NJ Transit's NJTRANSITGRID TRACTION POWER SYSTEM Project

Background paper by the Empower NJ Coalition
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Background

The Federal Transit Administration (FTA) selected the NJ TRANSITGRID TRACTION POWER SYSTEM as one elements of the "NJ TRANSITGRID" project, a Public Transportation Resilience Project in response to Superstorm Sandy. FTA's selection of the proposed project makes it potentially eligible for funds made available under the Disaster Relief Appropriations Act of 2013 (Pub. L. 113-2). NJ Transit is planning to use the FTA grant of $409.7M plus $136.6M from the New Jersey State Transportation Trust Fund (total cost of $546.3M) to build a microgrid to power some of its electrified trains. The project is described in its May 2019 Draft Environmental Impact Statement[1] as follows:

> New Jersey Transit Corporation (NJ TRANSIT) proposes to design and construct the NJ TRANSITGRID TRACTION POWER SYSTEM, a first-of-its-kind microgrid designed to provide highly reliable power to support limited service in a core segment of NJ TRANSIT's and Amtrak's critical service territory. As defined by the U.S. Department of Energy (DOE), a microgrid is a local energy grid with control capability, which means it can disconnect from the traditional grid and operate autonomously.
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> The purpose of the proposed Project is to enhance the resiliency of the electricity supply to the NJ TRANSIT and Amtrak infrastructure that serves key commuter markets in New York and New Jersey to minimize public transportation service disruptions. The microgrid would be capable of providing energy to portions of Amtrak's Northeast Corridor, NJ TRANSIT's Morris & Essex Line, and NJ TRANSIT's HBLR system during power outages.
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> The New Jersey Transit Corporation proposes construction of a 104 to 140 megawatts (MW) natural gas powered electric generation plant in Kearny, Hudson County, New Jersey, 19.6 miles of new electric power transmission lines, substations and other equipment to distribute the power to segments of New Jersey Transit and Amtrak passenger rail lines in northeast New Jersey.
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> The microgrid would generate power 24 hours per day/7 seven days per week.
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> As stated on page 2-15 of the DEIS, "Under normal conditions, NJ TRANSITGRID will potentially supply up to 60MW of traction power for the Northeast Corridor (for Amtrak and NJ TRANSIT trains), meet NJ TRANSIT's Morris & Essex load demand of 10 to 15MW, and transfer excess energy to

> PJM when those transactions are economically justified. Under emergency conditions (e.g., a PJM system blackout), NJ TRANSITGRID will operate in island mode and meet NJ TRANSIT's usage of parts of the Northeast Corridor, parts of NJ TRANSIT's Morris & Essex and HBLR loads, and assist Amtrak by moving its Northeast Corridor trains to nearby stations."
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> As stated on page 8 in NJ Transit's Final Scoping Document, the purpose for operating continuously is to generate revenue by selling power back to the grid.[2] NJ Transit's documents do not clearly state the assumptions under which they can make a net profit selling power back to the grid instead of using it all to power trains 24x7 and thus minimize their purchase of power from the grid. The DEIS also implies that 24x7 operation is necessary in order to provide instantaneous emergency power.
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> NJ Transit's schedule for this project is to finalize its permits in 2020, start construction in 2021 and finish in 2022.
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> NJ Transit's financial analysis considered a 30-year project life.

NJ Transit began this project four and a half years ago, when gas-fired power was more economical than solar/storage and when Tesla Powerpacks were not available. John Geitner, Senior Director of NJ Transit's Environment, Energy and Sustainability Group, who has led this project, previously worked for Hess where he was involved in the development of two gas-fired power plants.

