



August 18, 2016

U.S. Department of Transportation  
Docket Operations, M-30  
West Building Ground Floor, Room W12-140  
1200 New Jersey Avenue SE  
Washington, DC 20590

**Re: Consideration of Greenhouse Gas Emissions Measure for NHS Project Assessments**

Dear Federal Highway Administration (FHWA):

Thank you for this opportunity to comment on whether and how the FHWA should include a greenhouse gas (GHG) emissions measure in its final rule establishing National Performance Management Measures for State Departments of Transportation (State DOTs) and Metropolitan Planning Organizations (MPOs) to use when assessing the performance of National Highway System (NHS) assets within their jurisdictions. We believe that it is fundamentally important to include such a measure in the final rule, given that the transportation sector is responsible for roughly a quarter of total U.S. GHG emissions<sup>1</sup> and, according to the most recent data available from the Energy Information Administration, transportation has for the first time in 40 years become the largest source of GHG emissions in the country.<sup>2</sup>

The FHWA raised a series of questions in the notice of proposed rulemaking regarding the design of a GHG emission measure. We submit the following answers to those questions:

- 1. Should the measure address all on-road mobile sources or should it focus only on a particular vehicle type?** The measure should address emissions from all on-road mobile sources for which tools and data available to estimate emissions, including motorcycles, light-duty vehicles, and heavy-duty vehicles.
- 2. Should the measure be limited to emissions coming from the tailpipe, or should it consider emissions generated upstream in the life cycle of the vehicle operations?** The measure should account for emissions from the production of electricity used to

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<sup>1</sup> U.S. Environmental Protection Agency (EPA), *Sources of Greenhouse Gas Emissions: Transportation*, <https://www3.epa.gov/climatechange/ghgemissions/sources/transportation.html>.

<sup>2</sup> See Press Release, U.S. PIRG, *New Federal Data Show Transportation Sector Now the Largest Source of Carbon Pollution in the United States, First Time in Nearly 40 Years* (Aug. 4, 2016), <http://www.uspirg.org/news/usp/new-federal-data-show-transportation-sector-now-largest-source-carbon-pollution-united>; U.S. EIA, MONTHLY ENERGY REVIEW (July 26, 2016), <http://www.eia.gov/totalenergy/data/monthly/pdf/mer.pdf>.

power electric vehicles, and these should be treated as direct emissions in the same fashion as tailpipe emissions. The measure should also provide tools that State DOTs and MPOs can use to calculate indirect emissions, such as emissions from the extraction and refining of petroleum.

3. **Should the measure include non-road sources, such as construction and maintenance activities associated with Title 23 projects?** The measure should certainly account for emissions from construction and maintenance of NHS segments, and these should be treated as direct emissions.
4. **Due to the nature of CO<sub>2</sub> emissions and their relationship to climate change effects across all parts of the country, should the measure apply to all States and MPOs?** The measure should apply to all States and MPOs.

Moving beyond the questions raised by FHWA, we also recommend that:

5. **Address non-CO<sub>2</sub> GHGs:** The GHG metric should not be limited to CO<sub>2</sub>: it should include all types of GHG emissions that are produced in significant quantities from on-road sources and activities related to the construction and maintenance of NHS roadways, including nitrous oxide (N<sub>2</sub>O) and methane (CH<sub>4</sub>).
6. **Consider effects on alternative transportation options:** FHWA should direct State DOTs and MPOs to consider how NHS planning decisions (including new investments and expansions of the NHS) would affect the development and use of alternative transportation options, including all modes of public transit, biking, and walking.
7. **Consider effects of speed limits and enforcement:** FHWA should direct State DOTs and MPOs to consider how speed limits and the enforcement of those speed limits may affect GHG emissions.
8. **Calculate net emissions if feasible:** FHWA should consider whether and under what circumstances State DOTs and MPOs should conduct a net emissions analysis, and should provide guidance on how this analysis should be performed.
9. **Assign a cost value to net GHG emissions:** If FHWA concludes that it is feasible to estimate net GHG emissions, FHWA should direct State DOTs and MPOs to use the federal Social Cost of Carbon (SCC) and other tools to assign a cost value to those emissions. This will enable decision makers to better understand the significance of GHG emissions and the value of GHG reductions.

These recommendations are discussed in greater detail below.

## 1. The GHG measure should address all on-road mobile sources

*Should the measure address all on-road mobile sources or should it focus only on a particular vehicle type (e.g., light-duty vehicles)?*

The measure should address emissions from all on-road mobile sources for which tools and data are available to estimate emissions, including motorcycles, light-duty vehicles, and heavy-duty vehicles.<sup>3</sup> If the measure only focused on one mobile source category, then it would only capture a fraction of the total on-road emissions.<sup>4</sup> Moreover, FHWA itself has recognized that transportation agencies should address emissions from both heavy- and light-duty vehicles for two reasons: (1) because this is a “more comprehensive approach, and will capture the benefits of strategies to improve the efficiency of freight movement, and (2) because this is consistent with the scope of regional emissions analysis that states conduct to meet Clean Air Act requirements in non-attainment and maintenance areas.<sup>5</sup>

