Renewable Energy Fairy Tales

Norman Rogers

Renewable energy is feel good energy. It's energy that doesn't make anyone mad. It is the energy that is left standing after years of energy controversy. It mostly runs on the sun and the wind.

According to the advocates of renewable energy, coal, oil and natural gas are dangerous. They pollute the air and will cause a global warming disaster.

Nuclear energy horrifies believers in renewable energy. Nuclear reactors will melt down and boy scouts in the Mideast will be using them to make atomic bombs for merit badges.

Waterpower is bad too. Spawning salmon will be stopped on their journey by hydroelectric dams. Dams will flood the best kayaking sites.

Brighid, fairy goddess of the sun, visits California's Ivanpah solar station

The parade of looming catastrophes from conventional energy is scary if we take it seriously. But for certain organizations and professions, looming catastrophes are a sales tool. If a scientist convincingly predicts a looming catastrophe, fame and money will follow. Fame because the media love sensationalism. Money, because who better can receive grants to study how to prevent a catastrophe than the scientist who discovered it in the first place.

But scientists are far too ethical to invent catastrophes for profit. Of course.

Environmental organizations need looming catastrophes. If everything is fine nobody needs environmental organizations to fight for the environment.

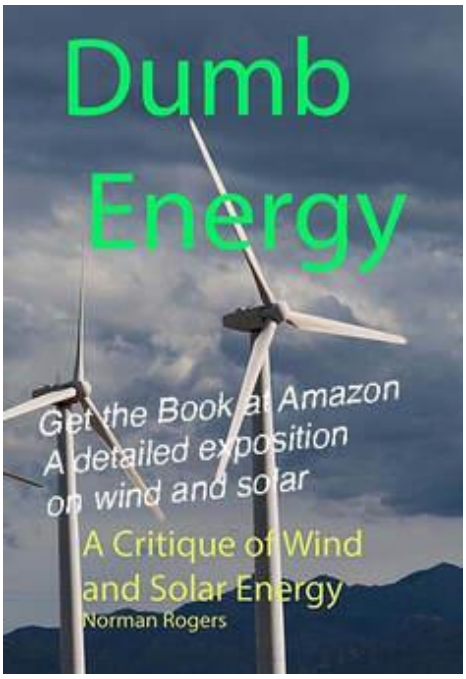
It turns out that renewable energy from the sun and wind is just the medicine we need to stop those infernal catastrophes. Lucky for us that there are giant corporations dedicated to the manufacture of wind turbines and solar panels.

Capitalism is stepping up to calm catastrophe anxiety. These corporations need large government subsidies to carry on their work for the public benefit.

But what if renewable energy really is a fairy tale? Maybe it costs too much and doesn't solve problems. Maybe it creates problems. Yes, that is the problem, exactly.

Renewable energy, as popularly defined, must have the following characteristics: It must not be a net emitter of carbon dioxide (CO2), it must not be nuclear, and it can't involve damming rivers. Renewable energy should not be subject to exhaustion of the resource. That pretty much eliminates everything that works, especially fossil fuels: coal, oil and natural gas.

There is a school of environmentalists that love nuclear energy. Nuclear energy is pollution-free and CO2-free. There is enough fuel to last practically forever. Nuclear is the cheapest fuel for generating electricity. Nuclear should be qualified as ideal renewable energy. But nuclear energy was attacked in the 70's and 80's by environmental groups. It was the looming catastrophe of the time. They managed to make nuclear evil in the public mind. The basis of the attack was that the reactors could be used to aid in bomb making; or that the reactors might release radioactivity in an accident; or that the radioactive waste would be difficult to dispose of. There is a very small kernel of truth in these allegations, but nuclear energy has been successfully commercialized without creating great dangers. For example, for many years, France has been getting about 80% of its electricity from nuclear. The U.S. gets 20% of its electricity from nuclear.



The exhaustion of fossil fuels has been predicted many times with ever receding deadlines. Fossil fuels may not last forever, but certainly there is enough for hundreds of years. Both coal and natural gas can be converted into oil. This is important because oil is the most valuable fossil fuel and the fuel for which there is no substitute in many applications. Jet planes cannot run on coal or natural gas. They need jet fuel, a type of oil.

