

November 2021

Green Scheme:

The Climate Action Council's Climate Transition Cost Analysis

James E. Hanley

KEY TAKEAWAYS

- An ambitious 2019 climate change law could result in a net cost to New Yorkers of \$205-\$300 billion.
- An analysis issued by the Climate Action Council assumes half of the new cars purchased over the next decade will be electric vehicles.
- The analysis fails to report how much monthly utility bills will need to rise in order to achieve the milestones laid out in the law.

A climate law adopted by the State Legislature in 2019 requires that New York transition to alternative energy sources on an aggressive timeline. At the time of its adoption, no cost benefit analysis of the legislation was performed. Only on October 14 – more than two years after the enactment of the Climate Leadership and Community Protection Act (Climate Act) – was the Climate Action Council (Council), the entity charged with drafting a scoping plan for its implementation, presented with a cost-benefit analysis that attempts to quantify the impact of transitioning to a carbon-neutral economy in New York State. The analysis finds that the transition will cost \$280-\$340 billion, while producing \$420-\$430 billion in benefits, for a net benefit of \$80 to \$150 billion. New Yorkers should be skeptical of this assessment, for several reasons.

First, the scale of the Climate Act qualifies this transition as a megaproject (a project that costs billions of dollars and takes many years to complete). Megaprojects typically come in 50 percent or more over budget while also overstating benefits by just as much.¹ Because of this, initial cost estimates should

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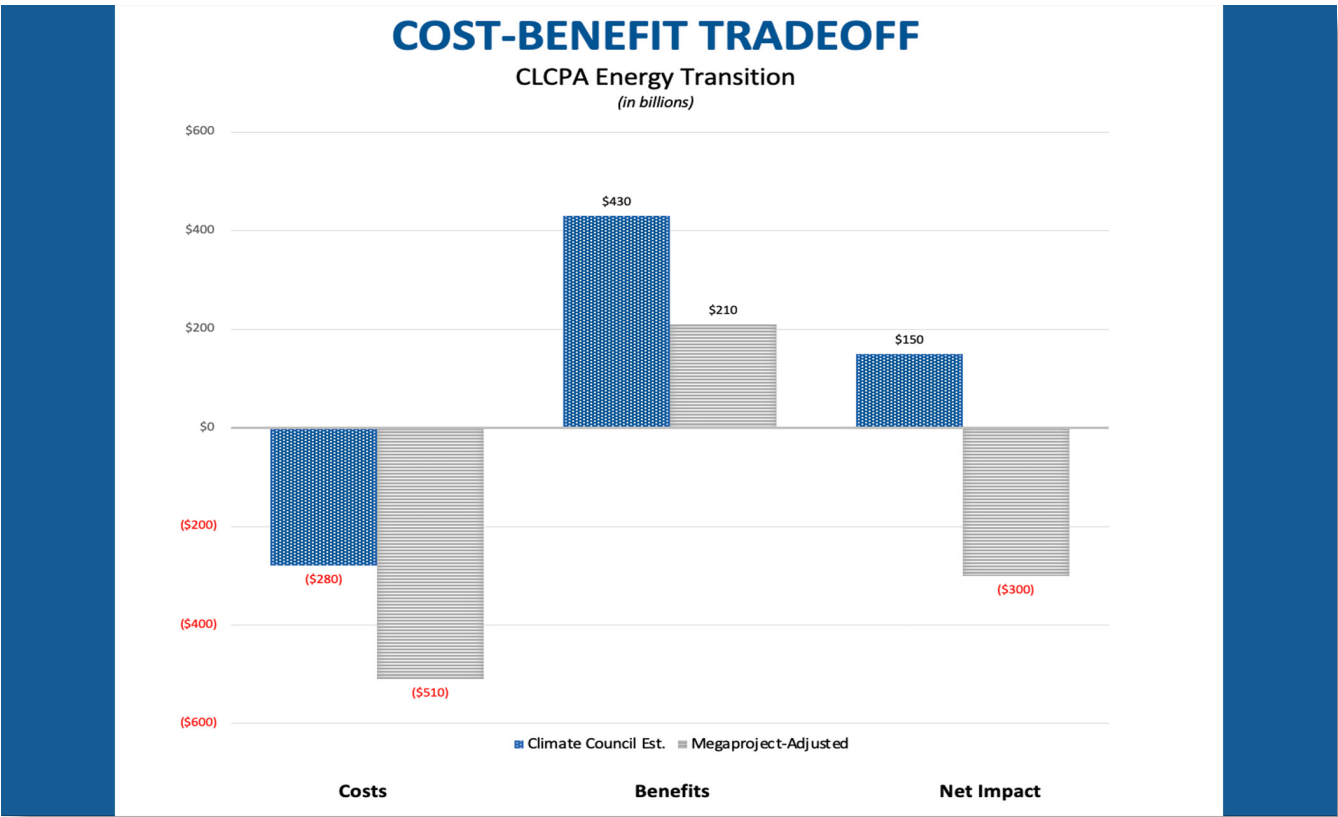
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be seen only as down payments rather than the true full cost.² If that pattern holds for this analysis of the Climate Act, the costs may be as much as \$420–\$510 billion, and benefits as low as \$210–\$215 billion. If so, the net value of the Climate Act could be negative, resulting in a net *cost* to New Yorkers of \$205–\$300 billion (See chart). That would mean the net loss per New York resident over the next 29 years would be between \$10,000 and \$15,000.

