Renewable Energy, A Reality Check

Norman Rogers, December 2020

Renewable energy enjoys a positive image. Some 30 states have passed laws mandating that some percentage of their electricity must come from renewable energy. For example, California mandates that by 2030 60 percent of the electricity must be from renewable sources.

What is renewable energy and what is the benefit, if any? Renewable energy is defined by the many state laws. Although the laws differ in detail, they are well summarized by the three No's.

No fossil fuels.
No hydroelectricity if a dam is involved.
No nuclear.

Renewable energy, more than anything else, is a ban on the existing methods of generating electricity. The state definitions of renewable energy closely mimic the energy policy of the Sierra Club. The Sierra Club and similar environmental outfits are well known as advocates for take no prisoners environmentalism. Maybe we don't want to jump off that cliff.

There are many niche forms of renewable energy. For example, extracting flammable gas from garbage decaying in landfills. That is called landfill methane. Like all the niche energies, it doesn't go very far.

The only scalable renewable energy is wind and solar. You can have as much wind and solar as you are willing to pay for. Wind and solar can't replace fossil fuel infrastructure because they generate erratically according to the state of the weather. The fossil fuel infrastructure has

to remain or expand to back up wind and solar. The bottom line is paying $80 to save $15 worth of fuel. That is wildly wasteful.

What are the justifications for state renewable energy quotas? The justification mentioned most often is the danger of global warming caused by emissions of carbon dioxide (CO2). But of the three No's only fossil fuel emits CO2. Hydroelectricity and nuclear don't emit CO2, but they are still banned. Renewable energy is more about deleting energy than providing energy. It's about making environmental extremism the law of the land.

Is global warming an emergency, like the Earth having a heart attack? Or is it more like asthma, annoying but not an imminent catastrophe? Why did the global warming advocates, about 15 years ago, stop talking about global warming and instead started talking about "climate change." It might have something to do with a failure of the Earth to warm as much as they were expecting or hoping. Global warming has become very political and the remedies being proposed, such as a carbon tax, have a strong political taint. A growing consensus is that the danger of global warming has been exaggerated and the ability of civilization to adapt to it has been minimized.

Many thoughtful environmentalists don't think it is wise to turn the economy upside down because there are overwrought activists that think the Earth will be lost to climate change any minute. When the lights go out people become very annoyed and will lash out. The environmental movement has to keep the lights on and keep electric bills reasonable. Otherwise, the political credibility of the movement will collapse.

Prominent global warming activists are denouncing renewable energy as ineffective and overpriced. They are advocating for nuclear energy. Nuclear has long been the third rail of environmental politics. Not any

longer. These serious scientists and environmentalists now see renewable energy as a false god that can't deliver the goods. Nuclear, the former third rail is now seen as the only way forward.

James Hansen, the scientist often considered the driving force behind global warming alarm, has come out strongly against renewable energy. In a Boston Globe op-ed he called renewable energy fantastical and grotesque.

Michael Shellenberger, a well-known environmental activist has been in the forefront of the environmentalists pointing out that renewable energy is a false solution, that will not work for reducing CO2 emissions, and that nuclear is the only workable solution.

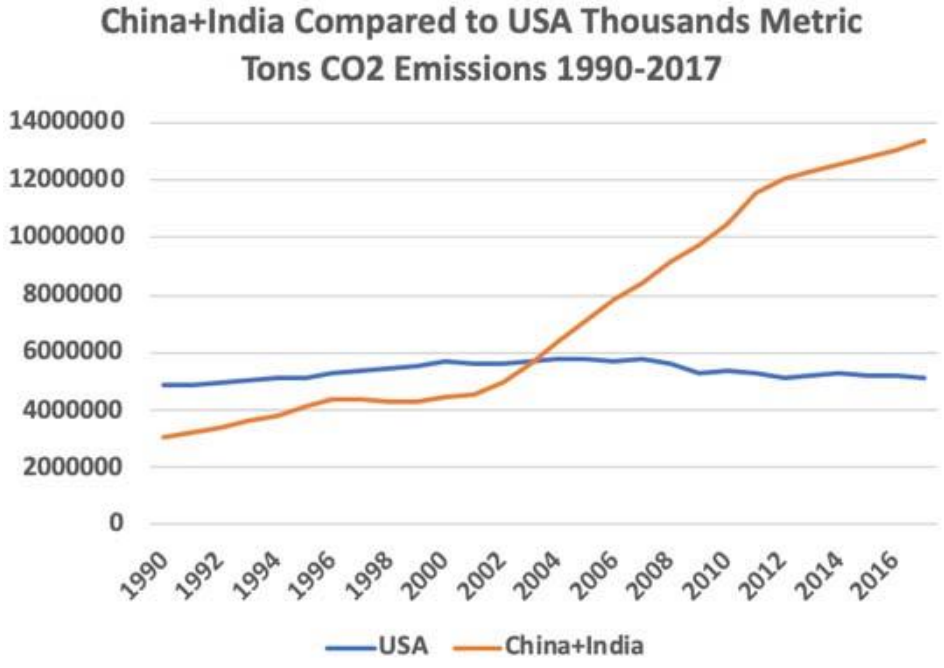
A collection the most prominent climate scientists in favor of nuclear can be seen at the site Climate Scientists for Nuclear. A video featuring James Hansen and Michael Shellenberger, bravely proselytizing for nuclear, is here.