Fossil fuels release CO2 when burned and the CO2 is the villain that will create the predicted global warming catastrophe. That is the dominant reason for attacking fossil fuels. Another major attack narrative, especially for coal, is that burning fossil fuels will cause air pollution resulting in cancer or various other medical problems. But modern plants, including coal, are nearly pollution free. Fracking is a technology that has provided vast new supplies of natural gas and oil, making the U.S. energy independent. Fracking has been attacked on the specious grounds that it will pollute underground water.

Hydroelectric dams prevent floods, store water and provide lakes for recreational boating. But some people argue that free flowing rivers are things of beauty and should not be disturbed for trivial benefits such as preventing floods or providing energy.

The practical and scalable forms of energy, fossil fuels, nuclear reactors and hydroelectricity, have been transformed into monsters in the public mind. But we have to keep the lights on and keep the cars running, so those sources of energy will continue to form the backbone of the energy supply. There is no alternative that could reasonably replace them, especially not renewable energy.

Environmental groups promote the very wrong idea that wind and solar energy can replace the existing arrangements. One can debate the motivations in the environmental movement, but it doesn't matter. They have great influence and many of their very wrong energy ideas have been widely adopted as government policy.

The Sierra Club says this on one of their web sites:

> "Transitioning to 100% clean, renewable energy nationwide offers new opportunities for economic growth, saves families money, and fosters job creation."
>
> "The rapidly dropping costs of wind and solar are boosting our national economy and saving money in families' pocketbooks."

Renewable energy is costly. It will not boost the economy or save families money. Transitioning to 100% renewable energy is a fairy tale, and not a very good fairy tale.

The advocates of renewable energy use *clean* not just to mean an absence of pollution, but also an absence of CO2 emissions. CO2 is odorless, harmless and not pollution. Increasing CO2 in the atmosphere has substantial benefits because plants grow better with less water when there is an increased concentration of CO2 in the atmosphere. Greenhouse operators frequently install CO2 generators in their greenhouses to promote plant growth. The entire Earth is greening as a result of the increase in CO2 from burning fossil fuels.

Tampering with the meaning of words, like clean, in order to make better propaganda makes me uneasy. It sounds like Newspeak in the novel 1984. Newspeak was a scheme to change the language so that people could not express ideas contrary to the official line.

CO2 may well cause some global warming. But the idea that warming will be dangerous, that there will be a catastrophe or that the oceans will rise up and flood the land is hype for which evidence is lacking. The *global warming* scare had its name changed to the *climate change* scare because the warming was not materializing. You can read comments from 1000 scientists that oppose the global warming scare here.

Even if one choses to believe in a global warming catastrophe caused by CO2, it doesn't do much good to try to reduce U.S. CO2 emissions by introducing renewable energy. The CO2 emissions originate mostly in Asia and are increasing rapidly there. For some reason the Chinese and Indians are let off the hook for that. Renewable energy as currently defined is both expensive and not very effective for reducing CO2 emissions.

There are many niche forms of renewable energy with limited possibilities. Either they are too expensive or require special circumstances for implementation. For example, there are certain locations, such as the Geysers in Northern California, where high pressure steam of volcanic origin can be had by drilling wells. But such sites are few. The garbage in landfills decomposes and generates methane (natural gas). But the potential energy from landfills is minor. Hydroelectricity is potentially an excellent source of energy, but there are only so many good sites. If dams are outlawed as the advocate of renewable energy demand, then hydroelectricity is no longer a viable source of energy. The renewable energy that is scalable is wind and solar. You can have as much wind and solar as you are willing to pay for. Wind is best in the Midwest along a north south line. Solar is best in the desert Southwest.

As a source of electricity for the electric grid, both wind and solar are impractical. The problem is the intermittent and unpredictable nature of the supply. Solar works best in the middle of the day and not at all if it is cloudy or nighttime. Wind comes and goes with the wind. The consequence is that if wind or solar is added to the grid, the existing network of generating plants is not replaced. It has to remain in place to carry the load when the wind and solar fail. Often the greatest electricity demand is in the early evening, when solar has died and, depending on the weather, wind may also die.

It is not particularly difficult to introduce 5% or 10% wind or solar electricity into the grid. Making the grid 50% renewable, as some state laws demand is quite difficult. Getting to 100% is a near impossibility.

Wind and solar don't replace or reduce capital investment in the conventional grid. Their only economic contribution is to reduce the consumption of fossil fuel by the conventional grid when wind or solar happen to be producing electricity. But the cost of generating electricity by wind or solar is, in favorable circumstances, about $80 per megawatt hour. By coincidence the cost is about the same for either wind or solar. But the value of the fuel saved is only about $20 per megawatt hour. So, for every megawatt hour of wind or solar electricity generated, someone has to pay $60 to fill the gap between $80 and $20 per megawatt hour. Keep in mind that the fossil fuel plants have to continue in existence as backup. Currently that gap is filled by federal and state subsidies as well as by higher electricity prices.

