

AGREE New York

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November 24, 2015

VIA ELECTRONIC MAIL

The Honorable Kathleen H. Burgess
Secretary
New York State Public Service Commission
Empire State Plaza, Agency Bldg. 3
Albany, NY 12223-1350

Re : Comments on Case 15-E-0640
Petition of Entergy Nuclear FitzPatrick, LLC to Retire the James A. FitzPatrick Nuclear Generating Facility

Dear Secretary Burgess:

Alliance for a Green Economy (“AGREE”) hereby submits some initial comments on Entergy’s notice of intent to retire the James A. FitzPatrick nuclear reactor near Oswego, NY. Also find attached, for filing, our “Replacing FitzPatrick” analysis, referenced in these comments.

Respectfully submitted,

/s/
Jessica Azulay
Alliance for a Green Economy

NEW YORK STATE
PUBLIC SERVICE COMMISSION

-----X
Petition of Entergy Nuclear FitzPatrick,
LLC to Retire the James A. FitzPatrick
Nuclear Generating Facility

Case 15-E-0640

-----X

COMMENTS IN SUPPORT OF ALLOWING FITZPATRICK
NUCLEAR GENERATING FACILITY TO CLOSE
By ALLIANCE FOR A GREEN ECONOMY

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Dated: November 24, 2015

NEW YORK STATE
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Alliance for a Green Economy (“AGREE”) hereby submits some initial comments on Entergy’s notice of intent to retire the James A. FitzPatrick nuclear reactor near Oswego, NY.

We urge the Public Service Commission to allow the plant to close. We submit these comments in anticipation that the Public Service Commission (“Commission”) may be considering some type of Reliability Support Services Agreement (“RSSA”) or other mechanism to compel or incentivize FitzPatrick to stay open. Given our previous experience with the Ginna RSSA case, we are submitting these comments out of an abundance of caution. We wish to get our position onto the record early to make the Commission aware of the strong opposition to any subsidy being provided to keep FitzPatrick running.

Introduction

Entergy’s announcement that it plans to close the FitzPatrick nuclear reactor has been welcomed with relief by many in Central New York, where people have been living under the risk of a meltdown at the plant for decades. AGREE is one of many organizations in the region and across New York that sees the closure announcement as a positive development and one more necessary step toward a renewable energy system in New York. AGREE has been watchdogging the FitzPatrick reactor for four years and our work has been informed by the work of the Central New York Citizens Awareness Network, which watchdogged FitzPatrick for twelve years before AGREE was founded in late 2011.

We understand that FitzPatrick is a significant contributor to the local economy in Oswego County, providing substantial jobs and tax revenue, but to many across New York and the United States, FitzPatrick is notorious as a particularly dangerous reactor that pollutes the environment at all stages of its fuel cycle. Organizations representing tens of thousands of New Yorkers want to see FitzPatrick shut down and replaced with efficiency measures and renewable energy. We want to see a just transition for workers and the local community. And we want to see a thorough and responsible decommissioning

process pursued at the plant, which would mitigate many of the presumed economic harms of closing the reactor.

We share the concerns about the local economic impacts of closing FitzPatrick, which is why we have consistently called for funding to support Oswego County and the workers at FitzPatrick in a transition beyond FitzPatrick toward other sources of economic prosperity. These are not competing public interest considerations, but rather real-world circumstances that require proactive measures to provide positive outcomes. Whether it occurs in 2016 or sometime in the not-to-distant future, FitzPatrick will close, and it is important to mitigate the local impacts of that and to assist the community with the economic transition. The state has recently taken steps to do so with other generation facilities, by enacting legislation providing property tax revenue assistance for up to five years after the closure of fossil fuel power plants. We see no reason to treat nuclear plant closures any differently. However, there are unique circumstances and opportunities in the closure of nuclear reactors the state can and must leverage.

Though you would not know it from the media coverage – which has focused almost exclusively from the perspective of workers at FitzPatrick and local politicians fighting to keep the plant open – there is significant support for closure among Central New Yorkers and across the state. (Please see the letter sent last week to Governor Cuomo signed by 52 organizations calling on the Governor to let FitzPatrick close: http://beyondfitzpatrick.org/wp-content/uploads/2015/10/LetFitzPatrickClose_Letter.pdf.) Over 700 New Yorkers and counting have also signed the Beyond FitzPatrick petition, calling on the Governor to avoid subsidizing FitzPatrick's continued operation, and to instead find solutions to support workers and local economies in the transition to a renewable energy future. (The petition is at www.beyondFitzPatrick.org.)

As we will detail below, it is in New York's best interest, both from an economic, environmental, and public safety standpoint to let FitzPatrick close. There is certainly no justification for a Reliability Support Services Agreement to subsidize FitzPatrick, as a study has already shown no reliability need for the plant.

It is also not in the state's interest to provide any kind of carbon-credit or other environmentally motivated subsidy for FitzPatrick. As we will discuss below, nuclear power is not clean or environmentally friendly. Expending clean energy resources on the plant would represent an unjust burden on ratepayers and delay New York's ability to meet its renewable energy goals by taking needed resources away from wind, solar, and efficiency. Our filing discusses how the Federal Clean Power Plan found that nuclear plants can be replaced by lower cost clean energy resources, and that subsidizing them would not be best practice for meeting the federal goals. Any out of market subsidy for FitzPatrick would not count as progress toward New York's Clean Power Plan obligations.

Our own analysis finds that FitzPatrick could be reliably replaced at lower cost by a combination of energy efficiency and wind, both of which have abundant potential in Central New York. (See that attached: "REPLACING FITZPATRICK: How the Closure of a Nuclear Reactor can Reduce Greenhouse Gasses and Radioactive Waste, while Creating Jobs and Supporting the Local Community." Also available at http://beyondfitzpatrick.org/wp-content/uploads/2015/11/replacing_fitzpatrick_updated.pdf)

We urge the Commission to authorize closure as soon as possible so that New York can move toward proactively planning for the decommissioning of the reactor and a just transition for Oswego.

Entergy's Notice of Retirement

On November 2, 2015, Entergy Nuclear FitzPatrick, LLC ("Entergy") filed a "Notice of Intent to Retire James A. FitzPatrick Nuclear Generating Facility."¹ In its notice, Entergy said that the company was required to give at least six-months' notice of retirement and that the company planned to shut the plant at the end the current fuel cycle in late 2016 or early 2017. Entergy's notice clearly complies with the notification requirements established by Commission Order in 2005.² The notification requirements were established to ensure the state enough time to address any reliability concerns with the closure of a generator.