Second, the Council was not created to be a disinterested source of information but to plan the implementation of the Climate Act.

A positive estimate of benefits to costs is necessary to the Council’s purposes, whatever the reality may be. This is true for all public agencies responsible for megaprojects, which is why they are so predictably wrong in their analyses. Finally, unlike past reports from its consultants, the Council has not yet made the transition cost analysis public so that independent analysts can review it. Instead, it has released a report that obscures some key assumptions of the analysis.

Because the Council has not released the analysis itself, we cannot assess its claims directly. But based on the Council’s report, the analysis



Note: The data for the Climate Council estimate is from a presentation made at the Council’s October 14 meeting posted at <https://climate.ny.gov/Climate-Action-Council/Meetings-and-Materials>. The Megaproject adjustment is based on, “Introduction: The Iron Law of Megaproject Management.” The Oxford Handbook of Megaproject Management. Oxford University Press. Pp.1-18.

appears to be based on unrealistic targets, to ignore substantial costs to be borne by New Yorkers, and to overstate the benefits from decarbonizing. Finally, the Council has provided no estimate of how much of the transition cost will be charged to utility ratepayers, via higher monthly bills.

REVEALING THE CLIMATE ACT'S UNREALISTIC TIME FRAME

Because the Climate Act arbitrarily sets 2040 as the date for achieving a carbon-free power grid and 2050 for reducing greenhouse gas emissions by 85 percent, the Council has had to create paper targets that appear to meet that goal. But that does not mean the targets are plausible in the real world. The state has already failed to stay on schedule in meeting its 50 by 30 goals (having 50 percent of the state's electricity provided by renewable sources by 2030).³ It is just as unlikely to meet the Climate Act's overly-ambitious goals.

The analysis relies on many unrealistic assumptions. These include targets for retrofitting buildings with improved shells for energy efficiency, consumer purchases of heat pumps, the transition to an all-zero emission vehicle fleet, gains in "active transportation" (walking and bicycling), and the development of offshore wind energy.

Retrofitting Building Stock

The analysis assumes that by 2050, 92 percent of building stock will have improved building shells to enhance energy efficiency. Neither the Council's public report nor the previous reports by its consultants explains how extensive these improvements will have to be, nor whether this can really be accomplished in the desired time frame. New York City alone has more than 1 million buildings. To retrofit 92 percent of them in the next 29 years will require over 31,000

building shell retrofits annually, just in New York City. The analysis does not address whether there is even sufficient construction labor available to accomplish this while meeting other construction and building renovation needs.

Heat Pump Sales

The analysis further assumes 100 percent sales of heat pumps for heating and cooling by 2030. Although the report gives little detail, this appears to apply to all furnace replacements as well as to new home construction. While heat pumps can pay for themselves over time, their upfront costs are considerably more than a furnace and air conditioner combination. This target is only nine years out, and heat pump prices are unlikely to decline so quickly as to make them affordable for all New Yorkers. The only way to achieve this goal is to ban the sales of alternative heating and cooling systems. Such a ban would either impose higher costs on consumers or require large public subsidies.