Renewable energy can't go very far for reducing CO2 emissions because it is much too expensive, and it can only replace a fraction of fossil fuel generation. As the degree of penetration of renewable in the electricity sector increases, the cost accelerates to unacceptable levels. CO2-free Nuclear does not have these problems and potentially can supply nearly all electricity, as is shown by the example of France that is 80 percent nuclear.

Another reason advanced for banning fossil fuels is that at some point we will run out of them. The exhaustion of oil has been predicted many times. Perhaps that will come true someday, but today we face an oversupply and low prices. Thanks to fracking the U.S. is now not only self-sufficient in fossil fuels, coal, oil and natural gas, but now is an exporter. Reserves of fossil fuels are sufficient to last into the far future.

There are many other sources of hydrocarbons that have hardly been touched, such as heavy oil, oil sands and oil shale. That is not to say that just because the reserves of hydrocarbons are vast, we should continue to exploit them forever into the future. But a sudden ban in the short term of a few decades is unrealistic and disruptive.

U.S. emissions of CO2 have been declining for years due to the substitution of natural gas for coal. Emissions in Asia dwarf ours and have been skyrocketing. The drive to reduce CO2 emissions in the U.S. without doing much of anything about Asian emissions is a very strange and illogical crusade.



Why is hydroelectricity banned? It won't run out because the flow of water is renewed every time it rains. There are no CO2 emissions or smoke emissions. Hydroelectricity is a big source of electricity, about seven percent of the U.S. supply. We only have to look again to the Sierra Club. The Sierra club hates dams and opposes even the most urgently needed dams to prevent flood catastrophes. For example,

Sacramento California is number two in the list of cities in danger from floods. New Orleans is number one. Two important rivers converge on low-lying Sacramento. Yet the Club opposes every effort to prevent a flood disaster because flood control dams are needed.

There is one dam that the Sierra Club seems happy to allow, the O'Shaughnessy Dam that dams the Hetch Hetchy valley in the Yosemite national park. The Club is notably not aggressive in trying to remove this dam, that flooded a second Yosemite Valley. The Club's political allies in the city of San Francisco, where the Club has its headquarters, get hydroelectric money and water from the dam.

Hydroelectricity is only banned if it involves a dam, but hydroelectricity is not practical without dams. Yes, dams may create problems for fish, may ruin kayaking spots and may flood valleys. Fish ladders were invented a long time ago to allow fish to bypass dams. The Sierra Club thinks we are facing a global warming catastrophe. What's more important, the fish, or, as the Club screams, the end of the Earth?

Finally, we come to the third No, nuclear. Nuclear provides about 20 percent of U.S. Electricity. A big coal power plant has a long train of coal cars arriving every couple of days. An equal size nuclear plant is refueled by a truck arriving every 18 months. A nuclear plant emits no CO2 and no smoke pollution. The nuclear fuel is the cheapest fuel for generating electricity, by a wide margin.