EmpowerNJ, NJ-ARP and the DGTM Coalition support the idea of building a microgrid for increased resiliency. In addition to providing resiliency, microgrids can be built using the most advanced, environmentally friendly and cost effective technologies and provide a pathway to rapidly transform the electric grid to support the goals of New Jersey's new Energy Master Plan in terms of efficiency, reducing greenhouse gas (GHG) emissions from the production of electricity, reducing air pollution and encouraging "**adopt[ion of] non-wires solutions that encourage complementary private sector investments when seeking expansion or upgrade of the distribution and transmission system or generation sources.**" [3]

However, NJ Transit has decided to power its microgrid with natural gas. As will be described below, natural gas is becoming less attractive than renewable technologies due to the rapidly improving cost effectiveness of renewable technologies, the impact of fossil fuels on our climate crisis (and the need to immediately make deep cuts, not increases, in GHG emissions) and the increasing likelihood of fossil fuel infrastructures becoming stranded assets over their expected lifetime.

NJ Transit identified two options in its DEIS (pages ES-5 – ES-7):

> The project alternatives analyzed in detail in the DEIS include the No Action Alternative and one Build Alternative. NJ TRANSIT is considering one Build

> Alternative, which would include a Main Facility with a potential power output between 104MW and 140MW, the installation of up to 19.6 miles of new electrical lines, the construction of two new electrical substations, and the installation of emergency generators (the "nanogrid"[4]) at HBLR Headquarters.

NJ Transit's positions on using renewable energy technologies for this project are expressed in the following excerpt from its Draft Environmental Impact Statement (DEIS, May 2019, page 2-25):

> The use of solar panels, wind energy, and other "green" technologies to fully "island" the NJ TRANSIT and Amtrak electrical systems from the larger commercial power grid are not practical or reasonable alternatives to a natural gas-fired generation plant due to the required load generation capacity, siting requirements for these technologies, the need to meet rapidly fluctuating loads associated with traction power systems under island conditions (especially due to the need for energy storage to guarantee a reliable power source), and cost. As discussed above, a solar panel facility would be installed to supplement the power needed to run the microgrid itself. Therefore, such technologies for generation of all power needs were not retained for analysis in the DEIS.

NJ Transit does not claim to have conducted an in depth analysis of renewable technology options and provided no evidence to support any of these assertions:

- Not practical due to the required load generation capacity.
- Not practical due to siting requirements.
- Not practical due to the need to meet rapidly fluctuating loads associated with traction power systems.
- Not practical due to the need for energy storage to guarantee reliable power.
- Not practical due to cost.

Impact of NJTRANSITGRID TRACTION POWER SYSTEM on Climate Change and Air Pollution

The following is an excerpt from the NJ Transit DEIS (page 18-4):

> 18.3.2 Air Quality and GHG Emissions
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> The air quality modeling accounted for current ambient air conditions; therefore, the impacts of past contributors to pollutant concentrations in the area have been considered. On an individual or cumulative basis, neither the proposed Project nor the other energy-related initiatives in the area would violate the National Ambient Air Quality Standards (NAAQS). Air pollution concentrations, which have been decreasing over the past couple of decades in response to increasingly strict environmental rules, would be expected to continue to decrease as progress is made on meeting the goals of the State's Energy Master Plan, as more coal-fired plants convert to using natural gas as the primary fuel, and as more electric generation capacity is converted to renewable energy sources, such

> as solar and wind. The proposed Project will result in additional GHG emissions, which combined with increasing global emissions, would result in climate change and associated effects. However, the increase in GHG emissions form the proposed Project in comparison to those in New Jersey, the United States and the world, are negligible. In 2015, New Jersey GHG emissions for electrical generation were 17.7 million metric tons of carbon dioxide equivalents (MMTCO2e) (of a total of 100.9 MMTCO2e). The NJ TRANSITGRID emissions of 0.577 MMTCO2e/year would be 3.3% of GHG emissions from power production in New Jersey. This would also be 0.00953% of the total GHG emissions of the United States in 2014, and 0.00141% of the world GHG emissions in 2014 (World Resources Institute, 2019).

