

Electrification of Mobility in Beautiful Ithaca, New York
as a *Driver* of Sustainable Nuclear Power:

Conversion of the Tompkins County Area Transportation (TCAT) System to Electric Mobility

Introduction

One of the most beautiful regions of New York is called the Finger Lakes. Now officially comprised of 12 lakes in-total, the largest most populated county is Tompkins County, which has as its spiritual, cultural and commercial center Ithaca, New York

Ithaca is home to two major academic institutions, making the population especially sensitive to the human condition, and how preservation of the environment is central to their well-being. That preservation however is intimately tied to ensuring that so-called solutions to environmental issues do not impinge in any way on the famous beauty of the Finger Lakes region.

There are two major academic institutions in Ithaca, Ithaca College, and my alma mater, Cornell University. Tompkins County houses Tompkins County Community College, and many technical and cultural learning centers; education is a major economic activity of the county. This academic focus contributes to a demographic that is much younger than the USA national median for cities/regions of similar population.

Relevant statisticsⁱ of the Tompkins County and Ithaca, New York:

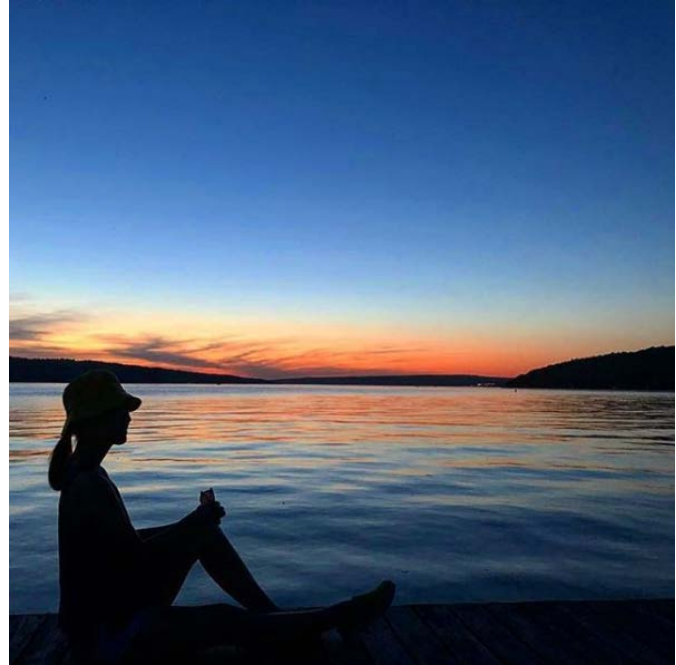
	Ithaca New York	Tompkins County
Population	30,625	104,268
Median Age	21.8	30.3
Median Household Income	\$30,291	\$54,133
Median Property Value	\$219,100	\$182,600
Number of Employees	11,976	49,581
Poverty Rate	44.8%	20.1%
Households w/ One Vehicle	40%	28%
Households w/ Two Vehicles	31%	41%
Households w/ More than Two Vehicles	13%	24%
<u>Commuter Transport Modes:</u>		
Drove Alone	33.7%	63.2%
Car-Pooled	6.3%	8.6%
Commercial/Public Transport	12.6%	6.5%
Walked	37.8%	14.1%
Climate / Weather	Four Distinct Seasons	Four Distinct Seasons
Average Annual High Temperature	56.5° / 13.6°	~same
Average Annual Low Temperature	36.8° / 2.6°	~same
Average Annual Rainfall	37.3" / 95 cm	~same
Average Annual Snowfall	65" / 165 cm	~same
Sunny Days	154	~same
Precipitation Days	85	~same

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Context

Mentioned above, the beauty of the Finger Lakes Region is not a matter of personal opinion, it is world-renown. The landscapes are as rugged as they are appealing to human and wildlife alike. When I share photographs of the area, including from the campuses of Ithaca College and Cornell University, many of the uninitiated, those who have never actually visited this area, remain skeptical that the photos are in fact from “New York.” Some samples :