## 2. The measure should not be limited to consideration of tailpipe emissions

*Should the measure be limited to emissions coming from the tailpipe, or should it consider emissions generated upstream in the life cycle of the vehicle operations (e.g., emissions from the extraction / refining of petroleum products and the emissions from power plants to provide power for electric vehicles)?*

The measure should account for emissions from the production of electricity used to power electric vehicles, and these should be treated in the same fashion as emissions from the tailpipe (as direct emissions from on-road vehicles). The measure should also provide tools that State DOTs and MPOs can use to calculate other types of indirect emissions, such as emissions from the extraction and refining of petroleum.<sup>6</sup> State DOTs and MPOs should not be expected to conduct independent modelling to assess such indirect emissions, due to capacity and resource constraints. Rather, DOT should provide a simplified tool or metric for reporting the emissions (e.g., an average estimate of upstream emissions per vehicle mile travelled for a particular vehicle type). This would simplify and streamline the assessments while ensuring consistency across multiple jurisdictions.

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<sup>3</sup> Examples of tools for estimating emissions from on-road vehicles include: U.S. EPA, *Transportation and Air Quality: Modeling and Inventories*, <https://www3.epa.gov/otaq/models.htm> (this website links to multiple tools for modelling GHG emissions from cars, trucks and motorcycles); GHG Protocol, *Calculating CO<sub>2</sub> Emissions from Mobile Sources*, <http://www.ghgprotocol.org/files/ghgp/tools/co2-mobile.pdf>.

<sup>4</sup> For a breakdown of GHG emissions by vehicle type (passenger cars, light-duty trucks, heavy-duty trucks, and motorcycles), see EPA, *INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS, 1990-2014, 2-28* (2016).

<sup>5</sup> FHWA, *A PERFORMANCE-BASED APPROACH TO ADDRESSING GREENHOUSE GAS EMISSIONS THROUGH TRANSPORTATION PLANNING*, 17-18 (Dec. 2013).

<sup>6</sup> One example of an existing tool for conducting this analysis is the National Energy Technology Laboratory’s Upstream Dashboard Tool. It allows users to enter parameters and generate upstream emissions estimates for petroleum and other fossil fuels. FHWA should consider whether this tool is suitable for use by State DOTs and MPOs or whether a more streamlined, simplified assessment tool needs to be developed.

**3. The measures should include GHG emissions from construction and maintenance.**

*Should the measure include non-road sources, such as construction and maintenance activities associated with Title 23 projects?*

Emissions from construction and maintenance of NHS segments should be accounted for in the GHG measure, and should be treated as direct emissions from the NHS segment. In addition to estimating direct emissions from, e.g., construction equipment and vehicles, the metric should also direct State DOTs and MPOs to consider life cycle GHG emissions from road paving. The National Center for Sustainable Transportation recently published a study explaining how to conduct a life cycle assessment (LCA) of pavement and use this information to inform decisions about highway construction, maintenance, and rehabilitation.<sup>7</sup> The study notes that the tools are available to do this analysis – indeed, certain jurisdictions, such as the Netherlands, are already using pavement LCA for their highway planning.<sup>8</sup>

**4. The measure should apply to all State DOTs and MPOs.**

*Due to the nature of CO<sub>2</sub> emissions and their relationship to climate change effects across all parts of the country, should the measure apply to all States and MPOs?*

There is no reason to confine the GHG measure to a particular State or MPO. All States and MPOs should begin evaluating the performance of NHS assets within their jurisdiction basis of GHG emissions. This will ensure a comprehensive and consistent approach to the GHG analysis. If FHWA determines that certain State DOT or MPOs lack the resources to conduct this analysis, then it could provide technical support as needed. It could also develop differentiated criteria for the GHG analysis to reflect the different circumstances of, e.g., small MPOs with limited technical capacity. Finally, FHWA may want to consider developing guidelines or technical tools to help State DOTs and MPOs coordinate their analyses where appropriate, as this will reduce duplication and inefficiencies in the process.

**5. The measure should include non-CO<sub>2</sub> GHG emissions to the extent that they can be estimated.**

On-road vehicles, construction equipment, and the other emissions sources noted above (e.g., power plants that produce electricity for electric vehicles) all produce N<sub>2</sub>O and CH<sub>4</sub> in addition to CO<sub>2</sub>. While these are produced in lesser quantities than CO<sub>2</sub>, they are particularly potent

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<sup>7</sup> JOHN HARVEY ET AL., NATIONAL CENTER FOR SUSTAINABLE TRANSPORTATION, THE ROLE OF LIFE CYCLE ASSESSMENT IN REDUCING GREENHOUSE GAS EMISSIONS FROM ROAD CONSTRUCTION AND MAINTENANCE (2015), available at [http://ncst.ucdavis.edu/wp-content/uploads/2014/08/07-06-2015-NCST\\_Reducing-GHG-in-Road-Construction-FINAL.pdf](http://ncst.ucdavis.edu/wp-content/uploads/2014/08/07-06-2015-NCST_Reducing-GHG-in-Road-Construction-FINAL.pdf).