This attempt to justify increasing GHGs by any amount when, according to the 2018 IPCC report, the world needs to reduce CO2e GHG emissions by 45% by 2030 (over 2010 levels) is illogical. It also demonstrates a lack of understanding of the challenges facing NJ to reduce GHGs, not to mention a lack of commitment to support New Jersey's Global Warming Response Act and the goals of the Governor's new Energy Master Plan.

- First, it proposes it be allowed to make climate change worse because it is only contributing a tiny amount to the problem and has no real impact. By this logic, no individual or company should concern themselves about making any effort to reduce GHGs because each one only contributes a tiny portion of the world's GHGs. Clearly, this is absurd and will lead to disaster.
- Second, New Jersey needs to reduce GHGs by 40MMT (million metric tons) per year by 2030 to meet the IPCC goal. (The 2018 level of GHG emissions is 102MMT and this needs to decline to 62MMT by 2030). Producing a real reduction of this magnitude will be extremely challenging and will require reductions in every segment of the economy - power production, transportation, buildings, industry, etc. Adding .577MMT/year, although only about .6% of current emissions will create the need to offset this with .577MMT of reductions elsewhere with real costs and real pain to others in the state.
- Third, methane (the primary component of natural gas) is 86 times more potent as a GHG than CO2 over a 20-year timeframe and leaks at every stage in its lifecycle and is worse for climate change than burning coal. Even the gas industry has recognized this (and knows the public is recognizing this) and opposed the damaging White House proposal to reduce regulations on methane emissions and leakage. Increased use of gas translates into increased amounts of leaked methane.

NJ Transit has an opportunity to contribute to the global and state efforts to reduce emissions and fight climate change. By powering this microgrid with solar energy it could virtually eliminate the need for the commercial grid to produce this electricity using a significant percentage of fossil fuels. However, instead of being part of the solution it has decided it is acceptable to make the problem worse. Governor Murphy's apparent support for this solution indicates he agrees.

Ironically, the FTA grant is under **the FTA's Selection of Public Transportation Resilience Projects in Response to Hurricane Sandy, yet it is using technology that contributes to the development and impact of super storms from which it is designed to protect us.**

NJ Transit's excuses for increasing air pollution are very weak. They claim it is acceptable because New Jersey will be closing all its coal plants soon and other (unnamed) electric generating stations will convert to renewable energy. There are only two coal plants left in New Jersey and they only produce 1.6% of New Jersey's total electricity. No existing gas-fired plants have announced plans to convert to renewable energy and there are 13 other natural gas infrastructure projects currently under construction or in various phases of planning. All of NJ is out of compliance with EPA standards on ground level ozone and the American Lung Association has graded both Bergen and Hudson Counties as 'F' for their ozone levels (Bergen improved slightly to a grade of D in 2019).[5] NJ Transit's solution to the increase in NOx and ozone is to buy NOx credits, which allows them to emit all the NOx necessary to operate. Just because the DEP will approve this permit does not make it a good decision, as the DEP has very limited power to regulate greenhouse gases and must allow applicants to purchase NOx credits, if they so choose. Once again, NJ Transit could be part of a solution to reduce pollution but instead has decided to be part of the problem.

NJ Transit's Resilience Program Benefits web site states that building its own power plant will reduce/eliminate the need to use power from peaker plants, which is usually dirtier and more expensive than electricity from plants that operate daily. While this is true, it neglects to mention that a good portion of non-peak power in New Jersey is from non-GHG generating nuclear power[6] while 100% of the power NJ Transit will generate is from dirty natural gas, which, due to methane leaks at all stages, is worse for the climate than burning coal.

Lastly, avoiding the construction of a new power plant on the Kearny site will also avoid degrading up to two acres of wetlands and avoid the risk of penetrating the cap on the underlying landfill.

Long Term Viability of Gas Infrastructure vs. Solar/Storage (Solar Rail)

The world recognizes that the solution to climate change is to move away from fossil fuels to renewable electric power. The future of trains is electric with renewable energy sources as can be seen by pioneering efforts around the world.

