Caiazza Response to the Invitation for Public Input on a Draft Memorandum of Understanding (MOU) of the Transportation and Climate Initiative (TCI)

I have prepared these comments in response to the TCI invitation. The rationale for the TCI cap and invest approach is that carbon pricing works. In my comments I will first compare the theory of carbon pricing relative to practical experience with it to see if that is a justified opinion. Then I address the specific topics for which TCI invited input.

I am a retired air quality meteorologist with extensive relevant experience. I became familiar with transportation planning and modeling when I modeled the air quality impacts of transportation projects including the Ted Williams tunnel in Boston. I have extensive experience with air pollution control theory and implementation having worked every cap and trade program affecting electric generating facilities in New York including the Acid Rain Program, Regional Greenhouse Gas Initiative and several Nitrogen Oxide programs. The opinions in these comments 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.

Carbon Pricing

The Transportation Climate Initiative has proposed using a cap-and-invest approach to reduce pollution from the transportation sector. According to their fact sheet, this is "an approach that limits the total amount of emissions from an industry or the whole economy. The total emissions limit—or cap—gets lower and lower over time, which means that less and less pollution is permitted from the capped sources of pollution." The second aspect, investments "provide funding for programs to further reduce emissions or to provide other benefits to households and communities, as determined by each state."

This is a carbon pricing approach. While theoretically attractive, there are a number of practical reasons that carbon pricing will not work as theorized: In addition, The Regulatory Analysis Project (RAP) recently completed a relevant study: Economic Benefits and Energy Savings through Low-Cost Carbon Management for Vermont that raises additional relevant concerns.

The following sub-sections describe my concerns relative to these practical carbon pricing issues because they underpin my response to the topics of particular interest highlighted in the TCI invitation for input on the modeling findings and the draft MOU.

Carbon Pricing - Leakage

Leakage refers to the situation when a pollution reduction policy simply moves the pollution around rather than actually reducing it. Ideally you want the carbon price to apply to all sectors across the globe so that cannot happen. I don't think a global carbon pricing scheme is ever

going to happen because of the tradeoff between the benefits which are all long term versus the costs which are mostly short term. I don't see how anyone could ever come up with a pricing scheme that equitably addresses the gulf between the energy abundant "haves" and those who don't have access to reliable energy such that "have nots" will be willing just to pay more to catch up with those who have abundant energy.

For any carbon pricing scheme in a limited area I think that leakage will be an insurmountable problem. Trying to force fit this global theory into just the TCI states suffers from this fatal flaw. As proposed, it will certainly result in people along the border of the TCI driving over the state line to get cheaper fuel. If stricter limits require vehicle restrictions, then it is not clear how out-of-the region vehicles would comply. If you cannot keep them out then the business model would likely be to simply move operations out of the TCU region. Eventually, it might also result in people out of the region in search of lower cost of living.

Carbon Pricing – Cost Effectiveness

The Social Cost of Carbon (SCC) is supposed to represent the future cost impact to society of a ton of CO2 emitted today. Therefore, it is entirely fair to use it as a metric to determine if the investments made from carbon pricing income are cost effectively reducing CO2. I believe New York and other TCI states will base their carbon pricing on a $50 global social cost of carbon at a 3% discount rate so that is the cost benefit effectiveness threshold metric I will use.

The fundamental assumption for any carbon pricing program is that the proceeds can be invested effectively. However, the observed results for New York's experience in RGGI suggests that this may not be the case. The New York State Energy Research and Development Authority (NYSERDA) report New York's RGGI-Funded Programs Status Report - Semiannual Report through December 31, 2018 ("Status Report") describes how New York invested the proceeds from the RGGI auctions.

Table 1 lists all the programs in the NYSERDA report ranked by the annual cost benefit ratio. It lists 19 programs with associated CO2 reduction benefits and another 18 programs with no claimed CO2 reductions. None of the 19 programs with CO2 reduction benefits meets the $50 SCC metric for cost effective investments. Clearly the 18 programs with no claimed reductions would not be able to meet the metric either.

