Transportation Conformity White Paper

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Prepared for:

Association of Metropolitan Planning Organizations (AMPO)

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Disclaimer

This White Paper was developed based on many discussions with the AMPO Air Quality Work Group. The contents of this Paper do not necessarily represent the views or position of any specific MPO or AMPO.

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Executive Summary

It has been more than 30 years since the 1990 Clean Air Act Amendments (CAAA) were enacted which included the transportation conformity requirements. The CAAA was intended to help States and regions to attain the public health-based National Ambient Air Quality Standards (NAAQS) and the MPOs that participated in this project support the need to reduce pollution and the role that transportation conformity plays in reducing on-road mobile source emissions.

This paper was prepared for the Association of Metropolitan Planning Organizations (AMPO) Air Quality Work Group to share information and inform decision makers on timely transportation conformity issues. Congressional reauthorization of a transportation infrastructure bill will be needed soon, and it is a good time to discuss current and emerging issues, challenges and lessons learned in the transportation conformity process.

This White Paper addresses five conformity-related issues as follows:

1) Modeling for regional emissions analysis and the relationship to air quality monitor data
2) Conformity requirements for same pollutant but multiple NAAQS (e.g., 2008 and 2015 ozone NAAQS, 2006 and 2012 PM2.5 NAAQS)
3) Transition to the latest emission model
4) Cost of and time needed to meet conformity requirements
5) Regionally Significant Projects

For each issue, this paper discusses the specific conformity requirement, challenges and conformity in practice, and lessons learned. These have been longstanding issues and could be addressed in a variety of ways to make the conformity process more efficient. Lessons learned and possible next steps could include:

- Public officials need to understand that modeling for regional on-road emissions to meet conformity requirements is completely different than air quality monitoring in a region. So, even though conformity requirements are being met, this is no guarantee that the region will attain the NAAQS on schedule.
- Conformity to multiple NAAQS for the same pollutant – develop legislative language to amend the CAAA so that conformity requirements apply only to the most recent NAAQS for each pollutant.
- Transition to latest emissions model – develop legislative language to require that SIP motor vehicle emission budgets be updated at the MPO request using a new emissions model prior to requiring use of the new model in conformity.
- Cost of and time needed to meet conformity requirements – The true costs of conformity are not known; there is a significant gap between EPA's cost assumptions and reality. If public officials want to know these costs, Congress could require a study be done that includes conformity practitioners.
- For regionally significant projects, the development of screening criteria or guidance at the MPO level has helped several MPOs by providing for a consistent review of projects to determine whether they are regionally significant.

Background

More than thirty years ago, on November 15, 1990, President George H. W. Bush signed the Clean Air Act Amendments (CAAA)[1]. Included in the CAAA were new requirements for the reduction of on-road mobile source emissions. These included CAAA Section 176(c) which put limitations on Federal (financial) assistance for activities that do not conform to an approved State Implementation Plan (SIP). The language in the CAAA describes conformity to an implementation plan as meaning:

(A) "Conformity to an implementation plan's purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards and achieving expeditious attainment of such standards; and

(B) That such activities will not---

a. *Cause or contribute* to any new violation of any standard in any area.

b. *Increase the frequency or severity* of any existing violation of any standard in any area; or

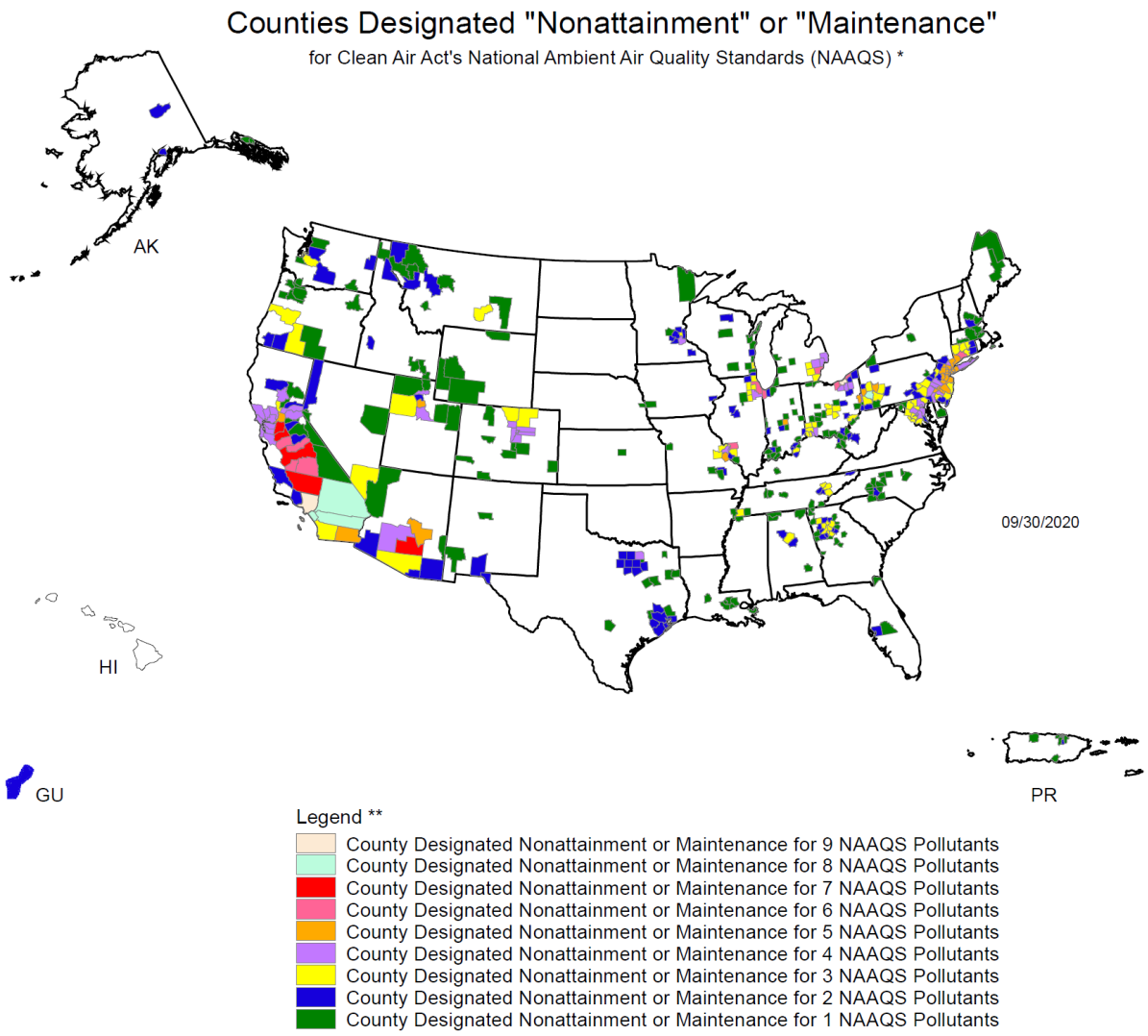
c. *Delay timely attainment of any standard* or any required interim emission reductions or other milestones in any area." *[emphasis added]*

The first transportation conformity regulation was issued by U.S. Environmental Protection Agency (EPA) on November 24, 1993 (40 CFR Parts 51 and 93). The conformity regulation has been amended fourteen times over the years with the latest amendments in 2012 with the conformity restructuring regulation. See Attachment A for a chronology of conformity rule amendments. For an overview of the conformity requirements, see: Basic Guide to Transportation Conformity.

