Increasing Ridership and Efficient Passenger Transit

Summary: This initiative presents an array of measures that can be adopted to decrease GHG emissions from the state's passenger transportation sector by influencing the transportation choices of Pennsylvanians. It presents a strategic approach to shift passenger transportation mode choice to increase ridership on public transit systems, without requiring any major new policies or regulations. Specifically, these measures aim to: (1) expand current mass transit services; (2) increase public transit ridership; (3) decrease single occupancy vehicle (SOV) trips; and (4) avoid motor vehicle trips altogether where possible. Many of these measures would require the passage of new policies or the implementation of new regulations.

This initiative does *not* outline implementation steps for—or the potential benefits of—large- scale expansions of existing public transportation systems, or the construction of new public transportation systems. However, these are key steps that the state should consider implementing especially with the help of state and federal dollars.

Possible Measure:

1. Continue to provide stable and adequate funding for the current system.
2. Invest in Growth.
    a. Expand the transit network:
        i. Incremental expansion of existing services
        ii. Implement new services.
3. Development of a Public Transportation Strategic Plan for Long-Term Ridership Growth by Transit Authorities.
4. Address Related Factors That Influence Personal Travel Behavior.

1. Fund the Current System

This component encompasses the provision of stable and sufficient funding to maintain existing services, including both annual operating funds and long-term capital funds to bring the systems to a state of good repair and provide for ongoing capital replacement. Sufficient funding will maintain existing transit ridership, but not necessarily mode share, in geographic areas now served by transit. This avoids increases in GHGs that would occur if transit users changed to personal vehicles, and maintains the foundation on which to significantly increase ridership.

This foundation simultaneously provides a basis for at least incremental transit ridership increases on existing services. However, large increases in transit ridership, either absolute or in proportion to the total number of personal vehicle trips or population, are likely not feasible absent implementation of the three other components of this work plan.

Act 44 of 2007 provided the basis to accomplish this (and included reforms and efficiency improvements that are in process).However, the future of Act 44 is uncertain; shortfalls in key portions of the act have led to annual funding gaps.

Funding the current system also recognizes that public transportation systems must take advantage of opportunities to improve their efficiency. Although Act 44 mandated a series of performance measures that account for and base additional funding on improved efficiencies, there are other operational improvements transit agencies can make (route analysis and restructuring, technology investments, etc.) that can improve their service delivery.

2. Invest in Growth

Investing in growth recognizes that public transportation is first and foremost a public service, and that the sustainability of transit systems and services is dependent on demonstrating sound management practices and prudent use of public funding to attract and retain riders.

As the state's overall and special-needs populations increase, efficient and effective personal mobility are increasingly necessary in the present and emerging economies. When high-occupancy modes are provided efficiently and used effectively, they decrease GHGs and other harmful emissions. Land development plans and implementations that provide sufficient density and connectivity for the institution of efficient and effective transit services are integral to system and ridership growth.

Local or intra-city transit ridership growth potential is most likely in the larger urbanized areas with the highest population densities. These areas can provide the most efficient, cost-effective high-quality transit services that attract riders, including fixed-guideway modes, such as bus rapid transit (BRT), priority corridors, rail, etc. Transit services in the Philadelphia and Pittsburgh areas, for example, currently comprise over 90 percent of total Pennsylvania transit ridership.

Similarly, key intercity markets exist and may continue to emerge, as travelers continue to seek lower-cost, higher quality, and more dependable travel modes. Examples are the Keystone Corridor (commuter rail between Harrisburg and Philadelphia), and may include other intercity pairs inadequately or not served by rail or air modes.

Investment is necessary to better serve the state's present citizens and provide attractive service to populations in future residential areas, employment areas, and other activity centers. This investment, made wisely, will significantly increase transit ridership and the proportion of total trips served by transit, *at a minimum* reducing the projected growth of vehicle-related GHG emissions, reducing highway vehicle-related GHG emissions from current projections, and striving to reduce the vehicle-related carbon footprint of each Pennsylvanian.