Table 2 - Summary of Expected Cumulative Annualized Program Benefits through 31 December 2018 from the NYSERDA report is the source of the Table 1 data. It provides costs, energy savings, electricity savings or renewable energy production, greenhouse gas emission savings and the calculated cost benefit ratio. The $/ton reduced metric is presented on an annual basis

Table 1: NYSERDA RGGI Status Report: Table 2 - Ranked Cost Benefit Ratio Data
Summary of Expected Cumulative Annualized Program Benefits through 31 December 2018

Portfolio	Program	Cost Benefit Ratio $/Ton CO2e Savings
Green Jobs - Green New York	Multifamily Performance Program Assessments	58
Energy Efficiency	Multifamily Carbon Emissions Reduction Program	129
Community Clean Energy	Clean Energy Communities	132
Community Clean Energy	Regional Economic Development & GHG Reduction	257
Energy Efficiency	Multifamily Performance Program	317
Clean Energy Fund	Clean Energy Fund	341
Green Jobs - Green New York	1-4 Family Residential Buildings Program Assessments	342
Energy Efficiency	LIPA Energy Efficiency and Renewable Energy Initiative	378
Renewable Energy	NY-Sun Initiative	461
Energy Efficiency	Home Performance with ENERGY STAR	882
Energy Efficiency	Green Residential Building Program	890
Energy Efficiency	Low-Rise Residential New Construction Program	1,171
Green Jobs - Green New York	One-to Four-Family Residential Buildings Program Financing	1,338
Green Jobs - Green New York	Small Commercial Energy Efficiency Program Financing	1,929
Energy Efficiency	EmPower New York	2,409
Innovative GHG Abatement Strategies	Charge NY	3,469
Energy Efficiency	Solar Hot Water (Thermal) Program	3,998
Renewable Energy	Renewable Heat New York	4,109
Renewable Energy	NYSERDA Solar Electric	4,495

NYSERDA RGGI Status Report: Programs with No CO2 Cost Benefits Listed

No $/ton listed	Program
	New York Generation Attribute Tracking (NYGATS)
	Advanced Renewable Energy Program
	Industrial Innovations Program
	Climate Research and Analysis Program
	Clean Energy Business Development
	Transportation Research
	Carbon Capture, Recycling, and Sequestration
	Advanced Buildings
	Competitive Greenhouse Gas Reduction Pilot
	Brookhaven National Laboratory Ion Collider
	Climate Smart Communities
	Economic Development Growth Extension Program (EDGE)
	Cleaner, Greener Communities
	Reforming the Energy Vision Campus Competition Program
	Community Energy Engagement
	Multifamily Performance Program Financing
	Small Commercial Energy Efficiency Program Financing
	Municipal Water and Wastewater Program

Table 2. Summary of Expected Cumulative Annualized Program Benefits through December 31, 2018