A Zero-Emission Vehicle Fleet

In the transportation sector, the analysis assumes that 98 percent of new automobile and light-duty truck sales will be zero-emission vehicles (ZEVs) by 2030, only nine years from now. While the cost of electric vehicles is declining, only about 1 percent of sales are fully electric at this time.⁴ New York has banned the sale of new fossil fuel vehicles starting in 2034, four years *after* the analysis's target date. This ban will likely lead to a rush on buying new internal-combustion cars and light trucks before 2034, making the 98 percent ZEV sales by 2030 goal an implausible target.

The analysis also assumes reductions in the total stock of fossil fuel vehicles so that 26 percent of all automobiles and light-duty trucks are ZEVs by 2030. The Council's consultants stated that "Consumer decision-making is especially

important in passenger vehicle turnover.”⁵ But in the transition cost analysis the reality of consumer decision-making is ignored. The average age of automobiles in the U.S. is 12 years,⁶ suggesting that at least half the cars bought since 2018 will still be on the road in 2030. Unless ZEVs are half of all light-duty vehicle sales over the next nine years, the state cannot meet this target. The analysis further calls for 95 percent of light-duty vehicle stock to be ZEV by 2050. Approximately 25 percent of cars are 16 or more years old.⁷ With only 16 years between the 2034 ZEV mandate and 2050, we can assume that far more than 5 percent of the cars bought in the years right before the mandate takes effect will still be on the road in 2050. In addition, as current low sales of ZEVs demonstrate, many people do not want an electric vehicle. Therefore, many auto owners may hold onto their gas-powered cars and trucks longer than they otherwise would, slowing the transition to an all-ZEV fleet.

“Active Transportation”

Another unlikely target is the hoped-for increase in “active transportation” (walking and bicycling). The analysis assumes a combination of education and smart growth will suffice to achieve this goal. But people already know that exercise improves health, and a public education campaign is unlikely to change their behavior. Smart growth will not solve the problem, either. We cannot fundamentally transform the basic infrastructure of existing communities in a mere 29 years. Nor can we expect developers to build enough new smart communities in a state that is losing population.

Offshore Wind Energy

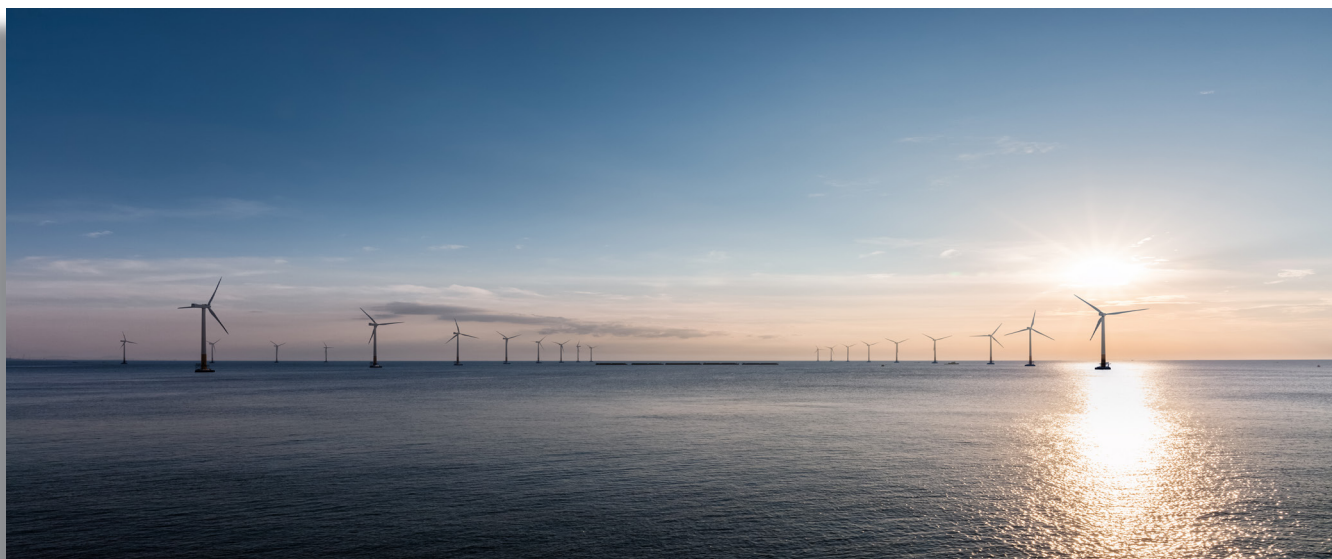
Finally, the analysis assumes the building of 16–19 gigawatts (16–19 thousand megawatts) of offshore wind energy by 2050, as much as twice the nine gigawatts the Climate Act envisions by 2035. The state currently has no offshore wind capacity, but has approved 4.3 gigawatts of