On November 4, 2015, Bill Mohl, president of Entergy Wholesale Commodities, told the *Syracuse Post-Standard* that the company had commissioned the New York State Independent System Operator ("NYISO") to study whether there would be any reliability concerns if FitzPatrick shut down.³ Though the NYISO study has not been made public, Mohl told the *Post-Standard* that NYISO found no reliability need for the FitzPatrick plant. We don't think anyone is surprised about this outcome, since Zone C, in which FitzPatrick is located, has over 6,500 MW of installed capacity compared to peak load forecasts remaining less than 3,000 MW through 2025.⁴ There are also 640 MW of new capacity in development, and only 70 MW of retirements planned in addition to FitzPatrick.⁵

There is clearly no reliability need for FitzPatrick to remain open and therefore no justification for the Commission to delay FitzPatrick's retirement or attempt to provide FitzPatrick with a costly Reliability Support Services Agreement. Such an agreement would represent a terrible deal for consumers as it would likely raise electricity prices throughout National Grid territory by at least \$60 million per year, and likely much more.⁶

We also remind the Commission that while the local economic impact of a large plant closure is of concern, it is not one of the criteria by which the Commission can consider a petition for closure. Arguments to include local economic impact were previously rejected by Commission Order.⁷

Even if economic impact could be considered, it would be necessary to weigh the economic impact of FitzPatrick's closure against the economic impact of a rate-hike on small businesses, employment in the wider region, the ability for low-income customers to pay their electricity bills, and the destabilization of the competitive wholesale electricity market in New York. Additionally, the economic impacts of

¹ Entergy Nuclear FitzPatrick, LLC. November 2, 2015. "Notice of Intent to Retire James A. FitzPatrick Nuclear Generating Facility." <http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={7E2F5C80-DB65-4B72-9E79-1AA829C5A16A}>

² Public Service Commission #05-E-0889. December 20, 2005. Proceeding on Motion of the Commission to Establish Policies and Procedures Regarding Generation Unit Requirements. "Order Adopting Notice Requirements for Generation Unit Retirements." <http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={6265D5EB-CD01-406E-989B-16D76F760EFA}>

³ *Syracuse Post-Standard*. November 4, 2015. "Can Cuomo make FitzPatrick nuclear plant stay open? Unlikely." http://www.syracuse.com/news/index.ssf/2015/11/can_cuomo_make_fitzpatrick_nuclear_plant_stay_open_unlikely.html

⁴ New York independent System Operator. 2015 Load and Capacity: "Gold Book." April 2015. Pp. 58 and 22. http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Documents_and_Resources/Planning_Data_and_Reference_Docs/Data_and_Reference_Docs/2015%20Load%20and%20Capacity%20Data%20Report.pdf

⁵ *Ibid*. Pp. 68 and 70.

⁶ \$60 million per year is the widely reported number of Entergy's annual losses at FitzPatrick. A subsidy to keep the plant in operation would necessarily provide enough to break even, and likely enough to also provide Entergy with a return on investment.

⁷ See "Order Adopting Notice Requirements for Generation Unit Retirements." December 20, 2005. Pg. 19. Footnote 10. <http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={6265D5EB-CD01-406E-989B-16D76F760EFA}>

alternative uses of the subsidy would need to be considered. For instance, FitzPatrick's proponents would have to show that subsidizing FitzPatrick creates a better economic driver than a similar amount of subsidy for renewable energy, which has been shown to create many more jobs than nuclear power plants on a per \$1 million invested basis. (Please see our attached White Paper in which we conducted a preliminary analysis of a replacement scenario for FitzPatrick with clean energy resources.)

Therefore, we support Entergy's petition to retire FitzPatrick and we see no legal obstacles to closure.

However, we disagree with the company's claim that the reactor's economic circumstance is "a result of market structure design flaws, including the failure of markets to compensate FitzPatrick for the generation of clean energy."

FitzPatrick's inability to compete in the market is simply a result of the reactor being too expensive compared to other market participants, including not just natural gas, but also carbon-free resources like efficiency, wind, and demand response. New York's energy system is in transition, largely because of public interest policies put in place by the Commission to encourage competitive wholesale markets, demand reductions, and renewable energy generation. Nuclear power just isn't suited to do well in the new energy era and the 21st Century electricity system.

The retirement of uncompetitive generators is exactly what was envisioned by the restructuring in the 1990s, and the provision of subsidies to financially support nuclear power stations was not only unanticipated, but specifically precluded by the Commission. In reviewing the sales of Ginna, Indian Point Units 1 and 2, and Nine Mile Point Units 1 and 2, the Commission cited the public interest benefit of ensuring that the cost and risk of future operations of nuclear facilities being borne by merchant generation companies, rather than by utility customers. It was never contemplated that the transfer of these facilities would eventually be accompanied by future return to out-of-market ratepayer support, even though the state's energy efficiency and renewable generation capacity were far smaller then. Demand in Central New York has fallen by 7% over the last decade and wind generation has grown by 3,000 percent, with much more ready to be built in the near future.⁸

We vehemently disagree with Entergy's implication that nuclear power should receive a price premium for "clean energy" generation.

FitzPatrick's Design Flaw

Though it is not within state authority to regulate nuclear safety, we think it is important for the Commission to consider the economic risks of subsidizing FitzPatrick's continued operation, particularly in light of the reactor's safety record and the particular and unique impacts. We understand it would not be legal for the Commission to shut down FitzPatrick based on a safety concern, but that is not in any way what is before the Commission. Rather, the question is whether the state should mandate out-of-market subsidies derived from charges to regulated utility customers within its jurisdiction in order to support the continued operation of a power plant that is not needed on a reliability basis and is not justified on an environmental basis.

⁸ NYISO. 2015 Gold Book. Pp. 22, 62, and 68.
NYISO. "Power Trends 2015: Rightsizing the Grid." Pg. 7.

In that context, surely it is legal for the Commission to consider the economic risks of nuclear safety impacts as a criterion in deciding which energy sources additional ratepayer or public subsidies should encourage in New York. We do not know whether the Commission is actively considering a subsidy for FitzPatrick, but media reports have quoted Governor Cuomo as threatening to use every regulatory avenue available to prevent closure.⁹ We are also aware of reports that there is a possible incentive or mandate in the works for utilities to buy nuclear power in order to keep economically struggling units in business.¹⁰ Therefore, we briefly discuss FitzPatrick's safety deficiencies here.

The economic impact of a nuclear accident at FitzPatrick would be far greater than the alleged benefits of extending the reactor's operations. An estimate of the cost of a worst-case accident has not been produced recently, to the best of our knowledge. However, in 1982, the Nuclear Regulatory Commission solicited a report from Sandia National Laboratory to estimate the human and economic costs. The resulting CRAC-2 report estimated that an accident at FitzPatrick could result in \$103 billion in property losses alone, in 1982 dollars.¹¹ Adjusted to present day values using the Consumer Price Index, the property losses would amount to \$254 billion dollars. That equates to:

- Nearly 50 times the value of the electricity that could be produced by FitzPatrick over the next 18 years (at average wholesale market price of \$44/MWh).
- Over 150 times the value of all of the property taxes and salaries during that period.
- More than 25 times greater than Entergy's questionable estimate of the local economic benefit from FitzPatrick (\$500 million per year).

Note that the federal Price-Anderson Act exempts private insurers from liability for property losses due to commercial reactor accidents, so any such losses would have to be recovered from the federal government.

It is also worth noting that those cost estimates only relate to property losses, not other environmental and/or remediation costs. A nuclear accident at FitzPatrick would have devastating impacts on Lake Ontario, which supplies drinking water and supports economic and agricultural activity to millions both in New York and Canada.

