

## Caiazza Draft Scoping Plan Transportation Scenario Incremental Cost Comment

### Summary

This is a technical comment on a trivial problem and has no major bearing on Climate Act implementation. However, it raises a pervasive issue that needs to be addressed. All indications from the Climate Action Council meetings this year are that the plan for public involvement is simply going through the motions. There was no attempt to start identifying comments as they were submitted to determine if they rose to the level where the Council would have to address them specifically. Instead, Council leadership has insisted that they can only respond once the comment period closes. In addition, there is no provision for the kind of discrepancy documented here to be reconciled. While this problem is not a big deal, the terrifying prospect is that the issues associated with reliability raised at last summer's [Reliability Planning Speaker Session](#) could possibly be treated the same, that is to say ignored.

Every time I have dug into the numbers, the Draft Scoping Plans numbers are not a reasonable estimate compared to my work. I have consistently found that the Scoping Plan costs estimates are biased high and the benefits proposed are biased low. This is a specific example that shows that one of the conclusions for Scenario 4 is not correct.

In particular, this comment evaluated the transportation sector vehicle miles traveled difference between Scenarios 2 and 3 compared to Scenario 4 due to rail passenger improvements. The Draft Scoping Plan claims that "Incremental reductions from enhanced in-state rail aligning with 125 MPH alternative detailed in Empire Corridor Tier 1 Draft EIS" will provide a reduction of 200 million light duty vehicle miles at a per unit cost of \$6 per mile or \$1.2 billion. I estimate that the only valid cost for the difference between the rail alternatives is \$8.4 billion and that it would only provide a reduction of 64.7 million miles. While my estimate is for 2035, consistent with the Empire Corridor evaluation, and the Draft Scoping Plan is for 2050, I don't think there is any question that the numbers are inconsistent.

I conclude that the Final Scoping Plan must provide more detailed documentation because there is little reason to trust the cost estimates in the Draft Scoping Plan because of the pervasive issues I have found. I believe that the Final Scoping Plan documentation should provide sufficient information so that anyone can readily determine the costs and emission reductions for their particular concerns. In my opinion in order to fulfill this obligation, the Final Scoping Plan must describe all control measures, assumptions used, the expected costs for those measures and the expected emission reductions for the Reference Case, the Advisory Panel scenario and the three mitigation scenarios.

### Introduction

The Integration Analysis developed four scenarios to compare with a reference case that describes the New York energy system without the Climate Act. The first scenario is based on Advisory Panel inputs but did not meet the Climate Act targets. According to Appendix G, Integration Analysis Technical Supplement, Section I, page 13:

Transformative levels of effort are required across all sectors, and scenarios include high levels of electrification including Scenario 2, which also incorporates strategic use of low-carbon fuels. Scenario 3 pushes harder on accelerated electrification to meet the emission limits using a very low-bioenergy and low-combustion mix of strategies. Scenario 4 pushes beyond 85% direct reductions in 2050 by including use of some low-carbon fuels, examining very high VMT reductions, and assuming high (but also highly uncertain) levels of innovation in the waste and agriculture sectors. The Council expressly seeks feedback on the components of these scenarios of which detailed information can be found in the sector strategies portions of the sectoral chapters in this draft Plan.

This article describes only one component of the strategies. Make no mistake there is so much information presented and the documentation is so marginal that it is impossible to evaluate all the components in any detail. For this comment I addressed one aspect of the transportation sector plan. The attached [addendum to this article](#) consolidates relevant information in Appendix G, Integration Analysis Technical Supplement, Transportation in Section I starting on page 35 where the components of the transportation sector scenarios are described.

#### **Transportation Component Comment**

The mitigation scenarios reduce transportation emissions by reducing the miles traveled by vehicles, adoption of zero-emission vehicles, electrification of non-road sectors, and targeted low-carbon fuel use. Reducing energy consumption means that GHG emissions are reduced within the transportation sector.

When I evaluate a regulatory proposal my first step is to try to reproduce the proposal's numbers so that I can verify that the assumptions used are reasonable. Even though I limited myself to just the transportation sector there still are far too many aspects to consider them all. The scenarios proposed to reduce vehicle miles traveled using smart growth, expanded public transit, telework and demand management programs but all of those strategies are broader than I want to deal with at this time. I considered discussing the suggestion that there could be a "small role for electric aviation in decarbonizing short distance flights by 2050, and hydrogen aviation to decarbonize medium distance flights". The claim that "hydrogen and electric aviation displace 47% of remaining aviation fuel demand in Scenario 4" sets off my BS detector but I chose instead to use a different claim in this article to see if the numbers can be trusted.