offshore wind projects. The earliest is scheduled to come on-line in 2024. That leaves 26 years for complete buildout. Assuming technology-leading 12-megawatt turbines, over 1,500 turbines will be required to achieve 19 gigawatts of capacity. This will require the completion of more than one turbine a week between 2024 and 2050. The most efficient sites will have been the first selected, so the remaining 12–15 gigawatts of offshore turbines will be in increasingly less productive, and possibly more controversial, sites. These may be more environmentally sensitive or perhaps closer inshore where the turbines may be visible from land, in either case stirring up opposition. The regulatory siting and approval process is unlikely to move fast enough to accommodate this buildout, and predictable legal challenges to at least some of the siting decisions will further slow their development.

UNCONSIDERED COSTS

The analysis considers only direct costs of transition and ignores real but indirect costs. Among these are the personal costs of active transportation and the higher cost of construction and home repairs due to increased demand for construction labor for building shell retrofitting. While indirect costs are challenging to measure or estimate, the Council should insist that its analysts not ignore them entirely.

Based on the public report, the analysis also appears to ignore the additional cost of upgrading the grid to handle less reliable renewable power sources, as opposed to the lower cost of upgrading the grid for continued reliance on reliable sources such as hydropower, nuclear, and natural gas with carbon capture. While New York’s grid will require substantial investment in the coming decades regardless, a smart grid that can effectively distribute only intermittent renewable sources is more complex and more expensive to develop. The analysis should clearly address the additional cost of building this grid. If it already does account



for this, the Council's report should have clearly demonstrated that it does so.

Finally, the analysis does not address effects on the economy from transitioning to renewable energy. Previous studies have found substantial economic effects when states adopt renewable portfolio standards, with nearly 14 percent decreases in industrial electricity sales, significant declines in real personal income of over \$4,000 per family, and a ten percent increase in the unemployment rate.⁸ The effective expansion of New York's Renewable Portfolio Standards can likewise be expected to have a substantial negative macroeconomic effect, which the analysis does not appear to consider.

The net effect of these additional costs is beyond the scope of this paper, and will be difficult to calculate. However, the historical evidence from legislatively-mandated shifts to renewables indicates that the Climate Act could cost New York families thousands of dollars per year. If the population of the state continues to decline – and these costs could drive further out-migration – the costs will fall even more heavily on the remaining residents.

QUESTIONABLE ANALYSIS OF BENEFITS

Some of the analysis's claimed benefits are questionable. For example, the report claims \$1.9 billion in benefits from reduced trip or fall injuries in the home. These come from home efficiency interventions that also incorporate non-energy-related side projects such as improved lighting, stair handrails, and raised toilets. But the American Council for an Energy-Efficient Economy (ACEEE) projects savings from these interventions as \$2.18 billion *nationally* over ten years.⁹ Projected through 2050, that amounts to around \$6.5 billion dollars nationally. Even if these side projects are implemented, which is uncertain, it is implausible that New York alone would account for nearly one-third of total national benefits.

More substantially, there is the claim of \$260 billion in benefits from avoiding economic damages caused by climate change. The public report makes no argument for this critical but dubious number. The claim seems to assume that New York's contribution to CO₂ reduction will have a substantial effect on climate change. But New York has already reduced its greenhouse gas emissions (GHG) significantly. According to the New



York State Energy Research and Development Authority (NYSERDA), electrical production in New York produced 64.8 million metric tons of CO₂ equivalent greenhouse gases in 1990, but only 31.5 million metric tons in 2016, due to a shift from petroleum oil and coal to natural gas. As a result, total GHG production by the state fell from 236 to 205.6 million metric tons during that time period.¹⁰ As of 2014, the U.S. as a whole emitted over 6,800 million metric tons,¹¹ so New York contributed just over 3 percent of the U.S. total. Global GHG production in 2016 was 49.4 billion metric tons,¹² meaning New York's share is only 4/10ths of one percent of global GHG emissions. It is unclear how reducing such a minuscule portion of global GHG production could have any significant effect on climate change and so reduce any resulting economic damages.