In 2018, EPA estimated that approximately 109 MPOs[2] in 38 States were required to meet the transportation conformity requirements. According to EPA's Green Book, as of September 30, 2020 there were 129.7 million people living in 200 nonattainment areas. Of this, there are 169 nonattainment areas for ozone, PM2.5, and PM10. There are also approximately 76 carbon monoxide (CO) maintenance areas and maintenance areas for ozone, PM2.5, and PM10. Exhibit A below shows a map of all nonattainment and maintenance counties as of September 30, 2020. Note, some nonattainment and maintenance areas are partial counties which must be considered in the conformity process.

[1] The Clean Air Act (42 U.S.C. 7401–7626) consists of Public Law 159 (July 14, 1955; 69 Stat. 322) and the amendments made by subsequent enactments.

[2] According to EPA ICR Notice, Federal Register, November 19, 2018, pg. 58249.



Purpose

This paper was prepared for the Association of Metropolitan Planning Organizations (AMPO) Air Quality Work Group to share information and inform decision makers about timely transportation conformity issues. There have been many lessons learned over thirty years of conformity in practice. Reauthorization of a transportation infrastructure bill will be needed by Congress soon and it is a good time to discuss current and emerging issues, challenges and lessons learned in the transportation conformity process.

Key Conformity Issues

The AMPO Air Quality Work Group which includes more than 30 MPOs, identified several conformity issues and decided to explore five issues in this paper. For each issue, this paper addresses:

- **the conformity requirement,**
- **challenges and conformity in practice, and**
- **lessons learned**.

The sources of information used to develop this paper included: discussions, examples, and contributions from AQ Work Group members; AASHTO/AMPO responses to Information Collection Requests (ICR) from EPA in 2004, 2011, 2015, and 2018; a Spring 2019 survey of MPOs; and experience working with transportation conformity since 1990. The issues addressed in this paper are:

1) Modeling for regional emissions analysis and the relationship to air quality monitor data
2) Conformity requirement for same pollutant but multiple National Ambient Air Quality Standards (NAAQS) (e.g., 2008 and 2015 ozone NAAQS, 2006 and 2012 PM2.5 NAAQS)
3) Transition to the latest emission model
4) Cost of and time required to meet conformity requirements
5) Regionally Significant Projects

Modeling for Regional Emissions Analysis and Relationship to Air Quality Monitor Data

Overview of conformity requirement

The transportation conformity regulation includes specific regional emissions analysis requirements for estimating on-road mobile source emissions. These are discussed below and are based on the pollutant and severity of pollution in the nonattainment or maintenance area.

Network-Based Modeling Requirements

The rule includes six, specific network-based travel modeling requirements (§93.122(b)) and use of the latest emissions model. These requirements must be met as part of conformity determinations in areas classified as serious and above for ozone[3] and serious carbon monoxide (CO) areas. Marginal and moderate ozone areas, PM2.5 and PM10 areas and CO maintenance areas must use the latest emissions model but are not subject to the network-based modeling requirements unless they had already been using network-based travel demand models in their planning prior to being designated as a nonattainment area. As a practical matter since modeling tools have evolved substantially over the past 30 years most nonattainment and maintenance areas are using network-based travel models and therefore must meet these six requirements. The specific requirements for different areas are shown below.

Requirements for serious and above ozone areas and serious CO areas (§93.122(b)

Serious and above ozone areas and serious CO areas must meet the six, specific network-based travel modeling requirements shown below.

1. Validation against observed counts for base year not more than 10 years prior to conformity determination
2. Document model assumptions such as land use, population, and employment
3. Consistent land development scenarios and future transportation alternatives
4. Capacity-sensitive assignment method must be used and, emissions estimates must be based on peak and off-peak volumes and speeds
5. Feedback – ensuring that the model considers the impact of demand on speeds and congestion when it assigns trips throughout the network
6. Sensitivity to time, cost, and other factors affecting travel choices

In addition to the 6 modeling requirements listed above, these areas are also required to:

- Estimate traffic speeds and delays using reasonable professional practice

[3] Ozone areas are classified as: marginal, moderate, serious, severe, and extreme.

- Vehicle Miles Traveled (VMT) must be calibrated to Highway Performance Monitoring System (HPMS) or local traffic counts or other procedures subject to interagency consultation.

Requirements for all other areas

Requirements for all other areas including PM2.5, PM10, CO maintenance, and marginal and moderate ozone areas that are not subject to network-based travel modeling requirements, emissions analysis may use best professional practice in estimating VMT growth (40 CFR 93.122(d)). However, as noted above, these areas must use network-based travel modeling procedures for regional emission analysis if those procedures have been the practice of the MPO prior to being designated nonattainment. All areas must meet the requirements below:

- Regional analysis must include all travel (§93.122(a)(1)),
- Regional analysis must be consistent with SIP for temperatures and similar factors (§93.122(a)(6)), and
- In PM10 and/or PM2.5 areas, meet PM10 and PM2.5 construction-related fugitive dust requirements in regional emissions analysis, as applicable under (§93.122(e)) and (§93.122(f)).

Limited Maintenance Plan Areas

Areas that have limited maintenance plans for a specific pollutant and NAAQS, are not required to conduct regional emissions analysis per 40 CFR §93.109(e) since these areas are not subject to conformity test requirements in 40 CFR 93.118 and/or 93.119 for that pollutant and NAAQS. In EPA's November 2018 Transportation Conformity Guidance for the South Coast Court Decision EPA discussed limited maintenance plans in detail. Projects in CO, PM10 or PM2.5 areas with limited maintenance plans would be subject to any applicable hot-spot requirements.

All limited maintenance plan areas must meet the conformity requirement for interagency consultation, including opportunities for public comment, and demonstrate fiscal constraint which is a Federal (FHWA and FTA) planning requirement[4].

1997 Ozone NAAQS Orphan Areas

Orphan areas were defined by the Court in South Coast Air Quality Management District v. EPA ("South Coast II")[5] as areas that were:

1. Designated *maintenance* for the 1997 ozone NAAQS and *attainment* for the 2008 ozone NAAQS, at the time of the revocation of the 1997 ozone NAAQS (63 areas) and,
2. Designated *nonattainment* for the 1997 ozone NAAQS and *attainment* for the 2008 ozone NAAQS at the time of the revocation of the 1997 ozone NAAQS (9 areas).

Areas that meet the definition above are not required to conduct regional emissions analysis as part of transportation conformity. They need to show they have an interagency consultation process, including opportunity for public comment, and that they meet the fiscal constraint requirement of the transportation planning regulations. If the area has transportation control measures (TCMs) in an approved State Implementation Plan (SIP) then they need to show that TCMS are being implemented in accordance with the SIP.

