**Caiazza Comment on Economy Wide Strategies**

**Summary**

Based on the format of Section 17, it was written to address specific issues raised by the Climate Action Council. As a result, it gets bogged down into details about specific issues raised by council members rather than looking at the big picture. In theory, a price on carbon is a great idea. The Council has not considered the theory relative to their perceptions.

My overview comments explain why I believe carbon pricing will always be a regressive tax. I also explain that there are a number of practical reasons that carbon pricing will not work as theorized. Leakage is an insurmountable problem. 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. There are gaps between the theory of carbon pricing and market reality, especially regarding how affect sources can act with limited control options. Based on investment results for RGGI proceeds, the programs funded are not cost-effectively reducing emissions. The Climate Act mandate for funding in Disadvantaged Communities will exacerbate that issue. The Regulatory Analysis Project (RAP) recently completed a relevant study: Economic Benefits and Energy Savings through Low-Cost Carbon Management for Vermont that concludes "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".

In addition to my practical concerns "A Practical Guide to the Economics of Carbon Pricing by Ross McKitrick defines how carbon pricing is supposed to work in theory. His guide is at odds with the Draft Scoping Plan for every point. He explains that "First and foremost, carbon pricing only works in the absence of any other emission regulations", but the proposal is in addition to the emission regulations of the Climate Act itself. The Guide goes to note "another important rule for creating a proper carbon-pricing system is to be as careful as possible in estimating the social cost of carbon". He argues that "whatever the social cost of carbon is determined to be, the carbon price must be discounted below it by the marginal cost of public funds (MCPF) — that is, the economic cost of the government raising an additional dollar of tax, on top of what is already being raised". The Draft Scoping Plan does not even recognize the importance of this aspect of carbon pricing. He concludes: "There may be many reasons to recommend carbon pricing as climate policy, but if it is implemented without diligently abiding by the principles that make it work, it will not work as planned, and the harm to the Canadian economy could well outweigh the benefits created by reducing our country's already negligible level of global CO2 emissions." Substitute New York for Canada and I believe this describes this policy option.

The estimates of current (2019) emissions coupled with the New York value of carbon yield very high revenues. The AP-NORC Center and the Energy Policy Institute at the University of Chicago (EPIC) survey regarding climate change included survey questions asking whether respondents would support, oppose, or neither support or oppose a law that imposed "a fee on carbon to combat climate change". Only 45% support $1 per month per household additional costs and $1 per month per person

in New York only provides revenues of $237 million. All of the projections in Table 2 estimate costs far higher than that level so I do not think the public perception of affordable will be met by any carbon pricing scheme using the New York value of carbon guidance.

**Introduction**

I first became involved with pollution trading programs nearly 30 years ago and have been involved in the Regional Greenhouse Gas Initiative (RGGI) carbon pricing program since it was being developed in 2003. During that time, I analyzed effects of these programs on operations and was responsible for compliance planning and reporting. My comments are based on practical experience with carbon pricing programs. I have followed the New York State Independent System Operator's (NYISO) carbon pricing initiative since its inception and my work on that program is the primary basis for these comments on the Draft Scoping Plan chapter on economy-wide strategies.

**Carbon Pricing Overview**

Proponents for a comprehensive policy that effectively prices GHG emissions claim that it is a viable, scalable market-based solution for helping to reduce carbon emissions. I frankly don't think most of those proponents have had actual experience with carbon pricing initiative logistics and have not evaluated whether the carbon price schemes proposed will provide the market signals necessary to spur the necessary renewable development needed to meet any CO2 emission reduction goals as a viable, scalable option for helping to reduce carbon emissions. The success of any carbon pricing scheme boils down to the question whether the carbon price set will provide enough of an incentive for projects that produce emission reductions that could displace today's emitters. Supporters often overlook that replacement costs are not the only costs. There are other expenses necessary to make the replacement technology viable. For example, a pricing scheme that encourages drivers to go to electric vehicles has to somehow also fund public charging systems or the funding necessary is incomplete.

In my opinion, carbon price support is based on parochial interests. In the case of the NYISO carbon pricing initiative NYISO appears to believe it will simplify the cost accounting for New York's renewable implementation efforts. I think they have under-estimated the difficulty implementing the infrastructure necessary to accurately track the price of carbon and have ignored the potential that the complex scheme needed to reduce leakage will lead to unintended consequences. Other support appears to be based on the potential to make money and it is not clear that is in the best interest of the New York's desire to reduce CO2 emissions as cost-effectively as possible.

Proponents have convinced themselves that somehow this is different than a tax but, in my experience working with affected sources, it is treated just like a tax. As a result, the over-riding problem with carbon pricing is that it is a regressive tax. In the following, I describe a number of other practical reasons that cap-and-invest carbon pricing or any variation thereof will not work as theorized: leakage, revenues over time, theory vs. reality, market signal inefficiency, control options, total costs of alternatives, and implementation logistics. In addition, The Regulatory Analysis Project (RAP) recently completed a study for Vermont, Economic Benefits and Energy Savings through Low-Cost Carbon Management, that raises additional relevant concerns about carbon pricing implementation.