Obviously space does not allow a complete photographic review, but the beauty is an important context for much of the discussion which follows below. ⁱⁱ

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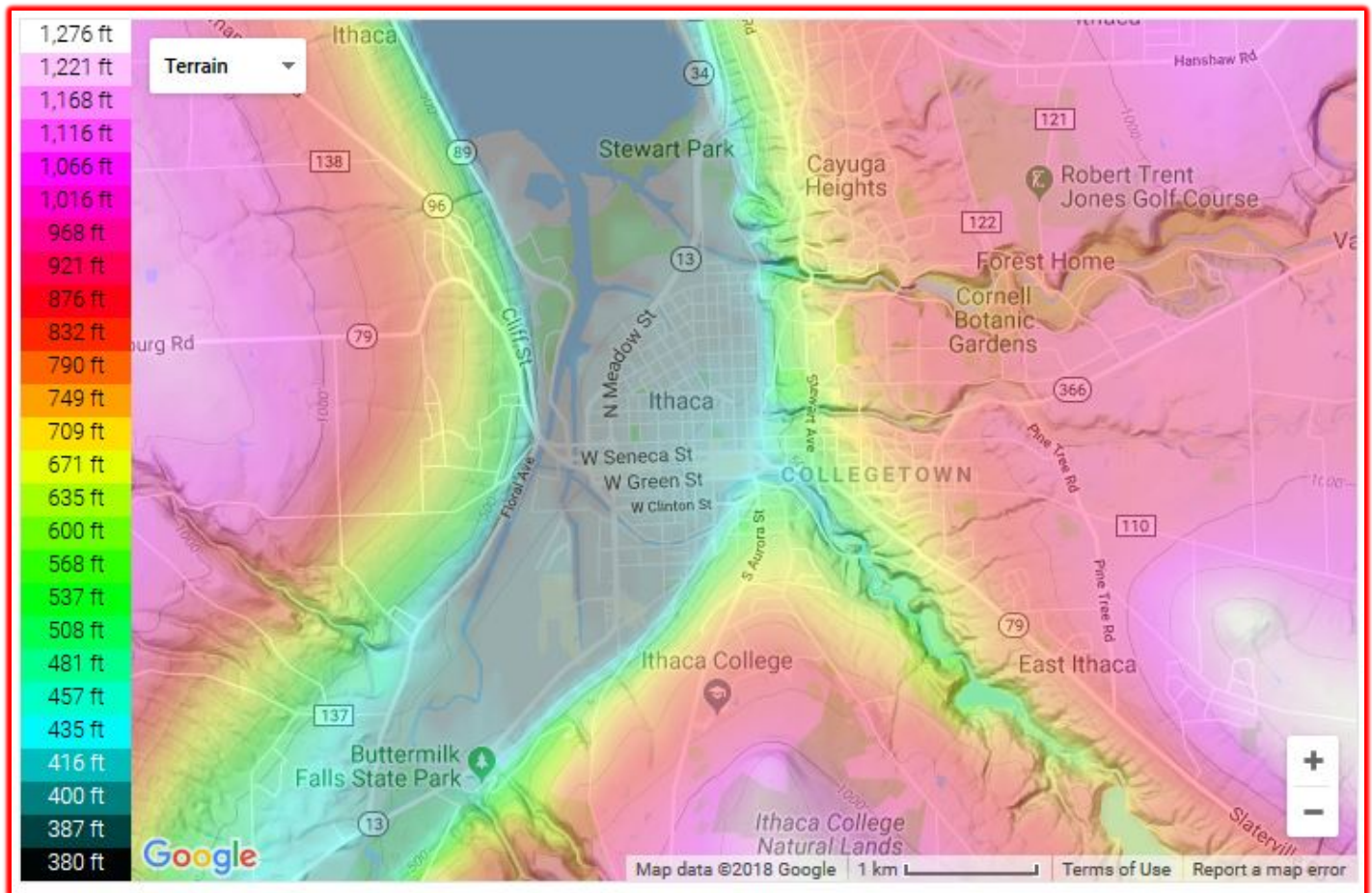
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Context – con't

