Renewable Energy Is Not the Answer; Nuclear Is

By Chris Wright

"It's always a good idea to start by asking about the facts." So advises Noam Chomsky. "Whenever you hear anything said very confidently, the first thing that should come to mind is, 'Wait a minute, is that true?'" *De omnibus dubitandum*—doubt everything—was Karl Marx's motto and should be the motto of every thinking person. Question even or especially what the tribe most takes for granted.

In the era of climate change, when fossil fuels are known to be driving civilization straight into the ocean, the idea that liberal and left-wing tribes take most for granted is "Renewable energy!" It is shouted confidently from every public perch. Renewable energy, scaled up to replace fossil fuels and even nuclear, is declared the only possible salvation for humanity. It has such obvious advantages over every other energy source that the world has to go 100% renewables ASAP.

Obviously!

But wait a minute—is that true?

Let's try to shed the religious thinking, look objectively at the facts, and come to a conclusion about this most important of subjects: how to power the future and hopefully save the world.

Renewable energy emits greenhouse gases

First, consider the claim that renewable energy has no carbon emissions. This is true, in a sense, for wind and solar farms (as it is for nuclear energy), which in themselves emit virtually no greenhouse gases. It isn't true for hydropower, however, which in 2016 produced 71% of all electricity generated by renewable sources. According to one study, hydroelectric dams worldwide emit as much methane (a potent greenhouse gas) as Canada, from decaying vegetation and nutrient runoff. Another study concluded they produce even more carbon dioxide than methane.

"These are massive emissions," one expert comments. "There are a massive number of dams that are currently proposed to be built. It would be a grave mistake to continue to finance those with the impression that they were part of the solution to the climate crisis."

And yet in every scenario projected by renewables advocates, hydropower is absolutely essential. For instance, Stanford Professor Mark Jacobson's famous—and deeply flawed—proposal to run the U.S. on 100% renewables by 2050 assumes the country's dams could add turbines and transformers to produce 1,300 gigawatts of electricity, over 16 times their current capacity of 80 gigawatts. (According to the U.S. Department of Energy, the maximum capacity that could be added is only 12 gigawatts, 1,288 gigawatts short of Jacobson's assumption.)

The International Energy Agency projects that by 2023, wind and solar together will satisfy a mere 10% of global electricity demand, while hydroelectric power will satisfy 16%. Nearly all the rest will be produced by fossil fuels and nuclear energy.

Burning biomass, too, which is a renewable energy source, releases large amounts of carbon into the atmosphere. "It does exactly the opposite of what we need to do: reduce emissions," says an expert in forest science and management.

Even leaving aside hydropower and biomass, the use of wind and solar dramatically increases greenhouse gas emissions compared to nuclear energy. This is because, given the intermittency and the diluted nature of solar and wind energy, a backup source of power is needed, and that source is natural gas. Robert F. Kennedy, Jr., a guru of the renewables movement, himself acknowledges this fact:

> We need about 3,000 feet of altitude, we need flat land, we need 300 days of sunlight, and we need to be near a gas pipe. Because for all of these big utility-scale solar plants—whether it's wind or solar—everybody is looking at gas as the supplementary fuel. The plants that we're building, the wind plants and the solar plants, are gas plants.

The burning of natural gas, i.e. methane, emits about half as much carbon dioxide as the burning of coal. So natural gas is better than coal, but not nearly good enough if we want to solve climate change. Even worse, many millions of tons of unburned methane are leaked every year from the American oil and gas industry—and methane is more than 80 times as potent a greenhouse gas as carbon dioxide. So these leaks cancel out much of the environmental good that wind and solar farms are supposedly doing.

In other words, the fact that wind and solar farms typically operate far below their capacity (because of seasonal changes and the unreliability of weather) necessitates that a more reliable power source "supplement" them. In fact, as researchers Mike Conley and Tim Maloney point out, strictly speaking it is the renewable source that acts as a supplement for the oil or natural gas plants linked to the renewables. A solar farm with a capacity of one gigawatt, for instance, will on average operate at only about 20% of its capacity, which means that if a gigawatt of energy is really to be produced, the majority will have to be provided by the "backup" fossil fuel plant(s).

The upshot is that an anti-nuclear and pro-renewables policy means an increase in greenhouse gas emissions.

California is a good example. Like other states in the U.S and countries in the Western world, it has been closing its nuclear power plants—despite their safety, reliability, effectiveness, and environmental friendliness. The carbon-free nuclear plants have been replaced with renewables + natural gas, which is to say, they've been replaced mostly with natural gas (prone to methane leaks). After it closed the San Onofre nuclear plant in 2013, California missed its CO_2 emissions targets as a result.

