Chapter VII: Air Quality and Conformity Determination

A. Introduction

Air Quality, as it pertains to the operations of the Syracuse Metropolitan Transportation Council (SMTC) and its member agencies, includes the state and federal requirements for transportation conformity, project level analysis for Congestion Mitigation/Air Quality (CMAQ) funding, and requirements for the State Energy Plan (SEP) and Greenhouse Gas analysis. Additional requirements may be added in the future as a result of the reauthorization of the Transportation Equity Act for the 21st Century (TEA-21) and/or other Federal or State initiatives.

The SMTC and its member agencies take a multi-faceted approach to improving and monitoring air quality impacts within the SMTC planning area. Improvements in traffic monitoring technology or engine development, such as Compressed Natural Gas (CNG) transit fleets and Light Emitting Diodes (LED's) in traffic signals, can result in reduced emissions of pollutants and energy savings. Planning studies of long-range transportation issues generally examine the impacts of improvements on the region's air quality. Each project proposed for use of CMAQ funds requires an analysis of the air quality impacts of that particular project. This chapter will examine the three main areas under which the SMTC attends to air quality: conformity, CMAQ and Energy/Greenhouse gases.

B. Conformity

Transportation conformity ("conformity") is a way to ensure that Federal funding and approval is applied to those transportation activities that are consistent with air quality goals. Conformity applies to transportation plans (such as the SMTC Long-Range Transportation Plan [LRTP]), Transportation Improvement Programs [TIPs], and projects funded or approved by the Federal Highway Administration [FHWA] or the Federal Transit Administration [FTA]) in areas that do not meet or previously have not met air quality standards for ozone, carbon monoxide, particulate matter, or nitrogen dioxide. These areas are known as "non-attainment areas" or "maintenance areas," respectively.

Transportation projects must demonstrate conformity in order to be funded. A conformity determination demonstrates that the total emissions projected for a plan or program are within the emissions limits ("budgets") established by the State Implementation Plan (SIP), and that transportation control measures (TCMs) are implemented in a timely fashion. TCMs are specific programs designed to reduce emissions from transportation sources by reducing vehicle use, changing traffic flow or congestion conditions. Examples include programs for improving public transit, developing high occupancy vehicle (HOV) facilities, and ordinances to promote non-motor vehicle travel.

The SMTC LRTP is a blueprint that guides investment in the surface transportation system in our metropolitan area, and is therefore required to be in conformity with the regional air quality plan or SIP. This is due to Onondaga County being designated a "maintenance" area for Carbon Monoxide (CO).

The SIP places limits on emissions of each pollutant for each source type (mobile, stationary and area sources). Projected emissions from highway and transit usage must be less than or equal to the emissions limits for on-road mobile vehicles that are established by the SIP. These emissions limits for motor vehicle emissions sources are called "budgets".

Budgets are developed as part of the air quality planning process by the New York State Department of Environmental Conservation (NYSDEC) and approved by the Environmental Protection Agency (EPA). The FHWA, FTA, and the New York State Department of Transportation Environmental Analysis Bureau (NYSDOT EAB) participate with NYSDEC and EPA as members of the Interagency Consulting Group (ICG) that approves the budgets.

1. Non-Attainment Background

The SMTC metropolitan planning area (MPA) consists of all of Onondaga County and small portions of Madison and Oswego Counties. In the late 1970s, a CO monitor was placed in downtown Syracuse by the NYSDEC. The location of the monitor, at the intersection of East Adams Street and Almond Street, indicated that there were CO concentrations in excess of the EPA standards. Subsequently, parts of Syracuse were designated non-attainment for CO. In 1990 the Clean Air Act was amended to include a CO non-attainment classification scheme, which included a classification for low to moderate non-attainment. At that time, the non-attainment classification was expanded by NYSDEC to include all of Onondaga County. In 1992, the SMTC non-attainment area was re-designated to attainment of the CO National Ambient Air Quality Standards (NAAQS). As part of the re-designation process a maintenance plan was developed for 1993 through 2003.

Under Section 175A of the Clean Air Act of 1990, the individual states are required to provide for the maintenance of the NAAQS once an area is re-designated to attainment. The maintenance plan includes an attainment inventory, demonstration of continued attainment, and budgets for years leading to the end of this plan, (in 2013). A 1990 base year is included for comparison for emission reductions as provided by the conformity regulation. The emission budgets are also provided by the transportation conformity regulation. The SMTC travel demand model has recently been updated to a base year of 2003 to more accurately reflect trends.

