



SOUTHWEST ENERGY EFFICIENCY PROJECT

Saving Money and Protecting the Environment Through More Efficient Energy Use

August 15, 2016

Comments on Behalf of the Southwest Energy Efficiency Project and Conservation Colorado re: National Performance Management Measures; Assessing Performance of the National Highway System, Freight Movement on the Interstate System, and Congestion Mitigation and Air Quality specific to Greenhouse Gas Emissions

We would like to submit the following comments on behalf of the Southwest Energy Efficiency Project (SWEEP) and Conservation Colorado. We appreciate the opportunity to comment on the proposed measures. In this document we focus on the question posed on whether a measure should be established for GHG emissions, and then provide some comments on the list of questions posed by FHWA. We strongly support a GHG performance measure, for the reasons described below. Many of our comments are applicable nationwide, but we focus on the state of Colorado as an example.

It is essential that FHWA require state DOTs and MPOs to both measure the impact of their transportation investments on GHG emissions and adopt goals for reducing these emissions.

The United States is a signatory to the Paris climate accords, which commit us to reductions in GHG emissions sufficient to avoid a 2 degree C rise in temperatures. This will require a reduction in GHG emissions of at least 80% by 2050.

Achieving this goal will require dramatic reductions in emissions from every major sector. Transportation is particularly important. Historically, emissions from electricity generation have been the largest source of GHG emissions in the US. However, emissions from electricity have been dropping significantly due to three factors: energy efficiency improvements have been limiting demand growth, coal generation has been displaced by natural gas, and solar and wind generation have grown rapidly. Transportation emissions have dropped slightly since 2005, but by much smaller amounts, and have grown in the last two years as low gas prices have spurred growth in VMT and a shift from passenger cars to light trucks and SUVs. In 2015, for the first time in decades, US GHG emissions from transportation exceeded those from electricity generation¹.

Multiple studies have examined how transportation GHG emissions can be reduced by 80%+ by 2050². Our organization has conducted two such studies for states that we work in, Colorado and Nevada. In every case, the conclusions have been that achieving deep reductions in GHG emissions will require multiple strategies – reducing vehicle miles travelled, increasing

¹ <http://www.vox.com/2016/6/13/11911798/emissions-electricity-versus-transportation>, based on data from the US Energy Information Administration, May 2016 Monthly Energy Review

² Yang, C., McCollum D., McCarthy, R., Leighty, W., *Meeting an 80% reduction in greenhouse gas emissions from transportation by 2050: a case study in California*, Transportation Research Part D: Transport and Environment 14, 2009; Melaina, M. Webster, K., *Role of fuel carbon intensity in achieving 2050 greenhouse gas reductions within the light-duty vehicle sector*, Environmental Science and Technology 45 (9), 2011.; International Energy Agency, *Transport, Energy, and CO₂: Moving Towards Sustainability*, 2009.



