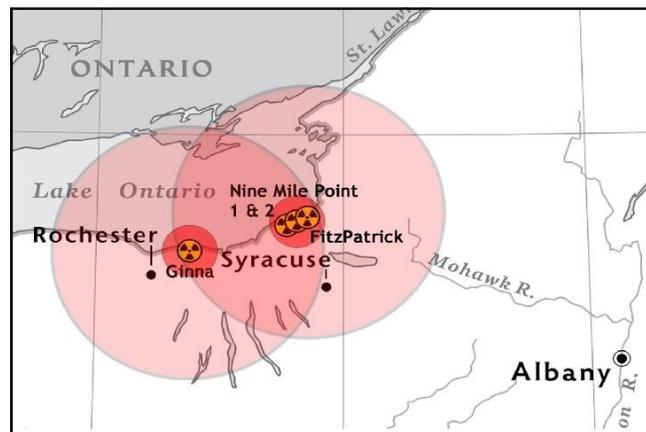


Fukushima Nuclear Catastrophe - 7 Years Later

New York's Upstate Nuclear Reactors: Still Expensive and Unsafe in an Era of Weak Enforcement

On March 11, 2018, we mark 7 years since the nuclear meltdowns and radiation releases at the Fukushima Daiichi nuclear reactors. That nuclear catastrophe resulted in the [forced evacuation of approximately 470,000 people](#), with over 120,000 still displaced. [The disaster is ongoing](#). It will [take many decades to resolve the crisis](#) and the cleanup and compensation costs will cost an [estimated \\$180 billion](#).

On April 1, 2018, we will mark another nuclear anniversary: one year since New York began an expensive nuclear subsidy program designed to ensure the continued operation of four nuclear reactors in Upstate New York. The subsidy program was [approved by the New York Public Service Commission](#) on August 1, 2016 and went into effect the following April 1. By this April, approximately \$482 million (the equivalent of \$1.3 million per day) will have been transferred from New York electricity customers to Exelon Corporation and two other companies through this program.¹ The program is scheduled to endure for 12 years, and in the end will cost New York's electricity customers an estimated \$7.6 billion in total.



Nuclear Power Reactors in Upstate New York
The larger circles around each reactor on the map indicate an approximate 50 mile radius. During the Fukushima Daiichi nuclear disaster, the U.S. government advised U.S. citizens in Japan within 50 miles of the plants to evacuate. In the U.S., the evacuation zones around nuclear plants are currently only about 10 miles (shown by the smaller circles) while emergency planning for nuclear impacts is required for a 50-mile radius.

Two of the subsidized reactors – Nine Mile Point 1 and FitzPatrick – have the same design as those that melted down and exploded at Fukushima. These Mark I Boiling Water Reactors are

¹ When proposing the nuclear subsidy, the Department of Public Service staff calculated that the nuclear plants would receive approximately \$965 million over the first two years of the program. We based our calculation on that source. However, the actual amount may be less or more depending on the actual output of the nuclear reactors over the course of the year. The Staff estimate can be found on page 2 of this document: <http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={BBFA4008-FD27-4209-B8E1-AD037578101E}>

known to have design flaws that compromise public safety in the case of a meltdown. Nine Mile Point 2 is a Mark II Boiling Water Reactor, which suffers from similar design flaws.

In 2017, nuclear safety analyst, Mark Leye, submitted [testimony to a joint committee hearing of the New York State legislature](#) describing the ongoing risks posed by the designs of Fitzpatrick and Nine Mile Point. He said:

primary containment of a [Boiling Water Reactors] Mark I is intended to protect the public from large releases of radioactive material in the event of a meltdown. In the Fukushima accident, three such primary containments failed to protect the Japanese public. In the event of a meltdown, there is no guarantee that the primary Mark I containments at either FitzPatrick or Nine Mile Point would prevent the harmful release of large amounts of radioactive material into the environment, as occurred in the Fukushima accident. U.S. Nuclear Regulatory Commission (NRC) reports from 1975 and 1990 both concluded that in the event of a meltdown, a BWR Mark I primary containment has “a relatively high containment failure probability,” because it has a relatively small volume for a commercial reactor.

New York is also home to two of the oldest nuclear reactors in the world. The R.E. Ginna reactor is 48 years in operation this year and is the oldest reactor in the U.S. of its type. Nine Mile Point 1 is 49 years in operation and is tied with New Jersey’s Oyster Creek as the county’s oldest reactor.

An [analysis performed for the U.S. Nuclear Regulatory Commission](#) (NRC) by Sandia National Labs in 1982 estimated that a severe accident at FitzPatrick could cause 1,000 early fatalities and 17,000 cancer deaths. At Ginna, a severe accident could cause 2,000 early fatalities and 14,000 cancer deaths. The same analysis calculated that an accident Nine Mile 1 could cause 800 early fatalities and 14,000 cancer deaths. An accident at Nine Mile 2 could cause 1,400 early fatalities and 20,000 cancer deaths.