As we will discuss in more detail below, FitzPatrick is of a nearly identical design to the Fukushima Dai-ichi reactors that suffered meltdowns in Japan. To this date, the molten reactor cores at Fukushima Units 1, 2, and 3 have yet to be isolated or recovered. Due to groundwater penetration through the site, this has resulted in 300-400 tons of contaminated water entering the Pacific Ocean each day, for going on five years now.¹² Lake Ontario is a much smaller and more self-contained body of water than the Pacific Ocean, so the concentrations of radioactive material could be far greater, with immense and far-reaching impacts, potentially rendering Lake Ontario too contaminated for drinking, consuming fish and

⁹ Klopott, Freeman, and Jim Polson. "Why Cuomo is Trying to Save One Nuclear Plant and Shut Another." Bloomberg Business. November 2, 2015. <http://www.bloomberg.com/news/articles/2015-11-02/why-cuomo-is-trying-to-save-one-nuclear-plant-and-shut-another>

¹⁰ McGeehan, Patrick. "Gov. Cuomo to Order Large Increase in Renewable Energy in New York by 2030." New York Times. November 22, 2015. <http://mobile.nytimes.com/2015/11/23/nyregion/gov-cuomo-to-order-large-increase-in-renewable-energy-in-new-york-by-2030.html? r=0&referer=https://www.google.com/>

¹¹ Sandia National Laboratories, for the U.S. Nuclear Regulatory Commission. "Calculation of Reactor Accident Consequences Report (CRAC-II)." U.S. NRC. 1982. <http://www.beyondnuclear.org/storage/CRAC%202%20chart.pdf>

¹² Kazuaki Nagata. "Fukushima-No. 1's Never-Ending Battle with Radioactive Water." Japan Times. March 11, 2015. <http://www.japantimes.co.jp/news/2015/03/11/national/fukushima-1s-never-ending-battle-radioactive-water/#.VIO1fYE8KrV>

waterfowl, and navigation; similarly, shoreline areas could also become too contaminated for human activities. The full scope and scale of economic risk to New York State and the Lake Ontario resource from economically extending FitzPatrick's operation so far outweighs the alleged benefits, the Commission would be hard-pressed to justify the decision to have instituted such consumer subsidies should a nuclear accident occur after 2016.

Additionally, FitzPatrick has a serious design flaw that puts the State of New York and Lake Ontario at risk of massive radiation release and near-permanent contamination. The Nuclear Regulatory Commission ("NRC") has recognized since the 1980s that the containment system at FitzPatrick is inadequate to provide public protection from radiation exposure in the case of an accident at the plant.

The design flaw with Boiling Water Reactors like FitzPatrick was put on horrifying display during the Fukushima nuclear catastrophe. The meltdowns at Fukushima were not caused directly by the earthquake, but by the subsequent loss of power feeding the reactors' cooling systems and the unavailability of backup generators due to flooding from the tsunami. The loss of power caused overheating and a nuclear meltdown. Nuclear reactors are supposed to be designed so that in the case of a meltdown, the containment structure provides a last line of defense to protect the public from radiation exposure. However, the containments of the Fukushima reactors failed because they were not properly designed to withstand the build-up of explosive gasses and the resulting detonations.

AGREE has worked with the national nuclear watchdog organization Beyond Nuclear to thoroughly document how the owners of FitzPatrick failed to follow an NRC recommendation to install a vent to partially address this design flaw, making FitzPatrick an unsafe outlier, even among its peers.

In the event of a severe accident at FitzPatrick, the plan as described in an NRC document, is for plant operators to vent radiation, steam, and hydrogen gas into a building adjacent to the reactor. **In that building, they expect the ductwork will fail, causing the building to overpressurize until the doors blow off, releasing radiation, steam, and hydrogen gas into the outside at ground level.**¹³ Such an event would expose workers at the site as well as the public to radiation.

AGREE and Beyond Nuclear also uncovered a post-Fukushima inspection report that again calls into question whether FitzPatrick can handle an accident scenario without a hydrogen explosion in that vent path,¹⁴ which would cause uncontrolled contamination of the reactor site and the region. The NRC has agreed these concerns may have merit and is currently considering our petition on the matter.

FitzPatrick was also recently put under increased NRC scrutiny due to the number of unplanned power changes experienced at the plant. The power changes stemmed from Entergy's decision to defer replacement of the main condenser, which was clearly beyond its useful life. Failure to replace the condenser in a timely manner exposed workers to more radiation than necessary and caught the attention of the Union of Concerned Scientists, which filed a petition¹⁵ at the Nuclear Regulatory

¹³ NRC Letter. "Hardened Wetwell Vent Capability at the James A. FitzPatrick Nuclear Power Plant." September 28, 1992. http://allianceforagreenconomy.org/sites/default/files/fof_fitz_09281992-nrc-ser-approves-no-dtvs-highlight-2_0.pdf

¹⁴ NRC Post-Fukushima Inspection Report. May 13, 2011. Pg. 8. http://allianceforagreenconomy.org/sites/default/files/fitzpatrick_2206_supplement_attachment_0.pdf

¹⁵ Union of Concerned Scientists, et al. "Recurring Condenser Tube Leaks and Petition Pursuant to 10 CFR §2.206 for the James A. FitzPatrick Nuclear Power Plant" July 25, 2015 http://allianceforagreenconomy.org/sites/default/files/20130725-jaf-ucs-nrc-condenser-tube-events_0.pdf

Commission calling attention to the need for a new condenser and its contribution to decreased reliability and excessive unplanned power changes. Entergy eventually replaced the condenser, but only after years of escalating plant instability.

We are concerned that Entergy's refusal to address the condenser in a timely way is but one symptom of the financial pressure the plant has been under. We are not alone in these concerns. In 2013, New York Attorney General Eric Schneiderman submitted a letter¹⁶ to the Nuclear Regulatory Commission raising questions about whether Entergy's financial losses at FitzPatrick were compromising safety at FitzPatrick as well as Indian Point. Though the NRC ultimately refused to thoroughly investigate the question, we remain concerned that Entergy continues to compromise public and worker safety in order to minimize its financial losses at the plant as much as possible.

Negative Environmental Impact

Like all nuclear power plants, FitzPatrick also has a negative impact on the environment that is separate from the safety concerns and the danger of a meltdown.

From cradle to grave, nuclear reactors pollute the environment and threaten human health. FitzPatrick's uranium fuel is mined by a largely unregulated industry that poisons Native American communities and other rural areas in the U.S. There are over 10,000 abandoned uranium mines throughout the country which have never been cleaned up, predominantly in indigenous communities.¹⁷ Uranium is then processed into uranium dioxide ore at a mill, which generates vast amounts of radioactive and toxic tailings that are deposited on the ground or in open ponds. The fuel is then enriched in an energy-intensive process. By the time fuel is delivered to a reactor for use, approximately 25,000 pounds of mining waste rock, mill tailings, and depleted uranium have been generated for each pound of nuclear fuel.¹⁸

During power production, nuclear plants routinely as well as accidentally radioactively contaminate the environment through discharges to the air and water. Nuclear fuel emerges from the reactor approximately one million times more radioactive than when it enters, and must be isolated from humans and the environment for millennia, posing a risk that shows no solution in sight.

Nuclear proponents like to call nuclear reactors "emissions free" because they do not emit carbon dioxide at the point of power generation. Yet, nuclear power's carbon-footprint includes mining, enrichment, waste transportation, and decommissioning. We are not aware of any study that has attempted to quantify the carbon footprint of nuclear power's entire fuel cycle, but we know it is not insignificant.

Carbon-emissions aside, the most important on-site emissions associated with nuclear power are the emissions of radioactive pollutants and the generation of large amounts of radioactive waste. Nuclear

¹⁶ Letter from New York Attorney General Eric Schneiderman. November 27, 2013.

