

GHG Analysis Methods and Resources

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Draft CEQ Climate Change in NEPA Guidance

CEQ issued draft guidance on consideration of climate change in NEPA, including GHG analysis, on February 18, 2010

- Recommends that federal agencies address GHG emissions impacts of proposed actions where the analysis would “provide meaningful information to decision makers”
- Recommends consideration of potential impacts of future climate change on proposed actions
- No set timeframe for final guidance

Draft CEQ Guidance: When to Analyze GHG Emissions

Suggests that NEPA EA and EIS documents for proposed federal actions resulting in direct GHG emissions of 25,000 metric tons per year should include a GHG emissions analysis of alternatives

Equates to a VMT increase of roughly 125,000 miles per day as a result of a proposed project

- Based on current GHG emissions rates, not including construction emissions.

CEQ doesn't define direct emissions for mobile sources. Our initial thoughts are that for most FHWA projects, direct emissions would include construction and tailpipe emissions.

Draft CEQ Guidance: Greenhouse Gas Analysis

Analyze GHG emissions if agency has determined that an analysis is appropriate

Quantify direct, indirect, and cumulative emissions over life of the project

Use interagency consultation to determine best procedures for evaluation

Programmatic Approaches

CEQ's draft guidance also provides for programmatic analysis

- GHG emissions and potential impacts of climate on proposed actions could be analyzed at a broad scale (e.g., in the planning process), and this analysis could be cited in NEPA documents for individual projects

This is consistent with FHWA's long-standing policy preference, which is to estimate GHG emissions at the regional level (state- or MPO-level analysis), instead of project-specific analysis

Greenhouse Gas Emissions from Transportation

GHG emissions from motor vehicles are directly related to energy consumption

90-95% of transportation GHG impact comes from CO₂; remainder comes from other transportation GHGs (CH₄, N₂O, HFCs)

Without good energy/GHG analysis, don't know if projects are increasing or reducing emissions.

- Could unknowingly work against climate goals
- Could invest in projects for purposes of GHG reductions that don't actually reduce emissions, at least in a useful timeframe

Life-cycle Considerations

GHG emissions are cumulative, not episodic like other air pollutants:
CO₂ will stay in the atmosphere for decades

Because of this, realistic analyses must use a lifecycle approach

Lifecycle analysis can be used to calculate payback periods (when emissions benefits from operational improvements are big enough to offset construction emissions), to compare different planning scenarios, and to ensure that projects are providing net GHG reductions by CAP target dates

NYSDOT's existing GHG analysis protocols address most lifecycle components

Lifecycle Components for Plans and Projects

Direct (operational) emissions

Indirect emissions (overall impact varies)

- Changes in travel activity on other roadways, mode shift
- Induced/displaced land use

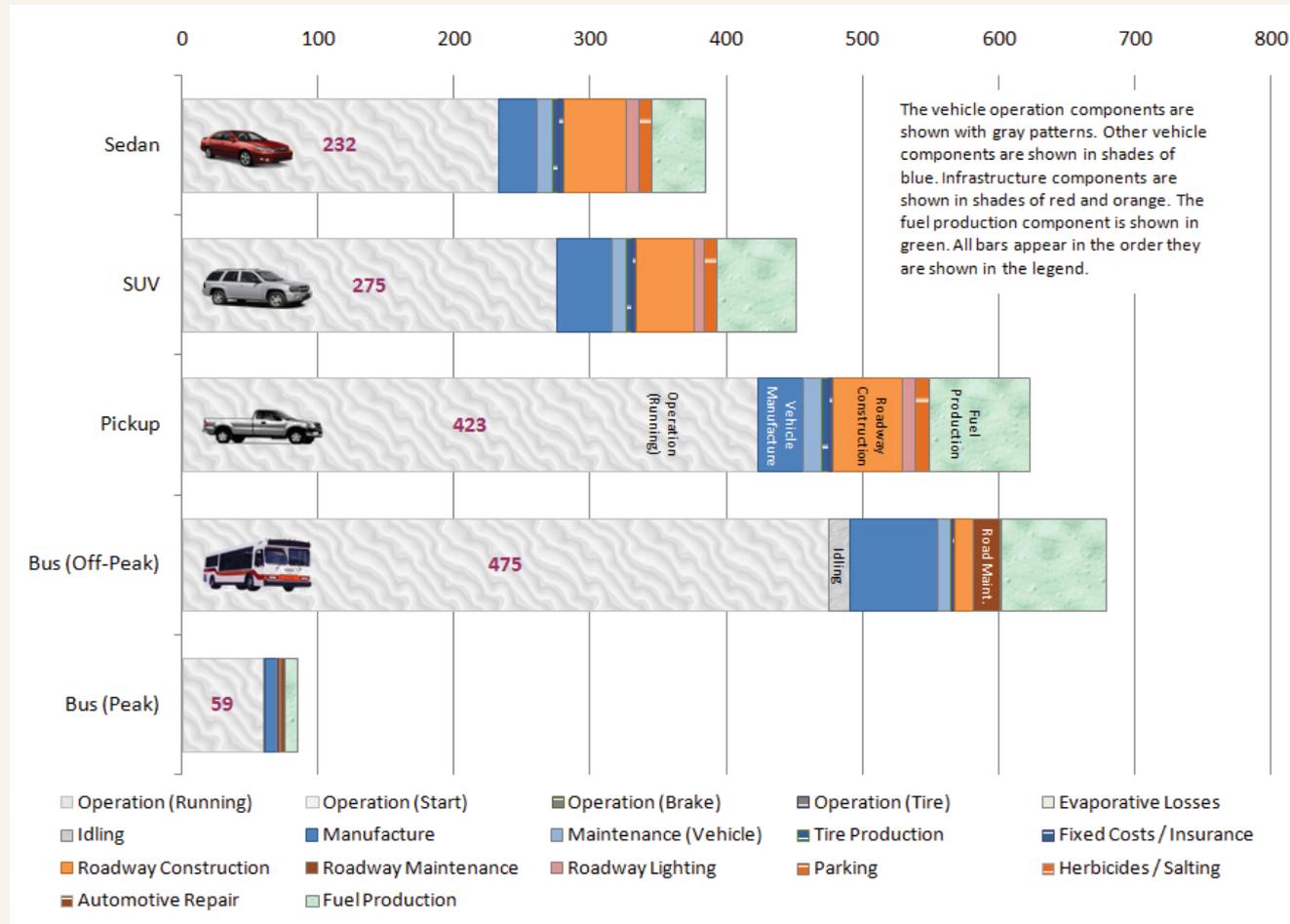
Construction and maintenance emissions (typically +5%, but can vary widely)

