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Draft – For Discussion Purposes Only

New Jersey Energy Master Plan
Potential Transportation Strategies and Actions

Last revised: 2/20/2007

The following tables were prepared by the Alan M. Voorhees Transportation Center (VTC) at Rutgers, The State University of New Jersey. The information contained in the tables is based on a review of available literature, data collected from various sources, and key informant interviews conducted with various subject matter experts at the NJ Department of Transportation and the NJ Department of Environmental Protection.

The tables were created as part of the NJ Energy Master Plan planning process to stimulate discussion within state government as well as with external stakeholders regarding the range of potential strategies and actions that might be pursued in order to achieve a future reduction in transportation-related petroleum consumption in New Jersey.

The tables provide a summary of twenty-four potential strategies in seven categories. For each strategy, we have provided an order-of-magnitude estimate of potential annual energy savings in the year 2020. The methods for estimating potential energy savings vary. Explanations of the methods used for each strategy are provided in the "Notes" column of the tables. ***The tables should be considered a work in progress and are subject to revision based on state agency and external stakeholder input.***

If you have any questions or comments regarding the information contained in the tables, please contact VTC Executive Director, Jon Carnegie, at carnegie@rci.rutgers.edu.

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NJ Energy Master Plan
Potential Transportation Strategies and Action
Summary Table
(Revised: 2/20/2007)

Category	Strategy	Potential Annual Energy Benefits (2020)	
		Gallons Saved	Barrels Saved
Engine Efficiencies			
	NJ Low Emission Vehicle Program	996,000,000	23,700,000
	Vehicle engine efficiency program (aka - "feebates")	880,324,000	20,960,000
	Changes to Federal CAFE standards	588,000,000	14,000,000
	Diesel truck idling restrictions	21,950,000	525,000
Alternative Fuels			
	Blended fuels (e.g., ethanol, bio-fuels, etc)	536,760,000	12,780,000
Financial/Market Strategies			
	Increase Fuel Tax by $0.50/gallon	71,582,000	1,704,000
	Road Pricing	1,407,000	34,000
Transit Investments			
	Maintain Good Repair	72,800,000	1,700,000
	TransHudson Express	13,100,000	311,000
	Committed Capital Projects	2,009,000	47,900
	New regional rail/ Bus Rapid Transit (BRT) corridor	2,500,000	60,000
	Regional rail extension / service enhancement	550,000	14,000
	New regional rail station / Park & Ride	600,000	12,000
	Bus priority treatment	450,000	9,000
	Light Rail Transit (LRT) extension	250,000	6,000
Transportation Efficient Land Use			
	Transit Hubs	54,386,000	1,295,000
	Transit Villages	21,600,000	514,000
Employer-Based Commute Options			
	Comp. Commute Options Strategy - Mandatory	5,800,000	138,000
	Rideshare matching program	285,000	7,000
	Comp. Commute Options Strategy - Voluntary	17,000	400
	Carsharing	9,800	240
ITS Investments			
	Incident management	2,936,000	70,000
	Signal synchronization	620,400	15,000
	Express EZ Pass toll collection	38,000	900

NOTE: See detailed tables for additional information on energy savings calculations and source/reference information