The worst nuclear accident ever, Chernobyl, in the Soviet Union killed around 40 people and gave easily cured thyroid cancer to 2,000 more because the government was tardy in distributing iodine pills that prevent the cancer. That plant was a product of socialist incompetence. It had no containment structure, the moderator was flammable graphite, and the operation of the plant was reckless in the extreme. None of these things apply to the hundreds of reactors in other

countries around the world. Although reactors have been damaged in various accidents, there is no other case of the damage spreading beyond the reactor in any serious way. Reactor technology is advancing. A new generation eliminates even the minor dangers present with current reactors and promises to dramatically lower the capital cost of building nuclear energy plants.

As the climate scientists for nuclear recognize, the minor danger of nuclear is perfectly acceptable, especially if a climate crisis is imminent. Lots of things are dangerous. For example, the escape of poisonous gas from chemical plants in Bhopal, India that killed 1,000 people. There is enough nuclear fuel of various types to last for thousands of years. In other words, forever.

Currently, in the United States, nuclear is expensive and difficult to implement due to its many enemies energetically blocking any nuclear project. In other countries it is being implemented rapidly. Legal reform and a change in attitude are needed for the U.S. to join the rest of the world in implementing nuclear. Our current fleet of reactors were built 30 years ago and more.

The latest versions of wind and solar feature gigantic batteries that are a major fire and explosion hazard. These are the same lithium-based batteries that are restricted on airplanes and that are known for catching on fire. A solar power plant being built north of Las Vegas will have a battery that stores as much energy as contained in five million sticks of dynamite. One of these large batteries recently caught on fire and exploded in Surprise, Arizona.

Wind turbines are constantly being enlarged. The taller they are, the better for catching good wind and accommodating bigger propellers. Some are over 70 stories tall. They are usually constructed in rural

areas where the inhabitants are poorly equipped to resist multi-national corporations with armies of lawyers at their disposal.

Neither wind nor solar is remotely economic. But subsidies and quotas make it possible for big corporations to make large profits by building these plants. The government has created what is really a green racket by subsidizing and mandating these systems.

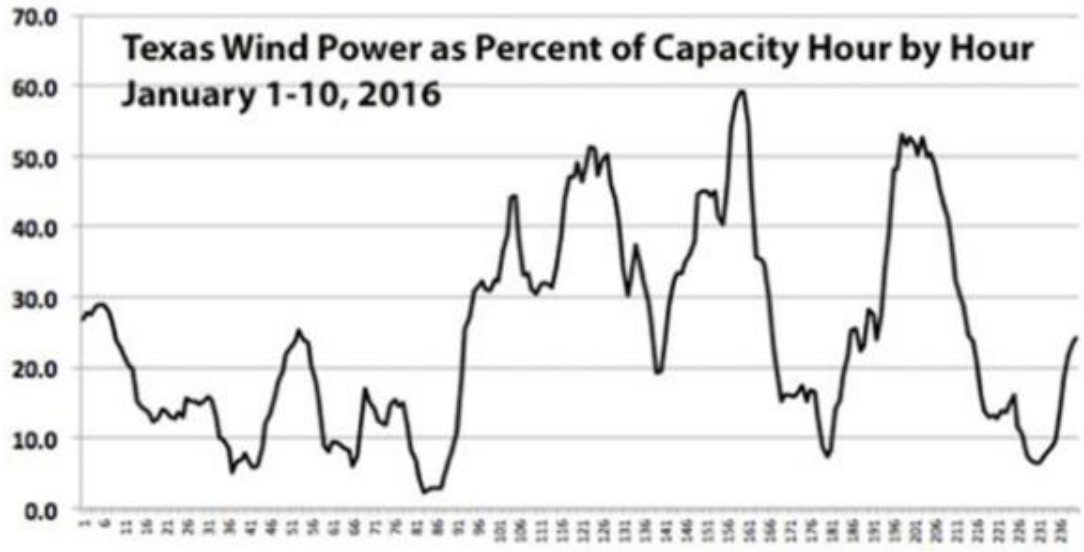
Wind turbines generate low frequency sound that causes an illness called Wind Turbine Syndrome. This illness can become so severe that people abandon their houses and move away from the turbines. Not surprisingly, the wind industry and their allies dismiss this illness as being imaginary or a cover for the opponents of wind power to attack the industry.

Wind turbines kill birds because the blades are moving at 200 miles an hour and the birds can't get out of the way. See this video. The industry advocates counter that cats kill birds too, although, presumably, not many eagles have been killed by cats. The wind industry enjoys a special exemption for killing eagles, our national symbol. They can kill as many eagles as they please.