<http://allianceforagreenconomy.org/sites/default/files/2013%2011%2027%20FitzPat%20Letter%20Final.pdf>

¹⁷ U.S. Environmental Protection Agency. Abandoned Mine Lands Portal. http://www.abandonedmines.gov/wbd_um.html

¹⁸ World Information Service on Energy Uranium Project. Nuclear Fuel Material Balance Calculator. Using values for 1 tonne of UO₂ and 4.0% enrichment. <http://www.wise-uranium.org/nfcm.html>

reactors routinely release radiation, and the federal government allows them to do so as long as they stay under the “legal limit.” However, “legal” does not mean “safe,” as there is no safe level of radiation exposure. The Nuclear Regulatory Commission legal limit for radiation exposure to the public from the routine operation of a reactor is 100 millirem per year,¹⁹ a dose rate the agency believes to result in 1 additional cancer fatality per 286 people exposed.²⁰ Nuclear reactors also experience radioactive leaks and spills, which can contaminate ground water or other water bodies. Radioactive leaks are not the exception. In 2011, an investigation by the Associated Press found that almost 75% of nuclear plants in the U.S. had experienced a radioactive tritium leak at some point.²¹

Every year, FitzPatrick generates approximately 20 metric tons of highly dangerous radioactive waste. The federal government and the nuclear industry have spent decades looking for a permanent solution to dispose of this waste safely, and they have come up empty handed. The current plan is to leave it on-site indefinitely. Oswego and New York State will be dealing with the legacy of this waste for decades or even centuries.

FitzPatrick sits on the shore of Lake Ontario and consumes roughly 800 million gallons of water daily, which it uses to cool the reactor and then dumps back into the lake, causing thermal and radioactive pollution and killing aquatic life.

For all the reasons above, nuclear power should never be considered a clean energy source and should not be encouraged by New York in the form of clean energy subsidies.

Impact on Renewable Energy Future for New York

FitzPatrick can and must be shut down and replaced by truly clean energy. FitzPatrick’s proponents have made a habit of claiming that New York cannot meet its climate goals or its obligations under the Federal Clean Power Plan without the reactor. These claims are simply without merit.

Alliance for a Green Economy and Nuclear Information and Resource Service undertook a preliminary analysis of what it would take to replace FitzPatrick with clean energy, how much replacement would cost, and what the job impacts of replacement would be.

We have released an analysis, entitled, “REPLACING FITZPATRICK: How the Closure of a Nuclear Reactor can Reduce Greenhouse Gasses and Radioactive Waste, while Creating Jobs and Supporting the Local Community.”

Our findings include:

- FitzPatrick’s full electricity generation could be replaced with energy efficiency and wind at less than the current cost of electricity from the nuclear plant, without federal or state subsidies.

¹⁹ 10 CFR § 20.1301 Dose limits for individual members of the public. <http://www.nrc.gov/reading-rm/doc-collections/cfr/part020/full-text.html#part020-1301>

²⁰ U.S. Nuclear Regulatory Commission. Expanded Policy Statement on Below Regulatory Concern. Federal Register. 1990.

²¹ Associated Press. "Radioactive leaks found at 75% of US nuke sites." June 21, 2011 <http://www.cbsnews.com/news/radioactive-leaks-found-at-75-of-us-uke-sites/>

- Diverting all of FitzPatrick's revenue to clean energy could result in additional reductions in greenhouse gas emissions, equivalent to a 264 MW coal plant or 330 MW combined cycle natural gas plant.
- Replacing FitzPatrick with efficiency and wind could create more than twice the number of jobs currently provided by Entergy at FitzPatrick.
- Municipalities and workers affected by FitzPatrick's closure could be supported through the economic transition for a lower cost than subsidizing FitzPatrick, if the state proactively negotiates with Entergy for a responsible and immediate decommissioning.

The full analysis is attached your consideration.

New York's 2015 State Energy Plan set ambitious 2030 clean energy targets for the electricity sector, including 50% generation of electricity from renewable energy sources and a 23% decrease in energy consumption in buildings. The Public Service Commission seems poised to approve surcharges equivalent to about \$6.5 billion over 10 years to promote these goals, which while a significant amount of money, represents a decrease over spending amounts on clean energy in recent years.

If the Public Service Commission were to cave to demands by nuclear proponents that reactors receive subsidies currently reserved for clean energy resources, New York would either need to collect much higher surcharges or significantly reduce the amount of money available for wind, solar, and energy efficiency. Raiding the Clean Energy Fund or the Large Scale Renewables allocation to subsidize nuclear power would put the state in the untenable situation of expending resources inefficiently simply to maintain the status quo, rather than directing them to increase deployment of more cost-effective resources. One the other hand, raising rates to support economically unprofitable plants would jeopardize the affordability goals of the Reforming the Energy Vision process and would result in no lasting investments in clean energy industries or infrastructure.

FitzPatrick is reportedly losing \$60 million per year. If FitzPatrick were given a clean energy subsidy, other reactor operators would argue they, too, should receive similar subsidies. This could amount to *at least* \$360,000,000 million in subsidies *per year* for nuclear plants, or \$3.6 billion over 10 years, or more than half the money New York plans to provide for the development of renewable energy and energy efficiency in New York. If only FitzPatrick and Ginna (the other unprofitable nuclear plant in New York) were subsidized, it would cost *at least* \$143 million per year in the near term. (The recent negotiation in the Ginna case put the annual subsidy for Ginna at \$83 million per year.)

Furthermore, an investment in maintaining the old nuclear fleet in New York is not at all equivalent to an investment in developing the industries that will carry New York into 2050 and beyond. New York has set a goal of 80% carbon reductions by 2050. This goal will necessarily be met without the contribution of New York's current nuclear fleet because all of the reactors in New York are scheduled to retire by then. In fact, no commercial nuclear reactor anywhere in the world has operated for even 50 years, and all have reactors that have closed in the U.S. have done so long before their operating licenses expired.

New nuclear plants are proving cost prohibitive in the U.S. and other countries with market economies, especially as compared to alternatives like efficiency, wind, and solar. New York must not compromise its efforts to bring clean energy resources to scale, continue to bring down costs, and create job-inducing supply chains in New York. Any attempt to divert subsidies and resources toward nuclear

power will represent a delay in moving New York on the only possible path toward a truly carbon-free electricity sector, thereby foreclosing substantial economic development opportunities at the same time.

It has also been suggested that the state may not be able to meet its goals for reducing greenhouse gas emissions if FitzPatrick closes. Such claims are not self-evident, nor are they demonstrated on an economic or technical feasibility basis. The analysis in the above-reference white paper on Replacing FitzPatrick indicates precisely the opposite: even at unsubsidized wind cost rates, sufficient renewable resources could be cost-effectively deployed not only to replace FitzPatrick, but additional fossil fuel generation, as well. To the extent that state and/or federal programs provide incentives to renewables at any level at all, that margin would only grow wider.

It is for this reason that the Environmental Protection Agency determined, in promulgating the Clean Power Plan (CPP) emissions regulation, that "preserving" uneconomical nuclear generation is not necessary to meet the CPP's emissions reduction targets. The agency determined that existing nuclear generation, like all other existing low-carbon sources (e.g., renewables and hydro), is not part of the Best System of Emissions Reduction (BSER) because closed reactors could be replaced with incremental additions of renewable energy. The agency's determination did not assume any deployment of new nuclear generation in that assessment, because new nuclear generation capacity was also determined not to be part of the BSER, due to the excessive cost, long deployment time, and uncertain completion of new reactors and power uprates of existing reactors.

Conclusion

For the reasons discussed above, we urge the Commission to accept Entergy's petition to retire the FitzPatrick reactor and to do so quickly. It is important to end speculation that the Public Service Commission may act in an unpredictable way to try to subsidize the plant. Clearly, there is no legal justification for a subsidy. Certainty of closure would allow the region to begin planning to support workers and Oswego County through the transition and would provide ample time to work out decommissioning issues with Entergy.