The beauty of the Finger Lakes Region is world-renown. The landscapes are as rugged as they are appealing. As the song of my alma mater, Cornell University, declares:

“High above Cayuga’s waters . . .” iii

As an example, travel from the basin of Lake Cayuga to the Cornell campus requires long uphill drives, **with a change in elevation** (in a very short linear distances) **of up to 800 feet:**



Such is the terrain routinely traversed by the Tompkins County Area Transportation (TCAT) system of buses. **These diesel and diesel-hybrid buses** negotiate this Ithaca, New York terrain throughout the year, serving the residents and university students with award-winning reliability.

But not only is the long steep uphill, passenger-loaded bus routes wrought with chemical pollution, **the strain on the TCAT powertrains are notoriously noisy.** These issues detract from the beauty and serenity of Ithaca, New York. The following discussion proposes an attractive, long-term remedy:

Full, all-electric buses, and the deployment of Small Modular Reactor (SMR) systems to ensure local grid reliability and stability throughout the seasons, for all electric energy end-users.

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Context – con't



From the TCAT website:

“ At present, TCAT has a fleet of 54 buses, including eight electric-diesel hybrid buses, traveling a combined distance of 1.6 million miles a year. Recent replacement buses include two new electric-hybrid and 13 new diesel buses that adhere to federal standards in producing fewer carbon emissions.”

During the long uphill routes, the diesel engine of both the diesel and diesel-hybrid TCAT buses is the primary propulsion source. The chemical pollutants include :

Carbon Monoxide
Nitrous Oxides
Hydrocarbons
Particulate Emissions

During the following two modes of operation, the following level of noise pollution is present:

Flat propulsion 80 – 85 decibels
Long uphill propulsion 95+ decibels ^{iv}

For emphasis, especially in the elderly, 90 decibels is the threshold level for hearing loss.

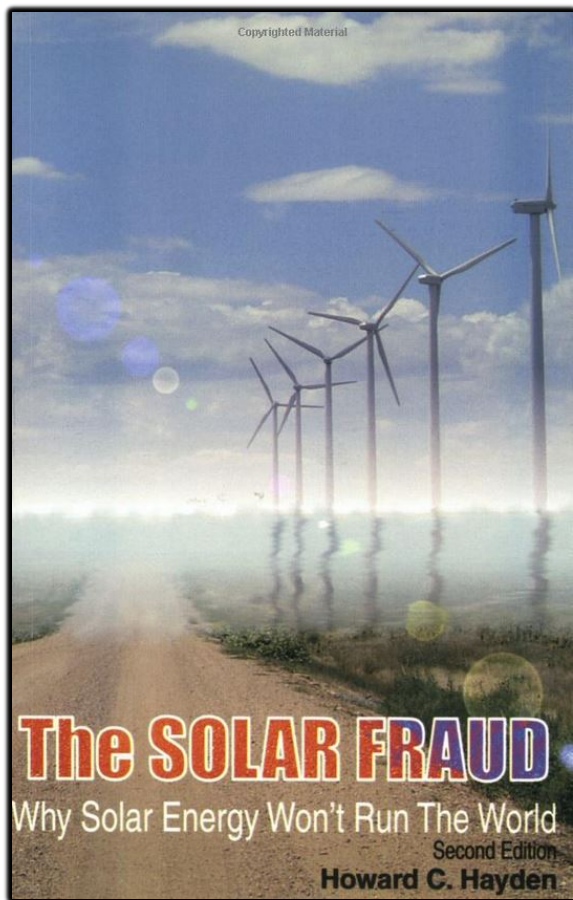
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Discussion – Part One : The Fairy Tales that Windfarms and Solar Farms are “Sustainable.”