Program	Costs (millions of dollars)		Net Energy Savings (Annualized MMBtu)			Net Electricity Savings or Renewable Energy Generation (Annualized MWh)			Net Greenhouse Gas Emission Savings[a] (Annualized Tons CO_2e[b])			Cost Benefit Ratio ($/Ton CO_2e)	
	Total Incentives[c]	Total Associated Costs[d]	Installed Savings[e]	Pipeline Savings[f]	Total Committed Savings[g]	Installed Savings[e]	Pipeline Savings[f]	Total Committed Savings[g]	Installed Savings[e]	Pipeline Savings[f]	Total Committed Savings[g]	$/Ton CO2e Savings[h]	$/CO2e EXPECTED LIFETIME Savings[i]
Green Jobs - Green New York													
One- to Four-Family Residential Buildings Program Assessments	$25.9	$1.0	992,301	-	992,301	12,669	-	12,669	78,701	-	78,701	342	15
One-to Four-Family Residential Buildings Program Financing	$119.6	$19.4	677,016	23,383	700,398	87,473	3,830	91,303	99,913	3,910	103,822	1,338	64
Multifamily Performance Program Assessments	$3.3	$1.4	769,668	9,378	779,046	52,018	829	52,847	79,538	1,030	80,568	58	4
Small Commercial Energy Efficiency Program Financing	$1.6	$0.3	8,179	-	8,179	760	-	760	957	-	957	1,929	111
Energy Efficiency													
LIPA Energy Efficiency and Renewable Energy Initiative	$179.6	-	18,889	-	18,889	817,210	-	817,210	475,449	-	475,449	378	21
Multifamily Performance Program	$13.0	$2.1	443,723	47,648	491,371	19,740	2,120	21,860	43,030	4,621	47,650	317	21
Multifamily Carbon Emissions Reduction Program[j]	$5.7	$0.2	-	-	-	-	-	-	45,151	-	45,151	129	10
EmPower New York	$25.9	$1.8	155,608	350	155,958	70	-	70	11,459	27	11,487	2,409	101
Home Performance with ENERGY STAR®	$21.2	$2.9	327,961	75	328,036	1,829	1	1,831	27,291	6	27,296	882	37
Green Residential Building Program	$2.5	$0.3	36,548	-	36,548	1,573	-	1,573	3,084	-	3,084	890	40
Solar Hot Water (Thermal) Program	$4.1	$0.1	14,217	44	14,261	22	0	22	1,057	3	1,061	3,998	200
Low-Rise Residential New Construction Program	$0.8	-	8,874	1,712	10,586	-	-	-	604	117	720	1,171	49
Renewable Energy													
Renewable Heat New York	$8.6	$1.2	3,998	160	4,157	990	21	1,011	2,338	57	2,394	4,109	205
NY-Sun Initiative	$63.6	$1.2	-	-	-	194,844	47,969	242,813	113,009	27,822	140,831	461	18
NYSERDA Solar Electric	$5.2	$0.1	-	-	-	2,040	-	2,040	1,183	-	1,183	4,495	180
Community Clean Energy													
Regional Economic Development & GHG Reduction[k]	$0.8	$8.8	-82,448	5,502	-76,946	-	3,735	3,735	35,140	2,490	37,630	257	14
Clean Energy Communities[l]	$12.2	-	298,783	-	298,783	127,945	-	127,945	93,032	-	93,032	132	9
Innovative GHG Abatement Strategies													
Charge NY[m]	$4.8	$1.4	100,246	-	100,246	-4,820	-	-4,820	1,804	-	1,804	3,469	192
Clean Energy Fund													
Clean Energy Fund[n]	$13.7	$3.7	122,137	159,699	281,836	7,765	31,158	38,923	23,675	27,286	50,961	341	21
Cross-Program Overlap[o]	N/A	N/A	-830,548	-16,233	-846,781	-38,232	-4,627	-42,860	-83,335	-3,862	-87,197	N/A	N/A
TOTAL Annualized Cumulative Benefits[p]	**$513.0**	**$45.9**	**3,065,149**	**231,718**	**3,296,867**	**1,288,717**	**85,037**	**1,373,753**	**1,053,081**	**63,506**	**1,116,587**	**501**	**N/A**
TOTAL Expected Lifetime Cumulative Benefits[p]	**$513.0**	**$45.9**	**58,679,620**	**3,786,850**	**62,466,470**	**23,953,134**	**1,785,787**	**25,738,921**	**19,493,376**	**1,269,113**	**20,762,489**	**N/A**	**27**

Table 2 continued

[a] These emission reductions are associated with both electric and fossil-fuel saving measures. Under a cap-and-trade system, the total number of emission allowances is determined by regulation. Regulated entities can purchase allowances and collectively emit up to the cap that is currently in place. Therefore, in the near term, electric efficiency projects may not decrease the overall amount of emissions going into the atmosphere. However, electric efficiency projects will reduce end users' responsibility or footprint associated with emissions from electricity production.

[b] CO_2e stands for carbon dioxide equivalent and describes the amount of CO_2 that would have the same global warming potential as a given mixture of gases based on factors published by the Intergovernmental Panel on Climate Change.

[c] Inclusive of incentive dollars for expenditures, encumbrances, and contract pre-encumbrances.

[d] Inclusive of all non-incentive expenditures.

[e] Inclusive of savings from all currently operational projects installed since program inception.

[f] Inclusive of savings from all projects under a signed contract and projects with an application received that are not yet operational.

[g] The sum of savings from Installed Savings and Pipeline Savings.