The emphasis of my comments is on the practical limitations of carbon pricing. The last section in the overview presents the summary to "A Practical Guide to the Economics of Carbon Pricing" by Ross McKitrick published in University of Calgary, School of Public Policy Volume 9, Issue 28, September 2016. This research was financially supported by the Government of Canada via a partnership with Western Economic Diversification. The document describes the theory of carbon pricing and its limitations.

**Overview - Leakage**

Pollution leakage refers to the situation where a pollution reduction policy simply moves the pollution around geographically rather than actually reducing it. Ideally the carbon price should apply to all sectors across the globe so that leakage cannot occur. I don't think a global carbon pricing scheme is ever going to happen because of the tradeoff between the benefits that 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 to pay more (as carbon taxes) while they catch up with those who have abundant energy.

For any carbon pricing scheme in a limited geographical area, I think that leakage will be an insurmountable problem. I am primarily concerned about energy policy in New York and have written about New York's electric sector carbon pricing initiative. The New York Independent System Operator (NYISO) proposed a Carbon Pricing Initiative**.** Trying to force fit this global theory into just the New York electricity market is an extraordinarily difficult problem. As proposed, it will likely result in power leakage where energy and emissions are not reduced but simply shift emissions associated with power production out of the state within the inter-connected electric grid. Additionally, note that a carbon price on just the electric sector may even result in leakage if more consumers generate their own power using unpriced fossil fuel.

**Overview - 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. Air pollution control costs increase exponentially as efficiency increases so it is clear that the need for stable revenues over time is acute. 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 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 anyway because retirements and fuel switching were lower cost options without even considering CO2 emissions. New York State is now in the more difficult emissions reduction position where all future reductions will have to decrease the use of low-cost generating facilities with something that is more expensive.

This difficulty should be even more of a concern with CO2 emission reductions because at some point replacing existing fossil-fired generation not only has to consider the direct power output conversion costs but must also address dispatchability and grid support costs. When those costs are included there will be a sharp increase in total costs per CO2 reduced. Like many others, the NYISO Carbon Pricing Initiative proposes to use the social cost of carbon (SCC) as the carbon price. The SCC cost increases over time but, in my opinion, the costs over time do not increase enough to keep pace with the necessarily more expensive total costs to maintain reliable electricity to consumers.

**Overview - Theory vs. Reality**

Another problem with carbon pricing theory is that in practice affected sources may not act rationally or as theory expects. 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, then affected sources would have purchased allowances for long-term needs and "playing" the market to maximize earnings. In practice, RGGI affected sources plan and operate on short 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, 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 a fossil-fired plant as a long-term asset when they can no longer make a profit. In my opinion RGGI carbon pricing did not induce any New York companies to change their business plans.

**Overview - Control Options**

A fundamental difference between any carbon cap control program and cap programs for other emissions at power plants 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 affected sources have fewer options to comply with a CO2 price or cap. Ultimately, the affected source control strategy is to operate under the cap; if the cap is lower that means selling less energy. In addition, because there are so few CO2 control options for the affected sources, this increases the likelihood that they will simply treat the costs of purchasing allowances as a tax.

A carbon price initiative for the transportation sector would try to reduce fuel use. Clearly moving to an electric vehicle is the preferred option but there is not only a large cost hurdle but a host of practicality issues as well. Paul Homewood at the Not a Lot of People Know That blog described the flaws of an article supporting a carbon tax plan that addresses this issue. 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."

**Overview - Market Signal Inefficiency**

One of the underlying presumptions in any carbon price program is that the funds received will be spent effectively. I have evaluated the results of the investments made by regulatory agencies to date in RGGI measured as the cost per ton reduced. The RGGI states have been investing investments of RGGI proceeds since 2008 but their investments to date are only directly responsible for less than 5% of the total observed reductions. Furthermore, 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, far exceeds the SCC that represents the value of reducing CO2 today to prevent damages in the future.

I looked at New York's investments in more detail to see why those investments were so inefficient. 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 describes how New York invested the proceeds from the RGGI auctions. That report lists the programs that are funded using RGGI proceeds in six categories: Green Jobs – Green New York, Energy Efficiency, Renewable Energy, Community Clean Energy, Innovative GHG Abatement Strategies, and Clean Energy Fund. From the titles alone it is clear that waving a pot of money in front of politically-driven bureaucracies is an incentive to build empires. I evaluated the projects within these categories and found that there were 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 met the current Federal $50 SCC metric for cost effective investments. Clearly the 18 programs with no claimed reductions would not be able to meet the metric either.

Theory says that the carbon price alone can incentivize lower emitting energy production and that the market choices will be more efficient than government-mandated choices. Ultimately the market signal question is whether the SCC value is sufficient to incentivize the market to invest in zero GHG emitting generation resources. There is no sign that RGGI motivated the market to act and it is not clear that the carbon pricing schemes proposed in the Draft Scoping Plan will provide enough value either. If the market signal is inadequate, then New York's experience illustrates that government-mandated choices must be chosen carefully to ensure that the cost per ton of CO2 reduced is less than the SCC. I believe that the more targeted the investment to actually reduce energy use or CO2 emissions, then the more likely that SCC effectiveness criterion can be met. However, the Climate Act's goal of 40% of the benefits of clean energy investments flowing to Disadvantaged Communities makes that unlikely.