In addition to the context of the beauty of the Finger Lakes, and the blight that is currently being rendered on that natural beauty by the installation of windfarms and solar farms, for present day electric energy needs, we must now add the burden of electric mobility. Let us first dispense with the false, albeit highly promoted vested-interest ruse, that windfarms and solar farms constitute a viable long-term solution; a solution that is labeled as “sustainable.”

It is well-known that windfarms and solar farms are so low in energy density, that these energy creation formats cannot produce enough energy to power the manufacturing facilities that produce them! ^v



Recent New York Times (NYT) headline reads:

“Trump’s Solar Tariffs Cause a Scramble in the Industry.” ^{vi}

As is common knowledge, the vast majority of solar panels (as well as windfarm components) are sourced to China. The front page of the NYT article displays the workplace where SunPower sources its panels:



But the relevant point is that the Chinese solar panel manufacturing facility shown above is **NOT** powered by the solar panels it makes! Such is not possible . . . such is a matter that grammar school children can decipher with mere . . . arithmetic.

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Discussion – Part Two : China Commitment to True Sustainability

A recent video and news announcement connects these topics: ^{vii}

China's Shenzhen city electrifies all 16,359 of its public buses

The city has transformed the entire bus fleet.

Recall from above that TCAT has merely 54 buses, none of which are, or are projected at this time to be full EVs. From the footnoted article in *engadget* we find:

“ Of course, it's not as simple as just dumping more than 16,000 diesel-powered buses in a lake and hoping for the best. There was also the matter of building out 510 charging stations and an additional 8,000 charging poles across the city. According to EyeShenzhen, these poles can re-juice a bus from dry in two hours, serving up to 300 vehicles each day. ”

It would not be merely naïve, but **utterly absurd** to render the notion that China intends to power the “510 charging stations and an additional 8,000 charging pole” with solar panels and/or windfarms.

Remember, this is in the city of Shenzhen alone; what of China's commitment to convert the entire national transportation fleet to full electric?