[h] The sum of figures in columns Total Incentives and Total Associated Costs divided by the columns Total Committed Savings.

[i] The sum of figures in columns Total Incentives and Total Associated Costs divided by the expected lifetime committed savings. Inclusive of cross-program overlap.

[j] The Multifamily Carbon Emissions Reduction Program is a fuel-switching program and does not claim any energy or bill savings.

[k] The Regional Economic Development and GHG Reduction program consists of 15 unique projects. The costs for all 15 projects are included in this table although only a subset of these projects actually report quantifiable energy benefits. The negative MMBtu savings are due to a manufacturing project that switched from burning #6 residual oil to natural gas and a transportation project that switched from burning diesel fuel to compressed natural gas (CNG). CNG is slightly less efficient than diesel from an energy perspective but results in carbon emission reductions.

[l] The Clean Energy Communities Program budget is comprised of funding from both RGGI and CEF. These figures represent the proportion of RGGI funds allocated to the Clean Energy Communities program.

[m] Net Energy Savings values represent MMBtu savings from the use of electric vehicles; the electricity required to charge the vehicles is removed from this table as this induced electricity consumption is the result of beneficial electrification. Expected Emission reductions and customer bill savings are net, including both MMBtu that add to the benefits and the electricity required to charge the electric vehicles that subtract from the benefits.

[n] These figures represent a proportional allocation of benefits relative to the percent of RGGI contributions to the total approved CEF budget.

[o] Cross-program overlap accounts for projects that received any combination of a GJGNY assessment, a GJGNY loan, or a RGGI-funded incentive through the Home Performance with ENERGY STAR® Program, NY-Sun Program or Renewable Heat NY Program.

[p] Totals may not sum exactly due to rounding.

and as expected lifetime savings. For the purpose of this report I use the annual numbers because all the reduction targets are based on an historic annual level (usually 1990). In order to have an appropriate comparison it has to be annual to annual.

There is another concern. A quick perusal of the programs listed with no reduction benefits demonstrates justifiable cynicism of yet another government program controlled by politicians. The programs range from practical to clear pork barrel. New York wants to be able to track emissions from generation sources within the State and from imported sources to create "tradable generation attribute certificates". Rather than fund this through the general fund it is easy to justify this as a necessary expense for these funds. The research projects are another segment of funding where there is a justifiable rationale for funding projects that have no reduction benefits short-term because they could lead to long-term reductions. At the other extreme of clearly unjustified funding is the Brookhaven National Laboratory Ion Collider. I have no idea the tortured logic that was used to justify spending any RGGI funds on this.

Carbon Pricing - Control Options

A fundamental difference between any carbon cap control program and cap programs for SO2 and NOx is that there are no cost-effective add-on controls for CO2 whereas there are control technology options for SO2, NOx and most other pollutants. As a result, the sources affected by a carbon pricing rule have fewer options to comply with the cap. This concern is exacerbated for the TCI proposal. The affected TCI sources are the state fuel suppliers and it is not clear that they have any options to reduce CO2 emissions. The most likely scenario is that they will buy what allowances they can and pass the costs on to the customer because they have no way to make effective emission reductions.

As a result of the lack of control options, the most likely affected source control strategy is to operate under the cap. If the cap is lower than demand because it is set to bind emissions that means selling less fuel. I am not aware of any cap and trade program that got to the point where emissions were actually limited by the cap and affected sources had no other choice but to not operate. I strongly recommend that the TCI jurisdictions try to avoid that scenario at all costs.

Paul Homewood at the Not a Lot of People Know That blog described the flaws of an article supporting a carbon tax plan that are also relevant to this discussion. He said that "The only logical reason for a carbon tax is to reduce emissions. Such a tax might help to reduce energy consumption, but only at punitive levels, because energy demand is so inelastic. Therefore, the real intention is to make fossil fuels so expensive that renewables can eventually become competitive, along with CCS, hydrogen heating etc." In this instance, transportation energy

demand surely is inelastic. While in theory the cap and invest proceeds could reduce emissions so that compliance with a decreasing cap is possible, the tradeoff between making investments effective enough that demand is reduced sufficiently and the difficulty making effective investments is a very high hurdle to meet.