Another consideration in effectiveness is timing. New York has a legislative target to generate zero GHG emissions from electricity production by 2040. Even if investors do come forward, are they going to be able to develop alternative generating resources in the time frames necessary to meet the ever more aggressive goals set by states competing to be the most ambitious?

**Overview - Cost Shifting Total Costs**

As noted previously at some point replacing existing fossil-fired generation not only has to consider the direct power output conversion costs but must also address dispatchability and grid support costs. When the carbon pricing proposal simply increases the cost of the energy generated, I think that approach will lead to cost shifting where the total costs of fossil fuel alternatives are not addressed.

Consider an electric system carbon price. In that approach any generator that emits CO2 will have to include a carbon price in their bid which serves to provide the non-emitting generators with more revenue. However, solar and wind generators are not paying the full cost to get the power from the generator to consumers when and where it is needed. Because solar and wind are intermittent, as renewables become a larger share of electric production energy storage now provided by traditional generating sources will be needed but there is no carbon price revenue stream for that resource. Because solar and wind are diffuse, transmission resources are also needed but solar and wind do not directly provide grid services like traditional electric generating stations. Energy storage systems could provide that support but they are not subsidized by the increased cost to emitting generators.

There are ways to address this. The carbon price could be modified to direct revenues to energy storage systems. However, when you do that, the direct cost will go up and those least able to afford energy price increases will be hit with a regressive tax. The simplest solution would be to require all electric power sold to the grid to be dispatchable. In other words, require wind and solar to only sell power through their own dedicated energy storage systems. That won't be popular for those resources because it markedly increases their cost but the fact is that someone, somewhere will have to pay for those services so why not them.

**Overview - Implementation Logistics**

I also believe that there are significant logistical issues associated with carbon pricing. In order to set a carbon price, you have to know what the carbon emissions are for every source providing energy to the market. For a global all-sector pricing scheme, you could set the price as the fuel is produced so that everyone pays the cost all the way through its end use. On the other hand, in the NYISO proposal they have to set the carbon price as electric energy as it is sold. Tracking emissions on that real-time basis is a non-trivial problem. In New York, NYISO knows which generators are running and has a pretty good idea of their emission rates. However, the final emission numbers are not available real-time because the emission values reported to prove compliance are not finalized until quality assurance post processing is complete and that can be months after the fact. The more significant problem is that NYISO has no way to calculate imported electricity carbon emissions on a real-time basis so cannot assign a carbon price value that accurately reflects how imported electricity is being generated. These issues have been glossed over to date.

The sources affected by RGGI had a long history working with cap-and-trade programs such as the Acid Rain Program before RGGI was implemented. On the other hand, if carbon tax schemes are implemented for other sectors the affected entities may not have experience with this kind of

regulatory program. I believe that this increases the likelihood that affected sources will simply treat this as another tax.

**Overview - Vermont Regulatory Analysis Project Carbon Management Study**

There are not many critiques of carbon pricing schemes but there is one that deserves recognition. 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.
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> 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.
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> 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.
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> 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.

Although the focus of the RAP study was on transportation and energy efficiency the over-arching conclusions are also applicable to all carbon pricing proposals. The report raises the important 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.
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> 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 still claim that "energy pricing can be married to public policies", the high hurdles of leakage, reduced revenues over time and the disconnect between the theory and reality are unaddressed.

**Overview - Practical Guide to Carbon Pricing**

I reproduce the summary to "A Practical Guide to the Economics of Carbon Pricing by Ross McKitrick below. If the reader substitutes New York for Canada, I believe it is a very good synopsis for the New York situation. I have highlighted key points.

> Canadian economists, politicians and even environmentalists are lining up enthusiastically behind pricing carbon as the solution to controlling greenhouse gas emissions in this country. Pricing carbon (or, more accurately, pricing carbon dioxide) is not just a fashionable policy approach; it is the most efficient way we have to ration emissions, as it allows emitters — businesses and consumers — to make the most rational decisions about where it makes economic sense to curtail carbon and where it does not. Painfully costly command-and-control reductions make little sense in Canada, given our marginal contribution to global emissions. When practiced globally, a carbon price deals with Canadian emitters as fairly as it does others.
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> However, a beneficial outcome is not guaranteed: certain rules must be observed in order for carbon pricing to have its intended effect of achieving the optimal balance between emission reduction and economic growth. **First and foremost, carbon pricing only works in the absence of any other emission regulations.** If pricing is layered on top of an emission-regulating regime already in place (such as emission caps or feed-in-tariff programs), it will not only fail to produce the desired effects in terms of emission rationing, it will have distortionary effects that cause disproportionate damage in the economy. Carbon taxes are meant to replace all other climate-related regulation, while the revenue from the taxes should not be funnelled into substitute goods, like renewable power (pricing lets the market decide which of those substitutes are worth funding) but returned directly to taxpayers.

The price of carbon is set according to what is known as the "social cost of carbon" — the quantified value of the impact that an emitted tonne of carbon today will have on humans in the future (adjusted to present value). That cost is not limitless; there is a point at which the cost of abating a tonne of carbon outweighs the cost of the impact that same tonne will have in the future (and some of that impact may be positive, not necessarily negative). **Therefore, another important rule for creating a proper carbon-pricing system is to be as careful as possible in estimating the social cost of carbon.** Estimates are all we have, and they vary wildly, from negative — meaning any carbon price is too high — to hundreds of dollars per tonne. Minor adjustments to the calculation's inputs, such as the discount rate used and fluctuating estimates about climate sensitivity, produce dramatically different estimates. The social cost of carbon must be set with extreme prudence in order to set a reasonable carbon price.