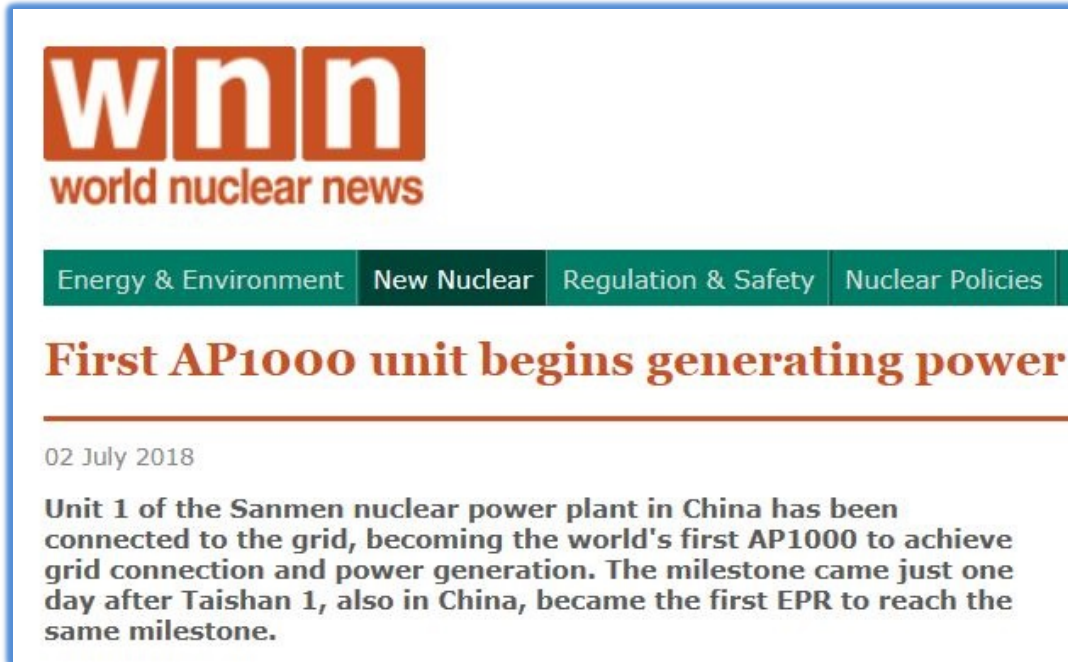


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Discussion – Part Two : China Commitment to True Sustainability con't

Some insight on China's long-term approach to electrified mobility is captured by the following World Nuclear Association headline: ^{viii}



The image is a screenshot of a news article from World Nuclear News. At the top left is the logo 'wnn world nuclear news' in orange and white. Below the logo is a green navigation bar with four tabs: 'Energy & Environment', 'New Nuclear', 'Regulation & Safety', and 'Nuclear Policies'. The main headline is 'First AP1000 unit begins generating power' in a large, bold, orange font. Below the headline is the date '02 July 2018'. The article text reads: 'Unit 1 of the Sanmen nuclear power plant in China has been connected to the grid, becoming the world's first AP1000 to achieve grid connection and power generation. The milestone came just one day after Taishan 1, also in China, became the first EPR to reach the same milestone.'

The recent rollout of the 16,359 full electric buses in the city of Shenzhen, China is shown in the following YouTube video by the manufacturer Build Your Dream (BYD): ^{ix}



BYD Delivering the Worlds Largest Electric Bus Fleet

<https://www.youtube.com/watch?v=sLo3Pn4KC3w>

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Discussion – Part Three : TCAT and the ‘Small Modular Reactor (SMR) - Scaled Sustainability

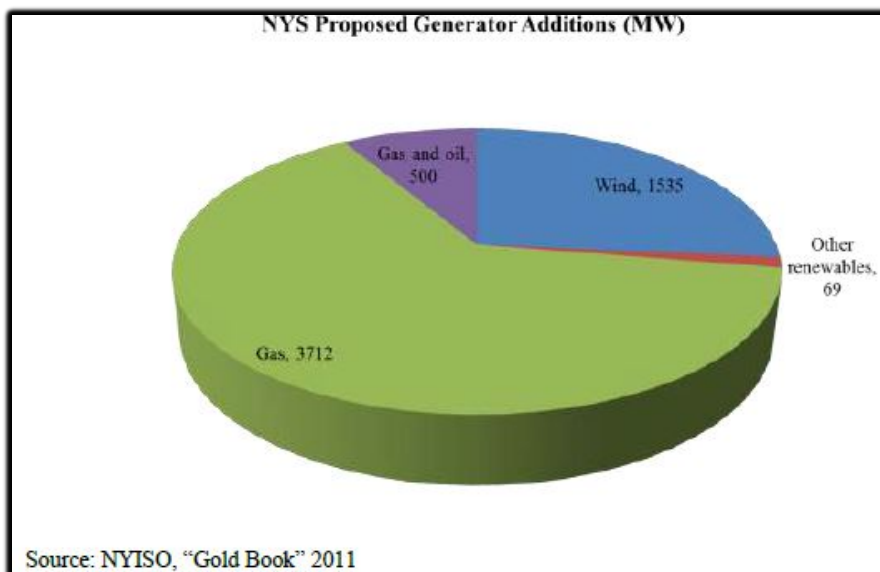
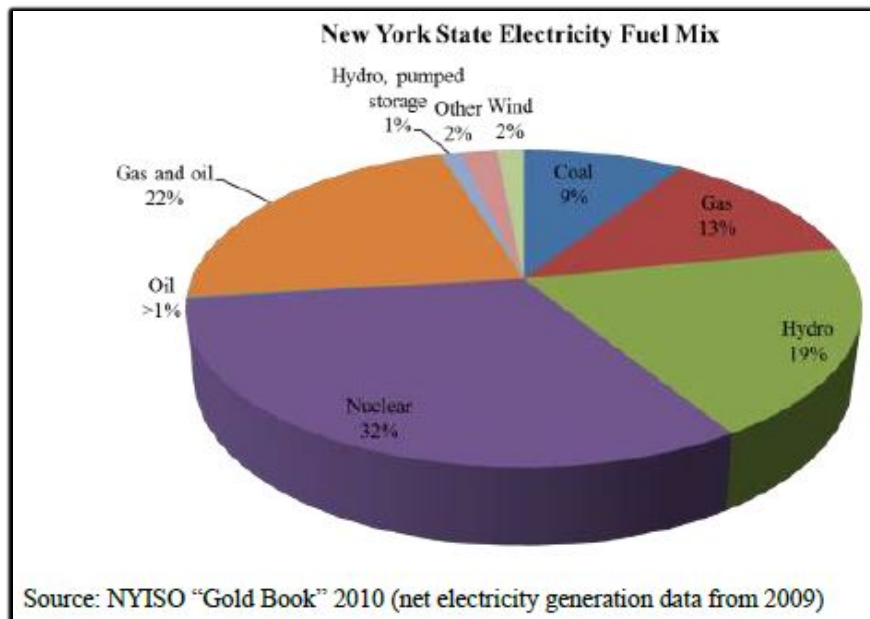
Two recent prominent energy studies focused on Tompkins County, and New York State as background include:

2012: Energy Supply and Demand for Tompkins County, New York ^x

2016: Tompkins County Energy Roadmap Evaluating Our Energy Resources ^{xi}

Although sincere and competent in most respects, the bias against nuclear power and the bias in favor of so-called “sustainable” energy is repulsive, insulting to a grammar school level of analysis. This is not necessarily connectable to all the authors/contributors; these reports can merely regurgitate ignorance and highly funded bias from political and other vested interests.

A demonstration of that blatant bias involves the projected ‘energy mix’ in the 2012 report:

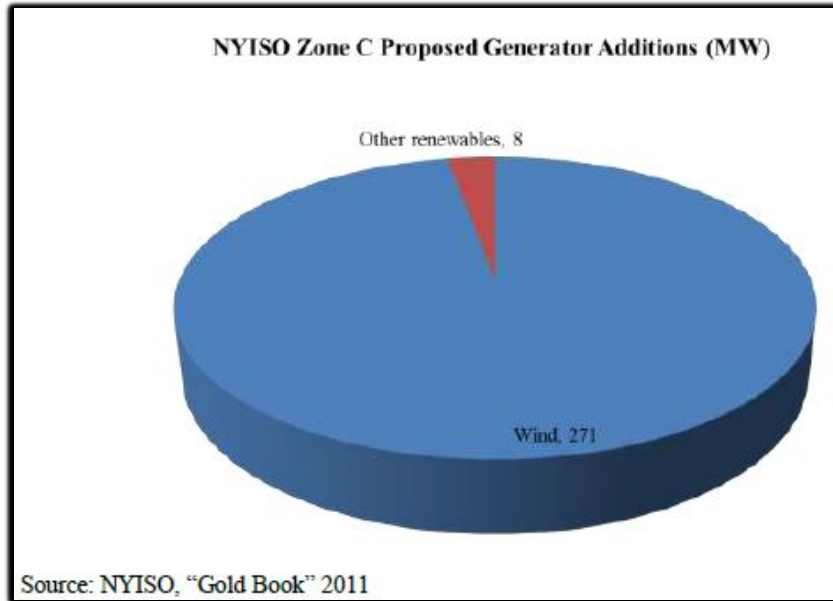


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In these reports, as examples, the only references to nuclear power are derisive, or diversionary and dismissive; wherein the latter speaks about “closures” and problems relating to “future licensing.” But the most ludicrous example, the most insulting example of vested interest bias is found in the 2012 ‘Zone C’ energy mix additions projection . . . Tompkins County is in Zone C:



The notion that windfarms blighting the Finger Lakes landscapes constitutes “sustainability,” that such will “protect the environment” is insulting. The notion that wildlife will benefit is criminal. ^{xii}



<https://www.youtube.com/watch?v=MVHzfUWul2Y>

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But what of the competence with respect to the instant topic of converting the existing TCAT fleet to full EV; how many times do the authors of the reports discuss that specific issue?

- In the 2012 report, the terms bus, TCAT, etc. are nowhere to be found.
- In the 2016 report, the only time that the issue of TCAT bus conversion to full EV is even remotely discussed is in the context of . . . “bus terminals.”

But this only gets worse . . . Pages 65 and 70 are similar, both proclaiming that bus terminals are “deemed appropriate” for medium and large scale wind farms. Page 65 is here:

Lands Deemed Appropriate for Medium-scale Wind:

Many land uses may be acceptable for developing medium-scale wind power. This analysis identified the following tax parcel property classifications as being appropriate for hosting medium-scale wind:

- Agriculture
- Commercial
- Industrial
- Public Services – includes water treatment facilities, bus terminals, pipelines, landfills, electric and gas facilities
- Recreation and Entertainment – includes fairgrounds, racetracks, golf courses, riding stables, camping facilities and picnic grounds
- Vacant Land – includes abandoned agricultural land
- Community Services – includes schools, libraries, colleges, churches, hospitals, government buildings and parking lots, correctional facilities and cemeteries

Such is the rubbish one finds in, not merely upstate New York “studies.” Such rubbish can be found in most so-called Western nations.

An emerging technology, that is truly “appropriate” for regions like the Finger Lakes is the ‘Small Modular Reactor’ or SMR. ^{xiii} As you might expect, SMRs are already in the advanced stages of **BEING BUILT** in Russia, Argentina and of course China. MIT Technology Review:

“ The grand promise of commercial SMRs is that they would be compact enough to prefabricate in factories and ship to their destination, where they could be stacked together to produce whatever level of energy generation is needed. Over time, the technology could introduce new levels of predictability, reliability, and economies of scale to an industry that’s become synonymous with billion-dollar cost overruns and years of delays. It also opens the possibility that nuclear power could serve smaller markets, and even military or industrial applications, where a full-scale reactor wouldn’t make economic sense. ” ^{xiv}

An example of the “smaller market” is Zone C in Tompkins County, where all the windfarms and solar farms (combined) could be removed and replaced with one to three SMRs.

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Discussion – Part Four : Upcoming Failure of Solar “Sustainability” - Spent Panel Waste Disposal

When Hurricane Maria rips through Puerto Rico in September 2017, not one solar panel or solar panel farm remained in operation . . . none were “sustainable.” A picture that the so-called news media failed to share from one such post-Maria solar farm shown here:



But this is just the beginning of an unsustainable environmental disaster; one the solar panel vested interests wishes remain unreported. In a May 2018 article:

**If Solar Panels Are So Clean,
Why Do They Produce So Much Toxic Waste?**

The author introduces some of the “details” ^{xv}

- Solar panel disposal will explode with full force in two or three decades and wreck the environment” because it is a huge amount of waste and they are not easy to recycle.
- The reality is that there is a problem now, and it’s only going to get larger, expanding as rapidly as the PV industry expanded 10 years ago.
- Contrary to previous assumptions, pollutants such as lead or carcinogenic cadmium can be almost completely washed out of the fragments of solar modules over a period of several months, for example by rainwater.