In this comment I will address the enhanced transit & mobility claims related to the Scenario 4 alternative "Incremental reductions from enhanced in-state rail aligning with 125 MPH alternative detailed in Empire Corridor Tier 1 Draft EIS". In particular, I am only going to address the rail improvements measures shown in Table 11 of Appendix G: 200 million light duty vehicle miles can be reduced relative to Scenarios 2 and 3 at a per unit cost of \$6 per mile.

**Table 11. Transportation-related Incremental Costs Associated with Scenario 4**

Measure	Per-Unit Cost	Units	Sources <sup>57</sup>
VMT Reductions <sup>58</sup>	\$.0309/mile	14 billion LDV miles reduced relative to Scenarios 2/3 in 2050	\$/mile reduction costs based on Moving Cooler estimates
Rail Improvements	\$6/mile	200 million LDV miles reduced relative to Scenarios 2/3 in 2050	Empire Corridor Draft 1 Tier EIS
Electric and Hydrogen Aviation Infrastructure	\$30/MMBtu	60 Tbtu in 2050 [47% of all aviation energy consumption in 2050]	E3 analysis of white paper on hydrogen fueling infrastructure in EU

<sup>57</sup> Moving Cooler:

<http://www.reconnectingamerica.org/assets/Uploads/2009movingcoolerexecsumandappend.pdf>, accessed November 2021

[Empire Corridor Draft 1 Tier EIS](https://railroads.dot.gov/environment/environmental-reviews/empire-corridor): <https://railroads.dot.gov/environment/environmental-reviews/empire-corridor>, accessed November 2021

EU Hydrogen Aviation Study:

[https://www.fch.europa.eu/sites/default/files/FCH%20Docs/20200720\\_Hydrogen%20Powered%20Aviation%20report\\_FINAL%20web.pdf](https://www.fch.europa.eu/sites/default/files/FCH%20Docs/20200720_Hydrogen%20Powered%20Aviation%20report_FINAL%20web.pdf), accessed November 2021

<sup>58</sup> Scenario 2 and Scenario 3 include 9 billion LDV miles reduced in 2050 relative to Reference scenario, from enhanced transit and mobility; telework and travel demand management; smart growth and mode shifting to biking/walking; No \$/mile cost was assessed for tranche of VMT reduction achieved in Scenarios 2-3. Table above shows incremental investment relative to Scenarios 2-3

Table 11 documents transportation-related incremental costs associated with Scenario 4. It claims that the per-unit cost is \$6 per mile and that 200 million light duty vehicle miles will be reduced relative to Scenarios 2 and 3 in 2050. The plain reading of this is that the 200 hundred million light duty vehicles miles reduced will cost \$6 per mile or \$1.2 billion. The basis of the claim is the “Empire Corridor Draft 1 Tier EIS” which is an analysis of improvements that could be made to railroad passenger service in New York.

### **Empire Corridor Rail Passenger Improvements**

The Federal Railroad Administration (FRA), in cooperation with the New York State Department of Transportation (NYSDOT) completed the [Empire Corridor Environmental Impact Statement](#) (EIS) in 2014 to “evaluate proposed system improvements to intercity passenger rail services along the 463-mile Empire Corridor, connecting Pennsylvania (Penn) Station in New York City with Niagara Falls Station in Niagara Falls, New York.” The components of the EIS include the following:

- [Empire Corridor Tier 1 DEIS - Volume 1](#)
- [Appendix A - Volume 2](#)
- [Appendices B-H - Volume 3](#)
- [Appendices I-J - Volume 4](#)

Completing an EIS always takes a long time but the fact that the FRA anticipates publishing the final report in 2022, eight years after it was completed suggests that there were issues. For this evaluation the point is that there were four alternatives considered to upgrade railroad service from New York City to Niagara Falls. There were two alternatives to raise passenger train speeds to 90 mph between Albany and Buffalo and one to raise passenger train speeds to 110 mph that all use the existing right-of-way. The fourth alternative would raise the passenger train speeds to 125 mph but that would require the development of a “new electrified (with overhead catenary), two-track, grade-separated high-speed rail corridor of 283 miles between Albany/Rensselaer Station and a new Buffalo station”. The following table highlights the differences between the alternatives.