Whatever the carbon price, it will necessarily detract some degree from economic growth. But when a carbon tax is added in the presence of other taxes, such as income, sales and corporate taxes, its effect will be even more harmful, due to the compounded burden on economic activity. As a result, **whatever the social cost of carbon is determined to be, the carbon price must be discounted below it by the marginal cost of public funds (MCPF) — that is, the economic cost of the government raising an additional dollar of tax, on top of what is already being raised.** This varies by province, but estimates suggest that in Canada, the optimal carbon tax should be about half of the estimated social cost of carbon.

Finally, **it needs to be remembered that carbon pricing works because it is a market based policy: it works with market forces, not against them**. But that means the policy maker needs to let the market play its role. Choosing the price means the market will set the quantity, and vice-versa. In response to a well-designed carbon price, the market may only reduce emissions a little, especially in the short term. Policy makers need to resist the temptation to reintroduce command-and-control rules and arbitrary quantity targets, which will simply unravel the gains from adopting the policy in the first place. There may be many reasons to recommend carbon pricing as climate policy, but **if it is implemented without diligently abiding by the principles that make it work, it will not work as planned, and the harm to the Canadian economy could well outweigh the benefits created by reducing our country's already negligible level of global CO2 emissions.**

**Draft Scoping Plan Carbon Pricing Strategies**

The Draft Scoping Plan chapter on economy wide strategies identifies three carbon pricing options for public consideration:

1. A tax or fee establishing a carbon price, referred to as a carbon pricing, hereinafter referred to as "carbon pricing";
2. A program that caps emissions across the economy, or within particular sectors, and allocates emissions primarily through an auction mechanism that provide revenues for investment, known as cap-and-invest hereinafter referred to as "cap-and-invest"; and
3. A clean energy supply standard, which would require providers of liquid and gaseous fuels across the economy to reduce the carbon intensity of fuels they introduce into commerce. Both carbon pricing and a cap-and-invest program would charge the entity emitting GHGs for the

pollution it produces, with a primary distinction being price certainty as compared to emission certainty, hereinafter referred to as "clean energy standard".

**Criteria for Evaluation**

The Draft Scoping Plan lists eleven considerations for evaluating the three potential policy mechanisms. This section responds to each consideration.

- Would the policy ensure compliance with emission limits as required by ECL § 75-0109 (that is, does the policy provide legally binding emission certainty)?

  The Draft Scoping Plan notes that a cap-and-invest program benefit is that it "caps and reduces emissions, providing legally binding emission certainty". It goes on to explain that "Although a carbon pricing program would likely reduce emissions, it would not ensure a particular level of emission reductions from all affected sources. Finally, the Plan says: "A clean energy supply standard would ensure a reduction in average emission intensity of the State's energy supply but, like carbon pricing, it would not limit the amount of energy used" so it does not provide emission reduction certainty. I agree with these statements.

  New York's unique emissions accounting approach includes upstream emissions from imported electricity and imported fossil fuels. In 2019, total GHG emissions were 379.43 million metric tons of $CO_2$ equivalent and the emissions from imported electricity and imported fossil fuels were 102.85 MMT $CO_2e$. The first of many complicating considerations is whether those imported emissions would be included. Most importantly who is going to pay for them. The 2019 data are the most up-to-date numbers available three years after they were emitted. Trying to set a price for someone to pay for these poorly documented back-calculated emissions would be an accounting nightmare. More importantly I believe that this accounting issue prevents any of the options meeting legally binding emissions certainty.

  **Table 1: 2019 Total GHG Emissions and Imported GHG Electricity and Fossil Fuel Emissions**

| | Greenhouse Gas (MMT CO2e AR5 20 yr) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | CO2 | N2O | Biogenic CO2 | CH4 | HFCs | NF3 | PFCs | SF6 | Total |
| **Total** | 210.09 | 3.35 | 11.79 | 133.07 | 20.89 | 0.01 | 0.10 | 0.13 | 379.43 |
| **Imported** | 46.31 | 0.16 | 0.00 | 56.39 | 0.00 | 0.00 | 0.00 | 0.00 | 102.85 |

  If the imported emissions were not included in the cap, the cap-and-invest carbon pricing option would provide legally binding emissions certainty. As noted in the definition of clean energy standard, the distinction of this option is "price certainty as compared to emission certainty".

- Would the policy provide price certainty?

  The Draft Scoping Plan claims that "Carbon pricing would provide the most price certainty, which would be beneficial for business and investor decision-making". It notes that "Although a cap-and-invest program would not establish a firm price, measures could be implemented to provide some level of certainty: examples include establishing a minimum allowance price or an emission containment reserve". Finally, the plan explains that "A clean energy supply standard would not establish a price per ton of carbon emissions." I don't disagree with these general statements.