The Biden administration has recently estimated the social cost of carbon as \$51 per ton.¹³ At this

price, though, the total social cost of New York's carbon emissions would be only \$10.5 billion. So this itself would only be about 4 percent of the claimed savings in economic damages, and cannot begin to explain the estimate of \$260 billion saved.

The public report specifies that some of the health benefits from cleaner air (mostly due to reduced particulate matter) will accrue to residents of neighboring states. It is possible that the benefits of avoided economic damage – if real – will also, but the report does not specify this. Because New Yorkers will be footing the bill for this policy, the transition analysis should, if it does not, clearly distinguish between benefits to New Yorkers and spillover benefits to other states, and the Council should make this information public. New Yorkers deserve to know whose benefits they are being asked to pay for.

Finally, the analysis uses a discount rate of 3.6 percent as recommended by the New York State Department of Public Service.¹⁴ However, the White House Office of Management and Budget recommends using a 7 percent discount rate for public projects,¹⁵ and the U.S. Department of Energy recommends running two analyses, one at 3 percent and one at 7 percent.¹⁶ The lower the discount rate, the higher the estimated value of future benefits. By choosing the lower rate rather than the higher recommended rate, the analysts may have inflated the estimated value of future benefits from rapid decarbonization. A precise analysis is impossible without knowing how the Council's analysis distributes benefits and costs across the years, but using a 7 percent discount rate would reduce both costs and benefits by roughly 30 percent. This suggests that costs could be \$196-\$238 billion with benefits of \$294-\$301 billion, reducing the expected net benefit to \$63-\$98 billion. That lower estimate assumes the underlying financial assumptions are correct and that the analysis is not as far off the mark as the analyses for most megaprojects have been. If it is similarly flawed, using a 7 percent discount

rate might show the policy as having a net *cost* of around \$200 billion – roughly the size of the state’s annual budget.

The Council’s transition cost analysis appears to be badly flawed. It relies on unrealistic expectations about how quickly major changes can be accomplished, ignores substantial costs, and almost certainly overstates the benefits to the people of New York. Unless the analysis is reconsidered, New Yorkers cannot understand the true cost of the Climate Act.

THE UNCERTAIN EFFECT ON RATE PAYERS

The analysis conducted for the Council was limited to determining net costs and benefits, leaving the question of how to pay for the decarbonization transition beyond the scope of the study. As NYSERDA’s Carl Mas said, “that comes in the articulation of the Scoping Plan.”¹⁷ Nonetheless, New York’s utility ratepayers, who already pay among the highest energy prices in the country, have an interest in knowing what the cost will be of transitioning to carbon-free electricity.

Unfortunately, the Council’s report does not clearly state the net cost of transitioning to renewable carbon-free energy sources. The report only contains a line item for “electricity” in its presentation of total expenditures, which appears to have a net present value of \$500 billion, with annual costs of around \$10 billion. As with much of this report, the numbers are neither explained nor broken down into their various components.

Because New York’s policy is a first-in-the-nation effort, there are no examples from other states to estimate the total electrical sector cost of shifting wholly to renewables. An independent analysis of the cost of transitioning the electricity sector will require an assessment of New York utilities’ plans for developing renewable energy sources. More specifically, details on the share of energy needs

to be met by solar, onshore wind, offshore wind, and renewable hydrogen is needed, along with estimated storage requirements.

The cost of these sources is declining over time. To make an accurate estimate, it’s necessary to know when projects are expected to come on-line. The timing affects the cost in at least two ways. First, it determines how much the cost gets discounted, with projects coming on line getting discounted more. Second, the cost of alternative energy projects is expected to decline over time as technology and construction techniques improve.¹⁸ For example, regarding offshore wind, the U.S. Energy Information Administration estimates the overnight capital cost of construction at \$5,466 per kilowatt-hour (compared to \$2,481 for natural gas with carbon capture) but expects that to fall to \$2,369 per kilowatt-hour by 2050. With an expectation of up to 19 gigawatts of total offshore wind power, an immediate buildout would cost up to \$118 billion, whereas a complete buildout in the year 2050 would cost only \$45 billion. The actual cost will likely be somewhere in-between as offshore wind turbines are sited and constructed over several decades. The cost is also likely to be affected by legal challenges to the siting of turbines. But the public report does not break down these cost estimates in enough detail to know what cost projection was used in the transition cost analysis.