EPA's November 2018 Transportation Conformity Guidance for the South Coast Court Decision explains that regional conformity test requirements do not apply to 1997 ozone areas because the 1997 ozone standard was revoked on April 6, 2015 and under 93.109(c) a regional emissions analysis is not required after a NAAQS is revoked.

[4] FHWA/FTA Planning Regulation.

[5] United States Court of Appeals for the District of Columbia Circuit, 882 F. 3d 1138.

Challenges and Conformity in Practice

In practice MPOs are finding that, although they can meet transportation conformity requirements for regional emissions analysis, the air quality monitors in their regions are measuring pollutant concentrations that continue to exceed the NAAQS. This is because **air quality monitors are measuring real-time pollutant concentrations[6] for all sources of emissions while regional emissions analysis requires estimating on-road emissions from the attainment year to at least 20 years in the future.** Air quality monitors also measure weather patterns including air flow. For example, at the Lake Michigan Air Directors Consortium (LADCO) which is based in Chicago, work is underway to better understand air flows over Lake Michigan and how this impacts ozone concentrations at various times of day.

While there is no way to compare air quality monitor data with regional emissions analysis results and this is not a conformity issue, per se, it understandably causes confusion. Two related issues were discussed by MPOs: 1) modeled emissions are below budgets, and 2) models do not reflect real-world conditions very well.

Regional emissions analysis and air quality monitoring are vastly different processes and cannot be compared. **Conformity only looks at on-road emissions and air quality monitors measure the area's air pollutant concentrations.** This presents a challenge to MPOs to explain to public officials who ask:

Why is our region failing to attain the NAAQS on schedule, yet the transportation conformity (regional emissions) analysis shows on-road mobile source emissions are below SIP motor vehicle budgets?

Modeled emissions are below budgets

Many MPOs are modeling emissions that are significantly below their motor vehicle emissions budgets in the State Implementation Plan (SIP). So, policy officials need to understand that even though the on-road mobile sector is doing its part to reduce emissions, real-world monitoring data is understandably sending different signals and raising legitimate questions.

One way that this issue manifests itself in the conformity process is illustrated by the eleven 2008 moderate ozone nonattainment areas that were required to attain the 2008 NAAQS by July 20, 2018. These areas met all their conformity requirements. However, since these areas did not attain the 2008 ozone NAAQS by that date, under CAAA Section §181(b)(2) EPA was required to take action. This resulted in a bump-up and reclassification of some of these areas to serious, the next highest classification. On November 7, 2018 EPA determined that two of the areas, Baltimore, MD and Mariposa County, CA attained the NAAQS by the required date. Two additional areas (Denver-Boulder-Greeley-Ft. Collins-Loveland, CO; and Sheboygan County, Wi.) applied for and were granted a 1-year extension of the attainment date to July 20, 2019. Subsequently, EPA bumped up the Denver region to serious in September 2019. The remaining areas were bumped up, reclassified as serious, and given until July 20, 2021 to attain the 2008 ozone NAAQS. These areas were:

1) Chicago-Naperville, Il-IN-WI
2) Dallas Ft. Worth, TX
3) Greater Connecticut, CT
4) Houston-Galveston-Brazoria, TX
5) Nevada County, CA
6) New York-N. New Jersey-Long Island, CT-NY-NJ
7) San Diego County, CA
8) Denver-Boulder-Greeley-Ft. Collins-Loveland, CO (added 9/19)

[6] An example of up-to-date ozone monitor data can be found at Ozone design value predictor, a national map showing predicted and historical ozone design values on a county-by-county basis with links to daily ozone monitor data.

These areas met the conformity regional emissions analysis requirements with little difficulty, yet the regions did not attain the 2008 ozone NAAQS by the July 2018 attainment date. While it had nothing to do with conformity or with on-road emissions, regional officials need to understand that models used in regional emissions analysis provide *on-road emissions estimates from the attainment date to at least 20 years in the future* while air quality monitors *measure real-time pollutant concentrations and reflect underlying data from all emission source*s. So, it is no surprise that policy officials may be confused as to how conformity contributes to the real goal --- attainment.

Models do not reflect real-world conditions very well, air quality monitor data is real time

Another concern is that the emissions models used in transportation conformity do not account for many real-world factors that impact monitored data. Below are five examples of where models do not reflect real world conditions.

1) Fleet Data - For regional emissions analysis, MPOs must use the latest planning assumptions including vehicle and fleet data per §93.110 of the conformity rule. The fleet data is derived from state vehicle registration data and does not necessarily reflect vehicles operating within a nonattainment or maintenance area. For example, rental cars may be registered in a different region or state for business purposes, yet those rental vehicles may be traveling primarily in one region. Truck registration data also poses challenges because registration could be anywhere in the U.S., not necessarily in the nonattainment or maintenance area. And trucks from Canada and Mexico travel extensively in the U.S., especially in regions with ports or major rail hubs. Finally, travel demand models often do a poor job of validating against vehicle classification counts (getting the right percent trucks etc.).

2) Emission controls and effectiveness - Another reason for differences in modeling for conformity and the real world is assumptions about emission controls and their effectiveness. For example, the assumptions that heavy-duty trucks are meeting the applicable heavy-duty engine standards may not reflect real-world conditions. We know that some amount of intentional defeat and/or tampering with emissions control devices on heavy duty trucks occurs, the extent of which is unknown and varies nationally.

3) Fleet age – Fleet age is another issue. As noted previously, the fleet data used in emissions modeling is derived from state vehicle registration data. The age profile is maintained throughout the emissions projections. For example, the age profile used in modeling in 2020 is reflected in modeling year 2040 which is required for regional emission analysis and project level analysis. However, actual age of vehicles can change. For example, during a recession, fewer vehicles are purchased and the overall fleet age increases. This is impossible to predict and impacts real world emissions.

4) Local Road Classification - The MOVES model lumps local roads with arterials and applies the same truck percentage to both. A challenge with local roads is that they are not included in the travel demand model (TDM). The TDM uses traffic analysis zones (TAZ) which are a subset of a census tract and includes homes, businesses, roads, and transit facilities all identified as a node or point in the TDM. The vehicle activity in the TAZ is equated to local road traffic reported in the HPMS system even though local road lengths or traffic volumes in the TAZ are not accurately known.

   Also, the EPA definition of a local road as used in MOVES refers to the function (access) of the road, but the definition of local road in state HPMS data is more about the ownership of the road (local government as in county or city as opposed to a state for federal facility). Traffic volumes reported to HPMS for local roads are often not actual measurements but a percentage of the traffic volume of a nearby state facility – and the volume on that nearby state facility is likely an estimate only based on a few traffic count samples.

5) VMT estimates - Nowhere in the vehicle emission estimating process is there a quality control check to compare VMT estimates with public records of fuel sales, or registration records of odometer readings.