  On the other hand, the Draft Scoping Plan also says:

  > A cap-and-invest program has the benefit of minimizing the costs associated with ensuring any specific level of GHG emission reductions. Where a government is implementing standards and other regulations to require emission reductions on a sectoral basis, or making investments to support emission reductions, the declining emissions result in a lower cost to the public for the cap-and-invest program. That has happened in the RGGI program, where complementary clean energy policies have led to reduced emissions, keeping allowance prices low even with a cap that declines substantially over time.

  As noted in the overview, I have shown that RGGI reductions were primarily because of retirements and fuel switching to lower emitting fuels. It can be argued that those reductions would have happened anyway because retirements and fuel switching were lower cost options without even considering CO2 emissions. The claim that clean energy policies have led to reduced emissions in RGGI is incorrect. More importantly it gives the false impression that a cap-and-invest program has actually worked.

- How would the policy prioritize emission reductions of GHGs and co-pollutants in Disadvantaged Communities and alleviate and prevent the formation of co-pollutant hotspots?

  The Draft Scoping Plan claims that "the investment of revenues or auction proceeds could be directed to reducing GHG and co-pollutant emissions in Disadvantaged Communities". However, in order to prove that claim is correct the Climate Action Council must show that the programs that can be funded in Disadvantaged Communities actually produce emission reductions in those communities. Based on my review of New York's investments, I found energy efficiency programs that are a great help for reducing low-income community energy costs don't provide much in the way of emission reductions. Any prevention of hotspots would be coincidental.

- Is there any difference between policy mechanisms in the sufficiency of funding or use of proceeds? Would each policy address a gap in other funding sources?

  The Draft Scoping Plan states that: "A carbon pricing program would provide government with more certainty regarding the revenues that will be available than a cap-and-invest program, allowing more certain budget decisions." It notes that: "In a cap-and-invest program, the amount of allowances available is set, but a fairly small variation in demand for allowances due to weather, the economy, and bulk fuel prices can result in fairly substantial variations in

allowance prices." The Plan points out that: "A significant drawback of a clean energy supply standard is that it would provide no revenues to fund other Scoping Plan strategies.

- How affordable would the policy be for average New Yorkers? Could it be designed to avoid regressive impacts?

  The Draft Scoping Plan states:

  > Because the regulated entities would likely pass on at least a portion of the program cost in the form of increased energy prices, the governmental entity would have to consider the economic impact on New York consumers in establishing the stringency of the programs. One concern often expressed about either pricing mechanism is the potential for regressive economic impacts, due to lower-income households spending a higher portion of their income on electricity, heating, and transportation fuel, which would all become more expensive if the resulting emissions bear a cost. Both carbon pricing and cap-and-invest policies could be designed to address those regressive impacts, such as with rebates funded by the revenues or other investments to reduce regressive impacts. In addition, a substantial portion of revenues under both types of programs would be directed to investment in Disadvantaged Communities in accordance with the Climate Act's requirement.
  >
  > It would be more difficult to mitigate any regressive impact of a clean fuel supply standard because no revenues are generated that could be used for rebates. Other programs, however, like New York's Weatherization Assistance Program, could mitigate price impacts to low-income New Yorkers.

  I think the Climate Action Council has to define affordable. The total New York State GHG emissions in 2019 379.43 million metric tons of $CO_2$ equivalent. If the carbon price was set at the 2022 New York State Value of Carbon Guidance value of $129, then the economy wide cost would be $48.9 billion. I submit that is not affordable for any New Yorkers and could not possibly be designed to avoid regressive impacts.

  Clearly, setting a carbon price for all New York emissions is unaffordable so the Climate Action Council should consider setting a price on different sectors. Table ES.2: 2019 New York State GHG Emissions is from the 2021 Statewide GHG Emissions Report and lists the emissions by sector.