Finally, a full analysis is incomplete without knowing the additional cost of transmission system upgrades required for managing the less reliable renewables and behind-the-meter solar compared to traditional on-demand sources of supply. Collectively, these factors will determine the cost of transition to New York electricity users. However, the transmission upgrades could produce net savings by enabling more producers to compete for customers at periods of unusually high peak demand.

Much depends on the New York Public Service Commission’s approval of rate increases. Because

the Climate Act goals are state policy, we can assume the Commission is likely to approve rate increases sufficient to cover the necessary transition costs. Other factors necessary to analyze the cost to ratepayers will be dependent on the implementation of the Climate Act, as shaped by the Council's Scoping Plan. Any tax-based subsidies proposed for renewables will reduce the direct ratepayer cost of transition while shifting that cost to taxpayers. Further, if utilities are required to subsidize energy efficiency improvements for homeowners, direct ratepayer costs will increase while costs incurred as homeowners will decline.

For independent analysts to figure out what proportion of the transition costs will be borne by ratepayers, the Council needs to provide the public with information on the incremental capital costs of the transition to renewables, what portion of that will be covered by the existing Renewable Portfolio Surcharge, what portion will be recoverable through new or increased fees by utilities, and the net increase in costs of electricity generation.

RECOMMENDATIONS

The Climate Action Council should take significant steps to ensure that New Yorkers can have confidence in its analysis of the costs and benefits of transitioning to a carbon-neutral economy. Looking to the future, and with a concern for transparent governance, the Council should take the following steps. First, the Council should release the complete transition cost analysis to the public so that independent analysts can review its financial assumptions and estimates and comment on it in detail. Transparent governance demands nothing less. Second, the Council should re-run the analysis using the Department of Energy's recommended 7 percent discount rate. Third, the Council should produce

companion analyses that consider potentially more cost-effective means of achieving the Climate Act's goals. Fourth, the Council should provide New York utility ratepayers with information on how the transition to a carbon-free electricity supply will affect their utility costs.

Provide Transparency

The public deserves to see the financial assumptions underlying the analysis. The Council should make public the full transition cost analysis, just as it has made other supporting documents available. In particular, the Council should address the following questions clearly and precisely:

1. What are the sources of the claimed \$260 billion in avoided climate change-induced economic damages, and how will the state's minuscule contribution to reducing atmospheric greenhouse gases produce those savings?
2. What portion of the claimed benefits—which will be paid for by New Yorkers—will stay in state and what share will go to neighboring states?
3. How are the cost estimates for the various elements of the transition determined?

For example;

- a. How is the cost of retrofitting building shells determined, and does it account for the impact on labor costs of the state's prevailing wage mandate and the increased demand for construction labor that this work will induce?
- b. What is the additional cost in grid development necessary for relying on renewables, storage, and behind-the-meter solar versus greater reliance on on-demand sources such as natural gas with carbon capture, hydroelectric, and nuclear power?
- c. What is the cost to upstate New Yorkers of shifting from wood to heat pumps, and how does that compare to their estimated gains in health benefits?

- d. What are the assumptions used to determine the cost of power sources such as offshore wind and the cost of storage necessary due to reliance on less-reliable renewable energy sources?
4. What are the bases for assuming the state can achieve the necessary targets by the specified deadlines?
5. Given that megaprojects regularly have cost overruns of 50 percent or more and benefit shortfalls of 50 percent or more, why should New Yorkers trust that the analysis provided by the Council does not understate the costs and overstate the benefits?

Re-Run the Analysis

While it is impossible to provide a fully detailed critique of the transition cost analysis unless and until the Council releases it publicly, the information presented to date suggests the Council should re-run the analysis with several changes. The first, as noted above, is that the discount rate should be set at 7 percent to avoid overestimating the benefits. Second, in keeping with the history

of other megaprojects, a companion estimate that assumes up to 50 percent less benefit and 50 percent greater cost should be appended to the analysis.