Respectfully submitted,

/s/

Jessica Azulay

Program Director

Alliance for a Green Economy



REPLACING FITZPATRICK

How the Closure of a Nuclear Reactor can Reduce Greenhouse Gasses and Radioactive Waste, while Creating Jobs and Supporting the Local Community

ABSTRACT

An analysis of replacement scenarios for the FitzPatrick nuclear power plant shows that the reactor's entire electricity output could be replaced by lower-cost, clean energy resources with funds left over for worker and community transition support and fossil fuel displacement.

White Paper prepared by Alliance for a Green Economy and Nuclear Information and Resource Service

Copyright October 22, 2015

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An electronic version of this White Paper can be found at
www.allianceforagreenecconomy.org/replacing_fitpatrick.

Summary of Key Findings

This preliminary analysis by Alliance for a Green Economy and Nuclear Information and Resource Service examines the arguments for subsidizing the FitzPatrick nuclear reactor, particularly around the potential impact on greenhouse gas emissions and the economic hardship for the local community. We set out to compare the cost of clean replacement for FitzPatrick’s electricity output as well as alternatives to economically supporting the municipalities and workers currently reliant on FitzPatrick.

Our key conclusions:

- **FitzPatrick’s full electricity generation could be replaced with energy efficiency and wind at less than the current cost of electricity from the nuclear plant.**
- **Diverting all of FitzPatrick’s revenue to clean energy could result in additional reductions in greenhouse gas emissions, equivalent to a 264 MW coal plant or 330 MW combined cycle natural gas plant.**
- **Replacing FitzPatrick with efficiency and wind could create more than twice the number of jobs currently provided by Entergy at FitzPatrick.**
- **Municipalities and workers affected by FitzPatrick’s closure could be supported through the economic transition for a lower cost than subsidizing FitzPatrick, if the state proactively negotiates with Entergy for a responsible and immediate decommissioning.**

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Replacing FitzPatrick

How the Closure of a Nuclear Reactor can Reduce Greenhouse Gasses and Radioactive Waste, while Creating Jobs and Supporting the Local Community

White Paper by Alliance for a Green Economy and Nuclear Information and Resource Service
October 2015

1 INTRODUCTION AND SUMMARY

The FitzPatrick nuclear reactor, located near Oswego, New York, is at the center of a fierce debate over New York's energy future. FitzPatrick, like many aging reactors across the U.S., has become uncompetitive and unprofitable. Entergy, the company that owns FitzPatrick, has announced it wants to close the plant in 2016. Many in Oswego, including local elected officials and workers at the plant, are rallying to try to save FitzPatrick, and Governor Cuomo has vowed to try to prevent the closure. Meanwhile hundreds of others from the region and from across New York are calling for FitzPatrick to close.



There is no dispute that Oswego County and local communities around FitzPatrick currently rely on Entergy for tax revenue and for jobs. There are approximately 600 workers at FitzPatrick, and Entergy pays about \$17.3 million annually in property taxes. FitzPatrick is reportedly Oswego County's fifth largest private-sector employer. The negative local economic impacts of closure have been the focus of much of the discussion around Entergy's announcement that it might close the plant. Advocates for keeping FitzPatrick open are also using climate change as a rationale for subsidizing the reactor. They claim New York cannot meet its climate goals if nuclear plants close.

Less talked about so far have been the negative impacts of keeping FitzPatrick open, especially if Entergy requires a subsidy in order to do so. Subsidizing FitzPatrick could cost tens of millions of dollars per year, which would most likely be paid by National Grid customers in the form of increased electricity rates.

Like all nuclear reactors, FitzPatrick also poses an environmental threat to the surrounding population, in the form of radiological releases, the accumulation of nuclear waste, and the potential for a catastrophic meltdown that could render large parts of Upstate New York uninhabitable.

There is also an opportunity cost to keeping FitzPatrick running. The electricity revenues going to Entergy to operate FitzPatrick represent money that will not be used to build truly renewable and clean energy

resources, many of which are cheaper than FitzPatrick. In addition, money can be spent on a just transition for workers and the Oswego community, enabling a solid plan for the future.

In the absence of public numbers from Entergy as to how much it is losing at FitzPatrick and a basic lack of understanding statewide and regionally about the costs and potentials for renewable energy development, it can be difficult for the average resident to form an informed opinion about the region's energy future.

Alliance for a Green Economy (AGREE) and the Nuclear Information Resource Service (NIRS) decided to perform a preliminary, fact-based analysis of the choices before us. Here's what we looked at:

- Based on the proposed subsidy for the Ginna nuclear reactor in neighboring Wayne County, NY, we have estimated what we believe is the minimum subsidy Entergy would require to keep FitzPatrick operational.
- We analyzed the costs of alternative, clean energy sources to determine whether and how FitzPatrick could be replaced with energy efficiency and wind, as well as the impact on greenhouse gas emissions.
- We looked at the potential job impacts of a scenario for replacing electricity generated by FitzPatrick with wind power and energy efficiency.
- We developed a "just transition" scenario for the local community in Oswego County, which includes utilizing the skilled workforce for the decommissioning process, property-tax replacement for municipalities, and job training and wage support for workers moving to other fields.

OUR CONCLUSIONS IN BRIEF

- It appears likely that FitzPatrick's electricity output could be replaced by energy efficiency retrofits and wind at a lower cost than the reactor costs today at current electricity prices. This means that for the same price that consumers pay for FitzPatrick's output today, Central New York could replace FitzPatrick *and* additionally displace other fossil fuel generation.
- The job creation potential for replacing FitzPatrick with efficiency and wind is more than twice the number of jobs currently provided by Entergy at FitzPatrick.
- FitzPatrick's decommissioning trust fund is a resource that can and should be used to keep a large portion of the current workforce employed in the clean-up and decommissioning of the reactor.
- For the same price as a potential subsidy for FitzPatrick – \$40 - \$60 million per year – the state could instead provide property tax replacement for local municipalities and wage support for workers.

2 ABOUT THIS WHITE PAPER

Alliance for a Green Economy (AGREE) is a Syracuse, NY based coalition of environmental and social justice organizations. AGREE works for safe, affordable energy and the development of a green economy in New York State. Our goal is a prosperous, safe, and healthy New York, fulfilling the promise of conservation, energy efficiency, and safe, clean renewable energy sources to end our state's reliance on wasteful and environmentally destructive forms of energy. We seek to capitalize on the opportunity to revitalize the state's economy which a clean energy transition would provide, particularly in regions and urban centers that are economically struggling. AGREE works to promote a transition to a carbon-free and nuclear-free future and educates the public about alternatives that can revitalize the economy and safeguard human health and the environment. As the primary nuclear watchdog organization in Upstate New York, AGREE has been faithfully monitoring Entergy's FitzPatrick nuclear reactor for the last four years. We have raised multiple safety and economic issues concerning FitzPatrick with the Nuclear Regulatory Commission. We advocate for the closure of FitzPatrick and the reactor's replacement with clean energy resources.



Founded in 1978, the **Nuclear Information and Resource Service (NIRS)** is the national information and networking center for grassroots organizations and environmental activists concerned about nuclear power, sustainable energy, radioactive waste, and the environmental and public health effects of radiation.