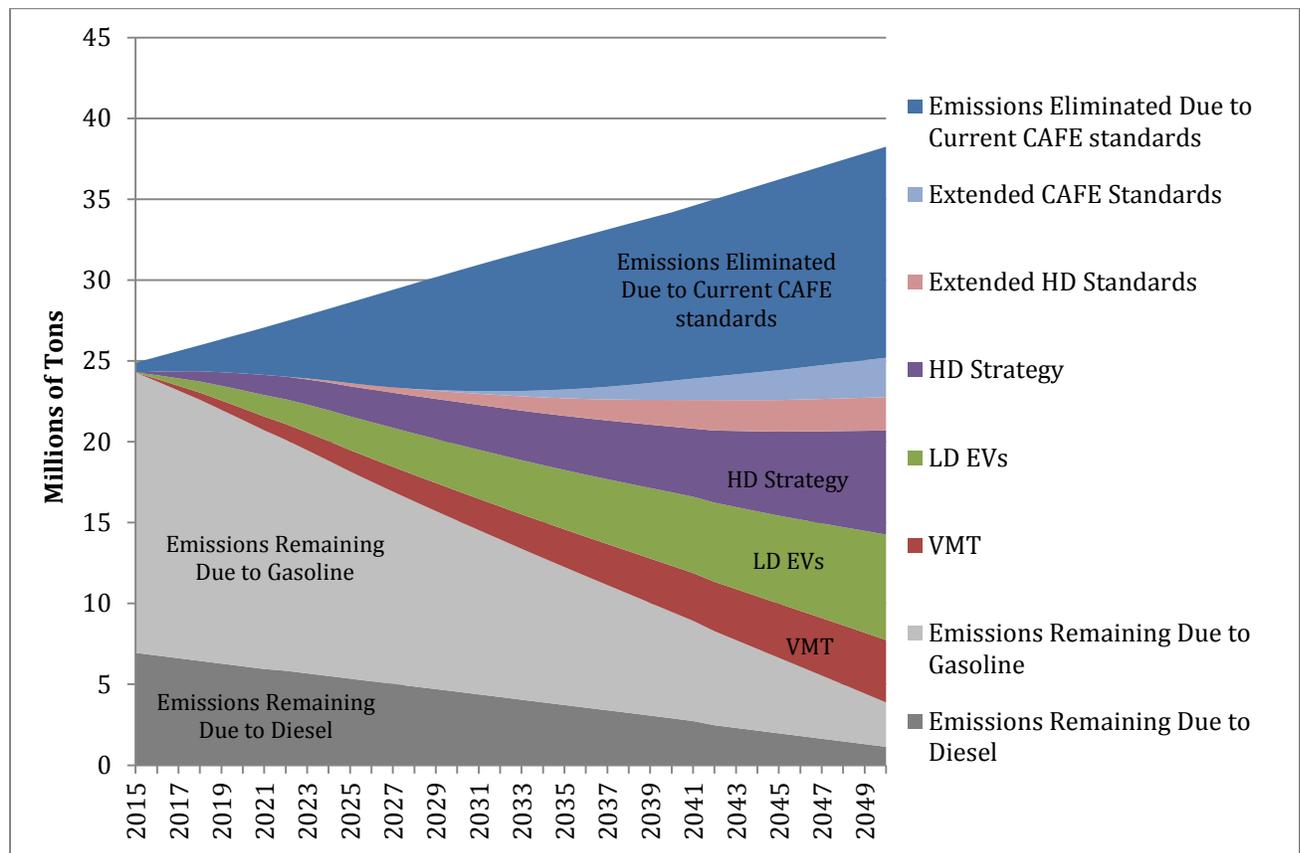
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the fuel efficiency of both light duty and heavy duty vehicles, switching to hydrogen or low carbon biofuels for long haul trucking, and electrifying essentially all light duty vehicle miles by 2050.

SWEEP has recently looked at a scenario for achieving this goal in Colorado. Our baseline projection assumes vehicle fuel efficiency and GHG emissions standards that have been adopted by the federal government for both light and heavy duty vehicles and assumes that per capita Vehicle Miles Travelled (VMT) is flat. Under this baseline scenario, GHG emissions are essentially flat, hovering at around 25 million tons per year. Essentially, the increase in miles driven due to population growth and due to greater levels of freight travel cancel out the reductions due to increasing fuel efficiency. While emissions do not rise, they do not approach the required 80%+ reduction.

We did look at scenarios that could lead to an 80% reduction. One plausible scenario is shown below:



In this scenario, per capita VMT is reduced by 1% per year in each of the major metropolitan areas of the state, and 75% of light duty VMT are electrified by 2050. In addition, in this scenario there is a substantial shift to the use of low carbon fuels for medium and heavy duty vehicles. These are targets that could be heavily influenced by transportation investment decisions made by state DOTs and MPOs.



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Note that there are very significant economic benefits that would come from implementing this scenario. In an earlier analysis, SWEEP analyzed a scenario that reduced VMT in the largest metropolitan areas in Colorado by 1% annually and had a 40% EV market penetration by 2040. In this scenario, the largest metropolitan areas experienced a \$10 billion savings in infrastructure costs and fuel cost savings between 2012 and 2040, and the state as a whole experienced a savings in fuel costs over this time of \$4.2 billion³.

In Colorado, our largest MPO, the Denver Regional Council of Governments, has had GHG emissions reductions goals for several years. The DRCOG Metro Vision 2035 Plan sets a target to⁴

- Reduce annual per capita greenhouse gas emissions from the transportation sector by 60 percent by 2035.

In addition, the DRCOG federal policy statement calls for federal action on GHG emissions from transportation⁵:

DRCOG supports strategies to reduce fossil fuel use and greenhouse gas emissions by the transportation sector.