The new approach by the advocates of renewable energy is to add batteries to wind and solar installations. When this is done the cost of wind or solar electricity doubles to about $160 per megawatt hour.

There is an established market for *carbon offsets*. A carbon offset is a certificate that certifies that CO2 emissions have been reduced by one metric ton (2200 pounds). Al Gore buys carbon offsets when he takes a trip in a private jet. He is offsetting the CO2 emitted by the jet. The cost of a carbon offset is about $10 and less in quantity. Carbon offsets are generated by such things as planting trees or energy conservation. Wind or solar generating plants create carbon offsets because wind or solar energy is substituted for burning fossil fuels, usually natural gas. The cost of a carbon offset generated by wind or solar is the cost of the subsidy that must be provided, the subsidy being the extra cost of wind or solar electricity compared to generating the electricity in the natural gas backup plant. It turns out that the cost of a carbon offset created from wind or solar is about $140, or 14

times more than the cost of a carbon offset in the free market. That is why we say that renewable energy is not an efficient method for reducing CO2 emissions.

If there were a method of economically storing electricity, wind and solar would be more practicable. The two main method of storing electricity are pumped storage and batteries. Pumped storage uses two water reservoirs. Electricity is stored by pumping water uphill and recovered by running the water downhill through a turbine. Pumped storage depends on having mountains and suitable sites for the reservoirs. About 20% of the energy is lost. Pumped storage is expensive, depending on the availability of natural lakes, but there are a number of installations in the world, mainly used to shift electricity from one time of day to another. A pumped storage facility has been proposed for southern Nevada – details here.

He other alternative, batteries, is very expensive. The batteries wear out after about 2000 cycles. Batteries are mainly useful for moving energy from one time of day to another or for short term but quickly available supply. A third method of storing energy, that is only applicable to a certain type of solar energy, is to store heat in a tank of molten salts, the energy is extracted at a later time by using the heat to generate steam and then electricity. None of the methods of storing electricity are remotely cheap enough to eliminate the need for wind and solar to be backed up by fossil fuel plants.

The backup fossil fuel plants are usually gas turbines rather than coal plants. Gas turbines, being agile, can compensate for the erratic nature of wind and solar. Nuclear plants, at least in the U.S. are baseload plants. They always run flat out to the extent possible because nuclear fuel is the least expensive fuel and thus nuclear plants have the lowest marginal cost of operation. (But nuclear plants are expensive to build.)

There are many legal definitions of renewable energy frozen into state laws that require that a certain, usually growing, portion of electricity to come from renewable sources. These laws, often called renewable portfolio laws, tend to have lists of permitted and forbidden sources of energy, rather than an abstract definition of renewable energy.

There are abstract definitions from various sources. The 1987 Brundtland Report of the United Nations defined sustainability, a closely related concept:

“Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. “

The Natural Resources Defense Council defines renewable energy as:

“Renewable energy, often referred to as clean energy, comes from natural sources or processes that are constantly replenished. For example, sunlight or wind keep shining and blowing, even if their availability depends on time and weather.”

A more concrete definition, from Nevada law, is this:

NRS 704.7811 "Renewable energy" defined.
1. "Renewable energy" means:
(a) Biomass;
(b) Geothermal energy;
(c) Solar energy;
(d) Waterpower; and
(e) Wind.
2. The term does not include coal, natural gas, oil, propane or any other fossil fuel, or nuclear energy.

The law goes on to limit the use of waterpower to small installations not involving dams.

The Nevada definition is similar to definitions enacted by many other states. But Nevada is in the process of adding the renewable energy quota to its state constitution. That will freeze Nevada into an impossible situation where it will be difficult and time consuming to modify or back out of the renewable energy quota.