The first Maintenance Plan expired in September 2003, and the NYSDEC released a new 10-year Maintenance Plan in December 2003, and subsequently revised it in February 2004. The February 2004 Plan is currently under review. The conformity analysis performed by the SMTC, in cooperation with the NYSDOT EAB, indicates that the SMTC area will continue to attain emission levels in conformance with requirements. As indicated previously, the conformity test for the SMTC maintenance area must demonstrate that, once a project is built, the emissions impacts of a proposed project will: 1.) be less than the emissions in the SMTC base year (originally established for modeling purposes as 1990); 2.) will remain below budgets. established for selected future years as determined by the Interagency Consulting Group (specifically 2005, 2009, and 2013), and 3.) that TCMs are being implemented in a timely manner. All of the SMTC TCM's have been implemented and no new TCM's have been included in the proposed Onondaga County SIP. The conformity analysis for this LRTP 2004

Update shows that SMTC is well below the 1990 standards, as well as below for all future years analyzed.

The SIP and the conformity determination, while integrated, both have separate time frames as far as each year is examined. The SIP is only concerned with the time frame up to the end of the maintenance periodin 2013, while conformity must look out at least 20 years, which is 2025 for this LRTP 2004 Update.

As the SMTC LRTP is a policy or "visioning" document, it does not contain specific projects. The projects included in the Transportation Improvement Program (TIP), all of which are consistent with the goals and objectives of the original LRTP and subsequent updates are considered to be the project list for the LRTP. The policies contained in this LRTP 2004 Update support the intentions of the Clean Air Act Amendments (CAAA) in maintaining the NAAQS. The LRTP goals, directives, recommendations and policies are in conformance with the SIP requirements.

2. Generation of Vehicle Miles Traveled and Average Speed Forecasts

The SMTC uses TModel2 as its travel demand-modeling platform. The Syracuse Intermodal Model (SIM) is utilized to estimate the study area's peak hour transportation demand for modes other than personal motor vehicles. The SIM is a stand-alone package developed as an adjunct to the original SMTC travel demand model that attempts to add bicycle, pedestrian and transit travel to the SMTC's travel demand model. This multimodal "add on" provides some estimate for non-automobile trips but is quite limited in its capabilities.

The data forecasts used in the model are derived from several sources. Current population estimates were obtained via the 2000 census while future population estimates for the horizon year were forecasted by a working group of local professionals with experience in demographic analysis. This working group included the Syracuse-Onondaga County Planning Agency (SOCPA), the Central New York Regional Planning & Development Board (CNYRPDB), NYSDOT, SMTC, and others.

Land use data in the model (e.g., type of employers and number of employees) was similarly calculated for both the base and future scenarios utilizing the above-mentioned working group with the addition of key economic development agencies and personnel. Some of the key additions to the working group included the Director of the Onondaga County Industrial Development Agency and the CNYRPDB's Director of Economic Development.

Travel data for transit was included in the modeling, taking into account Central New York Regional Transportation Authority (CNYRTA) fixed route service. CNYRTA's para-transit service is treated as shared ride trips. Additionally, bicycling and walking trips were also quantified via some system wide adjustments.

The process by which both the residential forecasts and employment forecasts was made will be significantly improved upon in the new Travel Demand Model that is currently under

development at the SMTC. These improvements are planned to yield an even more accurate and useful model for the SMTC area.

3. Projects Included in the Analysis

The conformity rules have designated several categories of projects that, by their nature, will not affect regional emissions. These projects are categorized as "**exempt**". Highway and transit projects of the types noted below are exempt from the requirement to determine conformity. Such projects may proceed toward implementation even in the absence of a conforming transportation plan and TIP. However, a particular action of the type listed below is not exempt if the MPO, in consultation with the ICG, concurs that it has regionally significant emissions impacts.

The following list of exempt projects is derived from "Table 2 - Exempt Projects" in 40 CFR Part 93.126 and 6 NYCRR Part 240.27.

- **Safety**
    1. Railroad/highway crossing
    2. Hazard elimination program
    3. Safer non-Federal-aid system roads
    4. Shoulder improvements
    5. Increasing sight distance
    6. Safety improvement program
    7. Traffic control devices and operating assistance other than signalization projects (i.e. Intelligent Transportation Systems (ITS) maintenance and ITS operations)
    8. Railroad/highway crossing warning devices
    9. Guiderails, median barriers, crash cushions
    10. Pavement resurfacing and/or rehabilitation
    11. Pavement marking demonstration
    12. Emergency relief (23 U.S.C. 125)
    13. Fencing
    14. Skid treatments
    15. Safety roadside rest areas
    16. Adding medians
    17. Truck climbing lanes outside the urbanized area
    18. Lighting improvements