Lessons Learned

There is little the MPOs and state DOTs can do to remedy the issues discussed above but there are some possible ways to explain the issues to policy makers. Four possible actions include:

1) Communicate to policy makers that we cannot compare air quality monitor (concentration) data to on-road regional emissions estimates because:

- *The monitoring data inherently includes emissions from all sectors, but regional emissions analysis includes only on-road vehicle emissions*
- *The monitoring data includes real-time and historical data, the regional emissions estimates are simply projections from the attainment date to at least 20 years into the future.*

2) Provide information on overall emission reductions per EPA Trends Report, 2019. As shown in Table 1 below, on-road mobile source emissions nationwide as a percentage of total emissions have declined for each major transportation pollutant from 1990-2018. For example, VOC emissions from on-road mobile sources declined from 41 percent of total emissions in 1990 to 12 percent in 2018.

Table 1: Air Quality Trends (million tons)
On-road mobile sources as % of total emissions 1990-2018

Pollutant	1990 on-road mobile source emissions	1990 Total all sources emissions	On-road % of Total 1990 Emissions	2018 on-road mobile source emissions	2018 Total all sources emissions	On-road % of Total 2018 emissions
NOx	9.6	25.2	38%	3.3	10.2	32%
VOCs	9.4	23.1	41%	1.6	13.5	12%
CO	110.3	143.6	77%	17	47.7	36%
PM10	.4	3.2	13%	.2	2.4	.08%
PM2.5*	.2	2.6	.08%	.1	1.6	.06%

*PM2.5 numbers are from 2000 to 2018
Source: https://gispub.epa.gov/air/trendsreport/2019/#home

Another way to communicate progress on emission reductions is to visualize this progress as shown in Figure 1 below. The green section represents highway vehicle emission reductions from 1990-2018. Note: these charts do not include Area Sources which include residential sources (heating), small engines, commercial heating and processes, surface coatings, solvents, consumer products, etc. On-road emissions have declined due primarily to regulations on engine technologies and fuels.

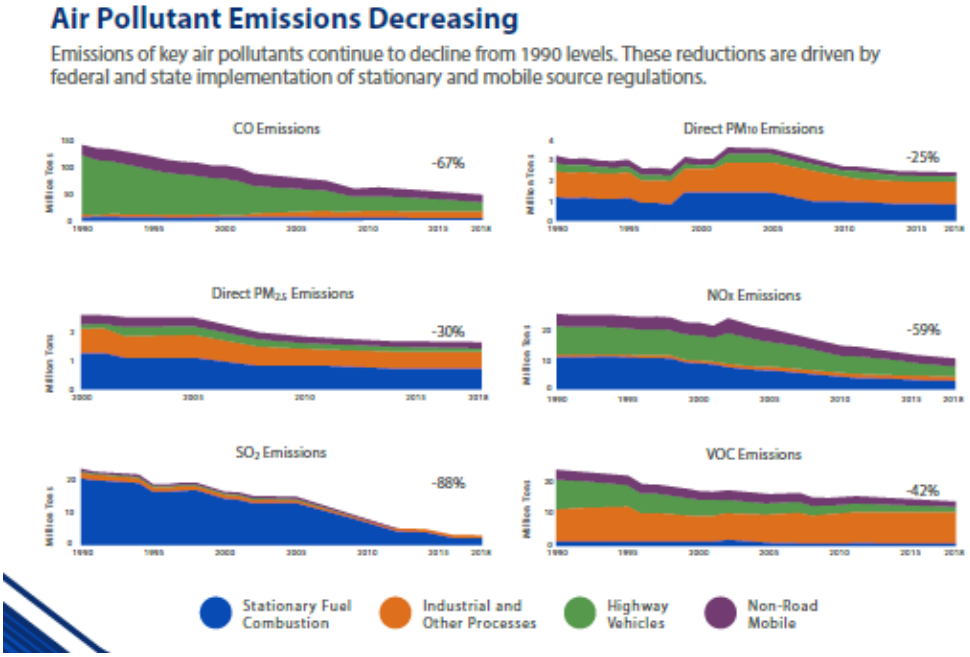


FIGURE 1

3) Identify any remaining levers to get further reductions from on-road mobile sources. On-road emissions have declined so dramatically due to fuel and engine technologies that it is difficult finding additional reductions from this sector.

4) Acknowledge that emission reductions in other sectors (e.g., non-road mobile sources) may be considerably more cost-effective than on-road measures; on-road emissions have been reduced so much that additional reductions may be increasingly costly. Nevertheless, mobile source emission reductions are an important part of some SIPs.

Conformity requirement for same pollutant but multiple NAAQS

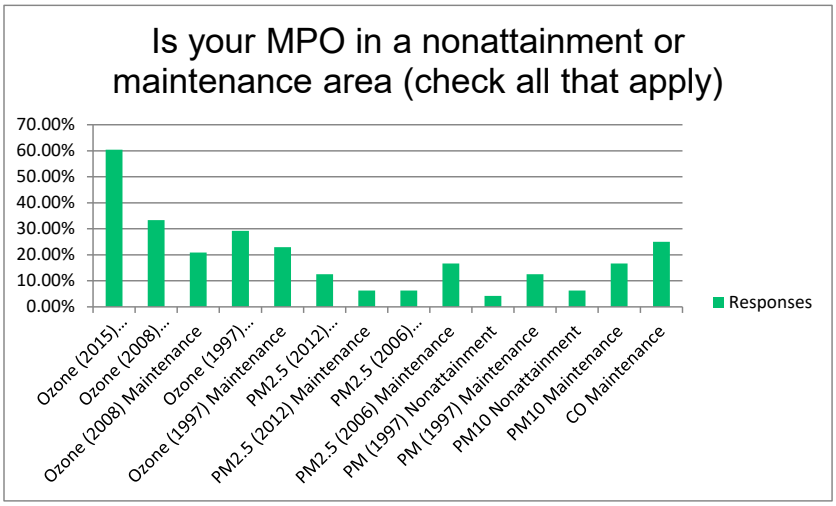
Overview of Conformity Requirement

According to the CAA and §93.102(b) of the conformity rule, conformity requirements apply in all nonattainment and maintenance areas for transportation-related pollutants for which the area is designated nonattainment or maintenance. This applies to ozone (O3), carbon monoxide (CO), nitrogen dioxide (NO2), PM10 particles less than 10 micrometers/cubic meter; and particles less than or equal to 2.5 micrograms/cubic meter (PM2.5). The requirements also apply to precursor pollutants including volatile organic compounds (VOCs) and NOx in ozone areas, VOCs and NOx in PM areas, VOCs, sulfur dioxide (SO2) and/or ammonia (NH3) in PM2.5 areas. Additionally, some areas must meet transportation conformity requirements for multiple NAAQS (e.g., 1997, 2008, 2015 ozone NAAQS).

The effect of this requirement is that areas can be required to conduct the conformity regional emissions analysis for many different years for different NAAQS for the same pollutant. In a survey of MPOs taken in April 2019, the 48 respondents had 131 nonattainment or maintenance areas in their MPO regions for an average of 2.73 nonattainment or maintenance areas per MPO. See Exhibit B. The survey did not get specific information, but we know that many MPOS are addressing multiple ozone and PM NAAQS. As noted above, for each NAAQS and for

each pollutant, there will be different attainment years, there may be different analysis years, different years when motor vehicle budgets apply, and different nonattainment boundaries.