**Exhibit ES-3—Comparison of Empire Corridor Alternatives**

	Alternatives				
	Base	90A	90B	110	125
<b>Train Frequency NYC - Albany</b>	13	16	17	17	24
<b>Frequency Albany - Buffalo</b>	4	8	8	8	19
<b>Trips continuing to Niagara Falls</b>	3	7	7	7	6
<b>Average running speed (mph)</b>	51	57	61	63	77
<b>Total ridership (million)</b>	1.6	2.3	2.6	2.8	4.3
<b>Ridership Gain (million)</b>		1	1	1.2	2.7
<b>Capital cost (\$ billion)</b>	\$0.3	\$1.7	\$5.6	\$6.3	\$14.7
<b>Annual O&amp;M Costs (\$ million)</b>	\$103	\$156	\$171	\$173	\$304
<b>Annual Revenue (\$ million)</b>	\$77	\$119	\$139	\$149	\$245
<b>Annual Deficit (\$ million)</b>	\$26	\$37	\$32	\$24	\$59
<b>Annual subsidy per rider</b>	\$16.25	\$16.09	\$12.31	\$8.57	\$13.72
<b>Trip Time NYC to Niagara Falls</b>	9:06	8:08	7:36	7:22	6:02

According to Appendix G, Scenario 4 would get additional vehicle miles traveled reductions by using the “125 MPH alternative detailed in Empire Corridor Tier 1 Draft EIS”. As this document is the sum total of the documentation a certain degree of guessing is required to deduce what that means. Although never mentioned it seems likely that Scenarios 2 and 3 use Alternative 110 from the Empire Corridor EIS to project reductions in vehicle miles traveled and using the “125 MPH alternative detailed in Empire Corridor Tier 1 Draft EIS” appears to provide incremental improvements.

It is possible to check the projected numbers. Table 11 claims that “200 million light duty vehicle miles will be reduced relative to Scenarios 2 and 3 in 2050” at a per unit cost of \$6 per mile. Recall, however, that I previously interpreted this to mean that the 200 hundred million light duty vehicles miles reduced will cost \$6 per mile or \$1.2 billion. The capital cost difference between Alternative 110 (\$6.3 billion) and Alternative 125 (\$14.7 billion) is \$8.4 billion, far more than that per unit cost.

There is another possible check. Exhibit 6-7 in the Empire Corridor EIS estimates the annual reductions in auto trips in 2035 for the different alternatives. Assuming that using the “125 MPH alternative detailed in Empire Corridor Tier 1 Draft EIS” means that the proposed improvement is the difference between the 110 and 125 alternatives, then that means that 307,475 autos are diverted from highways.

**Exhibit 6-7—Annual Reduction in Auto Trips, 2035, Compared to Base Alternative**

Alternatives	Diversion from Highways (one-way trips)		Qualitative Ranking <sup>2</sup>
	Autos	One-Way Person Trips <sup>1</sup>	
Base	---	---	<b>O</b>
90A	84,209	126,313	<b>+</b>
90B	139,519	209,279	<b>+</b>
110	177,603	266,404	<b>+</b>
125	485,078	727,616	<b>★</b>

Notes:

<sup>1</sup> estimated at 1.5 passengers/car

<sup>2</sup> based on 2035 estimate of total trips

- ★** Strongly supports program goals and objectives
- +** Supports program goals and objectives
- O** Neutral regarding program goals or objectives
- X** Contrary to program goals or objectives

In order to estimate the vehicle miles traveled reduction from the estimate of 307,475 autos diverted from highways, the distribution of where the passenger boarded and exited is needed. Exhibit 2-21 provides that information for 2009. I have an issue with these data. In particular, while the total appears consistent with the numbers in the rest of the document it is worrisome that the origin and destination numbers match exactly. I interpret this table to state that 320,155 people boarded trains in New York to go to Albany reading down the first column to New York City then across to the third column under the heading Albany. For the people going from Albany to New York City read down the trip origins column to Albany and then over to the second column for New York City. I believe it is highly unlikely that exact number of people going from Albany to New York City and vice-versa would be identical. Furthermore, the fact that the station pairs in all instances are the same means that there is an issue with the numbers. Because I don't expect that there would be a big difference between the numbers and the total is consistent, I have ignored this issue.