19. Widening narrow pavements or reconstructing bridges (no additional travel lanes)
20. Emergency truck pullovers

- **Mass Transit**

1. Operating assistance to transit agencies (or entities that provide transit service)
2. Purchase of support vehicles
3. Rehabilitation of transit vehicles
4. Purchase of office, shop, and operating equipment for existing facilities
5. Purchase of operating equipment for vehicles (i.e.: radios, fare boxes, lifts, etc.)
6. Construction or renovation of power, signal, and communications systems
7. Construction of small passenger shelters and information kiosks
8. Reconstruction or renovation of transit buildings and structures (i.e.: rail or bus buildings, storage and maintenance facilities, stations, terminals, and ancillary structures)
9. Rehabilitation or reconstruction of track structures, track, and trackbed in existing rights-of-way
10. Purchase of new buses and rail cars to replace existing vehicles or for minor expansions of the fleet
11. Construction of new bus or rail storage/maintenance facilities categorically excluded in 23 CFR 771

- **Air Quality and Other**

1. Continuation of ride-sharing and van-pooling promotion activities at current levels
2. Bicycle and pedestrian facilities
3. Planning and technical studies that do not proceed to construction
4. Grants for training and research programs
5. Planning activities conducted pursuant to titles 23 and 49 U.S.C.
6. Federal-aid systems revisions
7. Engineering to assess social, economic, and environmental effects of the proposed action or alternatives to that action
8. Noise attenuation
9. Advance land acquisitions (23 CFR 712 or 23 CFR 771)

10. Acquisition of scenic easements
11. Plantings, landscaping, etc.
12. Sign removal
13. Directional and informational signs (i.e. ITS maintenance and ITS operations)
14. Transportation enhancement activities (except rehabilitation and operation of historic transportation buildings, structures, or facilities)
15. Repair of damage caused by natural disasters, civil unrest, or terrorist acts, except projects involving substantial functional, locational or capacity changes

Projects which are expected to affect the distance, speed or capacity of a roadway, and do not fall under any of the above noted classifications, are categorized as "**non-exempt**" and must undergo a conformity analysis. All of the non-exempt projects included in the 2003-2006 TIP that could be modeled did undergo a conformity determination analysis for the 2025 scenario and are included in Table 7-1.

Table 7-1

Non-Exempt Projects Included in the Analysis

PIN	Project	General Scope	TCM?
375285	Geddes/Genesee Sts Signal Interconnection	Upgrading of signals and inclusion in existing interconnect system.	No
375272	Lodi St/North Salina St. Signal Improvements	Upgrading of signals and inclusion in existing interconnect system.	No
375281	Kirkpatrick/Court/Solar	Realign Court/Kirkpatrick, expand Kirkpatrick to 4 lanes, rehabilitate Solar Street.	No
303756	Rt. 31 Over Seneca River (Belgium Bridge)	Widening of Route 31 to reduce vehicle hours of delay and safety deficiencies.	No

Source: SMTC, 2003-2006 TIP. "PIN" stands for project identification number; "TCM" indicates whether or not the project is a Transportation Control Measure.

4. Emissions Modeling

The 2004 emissions analysis was based upon the emission estimates from the recently released MOBILE 6 model. The results of the model include an estimate of the total daily CO emissions from mobile sources (cars, buses, trucks) in Onondaga County. This emissions analysis is based on calculations for a winter day with vehicle, traffic and weather conditions that are the most conducive to carbon monoxide production. The above analysis includes measures from the emission control program. Specific examples include the gas cap integrity check, anti-tampering program, an on-board diagnostics system check, and the California Low Emission Vehicle II Program (CAL LEV II).

5. Results of the Emissions Modeling

The modeling output shows that carbon monoxide emissions between the base year of 1990 and the forecast year of 2025 will be significantly reduced. The analysis indicates that with the completion of construction or implementation of the projects on the TIP, the area will still result in emission levels that are lower than the 1990 base year.

In addition to the required emissions level conformity test, the SMTC staff and the NYSDOT analyzed several milestone years between the 1990 base year and the 2025-plan year. The results of these analyses demonstrate the gradual reductions in CO emissions over time for the milestone years. These are shown in Table 7-2.

Table 7-2

Emissions Modeling Results				
Year	**1990**	**2005**	**2009**	**2013**
Budget	N/A	495	372	357
Mobile 6 Analysis	803	438	275	224
Emissions in tons per winter day (tpwd). Calculated by the NYSDOT, EAB, April 1, 2004.				