Aside from the climate crisis, the argument for using renewables and storage is that the cost of renewables is coming down steadily. According to Greentech Media, energy industry analysts at Wood Mackenzie say the combination of renewables with battery systems can currently replace approximately two-thirds of U.S. natural gas turbines — right now. Estimates predict the cost of storage alone could drop 80 percent by 2040.[7]

A September 2019 article on Utility Dive stated:[8]

> If all proposed [U.S.] gas plants are built, 70% of those investments will be rendered uneconomic by 2035, according to the Rocky Mountain Institute. Clean energy portfolios, defined as an optimized combination of wind, solar, storage and demand-side management, are cheaper than **90%** of the 88 gas-fired projects proposed across the U.S., according to **RMI**, which could save customers an estimated $29 billion and reduce carbon emissions 100 million tons per year if they replaced those proposed gas projects. (RMI is the company to which the BPU/DEP outsourced the IEP development for NJ).

The cost of natural gas has nowhere to go but up. Right now, gas companies are losing money — and have been for some time — at the current price of natural gas in America. As DeSmog has detailed, the fracking industry, which is responsible for most U.S. natural gas production, has been on a decade-long, money-losing streak. The industry has proven unable to turn a profit at current natural gas prices. So, unless Wall Street wants to lose billions more subsidizing the natural gas industry, prices will have to go up at some point. [9]

Building a new gas plant now, will turn out to be an albatross in the long term and runs the risk of becoming a stranded asset as NJ's goal is to achieve 100% carbon neutral emissions in 30 years.

The sunk investment costs in a new source of greenhouse gas emissions also discourage investments in clean, renewable energy, and magnifies demand for natural gas, encouraging more fracking, pipelines and the associated leaks of the potent greenhouse gas, methane. Moreover, natural gas power plants are long-lived assets. Gas power plants lock in fossil fuel dependence and environmental damage for decades to come. The average New Jersey gas-fired power plant went online 23 years ago and 13 percent of the state's gas plants went online more than 40 years ago.

The NJ Draft EMP encourages policies and programs that would increase the use of mass transit to reduce car mileage and has an objective to improve NJ Transit's environmental performance. Unfortunately, it totally ignores the opportunity to accomplish both objectives by using solar to power trains. While this application is in its early stages and will require a good deal of creative engineering for each transit system, before discarding solar power for trains out of hand, NJ Transit must fully and transparently investigate this option and demonstrate that it cannot engineer a practical solution before being allowed to use fossil fuels (or forced to accept the no-build option).

Other countries are making the effort to explore and migrate to Solar Rail. Is New Jersey incapable of doing this? Why must we wait for others to show us how this

can be done? New Jersey should be taking a leadership role in developing better mass transit solutions and using renewable energy to support them.

Endnotes

[1] https://njtransitresilienceprogram.com/documents/deis/
[2] https://njtransitresilienceprogram.com/wp-content/uploads/2016/05/Final-Scoping-Document-May-2016.pdf
[3] https://nj.gov/emp/pdf/Draft%202019%20EMP%20Final.pdf
[4] The nanogrid consists of two natural gas-fired emergency generators capable of producing the necessary power (approximately 2MW each) for the southern segment of the HBLR, which is in addition to the 104MW to 140MW that would be produced by the microgrid. It would include some measure of stored energy in the form of batteries or flywheels to smooth the instantaneous load profile of the HBLR traction loads.
[5] https://www.lung.org/local-content/_content-items/about-us/media/press-releases/ozone-air-pollution-in-new.html
[6] In 2018, 42.5% of the state's electricity was generated by nuclear power sources. (Source: NJ Draft Energy Master Plan, page 14)
[7] https://www.desmogblog.com/2019/02/22/inevitable-death-natural-gas-bridge-fuel-renewables
[8] https://www.utilitydive.com/news/renewables-storage-poised-to-undercut-natural-gas-prices-increase-strande/562674/
[9] https://www.desmogblog.com/2019/02/22/inevitable-death-natural-gas-bridge-fuel-renewables