A revised analysis should also try to incorporate indirect costs that New Yorkers will bear. This includes higher costs in construction services due to increased demand for construction labor caused by requiring over 90 percent of buildings to be retrofitted in less than 30 years. It may also include higher-than-anticipated prices for heat pumps due to increased demand to meet 100 percent sales of heat pumps for home heating and cooling. Accounting for indirect costs is exceptionally difficult, which is why benefit-cost analyses frequently avoid them. But they are real costs to the public and should not be ignored.

There are likely to be additional costs of trying to force achievement of the transition targets by the arbitrarily-chosen deadlines. The Council's current analysis is forced to rely on the assumption that these target dates are achievable, but the public report does not make clear whether the additional costs of forcing rapid change are considered. The revised analysis should clearly account for accelerated-transition costs and look at whether the





transition to a carbon-free economy could be made more cost-effectively if that deadline—which is unlikely to be met in any case—were relaxed.

The revised analysis should also make regional distinctions for costs and benefits. This requires, at a minimum, distinguishing between the share of benefits accruing to New Yorkers and the share going to out-of-staters. It should also distinguish both the benefits and the costs by region, so that residents of different parts of the state can see how much they will pay and what benefits they might expect to receive. It is possible the analysis includes such a regional breakdown, but the public report does not do so.

Consider Alternative Approaches

Due to the nature of the Climate Act, the analysis is overly focused on achieving carbon neutrality by relying almost wholly on renewables (plus, potentially, carbon-neutral renewable hydrogen). As with most centrally-planned economic policies, these goals ignore economic efficiency. But if New Yorkers want to achieve a carbon-neutral economy, they

should also seek to maximize the net gains from doing so. That depends on choosing the most cost-effective method. The Council should, at a minimum, ask for an additional analysis that analyzes the cost of achieving carbon-neutral electrical generation through a combination of nuclear power, imported hydroelectric power, and natural gas with carbon capture, along with other carbon-neutral sources. The Council's own consultants recommended relying on "a diverse mix of resources" that included new natural gas plants with carbon capture and sequestration. As they noted, using reliable zero-emission energy sources in addition to renewables reduces total electric system costs by 10-62 percent.¹⁹

Emissions markets for other pollutants have reduced transition costs and achieved target reductions more quickly than command and control policies. The Council should request an analysis that relies on a greenhouse gas market in the electricity production sector.²⁰ This market would offer GHG emission permits (based on CO₂ equivalence) that decrease in time until the desired target is met. Prices for GHG permits would be determined by the market rather than by bureaucrats. In a market, utilities could research and discover their most cost-effective ways of

achieving carbon neutrality. This could be any potential combination of wind-solar-storage, a greater reliance on imported hydropower, renewable hydrogen, natural gas with carbon capture, or potentially even wave or tidal energy. During the transition period, individual utility companies might also choose to subsidize home efficiency improvements or ZEV purchases to meet net emission targets. By insisting on a centrally planned approach, New York is forfeiting the opportunity to benefit from the efficiencies of market-based mechanisms, and so is imposing unnecessary costs on New Yorkers.

Show the Effect on Utility Costs

The Council should give the public an estimate of how much the Climate Act will increase monthly utility bills. This is a matter of great importance to rate payers. Most Americans wouldn't pay \$10 or more in higher electricity bills in order to combat climate change, according to a national poll conducted in September.²¹ High energy costs are not only a financial burden but produce excess winter

mortality.²² If the Transition Cost Analysis does not specify this information, the Council should require its analysts to determine its best estimate of future utility rates.

CONCLUSION

The Climate Action Council's public report on the Transition Cost Analysis is a missed opportunity to provide transparency in the implementation of the Climate Leadership and Community Protection Act. New Yorkers can justly be skeptical of the findings. New Yorkers may support the reduction of carbon emissions without supporting the vague terms of the Climate Act or the still-to-be-produced Scoping Plan of the Climate Action Council. Or they may find the cost of transition to a carbon-neutral economy too high. If New York is going to follow a legislatively-mandated timeline to transition to carbon-free electrical production and a carbon-neutral economy, the state's citizens have a right to know the true costs and benefits of that transition and how they are expected to pay for it.

James E. Hanley is an independent non-partisan scholar. He earned his Ph.D. in Political Science at the University of Oregon, followed by a post-doctoral fellowship under 2009 Economics Nobel Prize winner Elinor Ostrom, and twenty years of teaching Political Science and Economics at the collegiate level.

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