Peaked Electricity

by Mark Robinowitz - www.PeakChoice.org

Oil is not the only critical resource that is "peaking." The amount of electricity is also approaching a peak of production due to finite supplies of the fuels used to make electricity (coal, uranium, natural gas). Renewable energies are ideal generation sources, but they are a small amount of the electric grid and cannot be expanded fast enough to maintain current levels.

Coal: Dirtiest and Biggest (but finite)

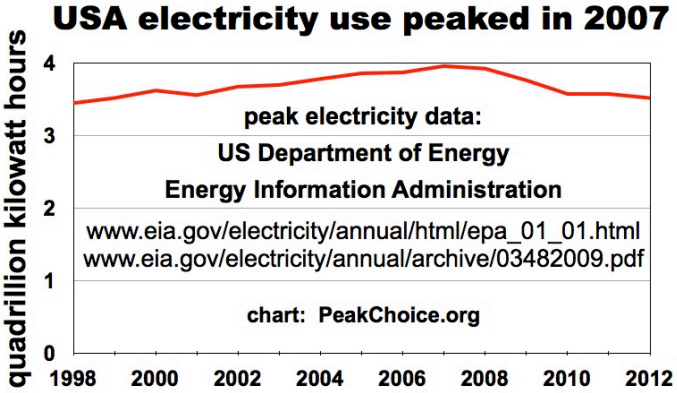
Half of the electricity in the US comes from burning coal to spin steam turbines. Coal is the dirtiest type of fossil fuel in terms of mining damage and greenhouse gas production. Estimates of the amount of remaining coal have been exaggerated and "peak coal" globally is likely in the next decade or two. There's not enough coal to fuel endless growth projections, but there is enough to further foul our air.

Coal peaked in the US in 1999, in terms of energy content. In Pennsylvania, where coal mining started, it peaked in 1920. In Britain, coal peaked in 1913 and Germany had Peak Coal during World War II.
For more info: www.oilempire.us/peak-coal.html
the best book: Richard Heinberg "Blackout: Coal, Climate and the Last Energy Crisis."

Nukes: Just a Fancy Way to Boil Water

The richest uranium deposits in the US were in the Colorado plateau, the best were extracted decades ago (with severe health and ecological impacts). Globally, uranium deposits are mostly in a few countries and are nearing their peak.

As of 2010, about half of the nuclear fuel in US power reactors comes from the "Megatons to Megawatts" program, which has diverted uranium from dismantled Russian nuclear bombs to civilian fuel production. Using weapons materials for power generation reduces weapons stockpiles, but still creates more high level nuclear wastes. This program will run out in 2013.



Some nuclear boosters want to revive plans for "reprocessing" of irradiated fuel rods, the most toxic technology ever invented. Reprocessing dissolves extremely radioactive "spent" nuclear fuel rods into acids, and uses solvents to extract the unfissioned uranium for reuse. The byproducts include the myriad "fission products" left over from the reactor's operation ("high level waste"), dissolved into a nasty mix of toxic solvents and acids. It is thermally hot, lethally radioactive and extremely difficult to contain.

In 1975, the Nuclear Regulatory Commission published "The Impact of Intensified Nuclear Safeguards on Civil Liberties," also known as the "Barton Report." It predicted that an economy based on nuclear reprocessing would require the suspension of civil liberties to safeguard the nuclear fuel since it would create commerce in nuclear weapons ingredients. Reprocessing also separates out plutonium from irradiated fuel rods. President Ford blocked US plans for reprocessing since it would fuel nuclear proliferation by commercializing weapons materials.

Unnatural Gas: Overcommitted, In Decline

Natural gas is the cleanest burning fossil fuel and it is also the most versatile, which has led to increased variety of uses of it. In recent years, its role in the electric grid has increased and now powers about one sixth of US electrical demand.

US natural gas production peaked in 1973 and has been on a bumpy plateau ever since. About

a quarter of US oil and gas production is from offshore wells in the Gulf of Mexico (since most on shore fields are in terminal decline).

Natural gas is the most difficult fossil fuel to transport, requiring pipelines between the well head and the ultimate user.

Since 9/11, US imports of Liquid Natural Gas via special ships have doubled (from one to two percent of US gas usage). LNG cools natural gas to about 260 degrees below zero (F) to compress it for transoceanic transit. LNG boats and terminals have the energy potential of a small nuclear bomb if they explode.