- Expand investment in research and development for alternative fuels, new clean fuel technologies, more efficient vehicles, and new ideas and technologies for transporting people and goods.
- Incentivize rapid conversion to more fuel-efficient and lower-emission vehicles or retrofits.
- Increase incentives for environmentally - friendly replacement transportation fuels.
- Incentivize regions to more closely link land use and transportation infrastructure to reduce transportation energy consumption, increase non-vehicle transportation options and reduce VMT, through techniques including scenario planning and investments in projects that improve accessibility.

The final bullet is clearly supportive of the use of GHG emissions as a planning factor to encourage regions to link transportation and land use planning to reduce emissions.

The second largest MPO, the Pikes Peak Area Council of Governments, has also established a goal of reducing total GHG emissions from transportation⁶.

³ Yuhnke and Salisbury, 2009, Colorado Transportation Blueprint for the New Energy Economy, [http://www.swenergy.org/data/sites/1/media/documents/publications/documents/CO%20Transportation%20Blueprint%20\(August%202010%20reprinting\).pdf](http://www.swenergy.org/data/sites/1/media/documents/publications/documents/CO%20Transportation%20Blueprint%20(August%202010%20reprinting).pdf)

⁴ <https://drcog.org/sites/drcog/files/resources/2016-Federal-Policy-Statement.pdf>, page 5

⁵ <https://drcog.org/sites/drcog/files/resources/2016-Federal-Policy-Statement.pdf>, page 16



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Combining investments in transit with smart growth strategies that locate jobs and homes near transit lines can make a whole region function better, reduce VMT and associated GHG emissions – and save billions of dollars in public investment.

When DRCOG developed its Metro Vision 2035 Plan, setting forth a 25-year vision for land use and for transportation investments, the region was not content simply to project out current trends. Instead, the DRCOG board asked staff to develop alternative scenarios to explore which approaches would lead to the best results. This led to a scenario planning effort, in which staff modeled different scenarios that combined different land use futures (some were more sprawling, some focused development along transit), and different transportation futures (ranging from focusing most investment on expanding highways to focusing on transit). In each case they assumed the same total growth in population and in jobs. They ran these scenarios through regional models that predicted traffic levels, water use, air quality impacts, access to employment, and other impacts to the economy and quality of life.

The results were striking. The scenario that combined transit with transit oriented land use performed better on every single metric that DRCOG looked at – lower water use, less traffic congestion, better access to job, lower emissions – and lower infrastructure spending. This scenario needed **\$5 billion** less in regional spending on infrastructure than the highway-oriented scenario, while having less traffic congestion and lower emissions.⁷ Thus, a performance measure focused on reducing GHG emissions will likely also contribute to reduced public infrastructure costs and better economic outcomes.

In addition, Colorado state statutes that guide the development of the state transportation plan by the Colorado Department of Transportation require that GHG emissions be a planning factor. The relevant language was adopted in 2009 as part of SB 09-108, the FASTER legislation⁸:

“43-1-1103. Transportation planning. (5)

The department shall integrate and consolidate the regional transportation plans for the transportation planning regions into a comprehensive statewide transportation plan. The formation of such state plan shall be accomplished through a statewide planning process set by rules and regulations promulgated by the commission. The state plan shall include ADDRESS but shall not be limited to the following factors:

⁶ Pikes Peak Area Council of Governments, Moving Forward 2040, Chapter 13, p3, <http://www.ppacg.org/library/transportation/2040-moving-forward-update/chapters/49-chapter-13-public-health-transportation/file>

⁷ A detailed description of the study was published in an article by Locantore et al titled *Scenario Analysis Helps Identify Sustainable Land Use And Transportation Policies*, in *Projections*, Volume 9, MIT Journal of Planning, (2010).

⁸ http://www.leg.state.co.us/clics/clics2009a/csl.nsf/fsbillcont/636E40D6A83E4DE987257537001F8AD6?Open&file=108_enr.pdf, pages 62-63



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- (d) THE TARGETING OF INFRASTRUCTURE INVESTMENTS, INCLUDING PRESERVATION OF THE EXISTING TRANSPORTATION SYSTEM COMMONLY KNOWN AS "FIXING IT FIRST" TO SUPPORT THE ECONOMIC VITALITY OF THE STATE AND REGION;
- (e) SAFETY ENHANCEMENT;
- (f) STRATEGIC MOBILITY AND MULTIMODAL CHOICE;
- (g) THE SUPPORT OF URBAN OR RURAL MASS TRANSIT;
- (h) ENVIRONMENTAL STEWARDSHIP;
- (i) EFFECTIVE, EFFICIENT, AND SAFE FREIGHT TRANSPORT; AND
- (j) REDUCTION OF GREENHOUSE GAS EMISSIONS.