Proponents of these alleged “sustainable” energy sources (windfarms and solar farms) think nothing of the blight that is being wrought upon the beauty of the Finger Lakes . . . ^{xvi}

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Conclusion

None of the prominent future energy reports covering the Finger Lakes region mention, with any degree of competence and sincerity, the benefits of converting the TCAT bus fleet to full electric.

None of the reports discuss that in-addition to chemical pollution, the TCAT conversion to full electric will greatly reduce the NOISE pollution generated by the current diesel and diesel-hybrid powertrains; noise pollution that is especially egregious during the high incline transport from the lower elevations to the high elevations of the Ithaca, New York locale.

The blighting of the beautiful Finger Lakes with windfarms, which pose immediate danger to wildlife, or a blighting of the region with the poisonous solar farms is unacceptable and unsustainable.

The out-of-hand dismissal of nuclear power as a clean sustainable source of electrical energy in the Finger Lakes region, Zone C in-particular, borders on fraud.

Prominent national proponents of converting the bus transportation fleet to full electric, thereby eliminating both chemical and noise pollution include China. Their approach involves selling solar panels and windfarm components to whomever, for very high margins that are also alleged to be predatory, while manufacturing such in facilities that are powered by modern nuclear power plants.



The China approach to electric mobility technology, business and policy involves a robust energy grid, energized primarily by nuclear power and hydro-power.

The conversion of the TCAT bus fleet to full electric can be viewed as a driver of sustainable nuclear power in the Finger Lakes region, eliminating the blight of windfarms and solar farms.

A scaled down version of this China approach is what I “deem appropriate” for the Finger Lakes, not the conversion of bus terminals to wind farms . . . (see page 10 above).

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The author in-attendance at the recent June/July 2018 all-electric Jaguar I-Pace introduction in Irvine, California:



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Endnotes

- ⁱ *Sources: DATAUSA, usclimatedata.com, nerdwallet.com
- ⁱⁱ Those seeking further pictorial review of the Finger Lakes, as well as a detailed discussion of the Cornell University campus, are encouraged to watch, '**GLORIOUS TO VIEW**' <https://vimeo.com/249592242>
- ⁱⁱⁱ Officially, these days, the Finger Lakes are comprised of 12 lakes, east to west as follows: Cazenovia, Otisco, Skaneateles, Owasco, Cayuga, Seneca, Keuka, Canandaigua, Honeoye, Canadice, Hemlock and Conesus.
- ^{iv} Typical date here: <http://www.trolleycoalition.org/noise.html>
- ^v <https://www.amazon.com/Solar-Fraud-Energy-World-Second/dp/0971484546>
- ^{vi} <https://www.nytimes.com/2018/05/03/business/energy-environment/solar-industry-tariffs.html>
- ^{vii} <https://www.engadget.com/2017/12/29/china-shenzhen-public-electric-buses/>
- ^{viii} <http://www.world-nuclear-news.org/NN-First-AP1000-unit-begins-generating-power-0207184.html>
- ^{ix} <https://www.youtube.com/watch?v=sLo3Pn4KC3w>
- ^x <http://pvsheridan.com/EnergySupplyandDemand-2012.pdf>
- ^{xi} <http://pvsheridan.com/EnergyRoadmap-TomplinsCounty-2016.pdf>
- ^{xii} <https://vimeo.com/149441240>
- ^{xiii} <http://www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-power-reactors/small-nuclear-power-reactors.aspx>
- ^{xiv} <https://www.technologyreview.com/s/608271/small-reactors-could-kick-start-the-stalled-nuclear-sector/>
- ^{xv} <https://www.forbes.com/sites/michaelshellenberger/2018/05/23/if-solar-panels-are-so-clean-why-do-they-produce-so-much-toxic-waste/#102b2d15121c>
- ^{xvi} <https://www.nationalreview.com/2017/06/solar-panel-waste-environmental-threat-clean-energy/>
<https://www.nationalreview.com/2017/06/renewable-energy-national-academy-sciences-christopher-t-m-clack-refutes-mark-jacobson/>