NIRS's mission is to advance the fastest possible transition to a nuclear-free, carbon-free sustainable energy supply; to advocate for responsible and environmentally just solutions to radioactive and toxic waste; and to promote the greatest possible protections from the health and environmental effects of radiation. We provide policy expertise and informational resources on energy and radioactive waste, and we monitor policy developments on the national and state levels. NIRS initiates and supports strategic campaigns to advance public health and safety, environmental justice, corporate and government accountability, and sustainable energy. We also work closely with the international movement, and have a long affiliation with the World Information Service on Energy, through which we are part of a network spanning 12 countries on five continents.

In analyzing the potential options for FitzPatrick's future, we acknowledge our anti-nuclear perspective. However, we undertook to be conservative and careful in our analysis out of our own interest in developing a realistic understanding of the options. We endeavor to present factual information to the public about the choices before us. We believe Central New York was saddled with the risks and burdens of nuclear power, largely because the public was not provided with accurate information and sufficient voice in the state's energy planning decisions. In order to make better energy and economic development choices in the future, the public needs accurate information, as well as a voice in the process.

This white paper contains a preliminary analysis, in which we took a somewhat rough look at the options and created general calculations. Throughout the analysis, we discuss our methodology and why we think our calculations are both conservative and reasonable. We hope this white paper will spark interest in a more detailed analysis by state governing bodies and independent technical experts as part of their deliberation process over how to approach the potential retirement of FitzPatrick.

3 WHY IS FITZPATRICK LOSING MONEY AND HOW MUCH WOULD IT TAKE TO KEEP THE PLANT RUNNING?

FitzPatrick is one of several reactors across the U.S. that is economically challenged. The economics for nuclear reactors have never been good. They have always required public subsidies for construction, accident insurance, and for dealing with the highly radioactive waste they produce. However, in recent years, the national nuclear fleet has become increasingly expensive to maintain and operate because the plants are getting older, the cost of nuclear fuel is on the rise, and new post-Fukushima safety regulations are going into effect. Due to the negative economic outlook, there have been several nuclear closures announced in the last few years, including Kewaunee, San Onofre, Crystal River, and Vermont Yankee.

Specifically for FitzPatrick, Entergy faces the following challenges:

- The costs of maintenance for FitzPatrick are rising due to the age of the reactor, which has now been operating for over 40 years. Entergy recently spent millions of dollars replacing tubes in the main condenser at FitzPatrick, and the company faces other required upgrades if it wants to keep operating the reactor.
- Electricity demand in Central New York is essentially flat, which is helping to drive down wholesale electricity rates. From 2005-2014, demand declined in Central New York by 7%¹, reversing the historical trend of constantly growing demand. Flat and declining demand is a result of increased use of energy efficient appliances, weatherization programs, rooftop solar installations, and New York's changing economy.
- FitzPatrick faces stiff market competition from natural gas as well as wind. Wholesale electricity prices have declined 30-40% since 2008.² Wind generation grew 3,000 percent from 2004 to 2015 in New York, and is projected to more than double in the next few years.³

We do not see the economic outlook for FitzPatrick changing on its own. The trends are moving against nuclear energy, in favor of cleaner, cheaper, and/or more flexible energy sources. Therefore, the only way to make it worth it to Entergy to keep FitzPatrick running is to provide the company a public subsidy or to change the wholesale electricity market rules to favor nuclear power over other energy sources. Either option would cost the public tens of millions of dollars per year.

Entergy has not said how much it would need to keep FitzPatrick running, but we can make an educated guess based on a similar situation in neighboring Wayne County. In the case of the Ginna Nuclear Power Plant, negotiations between the reactor's owner, Constellation Energy Nuclear Group, and the local utility company,

¹ NYISO. 2015 Load & Capacity Data: Gold Book. April 2015. Table I-4a: Historic Energy Usage and Coincident Peaks (p. 22)
http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Documents_and_Resources/Planning_Data_and_Reference_Docs/Data_and_Reference_Docs/2015%20Load%20and%20Capacity%20Data%20Report.pdf

² NYISO Day-Ahead LBMP data, Zone C (CENTRL), 2008-2012.

http://www.nyiso.com/public/markets_operations/market_data/custom_report/index.jsp?report=dam_lbmp_zonal

³ NYISO Power Trends Report – 2015.

http://www.nyiso.com/public/webdocs/media_room/press_releases/2015/Child_PowerTrends_2015/ptrends2015_FINAL.pdf

RG&E, arrived at a subsidized price equivalent to approximately \$50 per megawatt hour (MWh), or 5 cents/kilowatt-hour (kWh). The \$50 per MWh is a good conservative guess for what Entergy might require just to keep FitzPatrick operating. This is consistent with reports by the nuclear industry's trade association on plant operating costs, showing that single-reactor plants like Ginna and FitzPatrick averaged \$50.54/MWh in 2012.

To calculate what a subsidy for FitzPatrick might look like, we simply calculate the cost of electricity in the market and compare it to \$50 per MWh. The average market rate for electricity in Load Zone C, where FitzPatrick is located, over the last 5 years, is \$40.71 per MWh.⁴ This results in an estimated subsidy of \$9.29 per MWh. We then multiply the per MWh subsidy by the number of megawatt hours that FitzPatrick generates annually (on average 6,606,792 MWh) to arrive at an annual subsidy.

Based on recent market rates, we estimate that the annual subsidy needed to keep FitzPatrick in business would be approximately \$61.4 million.

In order to provide a more conservative estimate, we also calculated a potential subsidy based on a period when electricity prices were higher (2008-2012). Using that five-year average of \$44/MWh, the estimated annual subsidy for FitzPatrick would be least \$40 million, or \$6/MWh. This conservative estimate of \$40 million will be used throughout this analysis.

⁴ NYISO Day-Ahead LBMP data, Zone C (CENTRL), 2010-14.

http://www.nyiso.com/public/markets_operations/market_data/custom_report/index.jsp?report=dam_lbmp_zonal

4 CAN FITZPATRICK BE REPLACED BY CLEAN ENERGY?

With growing concern over greenhouse gas emissions and climate change, the nuclear industry has made itself out as a “clean” alternative to fossil fuels. Putting aside nuclear power’s other negative environmental impacts and dangers, we think it’s reasonable to wonder whether the shuttering of FitzPatrick would jeopardize the greenhouse-gas reductions necessary to prevent catastrophic climate change. Therefore, we looked at whether it is possible and cost effective to replace FitzPatrick with clean energy sources.

We developed a scenario that puts half the money spent by consumers today on FitzPatrick into energy efficiency retrofits (which includes weatherization and efficient lightbulbs and appliances) and invests the other half into onshore wind power. Why did we choose efficiency and wind? We chose efficiency because it is the lowest cost resource for consumers and the biggest bang for their buck.⁵ It also has the highest job creation potential and it has many co-benefits, which include improved comfort, indoor air quality, and health. Dollar for dollar, it is the best investment of consumer money. We chose wind because it is the next cost-effective renewable resource.⁶ Upstate New York has abundant, untapped wind potential, and it can be built relatively quickly at a large scale.

We found that not only is it economical to replace FitzPatrick with a combination of energy efficiency retrofits and wind, but doing so would be cheaper than continuing to operate FitzPatrick, even with no subsidy for the reactor. Replacing FitzPatrick with clean energy sources could drive down utility rates for the region and create extra renewable generation to further replace fossil fuel generation.

An important assumption built into our model is that, while we pay for FitzPatrick every single year, investing in energy efficiency and wind represent mostly upfront costs. The costs are normally financed over a period of time, with little ongoing operational or maintenance costs. In our model, we projected financing the costs over 20 years.

