such as an arrangement by social security number, then you can stop selecting employees from the list once you have the desired minimum sample size. On the other hand, if the list is organized by a factor that might be related to potential commuting patterns (such as by job type), you should continue selecting employees until you reach the end of the list in order to avoid having a biased sample.

Q. What should I consider in informing employees of the survey and distributing it?
A.   Including a cover memo or letter that describes the survey and its purpose is essential. The memo or letter should emphasize why it is important that the survey be completed. For example, you might explain to employees that the information

collected will help you better tailor your commuter benefits to employee needs and/or manage your program better.

Special arrangements may have to be made to distribute and collect surveys from employees who work during off-hours, telecommute, or work part time. Also note that while you may consolidate the design and distribution of the survey, you must report your results separately for each registered worksite.

Q: How many surveys do I need to receive back?
A: You must try to receive a targeted percent of surveys for your results to be valid. The target percent applies to the number of surveys that are distributed, whether or not all employees are surveyed or a sample is used.

For employers with 300 or more eligible employees:
A 70 percent or greater response rate from the survey should be achieved.

Employers in states and localities with trip reduction ordinances have found a 70 percent response rate attainable, and this level is needed to ensure confidence in the results.

For employers with fewer than 300 eligible employees:
The target response rate depends on the number of employees, as shown in the table below:

Number of Eligible Employees	Target Response Rate (%)
99 or fewer	92
100-199	85
200-299	78

The target response rate is higher for smaller employers in order to ensure the same level of statistical confidence among all employer size groups. A high response rate is often easiest for smaller employers since individual follow-ups with employees can be made.

Q: How do I collect employee surveys and contact non-respondents?
A: Employees should submit their completed surveys to a designated location or person by a specified deadline. One week after the surveys have been distributed (if sent out to individuals), determine how many have been returned. Normally, response drops off dramatically after one week.

All non-responders should be reminded to submit the survey through a general notice to all survey recipients. Another copy of the survey may also be distributed in case the employee has misplaced the original survey.

Tips for achieving a high response rate include:
♦ Include a due date on the survey form
♦ Let employees know why they are being surveyed and why it is important to the organization

♦ Provide incentives for returning the survey, such as small gift items, such as mugs, magnets, or T-shirts, or coupons for discounts on local goods or services

♦ Develop a contest where employees who return surveys can win gift certificates, transit passes, restaurant meals, or other prizes

Q: How do I compile the results of the employee survey?

A: Once you have collected the surveys, the next step is to tally the numbers from the employee surveys by category and by worksite. Please take care to include all of the collected responses in your totals. Enter the totals on the survey summary sheet, which is included in this *Guide*.

Q: Whom can I contact for assistance with surveying employees?

A: You can contact your account manager, the call the Best Workplaces for Commuters^{SM} voicemail at 888-856-3131 or email bwc@epa.gov. Your organization may also be able to seek additional assistance from regional rideshare organizations, transportation management organizations, or outside contractors to provide assistance in either customizing or conducting your employee surveys.