



U.S. Department of Transportation
Federal Highway Administration

Greenhouse Gas Mitigation: FHWA Activities

US DOT – Climate Adaptation and Mitigation Workshop
February 25 & 26, 2015

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Why is GHG Analysis Relevant to State DOTs?



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- Transportation is the largest source of GHG emissions in many states, and is also (by some metrics) the largest source of U.S. GHGs
- On-road GHG emissions are not expected to significantly decline, even with implementation of new fuel economy standards and low-carbon fuel programs
- State-level evaluation of mitigation strategies is often done without State DOT involvement, resulting in poor analysis

Estimated Reductions – State Climate Action Plans



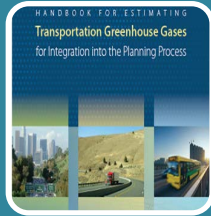
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State	Year	Vehicle	Low Carbon Fuels	Smart Growth and Transit	Other
VT	2028	21%	14%	49%	17%
CO	2020	40%	26%	22%	13%
SC	2020	14%	55%	29%	1%
CT	2020	51%	38%	8%	2%
ME	2020	53%	25%	21%	1%
OR	2025	80%	14%	6%	0%
NY	2020	59%	11%	27%	4%
PA	2025	53%	15%	<1%	28%
MN	2025	15%	35%	25%	25%
CA	2020	60%	24%	10%	6%

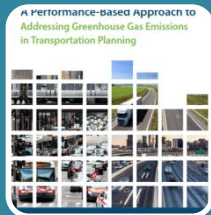
Source: Parsons Brinkerhoff / Sarah J. Siwek & Associates, Inc

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Handbooks



Handbook for Estimating Greenhouse Gas Emissions for Integration into the Planning Process



A Performance-Based Approach to Addressing Greenhouse Gas Emissions in Transportation Planning

Models

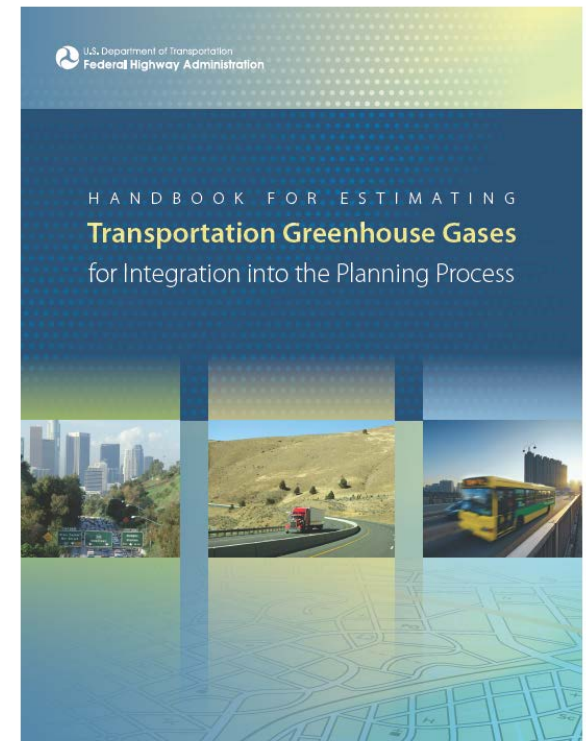


Energy and Emissions Reduction Policy Analysis Tool (EERPAT)



Construction and Maintenance GHG Calculator

- To help state DOTs and MPOs of all sizes and capabilities understand *possible approaches, data sources, and step-by-step procedures* for analyzing GHG emissions in the planning process.
- Designed to:
 - Be user friendly and informative, particularly for State DOTs and MPOs that have limited experience with emissions analysis.
 - Provide references to more detailed user manuals and technical resources.



A Performance-Based Approach to Addressing Greenhouse Gas Emissions through Transportation Planning



- Addresses selection of relevant GHG performance measure(s)
- Techniques for evaluating the impact of strategies and plans
- Use of performance information to support investment choices and decision-making

Energy and Emissions Reduction Policy Analysis Tool (EERPAT)



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- What is it?
 - A specialized tool, originated by the Oregon Department of Transportation, to evaluate GHG reduction strategies
 - Comprised of connected sub-models...
 - Regression and logit models, which draw on aspects of activity-based and 4-step modeling
 - Vehicle fleet and emissions models
- What are its advantages?
 - It allows for State-level analysis of traveler responses, which can be difficult (especially if no state-level model exists)
 - Much faster setup and run time than typical travel demand models and MOVES
 - Allows for evaluation of many different policy scenarios, which is useful for evaluating uncertainties associated with future variables (fuel economy, fuels, population, economic growth / population, etc.)
- Tool supported by FHWA, and available at:
http://www.planning.dot.gov/FHWA_tool/



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Policies Addressed by EERPAT



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Land Use / Smart Growth



Transit / Nonmotorized



Pricing (Parking, fuel tax, VMT tax)







Operations and Eco-driving



Vehicle Technology (EV and efficiency improvements)