EXHIBIT B



EPA includes several examples on how to meet conformity requirements for more than one ozone NAAQS at Transportation Conformity Guidance for 2015 Ozone NAAQS Nonattainment Areas, June 2018. The complexity of the analysis all depends on nonattainment boundaries for each NAAQS (which can be smaller, larger, the same, or overlapping), whether the nonattainment area is multi-jurisdictional (more than one MPO and/or more than one state), and other factors. So, while there may be some efficiencies possible in areas with multiple NAAQS for the same pollutant, there is no guarantee that will be the case.

The Houston Galveston Area Council (HGAC) MPO region is a 2008 ozone nonattainment area with an eight-county boundary and is also a 2015 ozone nonattainment area with a six-county boundary. Through interagency consultation and use of the EPA Guidance, the HGAC agreed on how they would meet the conformity requirements for both ozone NAAQS most efficiently. See Transportation Air Quality Conformity Report for the Houston-Galveston-Brazoria Region: 2045 Regional Transportation Plan.

Challenges and Conformity in Practice

This requirement that nonattainment areas do conformity for multiple NAAQS for the same pollutant is especially unnecessary because to-date, the most recent NAAQS has always been more stringent than the previous NAAQS. **It makes little sense for areas to demonstrate conformity to an older NAAQS when a newer NAAQS is more protective of public health and the area attains that newer NAAQS.** This was particularly frustrating with the 1997 ozone NAAQS where more than 80 areas had to demonstrate conformity for the 1997 ozone NAAQS after the South Coast Court Case[7], *even though these areas attained the 2008 ozone NAAQS which was more stringent*. Although the time and costs associated this specific requirement may not be high because areas no longer need to do regional emissions analysis, most MPOs agreed that this requirement may have no air quality benefit.

Lessons Learned

The workload associated with meeting these regulatory (§93.120(b)) and Court mandated (882 F, 3d1138 South Coast Air Quality Mgmt. District v EPA) ("South Coast II, "), 882 F.3d 1138 requirements is substantial and there is a

[7] United States Court of Appeals for the District of Columbia Circuit, 882 F. 3d 1138.

real question about whether this specific requirement adds any value to the transportation and air quality planning process or to attainment or maintenance of the NAAQS. **One recommendation is that conformity should only apply to the most recent NAAQS for which the area violates the standard, not old and outdated NAAQS.** This would require legislation but would make the conformity process much more efficient.

Transition to the Latest Emissions Model

Overview of Conformity Requirement

Under the conformity regulation, the latest emissions model must be used for regional emissions analysis (§93.111) and project level hot-spot analysis (§93.123). EPA, in consultation with DOT, can establish a grace period between 3 to 24 months for transition to a new emissions model per §93.111(b)(1). EPA made an exception to this in the transition period to use of MOVES2010 and provided a one-year extension, resulting in a grace period of three years to transition to the new model.

Challenges and Conformity in Practice

The three-year transition was needed because of the significant technical differences between MOVES2010 and the previous emissions model MOBILE6.2. This resulted in substantial differences in emissions estimates between the two emissions models. Many areas found that if they transitioned to MOVES2010, they would not be able to pass the regional emissions analysis tests because the MOVES model showed much higher emissions. MPOs were at risk of exceeding the motor vehicle emissions budgets which had been developed with the MOBILE model and unable to make a conformity determination. While this example is nearly ten years old, each time EPA transitions to a new emissions model the same issues arise, although with differing degrees of impact depending on specific model changes.

In practice, the SIP motor vehicle emissions budgets must use the latest planning assumptions and emissions model *at the time of SIP development*. The budgets age over time because SIPs only need to be revised as needed; there is no update requirement. For example, a motor vehicle budget developed to meet the 1997 ozone NAAQS was likely developed in the 1990s, over 20 years ago. Regional emissions analysis must also use the latest planning assumptions and emissions model but must be updated *no less frequently than every four years*. **Thus, SIP budgets can become old and, as time goes by, the assumptions used in the SIP budgets get further and further from the updated assumptions required to be used in conformity determinations.**

One example is in the Baltimore region which is a marginal 2015 ozone area, a moderate 2008 ozone area, and a serious 1997 ozone area. The most recent conformity determination demonstrates conformity to the 1997 ozone NAAQS, the 2008 ozone NAAQS, and the 2015 ozone NAAQS using the 2012 8-hour ozone Reasonable Further Progress (RFP) SIP budget[8]. MPOs that use budgets that were developed years ago for a different NAAQS (e.g., 1997 ozone NAAQS) with a different emissions model may face significant challenges as they attempt to demonstrate conformity for the 2008 and 2015 ozone NAAQS.

The fact that the latest emissions model produces different emissions estimates than the previous model presents challenges for MPOs every time EPA updates the emissions model. This has been a continuing problem since the mid-1990s and has been especially disruptive when the new model is substantially different from the model used to develop the motor vehicle emissions budget in the SIP (as was the case in transitioning to MOVES from MOBILE6.2). One example is in Texas where one model change showed an increase of NOX emissions of 30-50% over the previous model thereby requiring areas to get a SIP motor vehicle budget revision using the new model, in order to proceed with regional emissions analysis. This caused a long delay in the MPO being able to make a conformity determination.

[8] https://www.baltometro.org/sites/default/files/bmc_documents/general/environment/conformity/20-23TIP_conformity_determination.pdf

In Clark County, NV the MPO, the Regional Transportation Commission of Southern Nevada (RTC), had a 2013-2035 Regional Transportation Plan (RTP)/2013-2018 Transportation Improvement Program (TIP). They also had Ozone Maintenance Plan budgets for NOx and VOCs that were developed by the Clark County Department of Air Quality (DAQ) using MOBILE6. The budgets took effect in 2013 and replaced budgets in the Ozone Early Progress Plan. The area was in attainment for the 2008 ozone NAAQS and the region did not have to do conformity for the 1997 ozone NAAQS after the revocation of the 1997 ozone NAAQs in 2013. Subsequently, due to the decision in 2018 in the South Coast[9] case, the region was considered an orphan area and had to go back and demonstrate conformity for its 2018 TIP amendments before February 2019. Due to the change in models, the 2015 NOx estimates from MOVES were more than twice the estimates from MOBILE6. As Table 2 shows, for 2022 the RTC exceeded its emissions budgets for NOx and therefore a conformity determination could not be made.

Table 2. Clark County, Nevada Maintenance Plan - NOx Budget

Precursors (tons/day)	2008 Base	2015 Base	2022 Attainment
NOx	68.46	34.69	23.15
RTC Model Results	63.01	34.13	**31.00**

In a letter to EPA and Clark County DAQ, the RTC described this situation and the potential impact on planned $580 million in 2018 TIP amendments in the event of an anticipated conformity lapse. The MPO said:

> "From a fairness perspective, requiring compliance with a standard (NAAQS) that was established using one modeling tool, while also requiring the use of a different tool—with different internal methodology---for calculating emissions is inappropriate. At a minimum, if this court case requires that the 1997 standard still be met, a sufficient period of time should be provided for air quality agencies to establish new budgets using the latest required modeling tools so that the planning agencies have an accurate understanding of the target they are required to meet, the current best estimates for emissions, and an opportunity to determine how best to comply with the emission requirement.[10]"

At the request of the RTC and Clark County DAQ, EPA allowed Clark County DAQ to revise the ozone maintenance plan budgets using the MOVES model and this conformity issue was resolved. The area has subsequently been redesignated as marginal for the 2015 ozone NAAQS, has passed the motor vehicle emissions budget tests, and is no longer required to do regional emissions analysis for the 1997 ozone NAAQS.