A new technology called fracking has created a surge of US gas production. Fracking blasts underground rock with toxic solvents to liberate embedded natural gas. Industry groups claim shale gas is a "100 year" supply but wells in the Barnett shale gas field near Dallas, Texas have sharp decline rates. Shale gas will probably be a short term boom followed by sharp bust. A good summary is Richard Heinberg's book "Snake Oil: How Fracking's False Promise of Plenty Imperils Our Future" – postcarbon.org and shalebubble.org

Dams Damn Rivers

Hydropower was one of the earliest forms of large scale electrical production and is the easiest to operate. The fuel is essentially free and renewable (once the dam is built). It is easy to vary the flow rates up and down to match shifts in the load demand. But in the US, most sites with hydroelectric potential have already been dammed, so even if society ignored the ecological impacts on rivers and fish habitat, there are few places left in North America for more dams.

Grid Stability and Baseload

The electric grid requires balancing generation with load demands to keep it stable. Solar and wind power are reliable yet intermittent, it's not always sunny or windy. Running more than a small portion of the grid with renewables would require major changes to the way the grid runs since it's hard to store solar and wind power.

The Department of Homeland Security has run planning exercises on how to power "critical infrastructure" if the national grids break down and result in "islands" of fragmented grid sections. It will be harder to keep everything powered all of the time as fossil fuels decline, the economy contracts and components age.

Solar Power: Good for Billions of Years

Passive solar heating of buildings, solar hot water, and solar electricity are ultimately the best way to power our society. But there is a huge gap between where we are and where we would like to be. Current solar electric technology requires a global electronics infrastructure, rare mineral ores, copper and other materials that are energy intensive to process. Most solar technologies are ways to use fossil fuels, not substitutes for them.

Solar thermal energy — to heat water and buildings — is much simpler and cheaper than photovoltaic panels. Solar thermal can also make utility scale electricity that stores heat for the evening. It is better for grid baseload than PV.

The Answer is Blowing in the Wind

Wind turbines are also a way to use solar power, since sunlight creates wind. Commercial wind turbines require rare earth mineral ores for the magnets, which are mostly found in China. While there has been a big boom in wind farms, they cannot be built fast enough to replace depleting natural gas or the need to stop mining coal due to its ecological devastation.

Renewables for a Steady State Economy

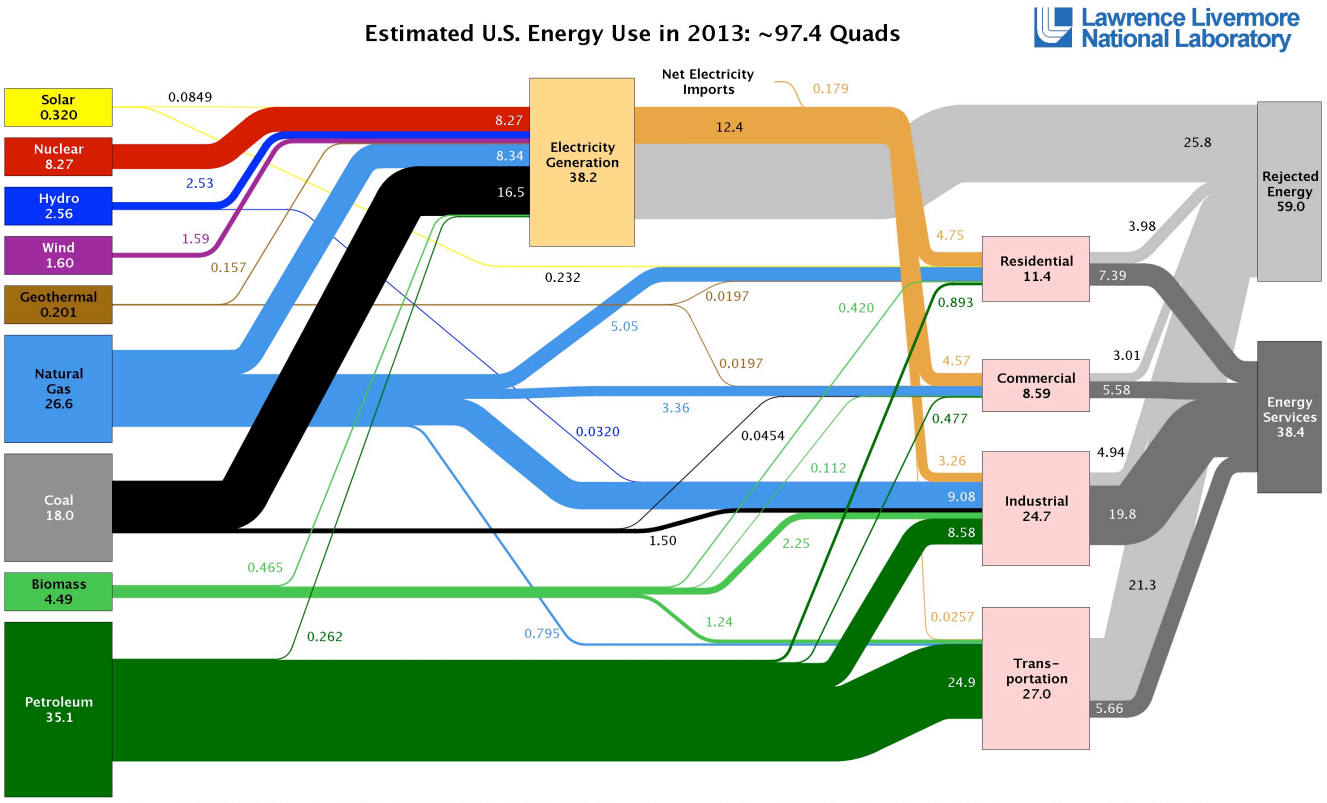
Using solar power for two decades (and wind power for one) taught me that renewable energy could only run a smaller, steady state economy. Our exponential growth economy needs ever increasing consumption of concentrated resources (fossil fuels are more energy dense than renewables). A solar energy society would require moving beyond growth-and-debt based money