For example, one potential control option is to reduce transportation CO2 emissions is to replace gas and diesel passenger vehicles with electric vehicles. The EPA Greenhouse Gas Equivalencies Calculator calculates the greenhouse gas emissions from a passenger vehicle driven for one year. Based on their numbers the average car drives 11,705 miles and emits 4.72 metric tons of CO2 or 5.2 short tons of CO2. The NYSERDA NY Drive Clean rebate is a typical electric vehicle (EV) program to encourage EV adoption. The program offers rebates from $2,000 for buying a model that has an EPA all-electric mileage range of more than 120 miles to $500 for a model that only has an all-electric mileage range of less than 20 miles. The $ per ton reduced rate for the $2,000 rebate is $384.65 and for the $500 rebate it is $96.19. Using the EPA numbers any rebate over $259.98 exceeds the $50 SCC cost effectiveness threshold.

The concern about the lack of options in the transportation sector is a problem not only for the affected sources but also for the TCI investments. Moving to an electric vehicle is preferred but we already showed that rebates are not cost effective and without rebates adoption will likely be low because of the cost hurdle. Not only that, there are a host of practicality issues as well. Another alternative is to try to make mass transit cheaper relative to gasoline and diesel vehicles. In rural areas this won't be practical and public acceptance of inconvenient travel will be an issue everywhere.

Carbon Pricing - Revenues Over Time

A fundamental problem with all carbon pricing schemes is that funds decrease over time as carbon emissions decrease unless the carbon price is adjusted significantly upwards over time. This problem is exacerbated because over time reducing CO2 emissions becomes more difficult. It has been observed that roughly 80% of the effects come from 20% of the causes and everyone knows the implications of the low hanging fruit analogy. This phenomenon has been observed with regard to New York's observed CO2 emission reductions to date. Supporters of the Regional Greenhouse Gas Initiative (RGGI) point out that since its inception that New York electric sector emissions have dropped over 40% between 2006 and 2018. However, I have shown that those reductions were primarily because of retirements and fuel switching to lower emitting fuels. It can be argued that those reductions would have happened without RGGI because retirements and fuel switching were lower cost options without even considering RGGI CO2 emission costs. Importantly, in the future reductions will primarily occur due to RGGI investments. Unfortunately, RGGI investments to date are only directly responsible for less

than 5% of the total observed reductions. Furthermore, we have already shown that New York's investments don't meet the SCC threshold for effective investments. Also note that from the start of the program in 2009 through 2017, RGGI has invested $2,527,635,414 and reduced annual CO2 emissions 2,818,775 tons. The resulting cost efficiency, $897 per ton reduced, is disturbingly high. Coupled with my belief that air pollution control costs increase exponentially as efficiency increases, it is clear that the need for stable revenues over time is acute.

Carbon Pricing - Theory vs. Reality

Another problem with carbon pricing theory is that in practice affected sources may not act rationally or as theory expects. The Regional Greenhouse Gas Initiative (RGGI) is a market-based carbon pricing program and I have written extensively on it. The academic theory for RGGI market behavior is that affected sources will treat allowances as a storable commodity and act in their own best interest on that basis. If that were true affected sources would be purchasing allowances for long-term needs and "playing" the market to maximize earnings. In practice RGGI affected sources plan and operate on much shorter time frames and have shown no signs of making allowance compliance obligations a profit center.

Carbon pricing theory claims that when the cost of using higher emitting energy increases that will provide incentives to develop alternatives and discourage continued use of existing resources. However, these incentives are indirect and again assume rational behavior in the market. While theory says that a company that currently operates a fossil-fired plant will change its business plan and develop a renewable energy facility to stay in business, in observed practice, there are a whole host of reasons why the company may not go that route and instead treat the carbon price as a tax, continue to operate with that constraint, and give up on fossil-fired plant as a long term asset. In my opinion RGGI did not induce any NYS companies to change their business plans.

I believe the fact that electric generating companies with extensive experience with market-based programs did not behave as expected means that affected sources in TCI are even less likely to operate as theory expects simply because they have experience with this type of program. In addition to the practicality issues there is another likely result. Because there are so few CO2 control options for the fuel suppliers this increases the likelihood that they will simply treat the TCI carbon price as a tax. There is no more regressive a tax than one on energy and transportation.