6. Timely Implementation of Transportation Control Measures (TCMs)

All of the TCMs from the previous Maintenance Plan have been implemented. No new TCM's have been identified in the new Maintenance Plan for the years 2003-2013. The previous TCM's from the 1999-2004 TIP are shown for informational purposes in Table 7-3.

7. Transit Impacts on Conformity

The Transportation Conformity Rule (40 CFR Part 93), issued by the USEPA, requires that the conformity determination for each Plan and TIP must discuss how transit operating policies (including fares and service levels) and assumed ridership have changed since the previous conformity determination (93.110(c)). In addition, the conformity determination must include reasonable assumptions about transit service and increases in transit fares and road and bridge tolls over time (93.110 (d)).

The CNYRTA has not had a fare increase since 1995. According to the CNYRTA, there would be no fare increase in the foreseeable future as fares are raised only as a last resort. The same applies to service levels. The CNYRTA reduced service in 1995, however in November 2002, service was added as part of a major restructuring of bus lines and service hours. As a result of that restructuring, CNYRTA ridership is up approximately 4% overall. Finally, CNYRTA will continue to pursue the service concepts proposed in the ReMAP Study completed in 1999 to the extent possible, given adequate funding. These concepts include small bus community circulators in suburban settings, express services between downtown and outlying locations and

the development of key hubs. There has been limited success to date with some of those service concepts. Two new bus routes were added; one is doing moderately well, while the other was cancelled due to lack of sufficient ridership.

Table 7-3

Transportation Control Measures (TCMs) Update				
PIN	Project	1994-1999	1999-2004	Comments
303519	RT 57, phase IV, Gaskin to RT 31	Construction 11/96		Implemented
310412	RT 635, RT 5 to RT 298	Construction 11/94	Construction 6/98	Implemented
310413	RT 298, Syracuse to Carrier Circle	Construction 11/98	Construction 4/02	Implemented
375206	Harrison Street Traffic Signal	Construction 9/95		Implemented
375207	Buckley Road Improvements at Bear Road	Construction 11/95		Implemented
380272	Oncenter Signs	Construction 1/94		Implemented
380275	Downtown Syracuse Signal Interconnect System	Engineering 11/96	Construction 7/96	Implemented
380307	Connections Ride Sharing Program			Implemented
380312	AVL System	Construction 10/96		Implemented
382074	Fare Collection System	Construction 10/96		Implemented
382089	Shelter Schedule Panels	Construction 10/94		Implemented
Source: Syracuse Metropolitan Transportation Council, 1999-2004 Transportation Improvement Program.				

8. Summary

Since the regional implementation program of transportation projects, as reflected in the TIP and derived from the goals and objectives of the LRTP, have been shown to meet the required emission reduction test for air quality conformity, and there are no applicable TCM's in the current SIP for the Onondaga County area, **the 2025 LRTP 2004 Update has been shown to be consistent with applicable conformity regulations and the proposed February 2004 SIP**. No goals, directives, recommendations or projects of the LRTP will contradict requirements or commitments of the SIP or the intent of the CAAA or other applicable federal and state guidance.

The conformity analysis prepared by the SMTC, with the support of NYSDOT EAB, may be found in Appendix D.

C. Congestion Mitigation/Air Quality Program

The CMAQ program was established under the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 as a funding source for transportation projects and programs that help support the goals of the 1990 CAAA of 1990. The program was reauthorized under TEA 21. The main goal of the CMAQ Program is to fund transportation projects that reduce emissions in non-attainment and maintenance areas. In the context of total available federal transportation funding, CMAQ makes a small but targeted contribution toward addressing air quality issues.

Congestion mitigation is also a goal of the CMAQ Program. Congestion relief can contribute to improvements in air quality by reducing travel delays, engine idle time and unproductive fuel consumption. Over the past twenty-five years, vehicle miles traveled (VMT) have more than doubled, while lane miles have increased slightly. As VMT increases there is greater opportunity for congestion and increased emissions.

All sponsors in the Syracuse metropolitan region requesting CMAQ funds must provide an air quality analysis for review and approval by the SMTC and NYSDOT EAB. A few examples of CMAQ projects funded by the SMTC in the 2002-2006 fiscal year time frame include:

- Geddes/Genesee Signal Interconnect (signal upgrades and linking to signal interconnect system);
- Lodi/North Salina Street Signal Improvement (signal upgrades and linking to signal interconnect system);
- Onondaga Lake Canalway Trail (significant regional pedestrian/bicycle trail),
- Syracuse Creekwalk, Phase 1 (significant urban trail project);
- Henry Clay Boulevard at Buckley Road (intersection improvement to reduce congestion and improve traffic flow); and
- 7th North Street at Wetzel Road (intersection improvement to reduce congestion and improve traffic flow).

