

How to meet Massachusetts' energy needs

By Joshua Goldstein, May 28, 2019, The Boston Globe

Massachusetts claims to care about climate change, but will permanently shut down its largest source of carbon-free energy, the Pilgrim nuclear power plant in Plymouth, on Friday. Pilgrim supplied more carbon-free electricity every year than all Massachusetts solar, wind, and hydro combined, and supplied it 24/7, year-round, in any weather.

This clean electricity will be replaced with the fossil fuel methane, also known as natural gas. New natural gas pipelines and power plants are being built this year to supply our grid, and our carbon emissions are expected to rise by more than a million tons per year as a result of Pilgrim's closing.

If we cared about climate change, we would rapidly reduce our greenhouse gas emissions ("decarbonize"). Scientists tell us, in the latest United Nations reports, that avoiding a climate catastrophe requires decarbonizing the world by 2050, a gargantuan task.

Massachusetts can't do that currently because we are a methane economy. Cheap natural gas generates two-thirds of our electricity, heats many of our homes, and powers our industries. But methane emits greenhouse gases, both when it burns and when it leaks unburned.

Renewables won't replace our methane economy. Electricity from solar and wind will always be intermittent. No battery can store a whole economy's energy needs long-term. So natural gas companies sell methane as "the perfect partner for renewables." When the sun sets, when the wind dies, methane power plants quickly jump in to keep the grid up. Decarbonization it's not.

There is a way to meet Massachusetts's energy needs reliably and affordably while decarbonizing quickly. It's simple, it's proven, and it sets an example others can follow: Build four latest-generation South Korean nuclear reactors on the closed Pilgrim site, with its grid connection and infrastructure, to generate most of Massachusetts' electricity — eight times Pilgrim's production.

Politically, this might seem impossible, but technically and economically it's easy. It's also a lot more environmentally friendly than the alternatives: Material throughput in nuclear power, from mining to construction to waste, is many times smaller than fossils or renewables.

Nuclear power scares many people, but statistically it has been far safer than methane or other fossil fuels. Some spent nuclear fuel is long-lived and toxic, but no worse than other forever-toxic industrial wastes, and the quantities are very small. The four reactors proposed would generate altogether about ten "dry casks" (18-foot-tall cylinders) per year, joining the small collection already on site at Pilgrim. These casks safely contain radiation, have never had a serious problem, and are certified for many decades. At some point this spent fuel can be burned in new reactors currently being designed, or buried deep underground, as Finland is doing.

LEDE

NUT
GRAF

ARGUMENT

Recent attempts to build US nuclear power plants have been expensive fiascos. That's why Massachusetts should have the South Koreans build us their APR1400 — the world's most advanced, safest reactor — which has already been built, operated, exported, and certified by the Nuclear Regulatory Commission for US use.

The four-reactor power plant we need is already being built, with some reactors operating, in South Korea and the United Arab Emirates. These experiences indicate that an identical plant in Plymouth would cost about \$20 billion and take a decade to complete. The cost would be amortized over a 60-year lifetime, and the electricity would come to market at prices roughly competitive with our current fossil fuels, but with greater long-term price stability.

The supply of reliable, affordable clean electricity would boost our state economy by attracting business and accelerating the electrification of transportation, industry, and heating. For instance, shifting to electric vehicles would slash oil consumption, and electric air-source heat pumps would reduce methane used to heat buildings. This electrification, which would also provide us cleaner, healthier air, could be supported over time by several more Plymouth-style power plants, for instance at Seabrook, N.H. (Using existing nuclear power sites would speed deployment and reduce costs.)

As a 13th-generation Massachusetts resident, I want to leave our children and grandchildren a livable, healthy, and prosperous state. Burning more methane while adding renewables won't get us there. There is a practical alternative, if we would just use it.

CALL
TO
ACTION

Original Op-Ed © Boston Globe. All rights reserved. This content is excluded from our Creative Commons license. For more information, see <https://ocw.mit.edu/fairuse>.

MIT OpenCourseWare
<https://ocw.mit.edu/>

22.011 Nuclear Engineering: Science, Systems and Society
Spring 2020

For information about citing these materials or our Terms of Use, visit: <https://ocw.mit.edu/terms>.