Two forms of key investments in service expansions are possible: incremental and strategic.

- *Incremental service expansions* may be performed largely or completely within the context of existing capital assets. Capital expenditures to initialize such services would be relatively minor, such as several buses added to a fleet. Incremental improvements, such as relatively inexpensive steps that improve transit efficiency or effectiveness, are included in this category. Sample service expansions and improvements include: add buses to an existing route to alleviate crowding or improve headways (also improving service quality); expand the days and/or span of services (add weekend service, provide service earlier in the morning or later in the evening); install traffic-signal-priority technology to provide faster bus services and improve vehicle utilization; and add bus-only priority lanes in congested corridors to decrease passenger travel times and increase productivity.

- *Strategic service expansions* require significant additional capital investment to initialize the service and significant additional ongoing funding to operate the service. Examples include: new services requiring a significant number of new-revenue vehicles, equipment, or storage/maintenance facilities; new or expanded fixed-guideway (e.g., rail, busway, BRT) services; additional rail cars or power units for rail fleets; electrification of existing diesel rail service; and new networks of park-and-ride lots served by bus and/or rail transit.

  For the purposes of this GHG work plan, strategic service expansions are conservatively estimated to be $1–$3 billion for initial capitalization and $30–$60 million annually for operating funds.

All transportation investments must be appropriate to the existing and planned environment to ensure implementation of Smart Transportation approaches. Service improvements and expansions, and new services may include the following modes and services:

- Expand and improve existing services by providing more days/hours of service, modernizing equipment and facilities, expanding NextBus systems, implementing electronic fare systems and improving modal connectivity (including park & ride).
- Upgrade traditional local motor bus and demand-response services.
- Expand BRT lines.
- Expand Light-rail lines.
- Expand Heavy- and commuter-rail lines.
- Develop employer and private-sector programs to boost transit use.
    - ***Workplace Incentives for Public Transit Use***: To encourage public transit use by employees at workplaces with access to public transit systems, the state and local governments could work with businesses to provide incentives for their employees to use public transit for their work commute. Such programs should also include state workers, and incentives could include free/discounted bus or train tickets, transit ticket purchase with pre-tax dollars or vouchers for discounts at businesses in the area.
    - ***Workplace Incentives for Carpooling:*** State and local governments could work with businesses to provide incentives for their employees to carpool for their work commute. Such incentives could include free/discounted parking, matching up riders or vouchers for discounts at businesses in the area.
    - ***Telecommuting in the Private Sector****:* By working from home, workers can avoid vehicle trips and their resulting GHG emissions. Actions to encourage more telecommuting in the private sector include business tax incentives for employers to provide telecommuting as an option to their employees (could include local wage tax adjustments), and funding for regional telecommuting centers (which provide an office-like environment for workers in a given area closer to home and away from their employer's office).
    - ***Telecommuting in the Public Sector:*** To help set the example and establish some of the regional telecommuting centers, the state should offer telecommuting as an option for employees wherever appropriate, and set clear targets and timelines for the number of employees utilizing the telecommuting option.
- Create and integrate high-occupancy-vehicle (HOV) lanes/systems into the transportation network.
- Engage in multistate collaboration to implement new and improve existing intercity high-speed rail links.
- Complete the streets program, including pedestrian, bicycle, and transit-friendly networks of lanes, sidewalks, etc.
- Implement commuter flexibilities to reduce travel demand and increase transit's viability. Strategies include flexible and compressed work weeks, flexible work hours, telecommuting programs, live-near-your-workplace, etc.
- Include transit and all non-SOV-mode information in educational efforts regarding energy efficiency, conservation, and the effects of GHG emissions on climate change.