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NJ Energy Master Plan
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Category	Strategy or Support Programs	Potential Annual Energy Benefit (2020)		Notes	Source
		Gallons saved	Barrels saved		
Vehicle Engine Efficiencies					
	NJ Low-emission Vehicle Program	996,000,000	23,700,000	EPA CO/CO2 emissions estimates per mile driven were converted to an equivalent emissions rate per gallon, given the average fleet efficiency. The emissions savings from each strategy was divided by the emission rate per gallon to yield an estimate for amount of fuel saved. NJDEP estimates that the program will yield a 10.9 million ton/yr reduction in CO2 emissions in 2020.	NJDEP/NJDOT
	Vehicle Engine Efficiency Incentive (aka Feebates: $500)	880,324,000	20,960,000	A "feebate" is a revenue-neutral policy that charges fees for the purchase of new, inefficient vehicles and returns the revenue generated from these fees to purchasers of fuel efficient vehicles in the form of a rebate. Fuel savings quoted from a single category price structure for all light-duty vehicles. The feebate is calculated based on the average fuel economy achieved after implementation, a savings of about 20% from the base year (Greene et al, 2005; pg. 762). Base year fuel consumption from US DOT FHA Motor Fuel Use, 2003. Calculation formula = Total motor fuel usage x 20% increase in fuel economy x 10% annual vehicle turnover rate. See also Greene et al (2005) for more details.	Greene et al, 2005
	Changes to CAFE standards	588,000,000	14,000,000	Changes to federal Corporate Average Fleet Efficiency (CAFE) standards could significantly reduce petroleum consumption. If CAFE standards for cars and light trucks were changed from the current level of 27.5 miles per gallon (mpg) and 20.7 mpg, respectively, to 33 mpg, this change could reduce oil demand by approximately 14 million barrels annually in New Jersey. Source NJDOT.	NJDOT
	Truck Idling Program	21,950,000	525,000	The implementation of heavy-duty diesel truck idling restrictions will have a significant impact on the consumption of diesel. The EPA estimates 1 billion gallons of diesel is expended annually due to truck idling nationally. The assessment of the impact in New Jersey is based on NJDOT RACM Analysis, where 10,000 trucks would be impacted by the regulations per day. The RACM Analysis uses MOBILE6.2 to generate a diesel fuel savings estimate.	NJDOT
Alternative Fuels					
	Blended fuels (e.g., ethanol, bio-fuels, etc)	536,760,000	12,780,000	The increased use of blended fuels such as ethanol and bio-fuels could significantly reduce petroleum consumption. Estimates based on achieving a 10 percent blended fuel rate.	NJDOT/NJDEP

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Category	Strategy or Support Programs	Potential Annual Energy Benefit		Notes	Source / Reference
		Gallons saved	Barrels saved		
Transit Investments					
	Maintain existing transit infrastructure in a "State of Good Repair" -- *This includes capital improvements necessary to maintain rolling stock, system capacity and a state of good repair. Includes ambient growth anticipated on the NJT system and private interstate bus carriers subsidized by NJT.*	72,800,000	1,700,000	This investment program is designed to maintain transit equipment and components in a state of good repair. This includes repair and replace most of transit infrastructure components, including: rail track, structures, electric traction, signaling and work equipment on a frequency consistent with equipment life-cycle. It also includes investments in vehicle modernization, station and terminal upgrades and improvements to facilitate access to transit with the goal of providing high quality and reliable transit service aimed at maintaining and growing transit ridership on existing services. Estimates of trips saved are system-wide and derived from the NJTDM model. Analysis year is 2020.	NJ TRANSIT
	Construct TransHudsonExpress Tunnel (aka Access to the Region's Core (ARC))	13,100,000	311,000	This investment program is designed to expand core system capacity by constructing the Trans Hudson Express rail tunnel between NJ and NYC and its associated rail system improvements. Estimates of trips saved were derived from the THE tunnel Draft Environmental Impact Statement (DEIS) model. Analysis year is 2025. Includes both peak and off-peak ridership.	NJ TRANSIT
	Expand existing transit services [committed capital projects - e.g., Northern Branch diesel multiple unit (DMU), Meadowlands rail spur, Bayonne 8th Street Hudson-Bergen light rail (HBLR), Lackawanna Cut-off Andover, Bergen-Passaic)	1,749,000	41,700	This investment program is designed to expand existing transit services as detailed below. Each project appearing below represents a committed capital project. Estimates of trips saved are cumulative for the projects listed and were derived from various sources (see below).	NJ TRANSIT
	Expand existing transit service (other candidate capital projects)			This investment program presents a range of results that may be derived from unspecified generic transit expansion investments. Estimates of trips saved are presented in ranges and were derived from various sources associated with the planning and study of actual NJ-specifc transit proposals investigated by NJ TRANSIT and others.	NJ TRANSIT
	New regional rail/ Bus Rapid Transit (BRT) corridor	2,100,000 to 2,800,000	50,000 to 67,000	High-low range based on three case-studies, including: Route 1 BRT (Bus Rapid Transit), Northern Branch ARC (Access to the Region's Core), MOM (Monmouth-Ocean-Middlesex) Direct to Penn Station (PSNY))	NJ TRANSIT
	Regional rail extension / service enhancement	443,000 to 690,000	10,500 to 16,400	High-low range based on three case-studies, including: Union County Light Rail Transit (LRT), Atlantic City (AC) Rail double track+service enhancement, Extend AC-Phil service to Newark	NJ TRANSIT
	New regional rail station / Park & Ride	199,000 to 788,000	4,700 to 18,800	High-low range based on three case-studies, including: So. Amboy/Old Bridge P/R, North Brunswick Station, Jersey Ave, eastbound station	NJ TRANSIT
	Bus priority treatment	202,000 to 578,000	4,800 to 13,763	High-low range based on four case-studies, including: Bus priority - Rt. 3/46, NJ Turnpike, Route 9 Monmouth County	NJ TRANSIT
	Light Rail Transit (LRT) extension	133,000 to 302,000	3,200to 7,200	High-low range based on four case-studies, including: River Line Extensions, Bayonne 8th Street Hudson-Bergen Light Rail (HBLR), HBLR extensions	NJ TRANSIT