Thus, there is a need for action at the regional, state and federal level to reduce GHG emissions from transportation, and in Colorado there is existing policy language that governs the actions of the state DOT and the largest MPOs that is consistent with and would be strengthened by the adoption of federal measures.

Response to detailed questions in NOPR

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

While light-duty vehicles are the largest contributor to GHG emissions in the on-road transportation sector, any measure should also include medium and heavy duty vehicles. Heavy duty vehicles are expected to make up a larger percentage of emissions in the future and it will be a major challenge to meet GHG emission goals in the transportation sector without aggressively pursuing strategies to reduce heavy duty emissions.

- Should the measure be normalized by changes in population, economic activity, or other factors (e.g., per capita or per unit of gross state product)?

The measure should examine total emissions (as this is the number that must be reduced to achieve GHG reduction goals) and also normalize the change in emissions as a function of population. A measure of per capita emissions will provide the greatest ability to compare progress across states and MPOs.

- 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)?



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We would propose an intermediate approach. A true lifecycle approach includes not only upstream emissions associated with the fueling of the vehicles, but also the upstream emissions associated with vehicle production. Since most DOT and MPO decisions will primarily affect how much and how vehicles are used, we believe that it is appropriate to primarily focus on the emissions associated with vehicle operation, not production – so include upstream emissions associated with vehicle operations, but not all lifecycle emissions including vehicle production. This is important since upstream emissions from extraction, refining and transportation petroleum can be significant, and upstream emissions associated with methane emissions can be significant for natural gas vehicles. Since the emissions from electric vehicles take place from power plants, it is essential that these emissions be considered; otherwise the vehicles will be treated as having zero emissions. By considering the actual emissions, actions that tend to increase the use of low carbon or zero carbon electricity will be encouraged. This also makes this rule more consistent with other federal regulations, such as the light duty vehicle GHG standards⁹, which are transitioning to account for upstream emissions from electricity production.

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

Yes. However, the primary emissions footprint comes from the use of these facilities, not their construction, so construction and maintenance activities should be a secondary focus.

- Should CO₂ emissions performance be estimated based on gasoline and diesel fuel sales, system use (vehicle miles traveled), or other surrogates?

Estimates could be based on gasoline and diesel sales as at this is the final source of GHG emissions. However, this data is often available only at a very aggregated level, as gasoline taxes are typically collected at the wholesaler level. This means that this data will not give the level of geographical information needed in order to evaluate the actual impacts of many transportation system decisions on emissions.

Thus, it would be helpful to also measure system use via vehicle miles traveled (VMT) as this will give a clearer picture of how much system use is contributing to changing GHG emissions. If only fuel consumption is measured not only will the level of spatial aggregation be too high, it will also not be clear if changes in fuel consumption, and hence GHG emissions, are the result of changes in VMT or changes in fuel economy.

- Due to the nature of CO₂ emissions (e.g. geographic scope and cumulative effects) and their relationship to climate change effects across all parts of the country, should the measure apply to all States and MPOs?

⁹ US EPA, EPA and NHTSA Set Standards to Reduce Greenhouse Gases and Improve Fuel Economy for Model Year 2017-2025 Cars and Light Trucks, <http://www.epa.gov/otaq/climate/documents/420f12051.pdf>



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Yes. Unlike other pollutants, where impacts are primarily local and vary depending on ambient concentrations, GHG gasses are globally mixed, and what matters is total cumulative emissions. Thus, emissions are equally significant wherever they take place.

And, since many of the measures that will affect VMT will involve the interplay between transportation infrastructure and land use decisions, it is essential that this measure apply to MPOs, as they are the locus for much of this decision making.

- Is there any criteria that would limit the applicability to only a portion of the States or MPOs?

No.

- Would a performance measure on CO2 emissions help to improve transparency and to realign incentives such that State DOTs and MPOs are better positioned to meet national climate change goals?

