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New York as a clean energy hub

Edward N. Krapels[1,2]

Anbaric, 401 Edgewater Pl, Suite 680, Wakefield, MA 01880, USA

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ABSTRACT

New York Gov. Andrew Cuomo has launched a "50 by 30" energy program to commit the state to obtain 50% of its electricity from renewable resources by 2030. The fate of aging nuclear power plants determines how difficult and costly this project will be. A host of renewable alternatives are waiting in the wings, as is a new policy approach to distributed energy. The outcome depends on infrastructure decisions made in the coming five years.

1. Introduction

In December 2015, New York Gov. Andrew Cuomo committed the Empire State to transform its electric system in two profound ways that will serve as a model – positive or negative – for all of North America. First, he directed the Public Service Commission (PSC) to implement a Clean Energy Standard (CES) so that 50% of the state's electric energy will be provided by renewable energy by 2030. This "50 by 30" commitment is the critical component of a broader campaign by New York State to achieve significant carbon reductions.

Second, Gov. Cuomo embraced the initiative by PSC Chairman Audrey Zibelman to modernize the structure of New York's utility industry. Her vision has been dubbed "Reforming the Energy Vision" (REV) and it requires utilities to serve as "platforms" for a new and more competitive and dynamic distributed energy sector. REV subjects the distribution sector to the bracing winds of competition, just as restructuring in the 1980s did to electric generation, and in the 1990s to electric transmission.

The 50 by 30 commitment for New York is echoed by similar plans in New England, California, and several Canadian provinces. As such, it is a model for the rest of North America. Six months after Cuomo's commitment, President Barack Obama, Canadian Premier Justin Trudeau, and Mexican President Peña Nieto went even further and pledged to impose the same standard by 2025.

There are many hopes and dreams associated with the development of clean energy. Behind all these messages is the reality that the ongoing change in energy technology, like the ones before it, entails a massive transfer of wealth and political power from the old to the new guard. As an industry, renewable energy is asking for – and in many progressive states, getting – various forms of subsidies and guaranteed contracts that allow it to compete with gas in generating electricity. There's public support for these subsidies in part because the public is aware that oil, coal, and gas have been subsidized for more than a century by society's willingness to tolerate oil, coal, and gas filling the atmosphere with carbon in ways that contribute to climate change.

As states like New York ramp up their support for renewable energy, however, they run into some gnarly questions, most notably who should get what *within* the renewable industry. Should solar "get more" than wind? Is offshore wind somehow more valuable than onshore wind? Is "big hydro" worthy of a subsidy? Must renewable energy produce jobs? If so, how many? How can we be sure jobs are indeed created instead of just promised? Are local renewables better than "imported renewables" even if imports are cheaper?

[1] Anbaric.
[2] Edward N. Krapels is the Founder of Anbaric, a clean power infrastructure development company. Clarke Bruno, Anbaric partner in charge of transmission; and Dirk van Ouwerkerk, Anbaric partner in charge of microgrids, contributed to this article.

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Go to any state house that's discussing new energy legislation and each sub-section of the renewables industry will have its advocates and its critics. On the web, there's a vast trove of scholarly and not-so-scholarly critiques of renewable energy, from Benjamin Zycher's January 2016 *Forbes* article arguing that California's solar program "subsidizes the affluent . . . at the expense of all other power consumers . . . " to the argument by Harvey Mudd's Spenser Anderson that "offshore wind is more than three times the price of onshore wind at this point in time."[3]

New York, as a leader in the field of renewable energy development, has to choose from among many contending renewable energy projects that claim to mitigate unwanted climate change. What should the criteria be for what gets the most support, and when they get it?

2. The sequence of renewable development

New York, like New England, has the luxury of choice among contending forms of renewable and zero- or low-carbon energy resources. In 2015, New York consumed 142 terawatt-hours (TWh) of electricity. Of that amount, 45% came from oil, gas, and coal. That means 55% already came from low- or zero-carbon-emitting resources. Essentially, then, New York has already achieved "50 by 30" in 2015! Here is the breakdown of that 55%:

1. New York has a large fleet of nuclear power plants that currently provide carbon-free energy. Some 31% of electric energy in 2015 came from New York's nuclear plants. The problem is, some of the nuclear plants are in dire straits economically, some are quite far along in the 60-year expected life span of these facilities,[4] and one of them (Indian Point) is doing better economically (because of a special subsidy for capacity resources in downstate New York imposed by the New York ISO) but has been in the center of a debate for decades about its location (45 miles north of New York City), which has caused many (including Gov. Andrew Cuomo), to call for its closure. If New York could keep its nuclear plants open, maintaining "50 by 30" will be easier; if all of the nuclear plants close, it will be much, much harder.
2. New York has a large fleet (5700 MW) of hydroelectric facilities, mostly in the north and west, anchored, of course, by the huge facility at Niagara Falls. Some 19% of New York's power in 2015 came from hydro.
3. New York is home to 1400 MW of onshore wind, and has the potential for several thousand more MW, most of it located in the western and northern parts of the state (a.k.a. "upstate"). Additional capacity could be readily developed, but will need a buildout of north-to-south and west-to-east transmission to get to market. Only 2.8% of New York's electricity in 2015 came from wind.
4. New York could be home to several thousand MW of offshore wind. The geography of the state is such that most of this would be developed close to the load centers of Long Island and New York City. Offshore wind costs, however, are much higher than onshore wind.
5. New York can import 1800 MW of power on a 7×24 basis, and an additional 1000 MW on a non-firm basis. About 1200 MW of imports can come from Quebec (almost all of it hydro). About 1000 MW can be imported regularly from PJM (the New Jersey-Pennsylvania-Maryland market). At the moment, those imports aren't renewables, but they could be. In addition, several other projects[5] are in development that could serve as "renewable expressways" into New York.
6. Solar energy is expanding rapidly, although most of it is "behind the meter" and not the large-scale, wholesale solar projects that are increasingly commercial in the west. As a "retail" form of renewable energy, the solar industry can attract large numbers of supporters, and is often seen as the safest form of renewable energy for politicians to support. Behind-the-meter solar will continue to expand in New York, but the scale of its ultimate contribution remains somewhat limited, and from an overall grid perspective, it's not highly visible precisely because it is behind the meter. Rooftop solar shows up, therefore, largely as the most important reason for flat or even declining growth in demand in the wholesale electric market.
7. Energy efficiency is similarly popular, and funding for it has been fairly constant over the years. There's no question substantial additional efficiency improvements will continue in New York (think of the large brownstone apartment buildings in New York with window air conditioners!). Again, this will show up largely as declining demand for electric power from the wholesale sector.

Due to a market design that does not tax carbon, wind and solar energy are dependent on some form of support from policymakers, whether it's a requirement on utilities to buy renewable energy credits, or a long-term contract, or some other form of payment that is apart from the established short-term payments for electricity.

As a result, policymakers and regulators have to decide how to allocate these various forms of support. That is the situation New York finds itself in now. What criteria should be used to select from this variety of clean energy alternatives? Even an "all of the above" approach doesn't answer the key question: who gets what, and when?

One old-fashioned but effective criterion is "bang for the buck." While the pursuit of 50 by 30 will enable many small-scale projects to be developed, the bulk of the clean energy will come from very large-scale wind, hydro, and some combinations of wind and hydro projects. Some of that wind can be homegrown, some can be offshore, and some will be imported from neighboring states or Canadian provinces.

Another useful selection criterion is price. It is unjust to impose higher energy costs on society if it's possible to achieve the same objectives at lower cost. Renewable energy, like the rest of the goods we produce, should be developed in order of cost, taking externalities fully into account. We know how to make cost estimates and we know how to account for externalities. We just have to do it conscientiously. In the current atmosphere of "advocacy analysis," transparent price competition for the contracts that will be awarded in pursuit of 50 by 30 is the only way to determine which renewable technology will be deployed next.

2.1. Defining the problem: 50 by 30, given nuclear power uncertainties

To understand what is necessary to reach the 50 by 30 goal, we must understand where New York is starting from. New York's total generation capacity is 38,576 MW, of which nuclear is 5402 MW (14%), hydro is 5721 MW (15%), wind is 1446 MW (4%), and other renewables are 413 MW (1%). In addition, the state has 1769 MW of import capability, and 1248 MW of demand response commitments.[6] This supply endowment raises numerous issues in

[3] New York State Department of Public Service, Staff White Paper on Clean Energy Standard, Jan. 25, 2016, available at http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={930CE8E2-F2D8-404C-9E36-71A72123A89D}.

[4] James A. Fitzpatrick has 19 years left on its current license; Indian Point 2 17 years; Indian Point 3, 20 years; Nine Mile 1, 13 years; Nine Mile 2, 32 years; Ginna 14 years.

[5] Including the Poseidon project being developed by Anbaric and Exelon.

[6] These figures and others in this article (unless noted otherwise) come from the New York ISO's *POWER TRENDS 2016: The Changing Energy Landscape.*