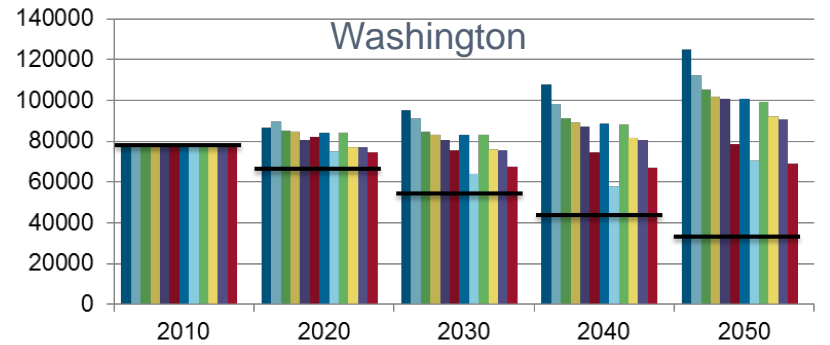
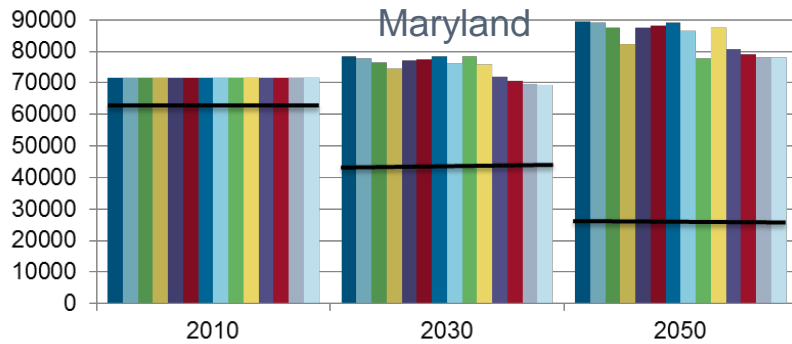
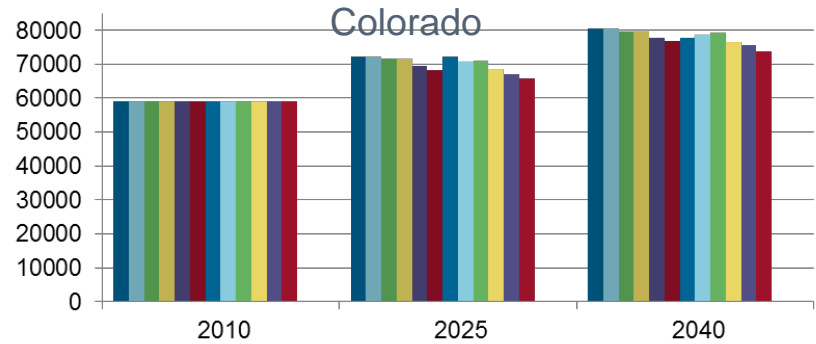
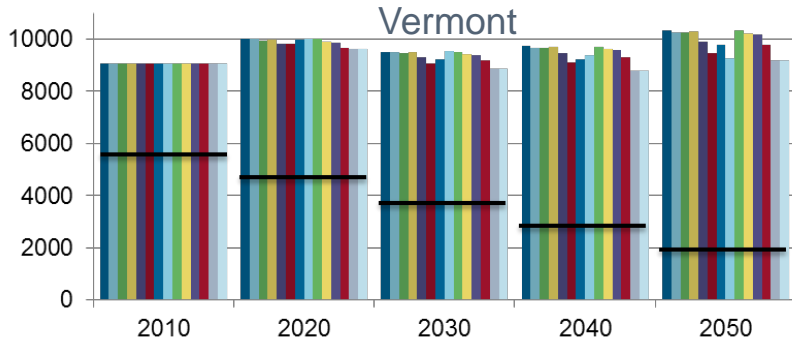
Fuels

- Objectives of pilot testing
 - Evaluate usefulness of EERPAT as a policy analysis tool for State DOTs
 - Create a community of users to provide feedback for enhancing model
 - Ongoing use of tool for planning and climate mitigation analysis
- Agencies Selected to Test EERPAT
 -  Washington State DOT
 -  Vermont Agency of Transportation
 -  Maryland DOT
 -  Colorado DOT
- Pilot Testing Process (early 2013 to late 2014)
 - Agencies collected local data; RSG assisted with model calibration
 - Each EERPAT application has been tested using policies of interest to the pilot state
 - Agencies submitted summary reports, which identified model strengths, weaknesses and future needs related to GHG analysis

Impact of Policies Relative to State GHG Reduction Targets



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Base Case Assumptions

- Account for 2012-2025 CAFÉ Standards, adjusted to reflect anticipated on-road performance
- Do not account for Medium / HD FE Standards
- Do not account for changes in fuel carbon content (per EPA)