- Extent of activity (earthwork, tunneling, grade reduction)
- Materials (amount of steel and concrete, recycled vs virgin materials)

Fuel and vehicle cycle emissions (+40%)

- Well-to-pump emissions for fuels
- Manufacture and disposal emissions for vehicles

UC Berkeley Analysis

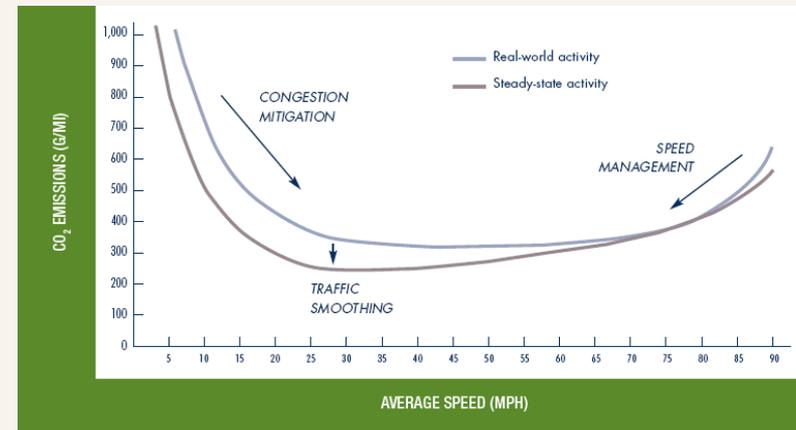


Operational Emissions: Simple, Inaccurate Analysis Approaches

VMT as a surrogate for GHG emissions

VMT + conversion factors
(fuel economy) to
estimate GHG emissions

MOBILE6.2 (CO₂ emissions
not adjusted for speed in
this model)



Speed matters!

Operational Emissions: EPA's MOVES model

Replacement for MOBILE6.2

Final model released 12/2009, updated 9/2010

Performs energy and GHG analysis

Can be used at regional or project level

Once MOVES is used for regional conformity, adding GHG analysis is a matter of checking a few extra boxes in the interface

Using MOVES for GHG Analysis: Two Options

Emission Inventory

- MOVES, unlike MOBILE6.2, is an inventory model
- Can calculate total energy consumption and/or GHG emissions for a selected geographic area and fleet

Look-up Table Output Option

- A look-up table output option allows users to produce running emission rates in grams per mile in order to post-process results, as some agencies currently do with MOBILE
- In a lookup run, MOVES produces energy or emissions rates (grams/mile, BTU/mile, etc.) for each speed bin (5 mph increments)
- Results available for GHGs, energy (and mpg with post-processing)

MOVES Data Needs

EPA is currently drafting technical guidance for using MOVES for GHG analysis. Data needs include:

Fleet age and population

Fuel formulation and market share

Meteorology

Inspection/maintenance programs

Travel activity (speeds, VMT by vehicle type and road type, ramp fractions, VMT fractions by hour/day/month)

Defaults available for much of this

Other sources of emissions

Construction and Maintenance

New York has a simple lookup methodology
(emissions by lane mile)

SAQMD Road Construction Model

FHWA is preparing a major research effort

Fuel and vehicle cycle emissions

Factors based on operational emissions available
from EPA and/or FHWA

Transportation Research Board Resources

NCHRP 25-25/Task 58: Methods to Address GHGs from Construction and Maintenance (report and spreadsheet tool)

<http://144.171.11.40/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=761>

GHG inventory methodologies for State DOTs

Currently active research:

- Updates to fuel cost adjustment factors for construction
- SHRP2 CO9 framework for addressing CC in planning, and practitioners guide

These projects should be completed later this year

EPA Resources

Updated COMMUTER model

Transportation GHG strategies reports

- GHG reductions from transportation efficiency

- GHG-related performance measures

TCM guidance

OMEGA model

Available at www.epa.gov/otaq

FTA/APTA Resources

Transit's Role in Responding to Climate Change

Transit GHG Emissions Management Compendium

Recommended Practice for Quantifying GHG Emissions
from Transit (APTA)

These reports and others posted at

www.fta.dot.gov/planning/planning_environment_12125.html

FHWA Resources

Peer Exchange/Workshop reports

- Summaries of peer workshops conducted in 2008 and 2010

USDOT Report to Congress: Transportation's Role in Reducing U.S. GHG Emissions

- Exhaustive review of transportation strategies to reduce GHGs

These reports posted at www.fhwa.dot.gov/hep/climate/resources.htm

Upcoming:

GHG mitigation guidebook: methodologies for planning level GHG analysis

- contract just getting underway, completion in 2012

State-level GHG analysis model

- Revised version of Oregon's GreenSTEP model, for statewide transportation GHG analysis, available later this summer