In New England, after the premature closing of the nuclear power plant Vermont Yankee in 2014, CO_2 emission rates rose across New England, reversing a decade of declines. When Massachusetts' last remaining nuclear plant, Pilgrim, closed last month, much more electricity generation was lost than the state generates with all its solar, wind, and hydropower combined. Several new fossil fuel

plants and a couple of small solar and wind farms will take the place of Pilgrim, increasing carbon dioxide emissions.

In their new book *A Bright Future: How Some Countries Have Solved Climate Change and the Rest Can Follow*, Joshua Goldstein and Staffan Qvist give other examples. Between 1970 and 1990, due to its construction of nuclear power plants, Sweden was able to cut its carbon emissions by half even as its electricity consumption more than doubled. Germany, by contrast, emits about twice as much carbon pollution per person as Sweden despite using one-third *less* energy per person, because it has chosen to phase out its nuclear power while introducing renewables.

This means that Germany has simply substituted one (relatively) clean energy source for another, while doing virtually nothing to decarbonize. Its energy production remains dominated by coal, and greenhouse gas emissions are around a billion tons a year.

A more sensible policy would have been to build more nuclear plants and phase out coal. Or at least to let the existing nuclear plants continue to operate while adding renewables, which then would have displaced coal.

ExxonMobil likes renewable energy

The fact that renewable energy directly and indirectly causes far more greenhouse gas emissions than nuclear should already tell us it isn't a solution to climate change.

Indeed, the willingness of the oil and gas industry in recent years to promote and invest in renewables is itself significant. Over the last three years, the five largest publicly traded oil and gas companies have invested over a billion dollars in advertising and lobbying for renewables. "Natural gas is the perfect partner for renewables," ads say. "See why #natgas is a natural partner for renewable power sources," Shell tweets.

By pretending to care about the environment, these companies not only burnish their reputations but also are able to associate natural gas with clean energy, which it very much is not. The formula "renewables + natural gas" thus serves a dual purpose. In fact, it serves a triple purpose: it also distracts from nuclear power, which, unlike renewables, is an immediately viable alternative to oil and gas.

Nuclear power, not renewable energy, is what the fossil fuel industry really fears. The reason is simple: the energy in nuclear fuel is orders of magnitude more concentrated than the energy in oil, gas, coal, and every other source. (Which is why nuclear reactors produce vastly less waste than everything from coal to solar.) If governments invested in a global Nuclear New Deal, so to speak, they could make fossil fuels largely obsolete within a couple of decades. Not even Mark Jacobson's wildly unrealistic $15-20 trillion 100% renewables plan envisions such a fast transition.

Because of the diffuse and intermittent nature of wind and solar energy, all the world's investment in renewables didn't prevent the share of low-carbon power in generating electricity from *declining* between 1995 and 2017. Western countries' shuttering of nuclear power plants in these decades was a disaster for the environment.

Another way to appreciate the disaster is to consider that global carbon emissions are actually *rising*, even as the world spent roughly $2 trillion on wind and solar between 2007 and 2016. (This is similar to the amount spent on nuclear in the past 55 years.) So much for the gospel of renewable energy!

Meanwhile, the fossil fuel industry has been smiling on the sidelines, giving millions of dollars to groups like the Sierra Club, the Natural Resources Defense Council, the Environmental Defense Fund, and many others that work to kill nuclear power and thus exacerbate climate change. (Greenpeace and Friends of the Earth are particularly active in the war on nuclear—and they refuse to disclose their donors. Could it be because they receive an unseemly amount from oil and gas companies?)

We have eleven years

According to the Intergovernmental Panel on Climate Change's 2018 special report, we have eleven years left to avoid potentially irreversible climate disruption.

António Guterres, the Secretary-General of the United Nations, has called on global leaders to "demonstrate how to reduce greenhouse gas emissions by 45 per cent over the next decade and achieve net zero global emissions by 2050." They're supposed to meet in New York in September 2019 to answer this call.

The only conceivable way to reduce greenhouse gas emissions on the scale called for is to aggressively embrace nuclear power. It is cost-competitive with all other forms of electricity generation except natural gas—although if you take into account the long-term environmental costs of using natural gas (or oil or even renewables), nuclear is probably the cheapest of all.

A worldwide rollout of nuclear power plants on the scale necessary to save civilization would certainly take longer than eleven years, but we can at least make substantial progress by then. If, that is, we pressure our governments to stop subsidizing oil, natural gas, and the renewables they go hand-in-hand with and instead massively invest in nuclear.

It's time to stop doing the bidding of fossil fuel interests and get serious about saving the world.