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Category	Strategy or Support Programs	Potential Annual Energy Benefit		Notes	Source / Reference
		Gallons saved	Barrels saved		
ITS Investments					
	Signal synchronization	620,400	15,000	Based on NJ Congestion Management System (NJCMS) analysis using MOBILE 6.2 to estimate potential idling time reduced from implementation of coordinated traffic signals in corridors where they did not otherwise exist. The results represent improvements to approx 262 intersections (1.24 Million VHT) -- These results could be factored up to account for larger program. Energy Calculation: (Vehicle Hours Traveled (VHT) saved) * (Fuel consumption @ idle 0.5 g/hr)	NJDOT RACM
	Express EZ Pass toll collection	38,000	900	NJ-AQONE software was used to estimate the air quality benefits of constructing Express EZ Pass lanes at the Union, Essex & Barnegat toll plazas on the Garden State Parkway (20,890 kg-CO/yr) -- If these improvements have already been made, the analysis should be factored up or down to adjust for implementation at other toll locations. Energy Calculation: (CO reduction) / (CO emitted per gallon)	NJDOT RACM
	Incident management	2,935,000	70,000	Based on NJ Congestion Management System (NJCMS) analysis designed to test the deployment of emergency service patrols in corridors where they do not already exist to reduce non-recurring congestion. The analysis year: 2009 (5.87 Million Vehicle Hours Traveled (VHT)). Energy calculation: (VHT saved) * (Fuel consumption @ idle 0.5 g/hr)	NJDOT RACM