Carbon Pricing - Vermont Regulatory Analysis Project Carbon Management Study

The Regulatory Analysis Project (RAP) recently completed a relevant study: Economic Benefits and Energy Savings through Low-Cost Carbon Management for Vermont that raises relevant concerns. The introduction describes the genesis of the analysis:

> In the 2018 legislative session, the Vermont Legislature called for a study to examine the possible methods, costs, and benefits of using carbon pricing to address the problem of carbon pollution in the state. Resources for the Future (RFF) was commissioned by the legislature's Joint Fiscal Office to conduct that study, using the economic models and approaches available to RFF.
>
> The Regulatory Assistance Project (RAP) has been asked to assess the RFF study and its conclusions, and to offer suggestions for action based on its results and our expertise in energy and climate policy. RAP has, over the past 25 years, examined these issues not only in Vermont but across the globe. Our observations and recommendations are based on that broad base of experience.
>
> For the purposes of this report, in the short time available, we commissioned two expert studies. The first, on low-carbon transportation, was completed by M.J. Bradley & Associates (MJBA), which has conducted several studies on this topic across our region and beyond. The second, on opportunities for energy savings in housing and public buildings, was completed by the Energy Futures Group (EFG), an expert consulting firm based in Hinesburg, Vermont. We are grateful to these two firms for lending their expertise to Vermont and offering leading insights to this review.
>
> What have we found? Based on the plain facts of Vermont's physical and economic conditions, we conclude that an attempt to reduce Vermont's carbon emissions based on carbon pricing alone will cost more, and deliver less, than a program of carbon reductions that is based on practical public policies—policies that attack the main sources of carbon pollution through tailored, cost-effective programs geared to Vermont's families, businesses, and physical conditions.

The report also raises the important question policy question: What does a climate policy cost consumers per ton of carbon avoided? Their answer is relevant:

> Many advocates of carbon pricing begin with the proposition that the main point is to charge for carbon emissions "appropriately" and that carbon reductions will surely follow in the most efficient manner. While carbon pricing is a useful tool in the fight against climate change, there is now substantial experience to suggest that wise use of the resulting carbon revenues is equally important, or even more important, if the goal

> is to actually reduce emissions at the lowest reasonable cost. One of the principal conclusions of the RFF study is that, even if carbon charges were set as high as $100/ton, the reduction in carbon emissions achieved statewide would be only about 10 percent below the expected business-as-usual case.
>
> This seems to present us with an insoluble problem. On the one hand carbon pricing is said by many to be the "best" and "most efficient" way to drive down emissions in line with global targets and Vermont's statutory goals. But on the other hand, as common sense and studies—including even RFF's analysis—conclude, carbon pricing alone will be a weak tool to deal with the realities of consumer behavior, our historic buildings infrastructure, rural settlement patterns, and the many barriers that working families and businesses face in choosing to invest in energy efficiency or other low-carbon options.

I believe that the RAP analysis supports my concern about carbon market pricing signal investment efficiency. Even though they claim that "energy pricing can be married to public policies", the high hurdles of leakage, poor observed cost-effectiveness, lack of control options, reduced revenues over time, and the disconnect between the theory and reality are unaddressed and still remain.

Response to TCI Questions

In the following sections I address the specific questions raised by the TCI.

- What factors should TCI jurisdictions consider when setting the starting level and the trajectory for a regional cap on carbon dioxide emissions from transportation fuels?
- How should the compliance period be structured to provide needed flexibility, while ensuring environmental integrity?
- What factors should TCI jurisdictions consider when designing stability mechanisms for managing uncertainties regarding future emissions and allowance prices?

Starting Level for Regional Cap

The starting level is the size of the initial cap. In order to determine that level we need to know what transportation emissions are now and the observed trend over time. One of the differences between the TCI cap and invest program and the stationary source cap and trade programs is the availability of CO2 measurements. Emissions from stationary sources in trading programs are directly measured or can be estimated from the amount of fuel burned. Of course, direct measurement from transportation sources is impossible so we have to rely on fuel burned estimates. All of the RGGI affected sources report emissions on a quarterly basis and have long records of available data. I have never seen transportation source emissions on anything less than an annual basis nor have I been able to get emissions for all states in the TCI.