**Table ES.2: 2019 New York State GHG Emissions, by IPCC Sector**

| CLCPA Format (mmtCO2e GWP20) | $CO_2$* | $CH_4$ | $N_2O$ | PFC | HFC | $SF_6$ | $NF_3$ | Total | % of Total | UNFCCC Total** |
|---|---|---|---|---|---|---|---|---|---|---|
| Energy | 216.07 | 72.46 | 0.92 | - | - | 0.13 | - | 289.58 | 76% | 164.75 |
| Fuel Combustion | 168.67 | 2.02 | 0.76 | - | - | - | - | 171.45 | 45% | 159.31 |
| *Electric Power* | *22.03* | *0.04* | *0.05* | - | - | - | - | *22.12* | *6%* | *21.51* |
| *Residential* | *39.38* | *1.27* | *0.07* | - | - | - | - | *40.72* | *11%* | *36.18* |
| *Commercial* | *22.35* | *0.33* | *0.02* | - | - | - | - | *22.70* | *6%* | *21.94* |
| *Industrial* | *9.08* | *0.07* | *0.03* | - | - | - | - | *9.18* | *2%* | *7.38* |
| *Transportation* | *75.84* | *0.31* | *0.59* | - | - | - | - | *76.73* | *20%* | *72.29* |
| Fugitive Emissions | 0.17 | 14.05 | + | - | - | - | - | 14.22 | 4% | 4.35 |
| Electricity T&D | - | - | - | - | - | 0.13 | - | 0.13 | 0% | 0.17 |
| Other Use of Fuels | 0.93 | - | - | - | - | - | - | 0.93 | 0% | 0.93 |
| Out of State Emissions | 46.30 | 56.39 | 0.16 | - | - | - | - | 102.85 | 27% | - |
| *Imported Electricity* | *7.81* | *0.01* | *0.02* | - | - | - | - | *7.84* | *2%* | - |
| *Imported Fossil Fuels* | *38.49* | *56.37* | *0.15* | - | - | - | - | *95.01* | *25%* | - |
| Industrial Processes and Product Use | 2.08 | + | 0.02 | 0.10 | 20.89 | + | + | 23.10 | 6% | 11.59 |
| Metals | 0.37 | + | - | 0.02 | - | - | - | 0.40 | 0% | 0.40 |
| Minerals | 1.71 | - | - | - | - | - | - | 1.71 | 0% | 1.71 |
| Electronics | - | - | 0.02 | 0.08 | + | + | + | 0.12 | 0% | 0.16 |
| Product Use | - | - | + | - | 20.89 | - | - | 20.89 | 6% | 9.32 |
| Agriculture, Forestry, and Other Land Use | 0.15 | 19.20 | 1.86 | - | - | - | - | 21.21 | 6% | 7.77 |
| Livestock | - | 19.20 | 0.36 | - | - | - | - | 19.55 | 5% | 6.11 |
| Soil Management | 0.15 | - | 1.5 | - | - | - | - | 1.65 | 0% | 1.65 |
| Waste | 3.59 | 41.41 | 0.54 | - | - | - | - | 45.54 | 12% | 10.45 |
| Solid Waste Management | 0.52 | 19.44 | - | - | - | - | - | 19.96 | 5% | 5.79 |
| Waste Combustion | 2.49 | 0.07 | 0.03 | - | - | - | - | 2.60 | 1% | 2.18 |
| Wastewater | - | 6.43 | 0.50 | - | - | - | - | 6.93 | 2% | 2.48 |
| Exported Waste† | 0.05 | 15.94 | + | - | - | - | - | 16.05 | 4% | - |
| **Gross Total** | **221.89** | **133.07** | **3.35** | **0.10** | **20.89** | **0.13** | **+** | **379.43** | | **194.56** |
| *% Gross Total* | *58%* | *35%* | *1%* | + | *6%* | + | + | | | |
| Net Emission Removals | (29.11) | | | | | | | (29.11) | | (29.11) |
| Net Total* | 180.98 | 133.07 | 3.35 | 0.10 | 20.89 | 0.13 | + | 338.53 | | 165.46 |
| *% Net Total* | *53%* | *39%* | *1%* | + | *6%* | + | + | | | |

NA Not Applicable. "+" less than 0.01mmt or less than 0.1%. Totals may not sum due to independent rounding.
*Gross $CO_2$ emissions include biogenic $CO_2$. The Net total and UNFCCC total omit 11.79mmt of biogenic $CO_2$.
**UNFCCC Total refers to conventional accounting used by other governments, applies a 100-year GWP (IPCC 2007), omits biogenic $CO_2$, and does not include emissions outside of New York State.
† Exported waste refers to emissions generated from waste sent to landfills and combustors outside of New York State.

I used this GHG emissions information and the 2022 value of carbon of $129 to look at several emission scenarios in Table 2. Using the IA-Tech Supplement Annex 2 Emissions Key Drivers spreadsheet 2022 Gross State Product and population each scenario estimates the cost per month for each NYS resident and the cost as a fraction of the GSP. If all the emissions were included in the carbon pricing scheme the cost per resident would be $262.50 and the costs are 3.36% of the GSP. The Candidate scenario only includes the Energy and Industrial Processes and Product Use sectors reduces the costs slightly. The Combustion scenario only includes in-state combustion emissions and drops the total revenues by more than half. Finally, I excluded everything except the electric power sector. Those costs are still pretty high: $12.05 per person per month and 0.15% of the GSP.

**Table 2: Estimated Statewide Costs ($Millions) of a Carbon Price Using 2019 Emissions and 2022 Value of Carbon for Different Scenarios**