According to the CMAQ analysis, the combined first year benefit of these projects is roughly 32 tons/year in CO emissions and is shown in Table 7-4.

Two other projects have a CMAQ analysis pending:

- Operations of the City of Syracuse Traffic Control Center (support for effective operation of signal interconnect system); and

- Replacement of 29 diesel transit buses with clean fueled buses.

Table 7-4

CMAQ Projects in the 2003-2006 TIP Benefits in Tons Per Year

Sponsor	Project	Anticipated Year Complete	Tons/Year Benefits
City of Syracuse	Geddes/Genesee Signal Interconnect	2004	0.096
City of Syracuse	Lodi/North Salina Signal Improvement	2005	0.005
City of Syracuse	Syracuse Creekwalk	2004	7.626
Onondaga County	Onondaga Lake Canalways Trail	2009	24.634
Onondaga County	Henry Clay at Buckley Intersection Imp.	2004	0.052
Onondaga County	7th North at Wetzel Road Intersection Imp.	2004	0.047
TOTAL			**32.46**

This table was created from information derived from the SMTC's 2003 – 2006 TIP and various individual CMAQ analysis calculated by the SMTC for various projects.

Once CMAQ projects have been completed, a "before and after" study is necessary (according to federal requirements) to confirm the benefits predicted by the project sponsors. To ensure continued emissions benefits from a project, the EAB and SMTC require that the scope be reviewed and an analysis completed for each year that funds are requested.

D. Energy and Greenhouse Gas Impacts

1. Introduction

A policy objective of both the U.S. Department of Transportation and the State of New York is the conservation of energy through a reduction in motor fuel consumption. In addition, the New York SEP has identified a reduction of greenhouse gases (CO_2) as an objective for all LRTPs.

Similar to the documentation relating to air quality emissions above, the SMTC performed a quantitative analysis on both energy consumption and carbon dioxide emissions that may result from the implementation of the 2025 LRTP. This analysis, included to promote the policy objectives of federal and state transportation departments, is intended to focus awareness on these issues.

2. State Energy Plan (SEP)

The 2002 SEP laid the foundation for many of the State's transportation policies with regard to energy-efficient travel. The SEP is coordinated with the statewide Master Transportation Plan prepared by the NYSDOT and the SIP for air quality prepared by the NYSDEC.

"The SEP achieves a true integration of transportation issues with energy, environmental and economic development issues. It contains several recommendations and goals that affect the transportation sector and how we do business. Among the more significant recommendations and goals are:

- Reducing energy use across all sectors and all fuels by 25 percent by 2010 from 1990 levels;

- Reducing greenhouse gas emissions across all sectors and all fuels by 5 percent by 2010 and 10 percent by 2020 from 1990 levels;

- Including greenhouse gas, air quality and energy production (and mitigation, as appropriate) in the development of transportation plans, programs and projects at a metropolitan and statewide level;

- Redirecting transportation funding to energy efficient transportation alternatives;

- Targeting open space funding to prevent suburban sprawl, reduce vehicle miles traveled, ad reduce energy use and pollutant emissions; and

- Supporting, adopting and enhancing various emission control strategies."[1]

The statewide Master Transportation Plan emphasizes maintaining transit infrastructure and providing operating improvements that will continue to improve the energy efficiency of travel in New York. The significant continuing investment in Intelligent Transportation Systems (ITS) statewide is also expected to have a positive effect on future energy use.

The policies and objectives set forth in the SEP provide many areas where efforts to improve the efficiency of the transportation system are aligning with these new travel trends, such as the statewide ITS program, passenger rail and bus infrastructure upgrades, transit enhancements, promotion of new pedestrian and bicycle facilities, intermodal freight access improvements, and the New York State High Speed Rail Initiative.

Energy use in the transportation sector is derived from the amount of travel, expressed as VMT, and fuel economy, expressed as miles per gallon (MPG). Increasing energy efficiency in the transportation sector can be accomplished by reducing VMT, increasing the fuel economy of the vehicles used for travel, or by reducing congestion and vehicle delays. Reducing VMT can be achieved in a number of ways, from an absolute reduction in travel to increasing the occupancy of each vehicle to move the same or more travelers in fewer vehicles (e.g., shifting from single-occupant vehicles (SOVs) to HOVs, which include carpools, vanpools, and transit vehicles).