Lessons Learned

The latest emissions model that is required in 49 states for use in conformity has changed nine times since 1993[11]. The model required in California, the emissions factors model (EMFAC), has also changed at least nine times[12] since 1993. The transition to a new emissions model has been a continuing problem for nearly 30 years with no expected resolution. Also, because motor vehicle emissions budgets do not have to be updated with new emissions models, the use of old budgets to demonstrate conformity for newer NAAQS also poses challenges.

The most effective way to remedy this is to develop legislative language that would provide an option for an MPO to require that motor vehicle emissions budgets from SIPs be updated using a new emissions model prior to requiring use of the new emissions model for regional emissions analysis and project level conformity. (Note that, in some cases, new emissions models estimate less emissions for a particular pollutant so an option may be more

[9] United States Court of Appeals for the District of Columbia Circuit, 882 F. 3d 1138.
[10] Letter from RTC of Clark County DAQ and EPA
[11] MOBILE5 and 5a-1993; MOBILE5b-1996; MOBILE6.0-2002 and 2004; MOVES2010; MOVES2010a; MOVES2010b; MOVES2014.
[12] EMFAC7F1996, EMFAC7G1998, EMFAC2000, EMFAC2001, EMFAC2002, EMFAC2007, EMFAC2011, EMFAC2014, EMFAC2017.

appropriate than a mandate.) This would: 1) ensure that motor vehicle emissions budgets are developed with the same emissions model used in conformity, and 2) ensure that budgets are occasionally updated. This would provide transportation agencies much more certainty and predictability in the conformity process.

Cost of and Time Needed to Meet Conformity Requirements

The U.S. Environmental Protection Agency (EPA) has issued several Information Collection Requests (ICRs) on the cost of transportation conformity in accordance with the Paperwork Reduction Act. ICRs were issued in 2004, 2011, 2015 and 2018. Each time that EPA has issued an ICR, the American Association of State and Transportation Officials (AASHTO) has responded to EPA (AMPO has also signed on to AASHTO's comment letters) on the accuracy of its estimated burden of the conformity process[13]. All four of AASHTO's responses have noted the significant gap between EPA's estimated costs and actual conformity costs. The most recent ICR request noticed in the Federal Register was July 18, 2019 (See FR Vo.84, No. 138, Thursday, July 18, 2019). The Docket for all the ICR requests is at: ICR DOCKET.

In the July 18, 2019 ICR submittal from EPA to OMB for approval, EPA estimated that the total annual cost of the conformity process to be $3,094,989 nationwide, or 48,671 hours per year. EPA estimated that 109 MPOs need to meet the conformity requirements. This would be about $28,000 per MPO per year; 440 hours per year at a rate of $63.66 per hour[14] including benefits. As noted in extensive comments from AASHTO members in 2004, 2011, 2015 and 2018, the EPA estimates of conformity costs are grossly underestimated. This is due in part to EPA's assumptions about how frequently MPOs must meet conformity requirements.

Overview of Conformity Frequency Requirements

The transportation conformity rule includes frequency requirements at 93.104 for a conformity determination as summarized in Attachment B. The rule requires that the conformity determination be updated not less frequently than every four years. Also, conformity must be determined every time a Long-Range Plan or Transportation Improvement Program (TIP) is updated or amended with non-exempt projects. In a few cases, a new regional emissions analysis is not required per 93.122(g). But, in every case, in every nonattainment or maintenance area, other conformity requirements such as interagency consultation and opportunity for public comment must be addressed. Finally, conformity must be determined within 24 months of certain SIP actions and within 12 months for new nonattainment areas.

Challenges and Conformity in Practice

The most significant problem with EPA cost estimates is that: "**EPA included the cost associated with meeting the minimum requirements, and therefore assumed that only one transportation plan or TIP conformity determination will be done for each MPO every four years in nonattainment and maintenance area**s". The one recent exception is that for MPOs designated nonattainment or maintenance for 3 or more NAAQS, EPA assumes this frequency to be once every 3 years.[15]" This one exception was added to the 2018 ICR.

How Big is the Gap Between EPA Assumptions and Reality?

As noted in comments to EPA since 2004, a systematic and thorough analysis of conformity costs would need to be done with full participation by state DOTs and MPOs as well as state air agencies and other agencies required to participate in the conformity process. Multiple offers to develop a full understanding of conformity costs by AASHTO and AMPO have not been accepted by EPA, so this paper provides a discussion on why the EPA assumption on frequency of conformity determinations and thus the time and costs of transportation conformity are remarkably off-base.

[13] See AASHTO and AMPO comments in ICR DOCKET: January 17, 2019; September 21. 2015; April 8, 2011; March 4, 2004.
[14] One of AASHTO's most basic comments was that this rate should be $100 per hour.
[15] See EPA, Supporting Statement for EPA Information Collection Request No. 2130.06 (November 2018).

One way to understand costs associated with conformity is to look at the different types of costs that are incurred to meet the conformity requirements. These include:

1) ongoing costs to meet the frequency requirements of the rule,
2) emissions model implementation costs,
2) costs of regional emissions analysis,
3) state DOT costs to support and coordinate conformity activities within each state, and,
4) state air or environmental agency staff activities in conformity activities.

For each of the costs above, apart from state air agency costs, we describe specifically what costs are incurred as part of meeting the conformity requirements. State air agencies are best equipped to know about their costs related to transportation conformity and should be consulted for this information.

Ongoing costs to meet frequency requirements

First, the EPA assumptions about frequency of conformity determinations are not supported. Many MPOs do at least one conformity determination each year that requires a full regional emissions analysis. Every Plan and TIP conformity determination must be reviewed through the required interagency consultation process, including the opportunity for public comment, even if new emissions modeling or regional emissions analysis is not required under 93.122(g) of the rule. Given that some areas do conformity even twice a year or more, **at a minimum, EPA should assume at least one conformity determination per year for every MPO where conformity requirements apply, including all costs of interagency consultation** and public involvement.