Wind and solar have one characteristic that make them economically useless. They generate electricity erratically. Generation depends on the weather – the clouds, the sun and the wind. Sometimes wind and solar generate nothing, or very close to it. The consequence is that wind and solar have to be backed up by reliable plants, meaning fossil fuel plants, that can take over when wind or solar are not generating enough electricity.

Because the backup plants are absolutely necessary, you end up with dual systems for generating electricity. Contrary to the often-made claim, fossil fuel plants are not being replaced by renewable energy. On

the contrary a traditional generating system has to remain in place, fully staffed and ready to generate, to fill in for the erratic wind and solar.



Another problem starts appearing as wind and solar grow. Wind or solar electricity is peaky, particularly solar. When there is too much, it has to be curtailed. But if renewable electricity is curtailed the grid loses renewable credits for its mandated quota of renewable electricity. Many purchase contracts for renewable electricity have take or pay clauses, meaning that the owner of the wind or solar plant is paid for electricity that could have been generated, if not for the curtailment.

The answer to the problem of too much wind or solar in many jurisdictions is batteries. The batteries are supposed to absorb the excess renewable electricity and discharge it later when it can be accepted. That preserves the credits toward the renewable quota. The batteries are fiendishly expensive, as much as doubling the cost of the renewable electricity.

Do not imagine that batteries are a complete method of taming the erratic nature of wind or solar. The batteries being used to reduce

peakiness only store a few hours' worth of electricity. Batteries sufficient to completely smooth erratic wind and solar are an impossibility due to the expense. Batteries wear out after a few thousand charge and discharge cycles and have to be replaced.

The complete cost of wind or solar electricity, exclusive of subsidies, is about $80 per megawatt hour. Wind and solar cost nearly the same per megawatt hour. The cost is mainly the initial construction cost, spread over the life of the installation. That construction cost is so great that the price of the electricity computes to about $80 per megawatt hour. The accounting details are complex and will not be explained in this article but are explained here.

Renewable energy cost accounting is extraordinarily complex. Legal fees for a wind farm or solar farm run to hundreds of thousands of dollars. The complexity serves to hide the truth, for example the extent that renewable energy is subsidized by special tax deals. Long term power purchase agreements sign up electricity consumers, without their knowledge or consent, to buy fantastically overpriced electricity for the next 25 years. Using Wall Street magic, the developers of renewable energy, turn their overpriced electricity into cash. The wind and solar farms end up with pension funds or insurance companies. When or if the reckoning arrives, conservative institutional investors may be hit very hard. The reckoning may be in the form of overpriced power purchase contracts abrogated in bankruptcy, turning supposedly conservative investments into worthless junk. The California utility, PG&E suggested doing just that in its recent bankruptcy.

I see a similarity between the renewable energy industry and the timeshare industry. Both are in business to make a quick buck by fooling people. The timeshare industry is now plagued by people having figured out how to legally escape from their forever timeshare contracts. Electricity consumers need a way to escape from 25-year

renewable energy purchase contracts. Within ten years electric rates will rocket up in certain states. Abrogating the renewable energy contracts will give instant relief. Remember the renewable energy is 100 percent backed up. Turning it off won't hurt supply. Someone will figure out how to erase those contracts.

Two different costs of electricity in the usual natural gas backup plant are important. The full cost of natural gas electricity, including the capital cost and staffing cost, is around $45 per megawatt hour. The marginal cost of natural gas electricity, the cost of generating an additional megawatt hour of electricity is $15, the cost of the fuel.

In a given electric grid system with a mixture of natural gas, wind and solar, Wind or solar electricity displaces natural gas electricity as wind and solar electricity is generated. Each megawatt hour of renewable electricity costs $80 and displaces $15 worth of natural gas fuel. The capital cost of the fossil fuel plants is not a consequence of introducing renewable electricity. Those plants have to be present and staffed whether or not there is renewable electricity.

It is very simple. Each megawatt of renewable electricity costs $80 and displaces $15 worth of natural gas. That's the bargain, taxpayers and electricity consumers get to spend $80 to save $15. The taxpayers are involved because there are huge subsidies for renewable energy.

The large corporations building these plants make a lot of money. The politicians responsible for the laws enabling the racket do well because they enjoy support from massively monied interests. The losers are the American people.