Category	Strategy or Support Programs	Potential Annual Energy Benefit		Notes	Source/ Reference
		Gallons saved	Barrels saved		
Financial/ Market Strategies					
	Increase Fuel Tax by $0.50/gallon	71,582,000	1,704,000	The current fuel tax is raised in order to provide a negative economic incentive, which is expected to alter commuter behavior, encouraging commuters to use alternative modes of transportation. According to the American Petroleum Institute's most recent reports at the time of this analysis (July, 2005) the gasoline excise tax in the state of New Jersey was 14.5 cents per gallon (cpg). Inputs/Assumptions: A 50 cpg fuel tax increase resulting in an avg. decrease in VMT of 4% (VTPI), avg. fuel economy of 25 mpg, and retail gasoline = $2.40/gal. Participation limited to 17 counties. NOTE: According to Harvey and Deakin, 1998, savings could be significantly greater (e.g., up to 9m barrels).	NJDOT RACM
	Vehicle Engine Efficiency Incentive (aka Feebates: $500)	880,324,000	20,960,000	A "feebate" is a revenue-neutral policy that charges fees for the purchase of new, inefficient vehicles and returns the revenue generated from these fees to purchasers of fuel efficient vehicles in the form of a rebate. Fuel savings quoted from a single category price structure for all light-duty vehicles. The feebate is calculated based on the average fuel economy achieved after implementation, a savings of about 20% from the base year (Greene et al, 2005; pg. 762). Base year fuel consumption from US DOT FHA Motor Fuel Use, 2003. (Calculation formula = Total motor fuel usage x 20% increase in fuel economy x 10% annual vehicle turnover rate. See also Greene et al (2005) for more details.	Greene et al, 2005
	Road Pricing	1,407,000	34,000	Market-based mechanism that applies a user fee to existing roadways to more efficiently balance supply and demand. Includes variable tolls, high occupancy toll lands and cordon pricing. Base case: 500,000 trips daily. Assumes zero marginal emissions impact due to increased transit usage, no new transit vehicle trips. Could be factored up based on scope of implementation	VTPI; CCAP 2006; DeCorla-Souza 2003, California Air Resources Board 1998
Employer-based Commute Option programs					
	Comprehensive Commute Options Strategy - Example 2 Mandatory Program	5,800,000	138,000	Washington State Commute Trip Reduction program (CTR) . Targets firms with 100+ full-time employees commuting during peak times -- totaling 25% of employment in 9 counties / 1,114 worksites with 560,000 employees / MPG=22. Also requires jurisdictions that have CTR-affected worksites to adopt CTR ordinances and to include their own worksites as affected, regardless of whether they are a "major employer" (100+). 7% reduction in drive alone trips at CTR sites. Figures are for 2005. One caveat -- this is a reduction in work trips, which may be offset by increases in non-work trips.	CTR Task Force 2005 Report to the Washington State Legislature
	Rideshare Matching Program	285,000	7,000	Vanpooling and buspooling are both rideshare strategies that have shown significant VMT reductions in empirical studies. Calculation based on 1000 vanpool participants using the service an average of 3 days/week (1.9 gallons saved per day per participant (TCRP Report 95, Ch 5)).	TCRP Report 95 Chapter 5
	Comprehensive Commute Options Strategy - Example 1 Voluntary Program	17,000	400	Comprehensive Travel Demand Management (TDM) program including (but not limited to) carpool/rideshare matching, transit passes & reduced fares, tax incentives for transit uses, parking management/pricing schemes, telecommuting, and compressed work week programs. Based on EPA Model using 10% of total NJ employees to account for those at larger firms (100+), regular business hours, without Transportation Control Measures (TCM)/TDM programs, and reasonable access to transit. Avg. fuel economy of 25 mpg.	NJDOT RACM
	Carsharing	9,800	240	Carsharing allows those with needs for incidental travel during the work day to have a vehicle available while still using transit for their commute trip. According to Cervero and Tsai (2003), fuel consumption was reduced among car sharing users by 0.027 gal/day, a 154% change compared to non-members (whose fuel usage actually increased over the study period). Calculation based on 1000 participants using carsharing daily. See Cervero & Tsai (2003) for more information.	Cervero & Tsai, 2003

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		Gallons saved	Barrels saved		
Land use reforms - TOD					
	Transit Villages - Enact a package of land use policy reforms and development incentives to encourage the development of new housing at transit-supportive densities (minimum net density of 15 units/acre) within ½ mile of regional rail and light rail stations/stops and bus transfer terminals (e.g., Transit Villages). Needed reforms include: greater use of minimum residential density standards; relaxation of bulk and setback requirements; requirements for mixed use development; parking policy reform (e.g., use of parking maximum standards and pricing programs); ped/bike investments to encourage non-auto travel and transit access.	21,600,000	514,000	The scenario tested assumes the ovarall number of annual residential building permits remains consistent with most recent 5 years (i.e., approx 40,000 du/yr statewide); however, it assumes that a greater share of the new housing units are constructed proximate to transit at net densities of at least 15 units/acre. A shift from 35% to 50% of net new units in this category would yield 6,000 new transit-supportive units. Each of these new multi-family units would yield an average annual energy saving of 240 gal/yr including work and non-work travel. The analysis is based on NJ specific density and mode choice data and an analysis of the past 10 years of building permit data which indicates that 31% of 5+ family units were built in dense locations served by rail, while 48% were located in non-dense, non-transit locations. The energy benefit calculation assumes 0.65 reduction in auto trips per capita per year. Household size varies by county. Average trip lengths vary by mode and county. Analysis year is 2020 and assumes a cumulative annual benefit based on 6,000 units per year for the r	Zupan 2006
	Transit Hubs - Enact a package of land use reforms and development incentives to encourage the development of new office/commercial space in transit hub locations -- e.g., Newark Central Business District (CBD), Jersey City, Elizabeth, Hoboken, Secaucus, Trenton and Camden.	54,386,000	1,295,000	This scenario tested assumes that the amount of non-residential floor area built each year in the state over the next 15 years is consistent with the rate of development over the last 5 years (approx. 30 million sq. ft). It further assumes a doubling of the share of this space constructed in transit hub locations from approx. 10% over the past 5 years to 20% annually over the next 15 years (or approx 100 million sq. ft of space). Also assumes 4000 workers per million sf, 250 work days, 2 trips per day.	Zupan 2006