**Exhibit 2-21—2009 Major Market to Market Boardings**

Trip Origins	Trips Destinations						
	NYC	Albany	Utica	Syracuse	Rochester	Buffalo	Total
NYC	-	320,155	19,858	29,787	23,427	29,881	423,108
Albany	320,155	-	2,082	7,013	8,224	11,133	348,607
Utica	19,858	2,082	-	819	1,421	2,480	26,659
Syracuse	29,787	7,013	819	-	1,794	6,466	45,878
Rochester	23,427	8,224	1,421	1,794	-	1,862	36,728
Buffalo	29,881	11,133	2,480	6,466	1,862	-	51,821
Total	423,108	348,607	26,659	45,878	36,728	51,821	932,801

Source: Amtrak

Unfortunately, there is no similar breakdown of boardings for the alternatives. Exhibit 6-6 does break down total ridership by alternative in 2035.

**Exhibit 6-6—Ridership by Alternative, 2035**

Alternative	Total	Percentage Increase from Base	Qualitative Ranking
Base	1.6 million	-	O
90A	2.3 million	44%	★
90B	2.6 million	63%	★
110	2.8 million	75%	★
125	4.3 million	169%	★

- ★ Strongly supports program goals and objectives
- + Supports program goals and objectives
- O Neutral regarding program goals or objectives
- X Contrary to program goals or objectives

My attached spreadsheet [Empire Corridor Data](#) uses the information from these three tables and the distances between the stations listed along the Empire Corridor (Markets tab) to estimate the vehicle mile traveled reduction expected in 2035 if the 125-mph alternative is implemented rather than the 110-mph alternative. I assume that the relative ridership between stations remains the same as that shown in Exhibit 2-21 and that the diversion from highways estimates are proportional to the passenger boardings. The difference in auto trips diverted from highways between the 110-mph alternative (177,603) and the 125-mph alternative (485,078) is 307,475. The number of diverted auto trips for each station is proportional to the station boardings per station in 2009 multiplied by 307,475 divided by the total number of boardings in 2009 (932,801). The vehicle mile traveled reduction is the number of trips per station pair times the distance per station pair. The sum of the distances for all these diverted trips

is 64.7 million miles in 2035. The Table 11 projected number of light-duty vehicle miles traveled is 200 million miles in 2050. Even though the dates are different I think it is clear that the numbers, and therefore the methodology, are incompatible.

There are a couple of ways to interpret these discrepancies. It could simply be that my interpretation of the Scoping Plan total costs and mileage reductions for this strategy are incorrect. On the other hand, I think it is more likely due to a methodology difference. Due to the lack of documentation, it is impossible to determine how the Integration Analysis estimated the costs and mileages. I suspect, but cannot prove, that the Integration Analysis assumed some sort of a relationship between railroad passenger investments and vehicle mile reductions based on the results of the Empire Corridor EIS. Unfortunately, the existence of a relationship does not mean that you can estimate benefits for anything other than the total costs of the alternative. The cost difference between the 110-mph alternative and the 125-mph alternative is \$6.3 billion and diverts 307,475 auto trips away from the roads to the trains. It is not appropriate, for example, to assume that an investment of \$3 billion would divert half as many trips but I think that something along those lines was done.

### **Conclusion**

Every time I have dug into the numbers, for example [residential heating retrofit electrification](#), the Draft Scoping Plans numbers are not a reasonable estimate compared to my work. I have consistently found that the Scoping Plan costs estimates are biased high and the benefits proposed are biased low. In order to address these quantitative issues I believe that the Final Scoping Plan documentation should provide sufficient information so that anyone can readily determine the costs and emission reductions for their particular concerns. In my opinion in order to fulfill this obligation, the Final Scoping Plan must describe all control measures, assumptions used, the expected costs for those measures and the expected emission reductions for the Reference Case, the Advisory Panel scenario and the three mitigation scenarios.

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Every time I have dug into the numbers, I have consistently found that the Scoping Plan costs estimates are biased high and the benefits proposed are biased low. I submitted this comment to illustrate this problem. I have [written extensively](#) on implementation of the Climate Act because I believe the ambitions for a zero-emissions economy outstrip available renewable technology such that it will adversely affect [reliability](#) and [affordability, risk safety, affect lifestyles](#), will have [worse impacts on the environment](#) than the purported effects of climate change in New York, and [cannot measurably affect global warming](#) when implemented. The opinions expressed in this document do not reflect the position of any of my previous employers or any other company I have been associated with, these comments are mine alone.

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