Because I have not been able to find appropriate transportation emissions, I cannot make any specific comments about the starting level. It is disappointing that the TCI request from input did not include emissions estimates over time for all the states in the program.

There is another cap consideration. Unlike traditional air pollutant cap programs there is no scientific rationale for the cap limit. Cap and trade programs for SO2 and NOx can be linked to specific air quality impacts such as meeting the National Ambient Air Quality Standards. Until such time that TCI quantifies the effect of reductions from this program on global warming potential, setting this cap is a tradeoff between feasibility and aspiration to meet some politically driven virtue signal. As a scientist I can offer no advice in this regard.

Trajectory

Because I have not been able to find appropriate transportation emissions, I cannot make any specific comments about the trajectory. Nonetheless, there still is a potential for meaningful technical recommendations. In particular, it is important that TCI do an evaluation of the potential for reductions for the investments chosen. For example, one potential control option is to reduce transportation CO2 emissions is to replace gas and diesel passenger vehicles with electric vehicles. The EPA Greenhouse Gas Equivalencies Calculator calculates the greenhouse gas emissions from a passenger vehicle driven for one year. As noted previously, the average car drives 11,705 miles and emits 4.72 metric tons of CO2 or 5.2 short tons of CO2.

NYSERDA has compiled statistics on the New York electric car market, including where registrations are, what makes and models are most popular, and more. These data can be accessed through a downloadable Excel file. I downloaded their data and found that their data start in December 2011. Through October 2019 there have been 38,882 PHEV/EREV registrations and 25,706 BEV registrations. Assuming that these vehicles replaced average cars and that all the power necessary to charge them came from non-CO2 generation, then the CO2 reduction would be 335,558 tons. The future trajectory must consider this kind of information and determine how much of a reduction is possible for the funded programs.

Setting the trend is a tradeoff between feasibility and aspiration. Based on the record of the RGGI stakeholder process, there will be numerous comments favoring an aspirational decreasing trend. I do not think that is advisable in this instance. As documented in my carbon pricing discussion, the lack of control options and market signal inefficiency concerns favor a cautious approach. In theory the carbon price signal will incentivize reductions but it is not clear how effective investments from the TCI tax will be in reducing gasoline use. Furthermore, we know that indirect investments have not been very efficient in the past. These concerns suggest that it would be wise to adopt a flexible approach. Base the reductions on observed impacts rather than someone's guess what the investments will provide.

Compliance Period

As shown in the discussion of carbon pricing control options, TCI reductions in emissions will rely entirely upon investment of TCI proceeds. I also showed that RGGI investments do not have a very good record making substantial reductions. I recommend a three-year compliance period not only because it seems to have worked out well in RGGI but also because a longer period will enable TCI to evaluate the emission reduction results of its programs.

Stability Mechanisms

TCI jurisdictions absolutely have to incorporate stability mechanisms for managing uncertainties related to future emissions and allowance prices. As mentioned previously, TCI jurisdictions should only plan on reductions that result from their investments. Not only is there a poor record of RGGI investment reductions, there also is a lag between investments and results. I strongly recommend that the reduction trajectory be set based on observed results.

If the cap or the trajectory reduction requirements create a situation where the cap is less than the demand it will bind emissions. In the best case this fuel tax will only rachet up the cost of living a little. I contend that the citizens of the TCI jurisdictions will not stand for a fuel shortage or price spike caused by a binding cap. I believe that binding cap problems are so big that they must be avoided at all costs.

The over-riding reason to avoid a binding cap is because of public sentiment. In my comments on the TCI Draft Framework explained that I had attended several New York meetings related to the TCI. Based on that, I think it is presumptuous to say that pubic is aware of this process. In my opinion the only segments of society that have even heard about this are climate activists, future transportation policy wonks, and some environmental justice advocates. Despite the best efforts of the TCI jurisdictions, the general public is not engaged. I guarantee that the public will become not only engaged, but likely enraged, if they find out that the reason their fuel prices just spiked is because of a fuel shortage created as a result of a TCI binding cap.