The primary methods used to reduce congestion and its impacts are decreasing Vehicle Hours of Delay (VHD) and total VMT. Every action undertaken by the State or local transportation agencies to mitigate the growth of congestion attempts to accomplish one or both of these objectives. These actions by nature are multimodal; covering highway construction and operating projects, transit capital projects and operating policies (e.g., fare incentives), and motor carrier and rail freight services.

[1] Memorandum from Michael Fleischer, First Deputy Commissioner to Executive Staff, Assistant Commissioners and Regional Directors, September 23, 2002.

3. SMTC Initiatives & The New York State Energy Plan

The SMTC and its member agencies fully support the efforts and goals of the New York State Energy Plan and there are several examples indicative of this support. The NYSDOT, the Onondaga County Department of Transportation (OCDOT) and the City of Syracuse have upgraded a number of their traffic signals to use LEDs, which save energy and are longer lasting than standard bulbs. The NYSDOT and the CNYRTA maintain CNG fueling stations and both agencies are increasing their fleets of CNG vehicles. In addition, the City of Syracuse has an established CNG fueling facility maintained by the Department of Public Works that services not only the growing City fleet of alternative fueled vehicles, but also provides services for other agencies and municipalities.

Diesel-Electric Hybrid during testing at CNYRTA

Previous UPWP studies have included ridesharing programs, emergency energy contingency plan development, staggered work hours feasibility, and several traffic improvement studies that have had direct input into the TIP development. In particular, extensive work has been completed on the coordination and optimization of traffic lights in the City of Syracuse. In addition, the SMTC has funded through its TIP process an Environmental Technology Degree program to support the Alternative Fuels Technology Center at Onondaga Community College, as well an expanding fleet of CNG and clean-fueled buses for the transit authority. The SMTC is also a stakeholder in the Clean Communities of Central New York program. The CNYRTA has also tested and is planning on purchasing diesel-electric hybrid buses, which further reduce energy, greenhouse gases and CO emissions.

The CNYRTA envisions that by 2025 their fleet would consist of Diesel-Electric Hybrids allowing the retirement of the existing diesel fleet and the operation of clean-fueled buses throughout their regional system (where currently CNG buses cannot operate). The support of the CNYRTA's efforts by the SMTC will allow the replacement of both diesel and CNG with an even cleaner, more energy efficient transit fleet. The Hybrid buses get improved mileage as well as significantly reduce emissions.

One interesting and useful initiative that is in the process of being implemented by the NYS Thruway Authority (NYSTA) is a Truck Stop Electrification (TSE) project. This is a $500,000,

two-year pilot program being funded jointly by the NYSTA, the New York State Energy Research and Development Authority (NYSERDA), and Niagara Mohawk. Up to 44 TSE units have been installed at the DeWitt and Chittenango Travel Plazas (both located near Syracuse) as part of the pilot project. The program is also being extended to other parts of the Thruway System. The goal of this project is to provide electrical, heat, air conditioning, and other powered services to the trucks via window units. This will allow the trucks to be powered down during their rest periods, saving energy (diesel fuel) and reducing truck-based emissions.

According to the Argonne National Laboratory, truck engines idle an average of six hours a day and 1,830 hours per year, wasting millions of gallons of diesel fuel annually. A single long-haul truck idling for 1,830 hours per year emits an estimated 220 pounds of nitrogen oxide, 380 pounds of carbon monoxide and over 20 tons of carbon dioxide (CO_2), a greenhouse gas. The fuel savings realized by not idling for an 8-hour period could provide truckers with 56 to 64 miles of distance, or about 60 more minutes travel time before stopping to refuel.

This TSE project is a practical implementation of a transportation related project that directly impacts energy usage and emissions output in a positive and measurable manner. This project is very much in line with the goals of both the SMTC's LRTP 2004 Update and those of the NYS Energy Plan as well assisting various environmental initiatives at the state and federal level.

Photo of TSE from the NYS Thruway website

4. Private Sector Initiatives

In Central New York the private sector has also been active in initiatives that support the goals of the State Energy Plan. CSX Transportation has been retrofitting its fleet of diesel engines with an auxiliary power unit (APU) generator, which allows the railroad to reduce idling thereby saving fuel, energy and substantially reducing emissions from railroad sources. The APU provides for power during idling and shuts down the main locomotive engine. According to the CSX Transportation Mechanical Department and the EPA, during idling the APU provides for the following reductions in emissions:

- 85% reduction in Carbon Dioxide (CO_2)
- 91% reduction in Nitrous Oxides (NOx)
- 94% reduction in Hydrocarbons (HC)
- 96% reduction in Carbon Monoxide (CO)
- 84% reduction in Particulate Matter (PM)

CSX Transportation anticipates completing installation of the APU on its fleet of 3,600 locomotives by 2005. In addition to the APU, according to reports of the American Association of Railroads (AAR), fuel efficiency in the railroad industry has improved 68 percent since 1980. CSX Transportation has reported a CO_2 emission reduction from 0.034 Kg/ton-mile in 1999 to 0.026 Kg/ton-mile in 2001.