3. Develop a Public Transportation Strategic Plan for Long-Term Ridership Growth

Pennsylvania's transit authorities need to develop a strategic plan for its large number of diverse public transportation services and to guide future expansion of existing systems and institution of new major services and facilities. As part of such a plan, the Commonwealth should also develop a technical intercity rail network plan to facilitate an understanding of the realistic investment structures and service models that are needed to implement a 21st-century intercity rail network in Pennsylvania.

4. Address Related Factors That Influence Personal Travel Behavior

For transit to successfully compete with the private auto for a significantly larger share of personal trips, transit must be competitive in terms of cost and convenience to make it the logical choice for many travelers. Part of this challenge is for the transit provider to meet the expectations of riders who *choose* to use transit by improving elements within their control, such as connectivity between travel origin and destination, on-time performance, safety, courtesy, ease of use, etc. The other portion of the challenge is to alter the balance of external factors—which transit alone cannot change—that influence an individual's choice of modes to meet a particular travel need.

External factors that influence travel demand and mode choice include, but are not limited to:

- Land use, including density and mixed land use.
- Context-sensitive design for transportation and other facilities.
- Smart growth communities and corridors.
- Efficiency of infrastructure and services.
- Convenience versus other modes.
- Cost versus other modes.
- Subsidies for auto use.
- Disincentives for auto use.

Transit agencies, MPO/RPOs, and municipalities should use all existing tools, techniques, processes, and options at their disposal, specifically including those regarding land use, zoning, and site design, to create communities supportive of non-single-occupant-vehicle (SOV) travel in general and transit in particular. See the related work plans for transportation-related site development and general land-use planning improvements.

Potential GHG Reductions and Economic Costs:

Table 1. Estimated GHG Reductions and Cost-effectiveness

GHG emission savings (2020)	0.11	$MMtCO_2e$
Net present value (2013–2020)	< $0	$million
Cumulative emissions reductions (2013–2020)	1.83	$MMtCO_2e$
Cost-effectiveness (2013–2020)	< $0	$/tCO_2e$

GHG = greenhouse gas; $MMtCO_2e$ = million metric tons of carbon dioxide equivalent; $/tCO_2e$ = dollars per metric ton of carbon dioxide equivalent.

Cost-effectiveness was determined to be not quantifiable, pending the specifics of the measures to be implemented and their scale. The literature indicates that a mix of TDM incentives and disincentives can result in zero or negative costs (savings) to the Commonwealth.

Key Assumptions:

Key assumptions are outlined in the quantification section, below.

Quantification:

The impact of transporation demand management (TDM) programs was calculated starting with the existing mode shares as found in the 2000 Census Journey to Work datasets and applying recommended reduction factors reported in the Center for Clean Air Policy (CCAP) *Transportation Emissions*

Guidebook.[1] The suggested reduction at the employer level was 5 percent to 25 percent. However, not all employers are located where these programs can be implemented effectively. The EPA Commuter Model documentation reports employer participation rates in TDM programs ranging from 10 percent to 30 percent.[2] It was also recognized that the effectiveness of TDM programs would vary, depending on the nature of the community, with more urbanized areas having the greatest potential (primarily due to the presence of more robust transit services, a key factor in the success of TDM programs).

The 2000 Census Journey-to-Work data were used as the basis for the calculation of the TDM impacts. Using Census state place and urban definitions, each city/town/township in the Commonwealth was identified as having a high, medium, or low propensity for TDM, based on existing mode shares and local knowledge. The percentage of new workers participating in the programs was based on the high- and low-end estimates in the Commuter Programs section of the CCAP Guidebook (5 percent–25 percent). Eligibility for the programs was based on the employer participation rates in the Commuter Model documentation, with a 30 percent high-end value being used. Table 2 summarizes the reduction rates developed.