<sup>8</sup> *Id.* at 2 (citing the Dutch Ministry of Infrastructure and the Environment’s “DubloCalc” tool). See also Athena Sustainable Materials Institute, Athena Pavement LCA, <http://www.athenasmi.org/our-software-data/pavement-lca/> (free LCA-based software package that measures environmental impact of Canadian and U.S. roadway designs).

climate forcers and their effect on climate change should not be ignored. The GHG measure should thus account for N<sub>2</sub>O and CH<sub>4</sub> emissions wherever tools and data are available to do so.<sup>9</sup>

**6. The measure should require consideration of how alternative transportation options.**

The most effective way to reduce GHG emissions from on-road vehicles is to use these vehicles less. This requires transitioning to alternative transportation options, such as buses (which are much more efficient than passenger vehicles on a per passenger basis), rail, light rail, ferries, biking, and walking. FHWA should therefore direct State DOTs and MPOs to consider how decisions related to the NHS – including any new investments or expansions of the NHS – may affect the development and use of alternative transportation options, and the corresponding implications for GHG emissions. This analysis should include a comparison of GHG impacts from all alternative modes of transportation under consideration. FHWA itself has noted that the “most comprehensive approach” for GHG transportation planning is to account for “GHG emissions from all transportation sources, potentially including rail, transit, and ferries in addition to on-road vehicles.”<sup>10</sup>

**7. The measure should require consideration of how speed limits and enforcement affect GHG emissions.**

The speed at which vehicles travel affects fuel efficiency and GHG emissions. 55 mph is frequently cited as the optimal speed in terms of fuel economy and emissions per mile.<sup>11</sup> Emissions per mile will increase at lower and higher speeds. The measure should therefore include speed limits (and measures to enforce those limits) among the factors to assess when considering the GHG performance of NHS segments.

**8. The measure should provide guidance on whether and how to calculate net emissions.**

It will be challenging for State DOTs and MPOs to accurately estimate the net emissions impact of any particular NHS project (the net impact being gross emissions minus any emissions that are displaced from other highway segments or alternative transportation options). FHWA should consider whether and under what circumstances State DOTs and MPOs should estimate net emissions, and provide clear guidance on how to perform this analysis. In doing so, FHWA may

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<sup>9</sup> EPA has provided CH<sub>4</sub> and N<sub>2</sub>O emission factors for all on-road mobile combustion sources. EPA, GREENHOUSE GAS INVENTORY GUIDANCE: DIRECT EMISSIONS FROM MOBILE COMBUSTION SOURCES (2016), [https://www.epa.gov/sites/production/files/2016-03/documents/mobileemissions\\_3\\_2016.pdf](https://www.epa.gov/sites/production/files/2016-03/documents/mobileemissions_3_2016.pdf).

<sup>10</sup> FHWA, A PERFORMANCE-BASED APPROACH TO ADDRESSING GREENHOUSE GAS EMISSIONS THROUGH TRANSPORTATION PLANNING, 17-18 (Dec. 2013).

<sup>11</sup> See *Strategies to Reduce Emissions from Transportation Sources*, Ch. 5 in TRANSPORTATION AND GLOBAL CLIMATE CHANGE: A REVIEW AND ANALYSIS OF THE LITERATURE (FHWA 1999).

want to consider allowing State DOTs and MPOs to aggregate emissions across multiple projects, as this may improve the accuracy and reduce the burden of the net impact analysis.

**9. The measure should assign cost value to net GHG emissions.**

If FHWA concludes that a net emissions analysis is feasible and warranted, then FHWA should direct State DOTs and MPOs to assign a cost value to net GHG emissions (or a benefit value to avoided GHG emissions). This will give decision makers a better sense of the scale of the impacts caused by GHG emissions and the value of GHG emission reductions. To ensure a consistent approach, FHWA should specify the values that should be used in this analysis. These values should include the federal Social Cost of Carbon (SCC), which provides a comprehensive estimate of the damages caused by CO<sub>2</sub> emissions,<sup>12</sup> as well as similar cost estimates for N<sub>2</sub>O and CH<sub>4</sub> emissions that are currently used by federal agencies.<sup>13</sup> These values should also be updated to account for any new GHG cost estimates that are promulgated or commonly used by the federal government.

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Thank you for this opportunity to comment on the development of the GHG performance measure for NHS assessments conducted by State DOTs and MPOs.

Please do not hesitate to contact me if you have any questions about these comments.

Sincerely,



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<sup>12</sup> The SCC is a tool developed by the federal government to estimate the costs of CO<sub>2</sub> emissions that are either released or avoided as a result of agency rulemakings. It is intended to be a comprehensive estimate of climate change damages and includes changes in net agricultural productivity, human health, property damages from increased flood risk, and changes in energy system costs. See EPA, *The Social Cost of Carbon*, <https://www3.epa.gov/climatechange/EPAactivities/economics/scc.html>.

<sup>13</sup> Marten et al., *Incremental CH<sub>4</sub> and N<sub>2</sub>O Mitigation Benefits Consistent with the US Government's SC-CO<sub>2</sub> estimates*, 15 CLIMATE POLICY 272 (2015).