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People's Fission

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One of the main reasons that lefties like me don't just back Bernie Sanders, but have an uncommon amount of trust in him, is his dogged, unflappable, remarkably un-politician-like hyperconsistency. For 40 years, he has stuck to the same script on campaign finance, on the billionaire class (even referring to "the richest one-half of one percent" way back in 1971, long before Occupy Wall Street), on the death penalty, on workers' rights. In 1983, he was fighting for LGBT civil rights when Reagan administration officials still regularly subjected gays, lesbians, and people with AIDS to hate-filled ridicule. He opposed a dodgy trade deal with Panama long before the Panama Papers were leaked. On issue after issue, he's been on the right side of history, years ahead of schedule.

But there's one issue on which Sanders has been hyperconsistently wrong. One yuuuuge-ly important, planet-saving, tiny little thing. It's his irrational, evidence-free opposition to nuclear energy.

Sanders—along with much of the left—needs to take another look at this issue. Because with his democratic-socialist, public-sector ethic, Sanders may just be the only candidate who could actually deliver the sort of mass build-out of nuclear power that the world desperately needs if we are to stave off catastrophic climate change. And even if he doesn't become president, an informed change of heart on nuclear could convince many of his fans to follow suit.

In recent years, a small and scrappy, but growing, grassroots pro-nuclear movement has emerged among progressives, scientists, conservationists, climate activists, andtrade unionists who see nuclear power fundamentally as a social justice issue—as the best, cleanest way to end energy poverty around the world. (Witness, for instance, the campaign to save the Diablo Canyon nuclear plant in California.) Sanders's waking up to the facts that have persuaded this new generation of environmentalists to embrace nuclear could help make support for the power source—and the vast energy wealth it can bring to humanity—the great left-wing cause it should be.

On his campaign website, Sanders argues that in the wake of the meltdown at Fukushima in Japan, and because "the toxic waste byproducts of nuclear plants are not worth the risks," he wants a moratorium on renewing nuclear plant licenses. He is "delighted" when existing plants

such as Vermont Yankee in his home state are shut down, and does not even support building new, advanced nuclear plants that have solved the safety issues that worry anti-nuclear activists. Instead, he reckons solar, wind, geothermal, and energy efficiency on their own will be enough to save us from climate disaster.

Ahead of next week's New York primary, Sanders has called for the shutdown of the Indian Point nuclear plant outside New York City, hinting of a Fukushima on the Hudson. "We cannot sit idly by and hope that the unthinkable will never happen," he saidin a statement. "It makes no sense to me to continue to operate a decaying nuclear reactor within 25 miles of New York City where nearly 10 million people live."

Like Sanders, James Hansen, NASA's former chief climate scientist, has been arrested protesting progressive causes—most recently in 2013, outside the White House at a demo against the Keystone XL pipeline—although Hansen is best known for his 1988 congressional testimony about global warming that raised public consciousness about the issue. Last week, he criticized the senator's position on Indian Point as "fear-mongering," saying, "The Nuclear Regulatory Commission (NRC) has repeatedly certified the safety of Indian Point. The scaremongers have taken minor maintenance questions and wrongly suggested they point to significant problems with the plant." Hansen added that "Sanders has offered no evidence that NRC has failed to do its job, and he has no expertise in over-riding NRC's judgement." He urged voters to "uphold science against ideology."

Indian Point delivers roughly one-quarter of New York City's electricity, and cleanly at that, producing as much electricity as all of the state's wind farms. As Hansen noted, if the plant were to close, it would largely be replaced by fracked natural gas that would produce carbon emissions equivalent to adding some 1.4 million cars on the road due to wind power's intermittency and transmission challenges. After the Vermont Yankee shut down in 2014, carbon dioxide emissions sharply rose by 7 percent in the state in 2015, following a steady 26 percent decline from the turn of the millennium.

In fairness, Sanders's Democratic opponent is not much better on the nuclear issue. If anything, due to Hillary Clinton's multiple flip-flops on the subject, we have no idea what she really believes. In February 2007, at a campaign rally in South Carolina, Clinton seemed to back it strongly for all the right, climate-change reasons. Then later that year, in December, she told New Hampshire's *Keene Sentinel* editorial board that she would not encourage the construction of future nuclear plants, saying that the technology had not addressed "very difficult" safety concerns, that subsidies should be spent on renewables instead, and that she didn't trust the Nuclear Regulatory Commission to keep people who live near the Indian Point plant safe. And then, at a debate in Las Vegas in January 2008, she said: "I have a comprehensive energy plan that does not rely on nuclear power."

Now she has now decided she's in favor once more. Sort of. Last July, Clinton unveiled her "Vision for Renewable Power," which sort of gives away her ambivalence on nuclear in the title. But it does, at least, mention that she backs grants for "advanced nuclear," the sort of nuclear that has indeed solved the problems of waste and meltdown. On Indian Point, Clinton has not echoed Sanders's emphatic call for a shutdown, but said recently she is "glad" her opponent discovered the issue and offered qualified support for Governor Andrew Cuomo's call to close the plant. "When I was a senator, I went after oversight, I went after safety. And again, Governor

Cuomo is calling for it to be closed. There's a current Nuclear Regulatory Commission study being undertaken." She continued: "We also have to be realistic and say: You get 25 percent of the electricity in the greater New York City area from Indian Point. I don't want middle class tax payers to see a huge rate increase. So this needs to be done in a careful, thoughtful way."

Even when the Nuclear Energy Institute, the industry's lobbying group, put out a statement welcoming Clinton's position on advanced nuclear, it was at best lukewarm, noting: "Her strategy falls short of recognizing that the current and future workhorse of carbon reduction in the nation's power generation is nuclear power." Nuclear already generates 63 percent of all zero-carbon electricity in America, yet among her plan's measures, the NEI lamented, "Clinton called for the installation of 500 million solar panels by 2024. To put this in perspective relative to the electricity production from nuclear energy, it would take three to five times as many solar panels—as many as 2.5 billion—for solar power to equal nuclear power's current electricity output."