About 1 million people live within the 50-mile emergency planning radius of each of the upstate nuclear reactors. As we mark this grim anniversary, we ask ourselves in New York – have the lessons from the Japanese nuclear catastrophe been taken to heart? Are we safe?

Alliance for a Green Economy, upstate New York’s primary nuclear watchdog organization, analyzed recent inspection reports and Nuclear Regulatory Commission (NRC) documents to gain insight into the state of the subsidized nuclear reactors this year. What we found was a pattern of regulatory violations that went without penalties, weakened regulations at the request of nuclear operators in New York, and missed deadlines to fix known safety and maintenance issues. A summary of our findings is below.

Our Findings

In response to flooding, Exelon requested and received, weakened emergency requirements. In the summer of 2017, shoreline communities on Lake Ontario experienced flooding, and the [water came within one foot](#) of the level that would have required Nine Mile Point Nuclear Station to take emergency action and declare “unusual event,” which is the lowest level of emergency action. In response, the owner, Exelon, requested a change to its operating license to avoid such a situation in the future. The Nuclear Regulatory Commission [granted the request to change the requirement](#) that Exelon declare an “unusual event” when the water reaches a certain level, and instead the event would be declared if flooding prevents employees

from reaching the site with their vehicles. This change [also applies to Exelon's FitzPatrick reactor](#), which sits close by. (Flooding of the Fukushima Daiichi reactors was the actual cause of the reactor meltdowns in 2011, because it is what disabled the reactors' cooling pumps and offsite power supplies.)

Despite multiple violations, NRC declined to penalize Exelon. From March 2017 through February 2018, [inspection reports](#) on the four reactors describe 18 violations of NRC regulations by Exelon (six of these were reported by the company to the NRC and the rest were discovered during inspections). These violations vary from [failure to properly fix and maintain plant components](#) and [equipment](#), personnel [performing tasks without proper qualifications](#), ["more than minor" human errors](#), and [failure to identify elevated risk during maintenance](#). Despite the fact that some of these errors could have compromised plant safety, the NRC did not fine or otherwise penalize Exelon for any of them.

FitzPatrick continues to operate without a containment vent. Nuclear reactors are required to have a leak-proof barrier to protect the public from radiation in case of a meltdown. Yet, it has been known for decades that the FitzPatrick and Nine Mile Point 1 reactors do not have containments that are likely to be able to contain the pressure and radiation released by a meltdown. In the 1980s Nine Mile Point 1 installed a vent to help control for the possibility of explosions and uncontrolled containment breach, but FitzPatrick did not. However, the Fukushima Daiichi reactors had been retrofitted with similar vents to those installed at Nine Mile Point 1 and other U.S. reactors, and they proved insufficient to address the Mark I containment design problems. As part of the post-Fukushima process, the Nuclear Regulatory Commission has required that all reactors like FitzPatrick and Nine Mile Point install improved hardened vents to address this known safety concern. (It should be noted that we nuclear watchdogs [do not consider even these upgraded vents adequate](#) to protect public health and safety.) To this day, FitzPatrick still has not installed the required vent. On September 8, 2016, FitzPatrick's previous owner, Entergy, requested and received an extension from the NRC to delay installing the vent yet again. [The NRC granted their request](#) and gave the plant a new deadline of June 30, 2018 for vent installation. AGREE has been working with national nuclear watchdogs to hold operators of the FitzPatrick plant [accountable for the dangers posed by the Mark 1 design](#) and the lack of a reliable containment there since 2011. We have been repeatedly assured by NRC that an upgraded vent would be installed, but deadlines for installation have been pushed back for years.

Due to the reversal of the decision to shut down, FitzPatrick has deferred maintenance issues, and Exelon is behind schedule in addressing these issues. FitzPatrick's previous owner, Entergy, had planned to shutter FitzPatrick in January 2017. As a result, the company reduced its investments in upgrades and maintenance, including but not limited to the hardened containment vent upgrade. However, the plant did not close as anticipated. Instead, Exelon bought the plant from Entergy in response to the lucrative subsidies for all of the upstate nuclear reactors from New York State. It is now Exelon's responsibility to fix all of the issues that Entergy let lapse. Exelon is behind schedule. The [inspection report from October 2017](#) describes how Exelon had planned to have everything done by the end of 2017, but progress has been slower than expected.

FitzPatrick has ongoing fuel leaks; Exelon is responding appropriately. In May 2017 and throughout the rest of the year, operators reduced power at FitzPatrick temporarily to [identify and suppress fuel leaks in the reactor](#). These are not leaks out of the plant. They are internal to the plant. However, fuel leaks within the plant can result in increased routine (legal) radioactive

releases from the plant into the environment, as well as expose plant workers to greater amounts of radiation. The fact that Exelon has been identifying and suppressing the leaks by inserting fuel rods is positive and will likely protect the public from increased radiation exposure. This situation should be monitored to ensure this practice continues.