| CLCPA Format (mmtCO2e GWP20) | Total | Annual Cost Using 2022 Cost of $129 | | | |
|---|---|---|---|---|---|
| | | Total | Candidate | Combustion | Electric Power |
| Energy | 289.58 | $ 37,356 | | | |
| Fuel Combustion | 171.45 | $ 22,117 | | | |
| Electric Power | 22.12 | $ 2,853 | $ 2,853 | $ 2,853 | $ 2,853 |
| Residential | 40.72 | $ 5,253 | $ 5,253 | $ 5,253 | |
| Commercial | 22.7 | $ 2,928 | $ 2,928 | $ 2,928 | |
| Industrial | 9.18 | $ 1,184 | $ 1,184 | $ 1,184 | |
| Transportation | 76.73 | $ 9,898 | $ 9,898 | $ 9,898 | |
| Fugitive Emissions | 14.22 | $ 1,834 | $ 1,834 | | |
| Electricity T&D | 0.13 | $ 17 | $ 17 | | |
| Other Use of Fuels | 0.93 | $ 120 | $ 120 | $ 120 | |
| Out of State Emissions | 102.85 | $ 13,268 | $ 13,268 | | |
| Imported Electricity | 7.84 | $ 1,011 | $ 1,011 | | |
| Imported Fossil Fuels | 95.01 | $ 12,256 | $ 12,256 | | |
| Industrial Processes and Product Use | 23.1 | $ 2,980 | | | |
| Metals | 0.4 | $ 52 | $ 52 | | |
| Minerals | 1.71 | $ 221 | $ 221 | | |
| Electronics | 0.12 | $ 15 | $ 15 | | |
| Product Use | 20.89 | $ 2,695 | $ 2,695 | | |
| Agriculture, Forestry, and Other Land Use | 21.21 | $ 2,736 | | | |
| Livestock | 19.55 | $ 2,522 | | | |
| Soil Management | 1.65 | $ 213 | | | |
| Waste | 45.54 | $ 5,875 | | | |
| Solid Waste Management | 19.96 | $ 2,575 | | | |
| Waste Combustion | 2.6 | $ 335 | | | |
| Wastewater | 6.93 | $ 894 | | | |
| Exported Waste* | 16.05 | $ 2,070 | | | |
| Gross Total | 379.43 | $ 48,948 | $ 40,338 | $ 22,237 | $ 2,853 |
| Cost per month per NYS resident | | $ 206.62 | $ 170.28 | $ 93.87 | $ 12.05 |
| % of Gross State Product | | 2.64% | 2.18% | 1.20% | 0.15% |

Another way to look at affordable costs is to set the costs per month per person and the costs relative to the GSP and see what revenues would be generated. Table 3 provides that information. On October 26, 2021, the AP-NORC Center and the Energy Policy Institute at the University of Chicago (EPIC) released the results of a survey that claimed that a majority of Americans regard climate change as a problem of "high importance". It also included survey questions asking whether respondents would support, oppose, or neither support or oppose a law that imposed "a fee on carbon to combat climate change". The survey question asked "If the law passed, it would increase the average amount your household pays each month for energy, including electricity, heating gas, and gasoline or diesel for your car by a total of X dollars per month" where respondents were randomly assigned a $1, $10, $20, $40, $75, or $100 cost increase. For a $1 per month increase, 45% would support, 30% would oppose, and 25% would neither support or oppose. For a $100 per month increase, 20% would support, 62%

would oppose, and 18% would neither support or oppose. Only 45% support $1 per month per household and $1 per month per person only provides revenues of $237 million.

**Table 3: Revenues for Affordable Carbon Price Cost?**

| | Population (Millions) | |
|---|---|---|
| **Cost per month** | 19.74 | |
| $1 | $236.9 | **Annual Revenues** |
| $5 | $1,184.5 | |
| $10 | $2,369.0 | |
| $50 | $11,844.9 | |

| | Gross State Product (2019$) | |
|---|---|---|
| **Fraction of GSP** | $1,851,570 | |
| 0.1% | $1,852 | **Annual Revenues** |
| 0.2% | $3,703 | |
| 0.3% | $5,555 | |
| 0.5% | $9,258 | |

The Draft Scoping Plan provides no details to recommend what is affordable. Rather than getting bogged down in implementation issues, the Climate Action Council and the Climate Justice Working Group should address what is affordable. That recommendation is going to drive the specifications for all three of these carbon pricing approaches.

- Could the policy be designed to minimize leakage or any economic disadvantage to the New York economy compared to the regional economy?

  The Draft Scoping Plan states: "Both carbon pricing and cap-and-invest programs present the risk of emission leakage, which may differ among sectors or industries covered." It goes on to say that:

  > The Climate Act requires programs to be designed to limit leakage. Policies have been considered and implemented elsewhere, however, that alleviate this risk by exempting certain industries from coverage or providing free allocation of allowances, sometime for only a multi-year phase-in period. Other possibilities would be to include border carbon adjustments, to the extent legally feasible, or to participate in multistate regional programs that may exist or be developed.

  With regards to the third option the Plan states: "Although a clean energy supply standard may raise a similar risk of leakage, further evaluation and research would be needed to fully understand the dynamics. Partnering with neighboring states on such a standard would help to address any risks of leakage."

  The reality is that I do not think it is possible to design a single state carbon pricing policy that would minimize leakage and economic disadvantage. If New York adds a carbon policy cost to

doing business in New York and other states do not it has to be a disadvantage to the New York economy. The possibilities proposed are band aids and pick winners amongst sectors.

- How would the policy interact with other applicable regulatory standards?

  The Draft Scoping Plan states:

  > Many of the regulatory programs recommended in this draft Scoping Plan that reduce emissions from covered sectors would complement the operation of economy-wide programs. Because a cap-and-invest program caps overall emissions, complementary regulatory measures would not result in additional reductions but would reduce the cost of meeting the cap by reducing demand for emission allowances. On the other hand, the level of a carbon price would not ordinarily vary depending on the emission reductions yielded by other programs. Therefore, the emissions reduced by a direct carbon price would be in addition to the emissions reductions from the regulatory standards. Of course, as those regulatory standards reduce emissions, the carbon price would be applied to a smaller amount of emissions, reducing revenues. As noted above, in the event a carbon price does not provide the required level of statewide emission reductions under the Climate Act, additional legally enforceable regulatory measures on certain source categories or sectors may be necessary. Other regulatory standards would likely be complementary to a clean energy supply standard, resulting in additional emissions reductions, similar to carbon pricing.