Construction and Maintenance – Relevance to GHG Analysis



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- Traditional air quality analysis has only considered localized impacts of short-lived pollutants (e.g., concentrations of carbon monoxide near roads)
- Focus has been on operational emissions (exhaust from vehicles using roads)
 - construction emissions are temporary (once construction is over, the emissions don't matter anymore)
 - maintenance vehicle emissions are accounted for in operation estimates
- Unlike traditional pollutants—
 - the impacts of GHGs are based on cumulative emissions (construction, operation, and maintenance emissions all have the same impact); and
 - The location of the emissions doesn't matter (they impact atmospheric concentrations regardless of where they occur)



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- Tool supports various sketch-level estimates and comparisons:
 - Regional transportation plan alternatives
 - Project alternatives
 - “Green” construction and maintenance techniques
- Not intended to
 - Promote one material or technology over another
 - Influence project decisions at the engineering and construction stages
- Tool is available at www.fhwa.dot.gov/environment/climate_change/mitigation/publications_and_tools/carbon_estimator/index.cfm



Tool Overview – Sample Roadway Inputs



Roadway Projects							
Facility type	Roadway Construction					Roadway Rehabilitation	
	New Roadway (lane miles)	Construct Additional Lane (lane miles)	Re-Alignment (lane miles)	Lane Widening (lane miles)	Shoulder Improvement (centerline miles)	Re-construct Pavement (lane miles)	Resurface Pavement (lane miles)
Rural Interstates	0	0	0	0	50	0	10
Rural Principal Arterials	5	0	0	10	0	0	30
Rural Minor Arterials	0	0	20	0	0	0	0
Rural Collectors	0	0	0	20	0	0	0
Urban Interstates / Expressways	0	0	0	0	40	20	30
Urban Principal Arterials	0	0	0	0	0	0	10
Urban Minor Arterials / Collectors	0	0	0	0	0	0	0

Calculation of Energy and GHG Impacts



Annualized energy use (mmBTUs), per year over 20 years						
Unmitigated						
	Roadway - new construction	Roadway-rehabilitation	Roadway - total	Bridges	Rail, bus, bicycle, ped.	Total
Upstream Energy Materials	89,975	152,838	242,813	24,643	178,067	445,523
Direct Energy Construction Equipment	33,942	27,079	60,021	10,747	61,606	132,374
Routine Maintenance						158,585
Total	123,917	179,917	302,834	35,390	239,673	736,482

Annual GHG emissions (MT CO2e), per year over 20 years						
Unmitigated						
	Roadway - new construction	Roadway-rehabilitation	Roadway - total	Bridges	Rail, bus, bicycle, ped.	Total
Upstream Emissions Materials	5,626	9,276	14,902	2,065	12,507	29,474
Direct Emissions Construction Equipment	2,402	1,975	4,377	784	4,491	9,652
Routine Maintenance						11,564
Total	8,028	11,251	19,279	2,849	16,998	50,690



- Purpose
 - To encourage State DOTs and MPOs to incorporate GHG and energy considerations in the planning process
 - To utilize several new analysis tools and methods recently developed
- Massachusetts DOT
 - Analyzing potential GHG/energy reduction benefits of current and planned strategies using EERPAT
- Delaware Valley Regional Planning Council (DVRPC)
 - Quantifying GHG/energy reductions from electric and CNG vehicle penetration rates
- East-West Gateway Council of Governments
 - GHG inventory and possible corridor level GHG analysis
- Southern California Association of Governments (SCAG)
 - GHG/energy analysis of transit “first and last mile” trips

- Purpose:
 - To assist state and local transportation agencies interested in promoting the use of alternative vehicle and fuel technologies at a state, regional or corridor scale with the needed tools, information, and knowledge to do so.
- 8-10 regional/topic-based workshops
- Development of a “toolkit” or framework tailored to specific needs/barriers
- Led by the Oregon State DOT
- Solicitation period – June 23, 2014 to June 23, 2015
- SP&R match waiver granted
- State DOT participation to date - NC, CA, WA, OR, CT, VT
- For more information:
<http://www.pooledfund.org/Details/Solicitation/1375>



Background

- Update of a version released by CEQ for comment in February 2010
- Published in the F.R. on December 24
- Comment period extended until the end of March



Addresses how/when to consider GHG emissions and climate change effects in NEPA

- Sets reference point for when to do quantitative GHG emissions analysis
- Applies to both construction and operational (tailpipe) emissions
- Says to consider impacts of climate on project and affected environment



Relevance to Planning

- FHWA's position is that GHG emissions analysis is best performed at planning level
- Currently evaluating how to move forward with implementation of guidance

Team Members

Mike Culp, Team Leader

John Davies, GHG emissions analysis, modeling, performance measures

Connie Hill Galloway, sustainability, brownfields, and hazardous waste sites

Tina Hodges, adaptation, sustainability

Heather Holsinger, sustainability, adaptation, GHG emissions analysis, energy

Rob Hyman, adaptation, GHG emissions analysis

Rob Kafalenos, adaptation, energy

Becky Lupes, adaptation, GHG emissions analysis, NEPA

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