Here are the numbers:

- At \$44 per MWh, electricity customers pay approximately \$290,698,848 annually for FitzPatrick’s electricity.
- If we spent half of that (\$145,349,424) on energy efficiency, we could get the equivalent of 5,813,977 MWh in energy use reductions.
- If we spent the other half on wind, we could build enough wind power to generate 2,190,630 MWh annually, with an installed capacity of 834 MW.

This would provide (through efficient savings and renewable generation) an annual total of 8,004,607 MWh, or 21% more (1,397,815 MWh) than FitzPatrick delivers to the grid every year. These “extra” megawatt-

⁵ Energy efficiency reductions from utility-run programs typically cost around \$25 per MWh

⁶ While wind power costs are continuing to decline, we conservatively use an unsubsidized cost estimate of \$2 million per MW, roughly 33% higher than recent costs of \$1.5 million per MW.

hours could be returned to customers in the form of avoided costs or could be used to help displace other dirty generators like coal or gas plants in the region.

The replacement of FitzPatrick with clean energy is not a question of *if* but rather *when*. New York has set a goal of 80% reduction in greenhouse gas emissions by 2050 and an interim benchmark of 40% reductions by 2030. FitzPatrick is only licensed through 2034, and so far no nuclear power plant has operated until the end of its license. Even if the plant somehow manages to stay open until its license expires, it will need to be replaced well before 2050.

5 REPLACEMENT RELIABILITY ANALYSIS

It is unknown whether any of FitzPatrick’s output is needed to maintain reliable electrical service in Central New York. There is a large surplus of generation capacity in Central New York⁷ to meet demand without FitzPatrick, but we do not yet know whether there are transmission constraints that would cause an issue. This will only be revealed with a reliability study. These studies are required once a company makes a decision to retire and notifies the Public Service Commission of its intention. In preparation for any reliability concerns that may arise from FitzPatrick’s retirement, we analyzed our replacement scenario above for its capacity reliably to meet electricity demand.

There are many ways to measure the predicted output of any given energy source:

- **Nameplate/Installed Capacity:** The full capacity of a resource to produce when it is at 100% efficiency
- **Capacity factor:** A ratio of the actual output of the generator over a given period of time, relative to its maximum possible output
- **Derated Capacity Value:** A measurement of the reliability of a resource to be available at peak energy usage times.

To determine the ability of our FitzPatrick replacement scenario to meet demand during peak energy use times, we looked at the derated capacity value of energy efficiency and wind. Energy efficiency essentially has a derated capacity of 100% because it reduces the amount of energy used by the household or businesses. With the consumption gone, there is no need to meet that demand. Wind has a peak capacity value in the Northeast of 13.2%.⁸

Peak Capacity Value of the Replacement Scenario:

Resource	Peak Capacity Value (MW)
Efficiency	664
Wind	110
Total	774

This means that our replacement scenario has a peak capacity value (or reliability value) representing 92% of FitzPatrick’s capacity.

⁷ NYISO. 2015 Load & Capacity Data: Gold Book. April 2015. Table III-3a: Capability by Zone and Type – Summer and Table III-3b: Capability by Zone and Type – Winter (pp. 58-59).

http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Documents_and_Resources/Planning_Data_and_Reference_Docs/Data_and_Reference_Docs/2015%20Load%20and%20Capacity%20Data%20Report.pdf

⁸ U.S. Energy Information Administration. Energy resource planners credit only a fraction of potential wind capacity. May 13, 2011. <http://www.eia.gov/todayinenergy/detail.cfm?id=1370#>

6 THE JOBS IMPACTS OF REPLACING FITZPATRICK WITH EFFICIENCY AND RENEWABLES

To calculate the potential job creation resulting from the energy efficiency retrofits and wind in our scenario, we used a report by the Political Economy Research Institute (PERI), titled, “The Economic Benefits of Investing in Clean Energy.”⁹ In that report, the researchers modeled direct, indirect, and induced job creation resulting from each million dollars invested in a variety of energy sources. Direct job creation is the number of jobs created by the work of building or running the energy source itself. Indirect job creation represents the potential job impacts from the supply chain for the resource. Induced job creation is the economic benefit produced when workers paid by the direct and indirect jobs spend their paychecks.

The PERI report estimates:

Energy Source	Direct jobs per \$1 million invested	Indirect jobs per \$1 million invested	Induced jobs per \$1 million invested	Total jobs per \$1 million invested
Efficiency Retrofits	7	4.9	16.7	28.6
Wind	4.6	4.9	13.3	22.8

Based on our scenario for replacing FitzPatrick with efficiency retrofits and wind, we estimate an annual direct job creation impact of 1,400 jobs (1,017 for efficiency, 383 for wind) each year for 20 years, or more than 2.3 times the number of jobs FitzPatrick can sustain.

It’s important to note that even though we would pay for these jobs over 20 years, and we calculated them over a 20 year timeframe, the retrofits and the wind construction could and should be done in the first few years, which would mean much higher jobs impacts in each year, but for fewer years. However, to keep the analysis consistent with FitzPatrick, which provides roughly the same number of jobs each year, we estimated the above numbers based on a 20-year timeframe.

The PERI analysis did not include nuclear energy in its estimates, so we have no way to compare indirect and induced job impacts. Nonetheless, we provide the figures here for our replacement scenario: 6,068 total jobs estimated annually (4,170 efficiency, 1,898 wind).

⁹ Political Economy Research Institute. “The Economic Benefits of Investing in Clean Energy.” June, 2009. http://cdn.americanprogress.org/wp-content/uploads/issues/2009/06/pdf/peri_report.pdf

7 DECOMMISSIONING AS THE FOUNDATION FOR A JUST TRANSITION

Having shown that climate change concerns could be met at lower cost and with higher job creation than continuing the operation of FitzPatrick even without a subsidy, we turn to the remaining argument to keep FitzPatrick open: to prevent economic hardship to the local community brought on by closure.

We analyzed whether it was possible to provide relief to the local community – in the form of tax replacement, transitional wage support, and economic development investments – in a way that was economical compared to the cost of subsidizing FitzPatrick.

Above, we calculated the cost of a subsidy for FitzPatrick to be at least \$40 million per year, but possibly \$60 million per year if the most recent electricity rates are used. This is money that FitzPatrick supporters are proposing consumers should pay in order to save approximately 600 jobs and sustain \$17.3 million in local property taxes. There are many ways to spend \$40-60 million in Central New York, where several areas suffer from high unemployment and underfunded schools. We know there is not consensus on whether it's fair for the state to unilaterally decide that keeping jobs and property taxes in Oswego is a priority over other public needs. Nonetheless, we set out to calculate what it would take to support the community through the transition. While addressing climate change and converting to clean energy sources will produce large, positive economic benefits, we support assisting communities that experience negative local impacts in the process.

First, we look to FitzPatrick's decommissioning trust fund as a resource that can be used to keep workers employed at FitzPatrick beyond closure. This is a resource unique to nuclear power plants, mandated by the Nuclear Regulatory Commission because of the long-lasting hazards of radioactive contamination. The trust fund for FitzPatrick had \$738 million at the end of 2014¹⁰, which is money already set aside for the cleanup of the plant. If Entergy is convinced, or required, to begin the decommissioning process right away, a large portion of the current workforce could be retained for a period of time using that fund.

We assume that about half of the workforce could be retained for decommissioning, and compensated by Entergy and the decommissioning fund for several years. The 50% number is derived from the decommissioning of the Rancho Seco reactor in California and Vermont Yankee in Vermont.