The concept of renewable energy (and sustainability) suffers from logical problems. Both fossil fuel electricity generating plants and renewable energy electricity generating plants require capital investment and maintenance. In addition, fossil fuel plants require a continuing input of fuel. Capital investment depreciates. It is a financial cost year by year, just as is fuel. When wind turbines wear out, they must be refurbished or replaced. During a wind turbine’s life there is a constant and substantial input of resources for maintenance. A wind or solar plant’s depreciation plus maintenance per megawatt hour is far greater each year than the depreciation, maintenance and fuel for a gas turbine fossil fuel plant. This is shown by the fact that electricity from wind or solar, exclusive of subsidies,

costs roughly double the cost of electricity per megawatt hour from a natural gas plant. The situation is worse than double cost implies, when the necessity of backing up the intermittent electricity supply from wind or solar with fossil fuel plants is taken into account. The high cost of wind or solar is made to appear less than it is by the substantial government subsidies, amounting to 75% or more of the cost.

The idea that we might use up irreplaceable resources and thus cripple the economy of future generations is a faulty concept, or at least not validated by past experience. The running out of resources idea has been soundly rebutted by Julian L. Simon in his book *The Ultimate Resource 2*. The reason is simple. In every case human ingenuity, the ultimate resource, has overcome predicted shortages. For example, for a period of time natural gas was in short supply in the United States, causing the price to go higher. The shortage was ameliorated by imports and substitution. Then human ingenuity provided fracking and now we have huge supplies of natural gas and the price has declined dramatically. The story is the same for every prediction that we will run out of some resource. Food is a dramatic example. In the 1970's experts predicted a coming famine due to limited agricultural land and a population explosion. That crisis never happened. Due to agricultural ingenuity, food is in greater abundance than ever. The population explosion has been replaced by a forecasted population implosion.

Implicit in the concept of sustainability is the notion that technology is static, and there will not be dramatic improvements in the future. Also implicit is the idea that we can predict the future by consulting experts and extrapolating present trends. The events of the last two centuries falsify those ideas.

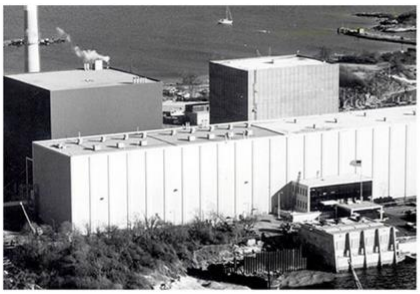
The idea that our society faces disaster for one reason or another is very appealing to the proselytizers of whatever the latest crisis is. For example, Paul Ehrlich, the professor that popularized the population explosion and famine crisis, made considerable money from book sales and scientific prizes. He became a respected authority and still is today, in spite of his predictions not materializing. James Hansen, the scientist most responsible for promoting the global warming or climate change crisis enjoyed a similar success to that of Paul Ehrlich. His crisis has not materialized either. This is not to say that Ehrlich or Hansen are frauds, knowingly hoodwinking the public. They surly believe what they say. Their belief is reinforced by the money and acclaim that their theories generate. The problem is that they are mistaken, or perhaps their ideas have been over-promoted by enthusiastic followers.

Although CO2 emissions are not emphasized in the Nevada law, all the approved sources of renewable electricity don't directly emit net carbon dioxide. Burning biomass does emit CO2, but the theory is that the CO2 will be absorbed by the next crop of biomass. Renewable energy is often promoted on the grounds that it will prevent climate change because it does not increase the level of CO2 in the atmosphere. Nuclear energy does not emit CO2 and it does not create a shortage of energy for future generations. Yet, it is banned from participating in the renewable energy fad. There is no logical reason for banning nuclear energy. Some of the most energetic promoters of climate change, including James Hansen, say that nuclear is the only solution for the alleged climate disaster.

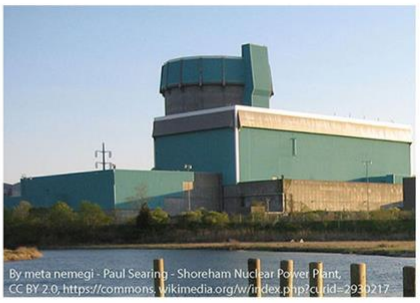
The real reason that nuclear is banned is that it was promoted during the 70's and 80's as a major looming disaster. By scaring the population with nuclear energy environmental groups benefited greatly. The greatest imaginable disaster actually occurred in 1986 at Chernobyl in the Soviet Union. That disaster was a fizzle as only 40-people died, and the next generation did not suffer from radiation caused mutations. For perspective, 256,000 people died from traffic accidents in China in 2018. It is hard to imagine even a Chernobyl scale disaster taking place in most places because the Chernobyl disaster was only made possible by socialist recklessness and disorganization. Further, new generations of nuclear reactors will have passive cooling systems that make meltdowns or overheating a very remote possibility.