  There is nothing in this description that does not state the obvious or dissuade me from my belief that the affected sources will treat this as a tax. Because there are so few control options available this is simply going to be an added cost of doing business in New York.

- Should the policy be adopted economy-wide or for selected sectors? How would it be applied economy-wide?

  Table 2 above shows some of the revenue expectations for different sectors. From an implementation standpoint, I do not believe that an economy-wide program can work. The emissions from the out of state emissions, imported electricity, and imported fossil fuels sectors do not lend themselves to carbon pricing of any sort. Tracking emissions to properly account for costs for the Agriculture, Forestry, and Other Land Use and Waste sectors would be difficult, time-consuming, and subject to large uncertainties so I don't think those sectors should be included. The Industrial Processes and Product Use sector is the one most likely affected by leakage so I think those emissions should also be excluded. In Table 2 that leaves the combustion and electric power sectors.

- Is the policy equitable across regions of the State?

  The Draft Scoping Plan states that "Members of the Council have identified the need to ensure that an economy-wide program does not place a disproportionate burden on particular geographic portions of the State". I think that is a concern borne of ignorance and ideology. Any variation of this type of approach is going to have tradeoffs. There are far bigger problems than some real or imagined disproportionate burden.

- Could the policy be designed to stimulate economic development and innovation?

The Draft Scoping Plan states: these policies "could have the effect of stimulating private investment in lower-carbon sources and technologies. In addition, auction proceeds or revenues could be invested in ways that support sustainable low-carbon economic development." That more or less just says the policy generates money and can be used as proposed.

- Could and should the policy integrate with regional policies like RGGI?
  The Draft Scoping Plan states the obvious. If combined with other regional policies, it is probable that there will be more reductions. In addition, the program would either have to be integrated with RGGI or New York would have to drop out of the program.

**Other Comments**

Based on the format of Section 17, it was written to address specific issues raised by the Climate Action Council. As a result, it gets bogged down into details about specific issues raised by council members rather than looking at the big picture. In theory, a price on carbon is a great idea. The Council has not considered the theory relative to their perceptions.

My overview comments explain why I believe carbon pricing will always be a regressive tax. I also think that there are a number of practical reasons that carbon pricing will not work as theorized. Because a global program is impractical, leakage is always going to be a problem. All carbon pricing proposals need to address the problem that as carbon emissions go down revenues go down relative to the fact that reductions get more difficult and expensive as control efficiency increases. The Council members who support carbon pricing seem to be blissfully unaware of the realities of the energy market that are at odds to their theories. Based on observed results I think that indirect market signals are going to lead to less cost-effective reductions in the time frame necessary for the aggressive reduction rules. To date, carbon pricing for the electric sector only considers generation costs which leads to cost shifting the additional costs to supply electricity when and where it is needed to be covered outside the carbon pricing framework. Supporters under-estimate the very real problems of implementation logistics. My concerns about carbon pricing are supported by the RAP study.

In addition to my practical concerns "A Practical Guide to the Economics of Carbon Pricing by Ross McKitrick defines how carbon pricing is supposed to work in theory. He explains that "First and foremost, carbon pricing only works in the absence of any other emission regulations." The Guide goes to note "another important rule for creating a proper carbon-pricing system is to be as careful as possible in estimating the social cost of carbon". He argues that "whatever the social cost of carbon is determined to be, the carbon price must be discounted below it by the marginal cost of public funds (MCPF) — that is, the economic cost of the government raising an additional dollar of tax, on top of what is already being raised". The Draft Scoping Plan does not even recognize the importance of this aspect of carbon pricing. Finally, he notes that: "it needs to be remembered that carbon pricing works because it is a market-based policy: it works with market forces, not against them. He concludes: "There may be many reasons to recommend carbon pricing as climate policy, but if it is implemented without diligently abiding by the principles that make it work, it will not work as planned, and the harm to the Canadian economy could well outweigh the benefits created by reducing our country's already negligible level of global CO2 emissions."

The estimates of current (2019) emissions coupled with the New York value of carbon yield very high revenues. The AP-NORC Center and the Energy Policy Institute at the University of Chicago (EPIC) survey regarding climate change included survey questions asking whether respondents would support, oppose, or neither support or oppose a law that imposed "a fee on carbon to combat climate change". Only 45% support $1 per month per household additional costs and $1 per month per person in New York only provides revenues of $237 million. All of the projections in Table 2 estimate costs far higher than that level so I do not think the public perception of affordable will be met by any carbon pricing scheme.

Finally, based on my experience, I think that the Council and authors of the Draft Scoping Plan have under-estimated the logistical effort needed to implement any carbon pricing scheme. The electric generating sector is the only one who has the infrastructure in place to provide the accurate and transparent emissions data necessary for a carbon pricing program.

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I prepared this comment because my extensive experience with the Regional Greenhouse Gas Initiative has shown that there is a major disconnect between the theory of a carbon pricing program and reality. This disconnect is also evident in the NYISO carbon pricing initiative and the Draft Scoping Plan. 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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