Improvements by short line railroads in the region have also contributed to conversion an increasing amount of freight traffic being converted from truck to rail thereby reducing number of truck trips and reducing congestion while saving energy and reducing emissions.

In addition to the above noted endeavors by the SMTC and its member agencies, the state energy plan requires an analysis of energy consumption and greenhouse gas for TIP's and Plans. The process and results of that analysis are described below.

5. 2025 Long-Range Plan 2004 Update Energy Analysis

The LRTP 2004 Update is the first document that requires both an analysis of energy usage and an analysis of greenhouse gas emissions. The NYSDOT EAB provided guidance on the approach to this process. These guidance documents are as follows:

- *Air Quality Analysis of Transportation Improvement Programs, Regional Transportation Plans, and Capitol Project programs – Technical Guidance to Assist Metropolitan Planning Organizations and Department of Transportation Regional Offices Meet the Objectives of the 2002 New York SEP* (January 21, 2003);

- *Development of Revised NYSDOT Energy Analysis Guidelines (Draft), Subtask 12a: Energy Analysis Guidelines for TIPs and Plans* (June 21, 2002); and

- *Development of Revised NYSDOT Energy Analysis Guidelines (Draft), Subtask 12b: Greenhouse Gases (CO_2) Emissions Estimates for TIPs and Plans* (June 21, 2002).

To comply with/adhere to this guidance, the SMTC staff worked through a nine-step process that included:

1. Projects were reviewed based on guidance provided in 6 NYCRR Part 240.6 (h)(2) for their significance in effecting energy consumption and the appropriate projects were

identified as non-exempt projects.

2. Travel Demand Modeling was completed to determine the impact of future projects in the Syracuse MPA. The analysis scenarios included a year 2025 no-build and a year 2025 build (2025 is the horizon year of the SMTC LRTP). The no-build scenario includes the 2003 roadway network with 2025 demographic and employment projections excluding two major private developments : Lakefront Development and the Clay Industrial Site Development, while the build scenario consists of the 2025 road network and 2025 land-use characteristics including the two noted developments. Please note that the omission of the previously mentioned projects in the No Build scenario resulted in an increase of VMT for the Build scenario compared to the No Build scenario. The programs and policies reflected in the LRTP would reduce the total Build scenario VMT to levels below the No Build scenario if these private development projects were excluded from the Build scenario. As these projects are private developments, their construction is not contingent on adoption of the LRTP.

3. Off-model Projects analysis to account for the visions of the 2025 LRTP that could not be modeled in TModel 2. Inclusion of transit and bicycle/pedestrian transportation modes is beyond the capabilities of the current modeling software in any meaningful way. Using information developed by the SMTC and its member agencies, SMTC calculated the reduction of VMT as a result of transit and bicycle and pedestrian system improvements envisioned in the LRTP.

4. Regional Emissions Modeling. The emissions modeling for the SMTC has traditionally been performed by NYSDOT EAB during the conformity analysis process. For this analysis, however, the SMTC averaged emissions factors by road type and speed, and developed emission factors for Volatile Organic Compounds (VOC) and Nitrogen Oxide (NOx) for both the build and no-build scenarios. CO was also calculated using the same methodology.

5. Direct Energy Analysis. Direct energy represents the energy consumed by vehicles using a transportation facility (for this analysis, "facility" is defined as the roadway segments in SMTC's regional travel demand model). For this analysis, per EAB guidelines, only the energy used in construction activities for the identified Non-Exempt projects, including new construction, reconstruction, rehabilitation, and widening was analyzed. Each scenario total VMT was multiplied by the percentage of each vehicle type to determine vehicle type VMT. That vehicle type VMT was then divided by the fuel economy rate to calculate the number of gallons of fuel used. These fuel consumption values were then converted to British Thermal Units (BTUs) by multiplying each gallon by 125,000. Finally, these total direct energy consumption (in BTUs) were summarized for all vehicles in either scenario.

6. Indirect Energy Analysis. Indirect energy represents the energy required to construct and maintain the transportation system. Indirect energy values were calculated for any non-exempt project where this calculation was relevant. Certain non-exempt projects, such as ridesharing, include no energy-consuming construction or maintenance activities, and therefore, an indirect energy calculation is not applicable.