Table 2. TDM Reduction Rates

TDM Propensity	Estimated Reduction Due to TDM	Share of Area Workers Eligible	Estimated SOV Reduction Due to TDM
High	25.0%	30.0%	7.5%
Medium	12.5%	30.0%	3.8%
Low	5.0%	30.0%	1.5%

The reduction rates were applied to the total number of workers using SOVs. The affected trips were reassigned to the alternative modes based on current distributions. Total trips were based on average values of 1.8 vehicle trips/day/worker and 260 workdays/year. VMT reductions were estimated first by calculating the net reduction in vehicle trips (SOV trips reduced less the new carpool vehicle trips), and multiplying the result by the average commuter trip length in the Commonwealth. The net VMT reduction calculated for 2000 (the year of the Census data) was projected to 2020 using growth rates found in the Pennsylvania Statewide Greenhouse Gas Highway inventory (October 12, 2012 Technical Memorandum Submitted by Michael Baker Jr., Inc). The defaults, intermediate values, and final reductions are summarized in Tables 3 and 4.

Table 3. Default Values Used in the Calculation of TDM GHG Benefits

Car Pool Occupancy	1.7
Average Commuter Trip Length (Miles)	12.9
Average Trips/Work Day/Worker	1.8
Workdays/Year	260
% decrease in VMT 2000–2020	2.6%

[1] Dierkers, Greg; Silsbe, Erin; Stott, Shayna; Winkelman, Steve & Wubben, Mac. CCAP Transportation Emissions Guidebook - Part One: Land Use, Transit & Travel Demand Management. Center for Clean Air Policy, US Environmental Protection Agency & the Surdna Foundation. (Latest Data Available) http://www.ccap.org/guidebook/downloads/CCAP%20Transportation%20Guidebook%20(1).pdf

[2] US Environmental Protection Agency. Procedures Manual for Estimating Emissions Reductions from Voluntary Measures and Commuter Choice Incentives Programs. October 2000.

Table 4. VMT and Emission Reductions for TDM Measures

Total Auto Trips Reduced (SOV)	164,377
Additional Carpool Auto Trips	41,351
2000 Total Daily Vehicle Auto Trips Reduced	123,026
2000 Total Daily VMT Reduced	1,587,037
2000 Annual VMT Reduced	412629584
2020 Reduction in VMT	**401,818,689**
2020 Avg. Emission Rate (kg CO_2e/Mile)	0.258
2020 GHG Reductions (kg CO_2e Reduced/Year)	103,669,222
2020 GHG Reductions (MMtCO_2e/Year)	**0.11**
Cumulative Benefits 2013–2020 (MMtCO_2e/Year)	**1.83**

Cost to Regulated Entities:
Most costs would fall to the state and the businesses that partner on the workplace initiatives. These costs would also have to be determined.

Other Potential Benefits and Drawbacks:
Additional potential benefits of changing behaviors to decrease greenhouse gas emissions from transportation include:

- Decreased emissions of ozone precursors (VOCs and NO_x), CO, and PM.
- Decreased motor fuel use.
- Enhanced mobility for citizens and visitors.
- Direct support of Smart Transportation initiatives, projects, and programs.
- Reduced congestion.

Ease of Implementation
Will vary depending on the specific measure.

Implementation Steps
Implementation steps will vary based on the specific measures, but could include a mix of market incentives and mandates.

Potential Interrelationships With Other GHG Reduction Measures: These measures aimed at changing behavior need to be implemented in coordination with system changes within the transportation sector and with transportation-focused land-use measures.

References:
Dierkers, Greg; Silsbe, Erin; Stott, Shayna; Winkelman, Steve & Wubben, Mac. CCAP Transportation Emissions Guidebook - Part One: Land Use, Transit & Travel Demand Management. Center for Clean Air Policy, US Environmental Protection Agency & the Surdna Foundation. http://www.ccap.org/guidebook/downloads/CCAP%20Transportation%20Guidebook%20(1).pdf

US Environmental Protection Agency. Procedures Manual for Estimating Emissions Reductions from Voluntary Measures and Commuter Choice Incentives Programs. October 2000.

Committee / Sub-Committee Comments:

- Work Plan weak