In the April 8, 2011 AASHTO response to the ICR,

> *"This approach grossly underestimates the burden hours because most areas complete new conformity determinations on their plans and TIPs on an annual or two-year cycle. As an example, data indicates that the average frequency of conformity analyses across all Pennsylvania MPOs and Rural Planning Organizations (RPOs) is 0.81 instances per year, or 3.25 times in the most recent 4-year cycle. This far exceeds EPA's estimate in the ICR. The largest agencies, with the most pollutants subject to conformity, are performing a conformity analysis, on average, at the rate of 1.13 per year, or nearly 4 ½ analyses in the 4-year cycle assumed by EPA in the ICR."*

Emissions Model Implementation Costs

The costs associated with emissions modeling are solely because of the conformity requirements. EPA's estimates do not include a multitude of costs that are incurred in the transition to any new emissions model. These costs include:

- computer hardware and software,
- data collection costs (e.g., vehicle data, latest planning assumptions, etc.),
- training costs,
- time to ramp up to efficiently run the model,
- development of pre-and-post MOVES processors,
- conversion of data used in one model platform to a new model platform,
- development of new data where needed, sensitivity analysis, and,
- processing and aggregation options to decrease model run times to manageable levels.

The costs of hardware are also underestimated by EPA. As one example, in the April 8, 2011 AASHTO comment letter on the ICR request, PennDOT estimated hardware costs to implement MOVES to be $1,820 per MPO > 200,000 population and $800 per MPO < 200,000 population, and $500 per rural area.

In the April 8, 2011 AASHTO comments on the ICR, labor implementation costs for transition to MOVES were estimated in Pennsylvania to be 146 hours for each small MPO and 344 hours for each larger MPO. Additional

information collected by AASHTO and AMPO from state DOTs and MPOs for MOVES implementation is significantly higher than EPAs estimates.

The Wasatch Front Regional Council (WFRC) in Utah noted that the costly transition from MOBILE to MOVES was understandable given that MOBILE was written in archaic Fortran. But it was a much more efficient tool. It now takes this MPO days to do with MOVES what took only minutes with MOBILE. This MPO said: "MOVES could be written to run much faster. It takes at least 45 minutes to run one county/year/season scenario. I have 7 non-attainment areas, 4 criteria pollutants each with their own critical meteorological conditions, and at least 4 analysis years. That is 112 separate runs of the MOVES model or about 80 hours of computing time. Then you get to summarize the 112 output files!" Plus, the staff had to learn MySQL coding and develop all new data input files and procedures. This MPO spent months on this, and it involved their travel demand modelers and computer coding expertise.

Costs of regional emissions analysis

These costs are associated with developing, maintaining, updating, and running travel demand models to meet the conformity requirements. Not all travel model costs are associated with conformity however, there are direct conformity-related costs. For example, while travel demand models have been used historically in transportation planning, conformity requirements place additional costs on travel demand modeling. The requirements include estimating future travel demand for specific analysis years throughout the life of the twenty-year (at a minimum) regional plan. Also, pursuant to conformity requirements travel demand models must be validated every ten years. In addition, there are ongoing costs and occasionally a new model or modeling platform will be introduced which requires a significant monetary investment. Additionally, the training and labor costs to become proficient in any new model should be considered.

As just one example, in the April 8, 2011 response to the ICR requests, New York State DOT and the New York Metropolitan Transportation Council (NYMTC), reported a cost of $3.2 million for travel demand model development and enhancement, $3.2 million for socio-economic and demographic forecasts once every 5 years, and $8.7 million for census data and travel surveys once every 10 years.

In NYMTC's State Fiscal Year (SFY) FY20-21 Unified Planning Work Program (UPWP)[16], the cost of regional analysis alone is $2.24 M. According to email exchanges with NYMTC staff, this does not include all other costs for conformity, which for SFY 20-21 total $12.73 M. For more information, the NYMTC UPWP provides a detailed breakdown of costs, which member agencies incur them, and discrete deliverables for each activity. While these costs are not representative of all areas, and some of these costs would be incurred without conformity requirements, there can be no question that there are costs to all areas in updating, replacing, or improving travel demand models to meet conformity requirements.

State DOT Costs to Coordinate and Support Conformity Activities

One other key element of costs that has not been accounted for in EPAs estimates are the costs incurred on an ongoing basis by state DOTs in supporting the conformity process. These costs vary depending on the state and in several states these costs are significant. In all states with nonattainment and maintenance areas, there are state DOT costs for, at a minimum, participation in interagency consultation which is required each time an MPO amends or updates a TIP or Plan. Also, state DOTs tend to be involved with project level conformity analysis which can be expensive and labor intensive. None of these costs are considered by EPA.

For example, in California there are seven full-time California Department of Transportation (Caltrans) employees dedicated to conformity work statewide. This does not include the costs of Caltrans employees involved in project-level conformity analysis for conformity. In Georgia, there is $125,000 set aside annually at Georgia DOT(GDOT) for

[16] https://www.nymtc.org/Required-Planning-Products/Unified-Planning-Work-Program-UPWP

conformity support. These examples and others, including the methodologies used the estimates, were included in AASHTO responses to ICR requests.

Additional examples include:

- Texas estimates an annual cost of $460,000 per year for each MPO region larger than 1 million and $725,000 per year for Texas DOT costs to support conformity.
- In California, ongoing costs are estimated by Caltrans at $500,000 per year for each large region, $50,000-$150,00 for each small region, plus seven full time Caltrans staff. There are approximately twenty-six nonattainment and maintenance areas in California; these costs alone exceed EPA's estimates for the entire country.
- In the Washington, D.C. region, MPO costs are estimated at $400,000 per year not including costs incurred by MDDOT, VADOT, or DCDOT, all key agencies in the conformity process.

Lessons Learned

The lessons learned about conformity costs are: 1) they are grossly underestimated in each of EPA's ICRs from 2004, 2011, 2015, and 2018; 2) the gap between real costs being incurred to meet conformity requirements and the EPA ICR estimates is exceptionally large; and 3) a systematic and thorough analysis of conformity costs would require a coordinated effort by AASHTO (state DOTs), AMPO (MPOs), EPA, FHWA, FTA, and state air quality officials. Without such an effort, the true costs of meeting the conformity requirements will never be known.

It is important to note that while the AMPO Air Quality Work Group members agree that the true costs of conformity are unknown, some MPOs note that these costs also have benefits. For example, the required consultation process helps develop partnerships with air quality groups that otherwise may not exist. Also, MPOs note that those relationships can help in other aspects of their work including climate mitigation, greenhouse gas emissions analysis which can be done using MOVES, NEPA and environmental justice concerns. Where MPOs do conformity in-house (vs. with consultants) the staff level expertise is developed regarding air quality and air quality modeling and used on analysis other than that which is required for conformity. Also, conformity forces elected officials on policy boards to be cognizant of air quality issues that otherwise they may not have to understand or know about.

Regionally Significant Projects

Overview of Conformity Requirement

According to the conformity rule §93.122, which addresses procedures for determining transportation-related emissions, all regionally significant projects must be included in the regional emissions analysis. This includes non-federal projects. The conformity rule (§93.101) includes a definition of regionally significant project as follows:

> *Regionally significant project means a transportation project (other than an exempt project) that is on a facility which serves regional transportation needs (such as access to and from the area outside the region, major activity centers in the region, major planned developments such as new retail malls, sports complexes, etc., or transportation terminals as well as most terminals themselves) and would normally be included in the modeling of the metropolitan area's transportation network, including at a minimum, all principal arterial highways and all fixed guideway transit facilities that offer a significant alternative to regional highway travel. [emphasis added]*

Challenges and Conformity in Practice

Since all regionally significant projects regardless of funding source must be identified, some judgements must be made about projects that may not fit this broad definition. Several MPOs have worked with their interagency consultation groups to define more clearly what will be considered a regionally significant project in their

nonattainment or maintenance areas. For example, the North Central Texas Council of Governments (NCTCOG) has adopted a definition that includes freeways and tollways documented in the Metropolitan Transportation Plan, grade-separated interchange projects on regionally significant roadways where no access existed previously and defined Regionally Significant Arterials. See: NCTCOG Regionally Significant Projects.

