Framework for enhanced mobile source GHG analysis in MEPA reviews

MEPA Advisory Committee

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Existing Regulations/Guidance

MEPA GHG Policy (2010)

- Addresses all types of GHG emissions (building, process, mobile source)
- Requires proponents to create a baseline ("build without mitigation") scenario and compare to preferred alternative and other alternatives that include mitigation measures not pursued
- Guidelines for mobile source estimates reference Mesoscale air quality analysis
- Calculated as net trips x vmt per trip x emissions factors
- VMT/GHG emissions enumerated separately for customer, employee, resident, truck, fleet trips
- Uses MOBILE 6.2 emissions factors
- For mobile source emissions Proponent to estimate impacts of mitigation using COMMUTER model, Work Trips Reduction Model, CMAQ worksheets, or other tools (not prescribed)
- Mitigation reported as reduction from baseline (build without mitigation) scenario, in percentage terms and tons CO2/year ("% better" approach)
- Requires proponents to "mitigate impacts to the maximum extent feasible"

Existing Regulations/Guidance

Guidelines for Mesoscale Analysis of Indirect Sources (1991)

- Focused on mobile source emissions that contribute to ozone formation ("non-methane hydrocarbons")
- Thresholds: office and nonresidential projects >3,000 ADT to >10,000 ADT
- Analysis required if >10% increase in VMT on any local roadways "due to project"; or if project affects any intersection with current or potential LOS of D or worse
- Analysis area radius as small as 1,000 feet or as large as 10 miles
- Trips must be assigned to analysis area roadway network; emissions calculated at link level (ADT x link length x emissions factor)
- References MOBILE 4.1 emissions factors
- Results evaluated as "build" scenario compared to "no build" scenario; mitigation required if "build" case shows an increase in emissions over "no build" ("no net increase" approach)
- "All reasonable and feasible hydrocarbon reduction mitigation measures should be presented"

Challenges with Existing Regulations/Guidance

- Predicated on achieving incremental improvement over non-mitigated or no-build scenarios
- No standard protocol for estimating mitigation impacts; Hard to compare emissions associated with different projects
- Use of background growth rates on local roadways may mask impact of new development (esp. mesoscale analysis)
- Results don't indicate whether project and associated mitigation are "good enough" to help meet CECP reduction targets and statutory GHG reduction goals.

Considerations for a new mobile source GHG framework

- Transition to 100% EV fleet and to 100% renewable electricity sources will take decades. Therefore, GHG emissions per mile driven will decline with the introduction of EVs, but will do so slowly.
- Meanwhile, VMT for personal vehicles in the region may increase by more than 21% between 2010 and 2030. Vehicle fuel efficiency would need to improve by at least 18% (equivalent to a fleet-wide average of 29 miles per gallon) before any net reductions in GHG are achieved.
- Many other environmental, health, and economic reasons to address growth in VMT: carbon-intensive auto infrastructure and heat islands; pedestrian safety; pollution from tires; and congestion.
- Changes in land use patterns can have a substantial effect on forecast growth of VMT. People who live and work in transportation-efficient locations and developments tend to drive less and for shorter distances than people living and working in outlying areas. *Per capita* VMT and emissions from "smart growth" locations will be less than similar developments in less advantageous locations.
- A MEPA analysis that is focused on per-capita or per-worker VMT and GHG can help to determine if a project is helping to slow or reverse the growth of VMT, or if it is contributing to increasing rates of GHG emissions.
- For example, the average Massachusetts household drives 49 miles per day (as of 2014) and emits 0.022 tons of CO2 equivalents in the process.

Examples from elsewhere

- In California, a 2013 law updated the way transportation impacts are measured through the CEQA process.
- "To achieve the State's long-term climate goals, California needs to reduce per capita VMT. This can occur under CEQA through VMT mitigation. Half of California's GHG emissions come from the transportation sector therefore, reducing VMT is an effective climate strategy, which can also result in co-benefits."
- New developments are required to estimate per-capita/per-worker VMT and take additional measures if estimated VMT is above specified threshold.
- CEQA process does not consider increases in auto delay or degradation of auto level of service (LOS) to be environmental impacts in and of themselves.

Conceptual framework for VMT/GHG analysis

Phase 1

1. Establish robust and practical methods for estimating project-induced VMT and GHG emissions, accounting for location, mitigation measures, and other characteristics.
2. Require project proponents to account for and report projected VMT and GHG emissions in aggregate and on a per-capita basis (or per-worker/per-delivery/etc.)

Phase 2

3. Informed by project-based analysis and goals of future CECPs, set targets for declining per-capita VMT, including targets for new development.
4. Require proponents to estimate per-capita VMT with all proposed mitigation. Developments above per-capita targets could be required to provide additional mitigation or offsets. Review procedures couldbe streamlined for developments meeting or exceeding targets.

Phase 1: Estimation Tools and Reporting Standards

Many existing data resources and forecasting tools in Massachusetts

- Massachusetts Vehicle Census (miles driven per passenger vehicle)
- Statewide Travel Demand Model (CTPS)
- Enhanced Multimodal Accessibility tool (MAPC)
- VisionEval (FHWA, MAPC)
- MOBILE 6.2 and MOVES (EPA)

Models should account for

- Project type and location
- Resident demographics
- Parking availability and cost
- Project-specific trip production and distribution patterns
- Current and anticipated transit service and nonmotorized facilities
- Vehicle fleet mix
- Carbon intensity of electrical grid energy
- Tiered analysis for projects at different scales

Next Steps

- Convene technical experts and consultants to inventory existing methods and tools
- Research protocols and tools used in other state
- Develop proposal for estimation and reporting
- Develop and publish detailed protocols and tools