7. CO_2 Emissions Estimates from Direct Energy Consumption. The guidance from EAB provides Carbon Emission coefficients based on vehicle type. The Direct Energy

consumed (by vehicle type) was multiplied by the Carbon Emission Coefficients for both gasoline and diesel engines and then by a factor representing the amount of carbon that is oxidized. This process created a value representing total tons of carbon dioxide emitted.

8. CO_2 Emissions Estimates from Indirect Energy Consumption. Similar to the step above, the indirect energy consumed was multiplied by the Carbon Emission Coefficients for diesel vehicles and then by a factor representing the amount of carbon that is oxidized. The results were the total tons of Carbon emitted.
9. Documented and presented the results of the analyses.

6. Analysis Summary

The results of the analysis demonstrate that the projects new to the 2025 LRTP will provide for an insignificant increase in the emission of VOC, NOx, CO, and CO_2 and the amount of direct energy used by vehicles in the Syracuse MPA. The emissions analysis for VOC, NOx and CO is shown in Table 7-5. The energy summary and CO_2 analysis is shown in Table 7-6. It should be noted that the TModel outputs are accurate to only +/- 10 - 15%. This indicates that the VMT generated for greenhouse gas and energy plan analysis are roughly equal since they are within that margin of error.

Table 7-5
Emissions Analysis

Scenario		VMT	VOC (grams)	NOX (grams)	*CO* (grams)
2025 no-build	Peak	4,519,672	949,131	949,131	48,104,377
	Off-Peak	10,008,969	2,402,153	2,201,973	109,031,038
	Total	**14,528,641**	**3,351,284**	**3,151,104**	**157,135,415**

Scenario		VMT	VOC (grams)	NOX (grams)	*CO* (grams)
2025 build	Peak	4,707,573	988,590	988,590	50,104,269
	Off-Peak	10,415,115	2,499,628	2,291,325	113,455,319
	Total	**15,122,688**	**3,488,218**	**3,279,916**	**163,559,588**
2025 build with off-model transit and bike/ped assumptions	bike/ped reduction*	-30,245	-7,127	-1,563	-17,035
	transit reduction**	-410,650	-96,770	-21,217	-231,295
	Total	**14,681,793**	**3,384,321**	**3,257,136**	**163,311,257**

Avg. Emission Factors***			
	35 mph	40 mph	Subtractive****
VOC	0.21	0.24	0.24
NOx	0.21	0.22	0.22
CO	10.64	10.89	10.90

*bike/ped reduction assumes decrease of 2% VMT in 2025 build scenario
**transit reduction assumes 32,852 daily riders with 12.5 mile average trip length in 2025 build scenario
***Emission factors were determined by an average of factors by road type for each speed
****Subtractive emission factors were developed as a function of peak versus off peak emission factors

Table 7-6

CO_2 and Energy Summary

Scenario	VMT	Energy		Greenhouse Gas (CO_2) Emissions	
		Direct (BTUs)	Indirect* (BTUs)	Direct (tons)	Indirect (tons)
2025 no-build	14,528,641	101,258,844,095	0	2,151	0
2025 build	14,681,793	102,326,250,454	126,300,000,000	2,174	2,749
Change (build-no build)	153,152	1,067,406,359	--	23	--
% Change (build-no build)	1.05%	1.05%	--	1.05%	--

** The intent of the indirect energy and greenhouse gas calculations was to measure the impact of the construction of the projects in the SMTC Long-Range Plan. The indirect energy used in the 2025 No-Build scenario is zero (as is the greenhouse gas emissions arising from the indirect energy used); therefore it is not possible to compute the percentage difference between the two scenarios.*

2025 Build scenario includes off model transit and bike/ped assumptions.

Further details of the analysis steps utilized by SMTC staff and the results thereof are shown in Appendix E. This appendix details several important considerations relevant to both greenhouse gas and energy calculations.

E. Conclusions

The SMTC and its member agencies will continue to develop processes and tools to further monitor and improve our air quality for a variety of pollutants, while working towards enhanced energy savings and a more effective transportation system operation. In addition, the SMTC and its member agencies will continue to work closely with the New York State Department of Transportation Environmental Analysis Bureau to achieve the goals and objectives of the State Energy Plan. However, it is anticipated that significant additional resources and funding will be required to address this area. Metropolitan Planning Organizations (MPOs) generally do not have the level of expertise and resources on hand that are now being required for increasingly more complex and integrated analysis in this subject area. In addition, the MPOs will require greater clarity and consistent detailed guidance, training and tools to allow for such analysis.