Yes. Without such a metric there will be less accountability from DOTs and MPOs. Meeting aggressive GHG emissions goals will require everyone involved in transportation planning to take an active role in finding ways to reduce emissions. Such a performance measure will encourage these planning organizations to take GHG emissions more seriously. The state of California has shown one example of how this can work through the implementation of SB 375, which requires MPOs to show how their plans will meet GHG emissions targets set for their regions.

- The target establishment framework proposed in this rulemaking requires that States and MPOs would establish 2 and 4 year targets that lead to longer term performance expectations documented in longer range plans. Is this framework appropriate for a CO2 emissions measure? If not, what would be a more appropriate framework?

Having both short and long term targets is an appropriate framework for a GHG performance measure. Short term targets will give agencies immediate goals to focus on. Without short term targets it would be easy for agencies to postpone steps that would reduce GHG emissions with the expectation that it will be solved by technology or future staff. The long term goal ensures that the short term goals are aggressive enough to lead to meaningful reduction in GHG emissions. Without the long-term goal, agencies might be inclined to adopt easy to achieve short-term goals that would not over time result in meeting the aggressive reduction in on road emissions necessary.

However, the types of actions that will lead to a meaningful change in GHG emissions are often longer term. We would suggest that the short term targets be set on a 4 year cycle that matches Transportation Improvement Program cycles, and the long term targets be 25 year targets that match the cycles for long range transportation plans.



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- Should short term targets be a reflection of improvements from a baseline (e.g., percent reduction in CO₂ emissions) or an absolute value?

As GHG reduction goals are generally expressed as a percent reduction from a certain baseline, it makes sense for the short term targets to follow this methodology. Given the precedent of the Clean Power Plan, which sets 2012 as a baseline, it may make sense to use the same baseline year of 2012.

- What data sources and tools are readily available or are needed to track and report CO₂ emissions from on-road sources?

MPOs and DOTs already calculate total Vehicle Mile Traveled. The gap between statewide VMT and MPO VMT could be used to determine each state's rural VMT. DOTs and FHWA also report estimates of gasoline and diesel consumption by state. Currently, the Energy Information Administration makes estimates of current vehicle fuel efficiency which will help to determine why changes in fuel consumption may be happening. Individual states and MPOs may need to make use of models such as the VISION model from Argonne National Lab to make more accurate estimates of their actual vehicle mix and fuel economy. As some states and regions have different mixes of vehicle types (more SUVs than passenger vehicles) than the national average, this would need to be taken into account. Additionally, urban and rural areas may need to make different assumptions about the efficiency of vehicle travel in their area based on differing fuel efficiencies for highway and city driving. Agencies should be able to use existing tools such as the MOVES model and EERPAT.

- What tools are needed to help transportation agencies project future emissions and establish targets for a CO₂ emission measure?

The Energy Information Administration does make forecasts of future vehicle efficiency and DOTs and MPOs make projections of future VMT. These two variables could give an estimate of future on road transportation emissions. Again, individual DOTs and MPOs may need to use tools such as the VISION model to more accurately represent the vehicle mix in their area.

- How long would it take for transportation agencies to implement such a measure?

We would propose a relatively short timeline of one year, but allow agencies to update their methodologies over time as the state of practice evolves.

- Additionally, the FHWA requests data about the potential agency implementation costs and public benefits associated with establishing a CO₂ emissions measure.

We believe that there could be significant public benefits from establishing a CO₂ emissions measure. As we describe in our comments above, analysis we have conducted has shown that a package of actions to achieve emissions reductions in the metropolitan areas of one



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state (Colorado), could total over \$10 billion in savings in public infrastructure costs and individual fuel costs, over a 25 year planning horizon.

This is savings from avoided fuel costs and reduced public infrastructure costs, so does not include the benefits of avoided carbon emissions, or the co-benefits arising from reduced emissions of criteria pollutants. For Colorado, a successful effort to reduce GHG emissions from transportation could, in the scenario we describe above, reduce GHG emissions by 10 million tons per year at the end of a 25 year time horizon. Using the EPA's estimates of the social cost of carbon, the projected 2040 SCC ranges from a low of \$21/ton up to a high of \$183/ton¹⁰, giving annual benefits between \$210 million and \$1.8 billion dollars. Setting performance measures will not, by itself, lead to these benefits being realized, but is an important step in this direction.

Sincerely Yours,

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¹⁰ <https://www3.epa.gov/climatechange/EPAactivities/economics/scc.html>