It's important to note that this is not a given. Entergy could instead mothball the reactor for up to 60 years using the SAFSTOR decommissioning option. If they want to keep workers at the plant, utilize their institutional knowledge and training, and ensure that cleanup begins immediately, the state and local governments will need to negotiate an agreement with Entergy, as the state of Vermont did in 2013, after the company announced plans to close Vermont Yankee. New York has a foot in the door with FitzPatrick's decommissioning fund. Unlike most decommissioning trust funds, which are solely controlled by nuclear owners themselves, FitzPatrick's fund is still owned by the New York Power Authority. This gives the state a stronger bargaining position in determining how the decommissioning trust fund will be used.

¹⁰ Entergy Nuclear Operations. Decommissioning Funding Status Report to U.S. Nuclear Regulatory Commission. Attachment 9. March 30, 2015.

We developed a comprehensive decommissioning and community protection scenario, based on an agreement Entergy entered into with the State of Vermont for the closure of Vermont Yankee. That agreement includes a number of important provisions:

- Transfer of nuclear waste from the fuel pool to dry-cask storage within six years
- Initiation of decommissioning within six months after the decommissioning trust fund has accumulated enough money
- \$25 million in local economic development funds (paid over four years)
- \$20 million for cleanup of non-radiological contamination (paid over four years)
- Establishment of an independent, state-appointed Community Advisory Panel to monitor decommissioning activities, with public meetings

Under our scenario, we assume that 300 workers will be retained for the decommissioning of FitzPatrick. If 10% of the new jobs created by clean energy replacement went to FitzPatrick workers (140 jobs), and Entergy transferred 10% of FitzPatrick’s workforce (60 jobs) to other positions in the company, that would reduce the number of workers requiring long-term wage replacement and career transition assistance to 100. Even assuming Entergy agreed to bear none of the costs related to community and worker protection, that would leave money for other community benefits such as job training, cleanup, and economic development:

Expense	Cost
Property Taxes	17,300,000
Wage Replacement at \$120,000/year	12,000,000
Training and Job Placement (at \$30,000/worker)	3,000,000
Toxic Cleanup Fund	5,000,000
Economic Development	2,700,000
Total	40,000,000

The \$40 million annual budget for this scenario is roughly equal to the minimum cost of subsidizing FitzPatrick, at a rate of \$6/MWh. If FitzPatrick’s electricity were replaced with wind and efficiency, as we modeled, the electricity would cost customers about \$36/MWh, 17% less than our estimated market price of electricity. Together, a comprehensive approach to replacing and decommissioning FitzPatrick would be \$42/MWh, still cheaper than the market price of electricity, and about \$60 million per year less than subsidizing the continued operation of FitzPatrick. Furthermore, this assumes Entergy would pay none of the community worker and protection costs. If Entergy agreed to bear a share of those costs, as it has in Vermont, then the cost to utility customers would be substantially less.

8 NET ENERGY COST SAVINGS AND EMISSIONS REDUCTIONS

In addition to the economic and environmental benefits we have identified, the clean energy and community and worker protection scenarios we recommend could also result in savings to electricity customers. This is possible even if customers bear the entire cost of replacing property taxes and transitional assistance for displaced FitzPatrick employees. The cost of energy efficiency and wind generation in our clean energy replacement scenario is 17% less than the market price of electricity. If only as much efficiency and wind were developed to replace the electricity FitzPatrick generates, it would cost customers over \$50 million less per year. That means the cost of replacing property taxes and wages for displaced workers could still be paid for, at less than the conservatively projected cost of subsidized power from FitzPatrick:

Basic Energy Replacement	FitzPatrick	Clean Energy
Energy	6,606,792 MWh	6,606,792 MWh
Price	\$44/MWh	\$36.32/MWh
Cost	\$290,698,848	\$239,935,169
Subsidy or Community Protection	\$39,640,752	\$40,000,000
Total	\$330,339,600	\$279,935,169

If the full amount of renewable energy and efficiency we project were developed, there would be substantially greater benefits. In that scenario, wind and efficiency provide 21% more energy than FitzPatrick generates. That would displace primarily fossil fuel generation, resulting in a significant net reduction in greenhouse gas emissions. The additional 1,397,815 MWh of electricity is equivalent to the output of a 264 MW coal plant, or a 332 MW combined cycle natural gas plant.¹¹

In addition, there would be even greater cost savings to customers by avoiding the purchase of more expensive electricity. That would result in over \$60 million per year in lower energy costs. Again, community and worker protections could be paid for, with a net savings of over \$20 million as compared to projected energy prices:

Basic Energy Replacement	FitzPatrick + Market Power	Clean Energy
Energy	8,004,607 MWh	8,004,607 MWh
Price	\$44/MWh	\$36.32/MWh
Cost	\$352,202,725	\$290,698,848
Subsidy or Community Protection	\$39,640,752	\$40,000,000
Total	\$391,843,477	\$330,698,848

¹¹ U.S. Energy Information Administration. Electric Power Monthly. Table 6.7.A. Capacity Factors for Utility Scale Generators Primarily Using Fossil Fuels, January 2013-July 2015. September 24, 2015. Rated capacity figures computed from average capacity factor values for coal plants (60%) and combined cycle natural gas plants (48%), to generate 1,397,815 MWh of electricity. http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_6_07_a

If the cost of the program applied only to National Grid's service territory, and were distributed equally among the utility's 1.8 million electricity customers, the average customer would save \$12 per year compared to electricity at projected market prices, without subsidizing FitzPatrick. If, instead, the state were to provide subsidies to prevent FitzPatrick from closing, it would cost National Grid customers at least \$40 million per year more than the market price of power. In that case, customers would pay \$61 million more each year than in our clean energy and just transition scenario. That would amount to \$34 more each year, for the average customer than replacing FitzPatrick with clean energy and supporting workers and the community through the economic transition.

9 CONCLUSION

As the above analysis shows, compared to cleaner alternatives, providing a subsidy for FitzPatrick is costly to ratepayers and the environment. There are major opportunity costs for allowing FitzPatrick to operate, even without a subsidy. If FitzPatrick were to close and the money currently going to the reactor in the market were instead directed into energy efficiency and wind, the entire output of FitzPatrick could be replaced. Money would be left over to build additional renewables or to lower energy prices. Our efficiency and wind scenario is 92% as reliable in meeting peak demand as FitzPatrick, and would result in a significant additional reduction in greenhouse gas emissions.

Pursuing a replacement scenario with a combination of efficiency and wind would create more than twice the number of jobs that FitzPatrick offers today. This job growth could be sustained over 20 years, or frontloaded into the first five years, which would increase the number of wind industry jobs annually four-fold.

Finally, if policymakers deem a subsidy is necessary only to prevent job losses and save local municipalities from tax-revenue losses, this could be accomplished at lower cost than subsidizing FitzPatrick's continued operation. The decommissioning trust fund could and should be put to work immediately so as to not delay the cleanup at FitzPatrick and to keep a large portion of FitzPatrick's skilled workforce employed for years to come, while utilizing their institutional knowledge and training. Direct payments to municipalities and to those workers unable to find a new job would then be cheaper than subsidizing Entergy to indirectly provide for those costs.

We conclude that if Entergy decides to close FitzPatrick, the Cuomo administration should let it do so and focus efforts on expanding tomorrow's energy sector and supporting the community through the economic transition. Concerns over climate change and economic hardship can be satisfied through more affordable means. We also believe a better long term plan for the community and for workers is possible that will not be achieved by a short term subsidy.