Moreover, the format of the meetings I have attended was more about “what are the things we can do for clean transportation options” than “how can we implement these options and at what cost?”. None of the meetings I attended addressed implementation issues, feasibility concerns, or potential costs. The documents provided for this round of comments did not adequately address those issues either (see below).

The TCI stability mechanisms should recognize that the support from the stakeholders to date is not representative of the public who I maintain are blissfully unaware of this process and the potential ramifications. That fact suggests caution and a measured plan based on observed results.

TCI documents

On December 17, 2019 the TCI jurisdictions released the draft "Memorandum of Understanding" and "initial projections of the potential economic and public health benefits such a program would unlock region-wide". If more details of the modeling analyses that evaluated various options are available, I have been unable to find them at the TCI website on the 2019 regional policy design process. That is unacceptable. The 3-page initial projection summary and the 6-page link with more information regarding tools and methods are insufficient to constructively comment on the results that underpin the MOU. The fact is that these documents only describe the process and do not provide the numbers supporting the claims made.

My primary concern, and that of the unaware general public I believe, is the fuel price cost. I am disappointed with the initial projection summary's description of this parameter. The summary states:

> If the regulated entities in the petroleum industry choose to pass the costs of compliance with a cap and invest program on to consumers, our modeling estimates an incremental price increase in 2022 of $0.05, $0.09 or $0.17 per gallon in the 20%, 22% and 25% Cap Reduction Scenarios, respectively. These changes would be well within the range of historical variability. The goal of a regional cap-and-invest program would be to use the proceeds to invest in clean transportation options, reducing the exposure of our economy to these oil market price fluctuations. Complementary programs that reduce fuel consumption, such as more ambitious federal and state vehicle emissions standards, would be expected to moderate costs further.

This paragraph is misleading and naïve. It is unreasonable to expect that the regulated entities in the petroleum industry would do anything but pass the costs of compliance on to consumers. As written this sentence attempts to deflect blame for the costs away from the TCI and on to corporations out to gouge customers yet again. The modeling results present 20% to 25% reduction scenarios but disingenuously omit the fact that the TCI component of the reduction is only 6% of the total. The data necessary to break down the actual costs of the TCI are unavailable from these summaries. Consequently, I cannot give meaningful technical comments.

Recommendation Summary

My comments have shown that transportation emission reductions are only possible with investments from the tax proceeds. Because the RGGI record of investment reductions is so poor and there is a lag between investments and results it would be prudent for the TCI to incorporate those considerations in their cap, trajectory, and stability mechanisms. Another factor to consider is the lack of data available on transportation emissions.

As a result, I recommend an initial a 3-year tax kick-off period with no cap. During this kick-off phase the mechanisms for collecting the tax could be developed, the criteria and methodology for choosing investments implemented, and initial results could be used to develop the initial control period cap. The emission reductions for future caps should be based on results rather than aspirational goals.

Conclusion

Due to the lack of sufficient detail on the TCI modeling results I was unable to provide substantive comments based on that information. My comments and recommendations are instead based on my experience and evaluation of carbon pricing programs in general and RGGI in particular. Any carbon pricing program limited to certain jurisdictions and sectors will have unavoidable leakage problems. The investment dollars per ton of CO2 reduced for New York programs in RGGI have not been able to meet the SCC cost effectiveness threshold of $50/ton. The fact that the EPA emission numbers for an average gasoline vehicle indicate that any rebate over $259.98 exceeds the $50 SCC cost effectiveness threshold suggests that TCI investments will be even less effective. Another problem with any carbon pricing scheme is that revenues over time go down at the same time the reduction implementation costs go up. There is a fundamental problem with carbon pricing schemes because there are not many control options available for existing sources. I believe this will be even more of a problem for the TCI affected sources. There should be concerns that the TCI carbon pricing theory will not match reality especially because the affected sources have no prior experience with this pollution control approach. As a result of those concerns, I recommend a cautious, measured approach for the cap, trajectory and stability mechanisms.

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