Despite promises, New Yorkers still cannot opt-out of the nuclear subsidies. An easy strategy to accelerate the transition to 100% renewable energy is for the New York Public Service Commission – the state agency that enacted the nuclear subsidies – to allow consumers to avoid their portion of the nuclear subsidies by adopting renewable energy instead. This is a common-sense option that the Public Service Commission promised to try to implement over a year ago, yet it remains unavailable to consumers in New York, many of whom are vehemently opposed to subsidizing nuclear energy.

Plant Specific Information

James A. FitzPatrick



12-Year Cost to Subsidize: \$1.9 billion

Location: Oswego County
Owner: Exelon
Generating Capacity: 838 MW
Type: Mark I Boiling Water Reactor
Age: 43 years in operation
Population within 50 miles: 909,798
Nuclear waste on site: ~456 tons

Recent Safety Issues

- 2016 - [Pump failure and oil spill into Lake Ontario](#)
- 2016 - [Inspection report reveals an ongoing 5-year radioactive leak on site](#)
- 2013-2014 - [Frequent condenser leaks resulting in multiple unplanned power changes and increased oversight from NRC](#)
- 2012 - [Major transformer fire](#)
>> Read about a [similar fire at the Indian Point reactors](#), after which Governor Cuomo held a press conference, saying "This was a relatively minor situation, but when you're talking about a nuclear power plant there are no really minor situations."
- 2006-2011 - [Multiple serious worker safety violations and fraudulent recordkeeping](#)

General Safety Concerns

Mark I reactors like FitzPatrick have relatively small containment structures, making them especially vulnerable to large-scale accidents. In 1986, Dr. Harold Denton, an official at the Nuclear Regulatory Commission (NRC) [acknowledged they had as high as a 90% chance of failure if challenged by severe accident conditions](#). Containment failure occurred at all three (100%) of the Mark I reactors that were operating at Fukushima Daiichi on March 11, 2011.

FitzPatrick is the only Mark I in the US that does not have a hardened vent system as was recommended by the NRC. The venting plan at FitzPatrick, in the case of an accident, is to let radiation, gases, and steam [vent into a nearby building, where it is expected the doors will blow off, releasing radiation at the ground level](#).

Alliance for a Green Economy has been calling on the NRC to address this dangerous venting plan since 2011, but the agency continues to allow the plant to operate without a hardened vent. In 2016, Entergy requested an 18-month extension for the required installation of a new vent and this [request was granted](#), putting off this important fix, yet again.

Most of FitzPatrick's spent fuel is kept in a fuel pool on site. Just like the reactor core itself, spent fuel pools must be kept cool with a constant supply of cooling water. In Boiling Water Reactors like FitzPatrick, these pools are high in the air near the top of the reactor vessel, making them vulnerable to exposure from leaks or to explosions caused by problems within the core.

The Nuclear Regulatory Commission has estimates that a spent fuel pool fire could [contaminate 31,000 square kilometers](#) (about 12,000 square miles), an estimate some scientists believe to be woefully low. (New York State is 55,000 square miles.)

A [1982 Sandia National Laboratories study for the NRC](#) estimated that a large scale nuclear accident at FitzPatrick could cause 1,000 early fatalities and 17,000 cancer deaths.

Are the Subsidies Necessary?

In 2016, the New York Independent System Operator (NYISO) found that [FitzPatrick could close with no need for additional plants to be built for replacement](#). Our analysis also found that [FitzPatrick could be replaced](#) with energy efficiency and renewable energy, while providing worker retraining and wage support and property tax replacement for municipalities at lower cost than subsidizing the continued operation of FitzPatrick.

About the Owners

FitzPatrick was previously owned by Entergy Corporation, and Entergy had planned to shutter the reactor in January 2017. Instead, ownership was transferred to the largest nuclear operator in the U.S., Exelon, in a deal brokered by New York's Governor as part of the process to subsidize the upstate nuclear reactors in New York. Though Exelon now owns and operates FitzPatrick, the legacy of Entergy's corporate culture and deferred maintenance in anticipation of closure is still clearly affecting the plant.

Entergy is also the owner of the Indian Point nuclear reactors in Westchester, New York, which are scheduled to close by 2021. In 2015 the Union of Concerned Scientists singled out Entergy for special mention since [3 of the year's 10 Near Misses](#) occurred at Entergy plants: Indian Point Unit 3, Pilgrim Nuclear Power Station, MA and River Bend Station, LA. In addition, 2/3 of the safety violations cited were given to Entergy reactors.