The East-West Gateway Council of Governments (EWGCOG) in the St. Louis region has also adopted EWGCOG Regionally Significant Project Screening Criteria. This criteria is used by the interagency consultation group to determine which projects are regionally significant. The criteria include seven questions about projects to assist in making this determination. These include information about the project length, Annual Average Daily Traffic (AADT) on the roadway segment, whether the project adds significant vehicular capacity and other questions related to project scope.

Another MPO region indicated that they use the definition from the rule rather than adding their own definition which they would have to defend if challenged. To interpret the EPA definition this region considers the limits of the travel demand model and whether the details of the project would be reflected in the travel demand model results. For example, the travel demand model would produce different results if an interchange were added where none existed, but the model would have the same results if the interchange were a classical diamond or a single point urban interchange (SPUI).

Lessons Learned

The adoption of screening criteria or other means to identify projects that might be regionally significant even if they are not included in the conformity rule definition has helped areas to be consistent in their review of projects through the interagency consultation process and has reduced disruption caused by disagreements over what is or is not a regionally significant project.

Conclusions and Next Steps

This paper discusses five specific conformity challenges, conformity in practice, and lessons learned. These have been longstanding issues, and some can be addressed in a manner that would make the conformity process more efficient. Next steps could include the following:

- ✓ One issue raised in this paper relates to regional emissions analysis for conformity, air quality monitor data, and the relationship between the two. MPOs can communicate to public officials that even though on-road mobile sources are doing their part to reduce emissions pursuant to SIPs, areas may still not attain the NAAQS on schedule. This has nothing to do with transportation conformity. There is a need for better communication on this issue to reduce misunderstanding.

- ✓ Conformity requirement for same pollutant but multiple NAAQS – develop legislative language to amend the CAA to eliminate the requirement that conformity applies for every NAAQS, even for the same pollutant. The conformity requirements should only apply to the most recent NAAQS for each pollutant.

- ✓ Transition to latest emissions model – develop legislative language as noted in this paper so that SIP emission budgets would have to be updated at the MPO request using a new emissions model prior to requiring use of the new model in conformity. This would address model mismatch issues that impact conformity and ensure that motor vehicle emissions budgets are occasionally updated.

- ✓ Understanding the costs and time involved in meeting conformity requirements – if public officials want to know the cost and time involved in meeting conformity requirements, Congress could require a study be done that includes conformity practitioners who know the actual costs of all elements of the conformity process.

- ✓ For regionally significant projects, the development of screening criteria or guidance at the MPO level has helped several MPOs to provide consistent review of projects to determine whether they are regionally significant.

TRANSPORTATION CONFORMITY CHRONOLOGY OF FINAL RULE MAKINGS Note: For purposes of brevity, this table only includes Final Rulemakings. To see proposed rules and other related information go to: EPA List of Chronological Rulemakings	
DATE	**RULE TITLE AND LINK**
November 24, 1993	Final Rule: Criteria and Procedures for Determining Conformity to State or Federal Implementation Plans of Transportation Plans, Programs, and Projects Funded or Approved Under Title 23 U.S.C. or the Federal Transit Act (PDF)
August 7, 1995	Final Rule: Transportation Conformity Rule Amendments: Transition to the Control Strategy Period (PDF)
November 14, 1995	Final Rule: Transportation Conformity Rule Amendments: Miscellaneous Revisions (PDF)
August 15, 1997	Final Rule: Transportation Conformity Rule Amendments: Flexibility and Streamlining (PDF)
March 18, 1999	Final Rule: Transportation Conformity Rule Amendment for the Transportation Conformity Pilot Program (PDF)
April 10, 2000	Final Rule: Transportation Conformity Amendment: Deletion of the Grace Period (PDF)
July 28, 2000	Motor Vehicle Emissions Budgets in Attainment Demonstrations for the One-Hour National Ambient Air Quality Standard for Ozone (PDF)
August 6, 2002	Final Rule: Transportation Conformity Rule Amendments: Minor Revision of 18-Month Requirement for Initial SIP Submissions and Addition of Grace Period for Newly Designated Nonattainment Areas (PDF)
July 1, 2004	Transportation Conformity Rule Amendments for the New 8-hour Ozone and PM2.5 National Ambient Air Quality Standards and Miscellaneous Revisions for Existing Areas; Transportation Conformity Rule Amendments: Response to Court Decision and Additional Rule Changes
May 6, 2005	Transportation Conformity Rule that Addresses PM2.5 Precursors
March 10, 2006	Transportation Conformity Rule That Addresses Requirements for Project-level Conformity Determinations in PM2.5 and PM10 Nonattainment and Maintenance Areas
January 24, 2008	Transportation Conformity Rule Amendments to Implement Provisions Contained in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
March 24, 2010	Transportation Conformity Rule PM2.5 and PM10 Amendments
February 27, 2012	Transportation Conformity Rule: MOVES Regional Grace Period Extension
March 14, 2012	Transportation Conformity Rule Restructuring Amendments

ATTACHMENT B

FREQUENCY REQUIREMENTS FOR CONFORMITY

§40 CFR 93.104(b) requires:

- §40 CFR 93.104(b)(1) each new transportation plan must demonstrate conformity prior to approval by the MPO or acceptance by U.S. DOT,
- §40 CFR 93.104(b)(2) all plan amendments require a conformity determination unless the amendment adds or deletes exempt projects per 93.126 and 93.127, and,
- §40 CFR 93.104(b)(3) conformity on the plan must be determined not less frequently than every four years.

§40 CFR 93.104(c) requires:

- §40 CFR 93.104(c)(1) a new TIP must be demonstrated to conform before approval by MPO or acceptance by U.S. DOT,
- §40 CFR 93.104 (c)(2) A TIP amendment requires a conformity determination, unless the amendment adds or deletes exempt projects per 93.126 and 93.127.
- §40 CFR 93.104(c)(3) Conformity on the TIP must be done not less frequently than every four years.

§40 CFR 93.104(d) requires:

- Projects to be found to conform prior to adoption, acceptance, approval or funding.
- Conformity must also be redetermined under certain circumstances including:
    - Change in regionally significant project design concept or scope,
    - If three years lapse since a major step to advance a project, or,
    - Initiation of a supplemental EIS for air quality purposes.

§40 CFR 93.104(e) includes:

- Three SIP actions that also trigger the need to do a conformity determination within 24 months of;
    - A SIP motor vehicle emissions budget found adequate,
    - A SIP revision of a motor vehicle emissions budget, or,
    - A FIP with a motor vehicle emissions budget.