Historically, it has been the left that defends science and evidence-based policy against the deniers and religious bigots of the right, on issues from evolution to stem cells to climate change. Yet the only presidential candidates openly, proudly, robustly defending nuclear in this cycle have been the Republicans—and even then, only Jeb Bush, Marco Rubio, and Ben Carson, who are no longer in the race. In the likely general-election matchup, single-issue nuclear advocates would do better than Clinton by plumping for Donald Trump—but even he swings from strongly backing the technology to saying "we have to be careful" because nuclear "does have issues," and he's also suggested that Indian Point may need to be shut down. While Trump's main rival, Ted Cruz, backs an "all of the above" approach to the energy mix, including nuclear, he opposes all energy subsidies and public funding for research—and nuclear has no chance, at least for the near term, without strong government support.

Today we know that radiation from nuclear plants was never the concern some once thought it was. You will receive more radiation exposure from one banana than from two liters of the tritiated water in test wells from the now-closed Vermont Yankee plant. One return New York-to-London transatlantic flight delivers roughly the same exposure (0.16 mSv) as a nuclear power worker receives in a year (0.18 mSv)—which itself is a tiny fraction of the typical annual background radiation Americans receive from natural sources (6.2 mSv). Modern reactors can recycle waste and are designed with passive safety systems; it is no more physically possible for them to melt down than it is for balls to spontaneously roll up hills. To complain about meltdown and nuclear waste today is akin to complaining about how you always have to rewind VHS cassettes before you take them back to the video store: No one has to do that anymore.

But even those who harbor concerns about existing plants are ill-informed. Some six decades of civil nuclear operation has shown it to have a better safety record than any other energy source. According to the World Health Organization, it has caused 0.04 deaths per terawatt hour compared to wind's 0.15, solar's 0.44, hydroelectric's 1.4, oil's 36, and coal's 100.

At Fukushima Daiichi, not a single person has died as a result of meltdown or radiation exposure; many are nowasking whether the deaths that have occurred, largely among the elderly, are the product of unnecessary evacuation and fear of radiation. The Chernobyl disaster was the consequence of an inherently unsafe design with no containment building; the facility was constructed mainly for the production of plutonium for bombs. According to the WHO, the

International Atomic Energy Agency, and the UN Development Agency, a few dozen died at the time of the accident, and around4,000 could eventually die from radiation exposure. Any death is tragic, although it should be noted that these figures are far lower than what Greenpeace and other groups allege. And the famous reactor incident at Three Mile Island in 1979 was contained, harming no one.

But the most important fact to keep in mind when developing policies ensuring a clean-energy transition is that while renewables like wind and solar can be part of the mix, they are *intermittent*. The sun doesn't always shine and the wind does not always blow. Large-scale hydro is more dependable, but there aren't enough rivers and valleys to replace fossil fuels completely. And while one day in the future we may solve the energy storage problem, for now batteries, hydrogen, and grid storage are helpful but not sufficient. This means that solar and wind have to be backed up by non-intermittent energy sources. Most of the time that involves gas-fired turbines, or, in the case of Germany, coal.

Germany's 'Energiewende' (energy transition), much-ballyhooed by green campaigners like Naomi Klein, provides a lesson in what happens when you pursue a neoliberal, renewables-only solution to climate change. The country subsidizes private firms and richer households that can afford to put solar panels on their roofs via jacking up electricity prices; this has transferred wealth from the poor upward, and has resulted in some of the highest energy-poverty rates in the EU. Is this upside-down wealth redistribution from the have-nots to the haves what Bernie Sanders wants?

We need to rapidly clean up our electricity generation, and renewables alone are not up to the task. The fastest records for decarbonizing electricity were set by France, Sweden, and Belgium, who constructed their nuclear fleets in little over a decade. This is the sort of timetable of rapid infrastructure build-out that is needed if we are to have a hope of keeping within the internationally agreed guardrail of 2°C of global warming by the end of the century.

This is where democratic socialism comes in—or should. While nuclear power is very cheap, reactors are still extremely expensive to build. It can take multiple decades for the initial investment to pay off, making such projects unattractive to the private sector without massive public subsidies. Multiple energy policy researchers haveconcluded that France's remarkable success came down to the country's muscular *dirigiste* political culture of the time—that has since withered in the face of neoliberal ascendency in Europe—that allowed centralized decision-making; to a public-sector monopoly enjoying considerable engineering manpower and skill concentrated in one place; to an influential public research and development agency; and to economies of scale from standardized build-out.

That is, it was a grand public-sector moonshot of a program—exactly the sort of project that is anathema to neoliberalism, but which a democratic socialist like Sanders is usually all about. (One senior fellow at the libertarian Cato Institute, who clearly understands this well, has denounced nuclear power as "risky business" because of the "government dole" that the industry requires.)

There do exist private-sector, next-generation nuclear start-ups and larger firms doing fantastic research and development. And one day many years from now, small modular nuclear reactors may be produced on factory assembly lines and achieve economies of scale that slash

costs and reduce the need for government handholding. But much of this is still on the drawing board. So for at least the medium term—the very period during which we need to make the clean energy transition if we are to keep within 2°C of global warming—there is no getting around the fact that any mass build-out of nuclear will have to be public-sector led.

The world is crying out for cheap, dependable, scalable, clean, public electricity—especially the billions of people who don't have electricity at all. Sanders has always been on the side of the little guy. I hope he'll change heart on this one issue. Because we need People's Fission, comrades.