Exelon is the largest nuclear owner and operator in the U.S. and is notorious for fighting competition from renewable energy. For example, in 2012 Exelon was [kicked out of the American Wind Energy Association](#) because of its active opposition to renewal of federal tax credits for wind energy.

Robert E. Ginna



12-Year Cost to Subsidize: \$1.3 billion

Location: Wayne County
Owner: Exelon and EDF
Generating Capacity: 581 MW
Type: Two-loop pressurized water reactor
Age: 48 years in operation
Pop. within 50 miles: 1,269,589
Nuclear waste on site: ~402 tons

Recent Safety Issues

- 2016 - [Emergency plan found in violation, which could have caused operators to fail to evacuate the public in case of an accident](#)
- 1983-2013 - [A significant flooding vulnerability was allowed to persist for 30 years](#)

General Safety Concerns

Ginna is the oldest reactor of its type in the US and one of the 8 oldest reactors in the world. No reactor in the world has made it to 50 years of age before shutting down, and Ginna is 48 years old. Ginna was slated to close in April 2017, but will be kept open through subsidies. A [1982 Sandia National Laboratories study for the NRC](#) estimated that a large scale nuclear accident at Ginna could cause 2,000 early fatalities and 14,000 cancer deaths.

Are the Subsidies Necessary?

Ginna received temporary subsidies from customers of the utility Rochester Gas & Electric, under a two-year agreement that ended on March 31, 2017. This agreement was designed to preserve electricity reliability in the region until the utility could finish building a transmission upgrade that made Ginna's continued operation unnecessary. In 2016, the New York Independent System Operator (NYISO) found that once that upgrade was finished, [Ginna could close with no need for additional power plants to be built for replacement](#). Yet, under a new "Clean Energy Standard" policy, all New Yorkers will now be forced to subsidize Ginna.

About the Owners

Ginna is owned by Constellation Energy Nuclear Group (CENG), which is jointly owned by Exelon Corporation and Électricité de France (EDF). Exelon holds the majority stake in the company.

In 2012, Constellation (which was purchased by Exelon) [was fined \\$245 million](#) for manipulating energy markets in New York.

Nine Mile Point



12-Year Cost to Subsidize: \$4.4 billion

Location: Oswego County
Owners: Exelon, EDF, and Long Island Power Authority
Generating Capacity: 609 MW (Unit 1) and 1,311 MW (Unit 2)
Types: Mark I (Unit 1) and Mark II (Unit 2) Boiling Water Reactors
Age: 49 years (Unit 1) and 32 years (Unit 2) in operation
Pop. within 50 miles: 909,523
Nuclear waste on site: ~826 tons

Recent Safety Issues

- 2013 - Nine Mile Point Unit 1 [cited for serious incident](#), which brought the plant within 9 hours of fuel exposure, which could have led to a meltdown
- 2013 - [A tritium \(radioactive water\) leak was found at Nine Mile Point](#)
- 2007-2015 - Failure at Nine Mile Point 2 to identify and correct reactor building water pipe penetration that caused leakage and affected secondary containment

General Safety Concerns

Nine Mile Point 1 is one of the two oldest operating nuclear plants in the US and it is showing its age. In 1997, severe cracks were discovered in the reactor's core shroud. Nine Mile Point 1, like FitzPatrick is a Mark I Boiling Water Reactor, which have been known to have flawed containment designs since the 1970s, when scientists at both the Nuclear Regulatory Commission (NRC) and GE raised concerns that their containment structures would not successfully withstand a nuclear accident. In 1989, the NRC advised Mark I operators to install a hardened vent, which was to be used as last resort if an accident occurred to relieve pressure and prevent hydrogen explosions within the reactor. In March of 2011, the Mark I design and the venting system were put to the test and failed during the Fukushima Daiichi nuclear catastrophe.

Nine Mile 2 is a Mark II Boiling Water Reactor, which is a close design to the Mark I reactors and suffers from the same containment design flaw. Like at FitzPatrick, most of Nine Mile Point's spent fuel is kept in fuel pools on site.

A [1982 Sandia National Laboratories study for the NRC](#) estimated that a large scale nuclear accident at Nine Mile 1 could cause 800 early fatalities and 14,000 cancer deaths. An accident at Nine Mile 2 could cause 1,400 early fatalities and 20,000 cancer deaths.

Are the Subsidies Necessary?

Even though Nine Mile Point will receive the lion's share of New York's nuclear subsidies, which were approved in order to prevent unprofitable reactors from retiring, Exelon has never submitted a retirement notice for either reactor at Nine Mile Point. There is no public financial evidence to justify subsidizing either reactor.

About the Owners

Nine Mile Point 1 is owned by the same owners as Ginna: Constellation Energy Nuclear Group (CENG), which is jointly owned by Exelon Corporation and Électricité de France (EDF). Nine Mile Point 2 is owned 82% by CENG, and 18% by the Long Island Power Authority.