The environmental organizations and government bureaucracies that resulted from the environmental campaign against nuclear energy and Chernobyl overregulate and suppress the nuclear industry. The former enemies of nuclear cannot reverse course and acknowledge that nuclear is a as safe or safer than the alternatives. As a result, the nuclear power industry has moved to other countries and the U.S., where nuclear power was invented, is out of the game.

A YouTube video featuring prominent global warming alarmists Michael Shellenberger and James Hansen makes the case for nuclear power and exposes the ineffectiveness of wind and solar for reducing CO2 emissions. Nuclear power is actually christened as clean energy in the video.



Millstone 1 Nuclear Power Plant
660 megawatts Cost $101 million 1966



Shoreham Nuclear Power Plant
820 megawatts cost $6 billion 1973

Millstone 1, near New London, CT was constructed in 5 years and operated from 1970 to 1998. Two other reactors, units 2 and 3 are still operating on the site.

The Shoreham plant on Long Island, NY was under construction for 11 years. In June, 1979 thousands of protestors gathered at the plant and 500 were arrested. The plant was finally scrapped In 1989 and never generated electricity.

Nuclear Cost Escalation

The organization Environmentalists for Nuclear Energy was founded in France in 1996 and promotes the environmental advantages of nuclear electricity. Besides not emitting CO2, nuclear does not have combustion products that are potentially polluting and that may require pollution control equipment. Environmentalists that support nuclear power are on the fringes as far as the mainstream environmental movement is concerned. The major environmental organizations still oppose nuclear power or remain silent on the subject.

The Difficulty of Meeting a 50% Renewable Electricity Goal

Many states have enacted renewable electricity quotas. New York requires 70% by 2030. California requires 60% by 2030. Nevada, New Jersey and Maryland require 50% by 2030.

These *renewable portfolio laws* are foolish. They are probably passed because the true facts are hidden, and because the large wind and solar industry is good at lobbying. That most of the expense of wind and solar is currently borne by federal subsidies creates the illusion that wind and solar are practical. The federal subsidies are scheduled to decline and could quite possibly be cut off entirely in the future.

There are serious roadblocks to generating 50%, or more, of electricity from wind and solar. Both wind and solar surge when there is maximum acceptable wind or full sunshine. But the average electricity generation is about 1/3 the surge rate for wind. For solar it is about 1/5 the surge rate. There is a limit on how much intermittent wind or solar the electric grid can accept. This is because there must be enough conventional generation to ensure stability, that is to increase or decrease generation as demand changes. Exactly what the limit is varies, but probably in most instances the grid cannot accept more than 80% wind or solar. If the amount of wind or solar is limited so that the surge does not go above 80%, then, the average power from wind and solar, depending on the mix will be in the range of 25% for wind and 16% for solar, far below the required 50%. If more wind or solar is added beyond these limits, then it will be necessary to curtail the wind or solar to prevent grid instability when the wind or solar surges. This will result in increasing the cost of the renewable power because the potential power that is curtailed is power lost forever.

There is a strategy for increasing renewable energy beyond 16% to 26%. That strategy is to add batteries to soak up the surges and then release the energy later when it is needed. In Nevada, the Gemini project, near Las Vegas, will have a 700-megawatt solar array supported by a 1400-megawatt hour battery. The battery is big enough to moderate the middle of the day solar surge and release energy in the evening when summer demand peaks due to high temperatures and air conditioning. The problem is cost. The battery system costs $500-million and when the batteries wear out every 5-years or so, $300 million must be spent to replace the batteries. The net effect is that the cost of the electricity increases from $80 per megawatt hour to $160 per megawatt hour. This compares with about $20 per megawatt hour to generate the same electricity in existing natural gas backup plants.

Another problem is the hazard from the large amount of energy stored in the batteries, lithium batteries that are prone to catching on fire. The Gemini battery will store as much energy as is contained in *5-million* sticks of dynamite.

What is the Point of Renewable Energy?

The answer is that there is no point to renewable energy. It is extremely expensive and inefficient for reducing emissions. The real emission problem is in China and India. If one believes in global warming the solution is obvious and it is nuclear. If you are not worried about global warming, the solution is to continue with natural gas and coal supplemented by nuclear. The environmental lobby can't have it both

ways, preaching the danger of global warming and then denouncing the only real solution to climbing concentrations of CO2 – nuclear.