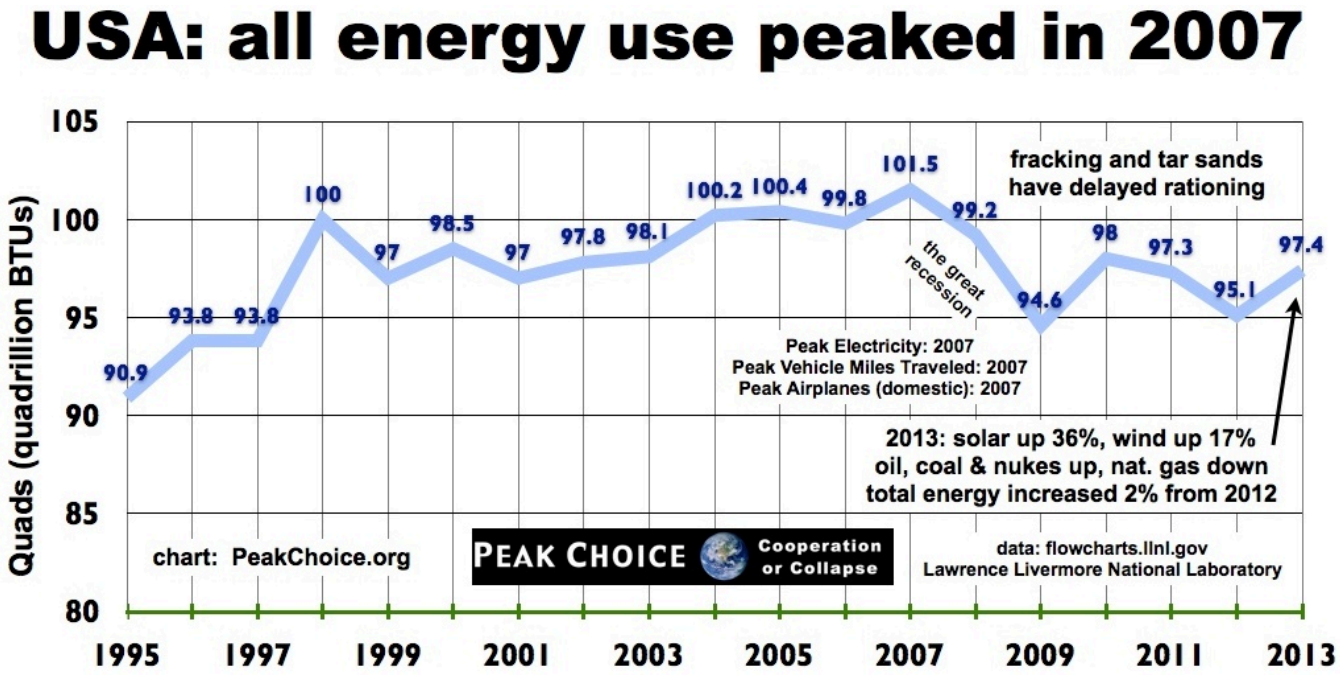
After fossil fuel we will only have solar power, but that won't replace what we use now. We need to abandon the myth of endless growth on a round, and therefore, finite planet to have a planet on which to live. Will we use the remaining fossil fuels to make lots of solar panels and relocalize food production instead of waging Peak Oil Wars?

additional resources on energy descent

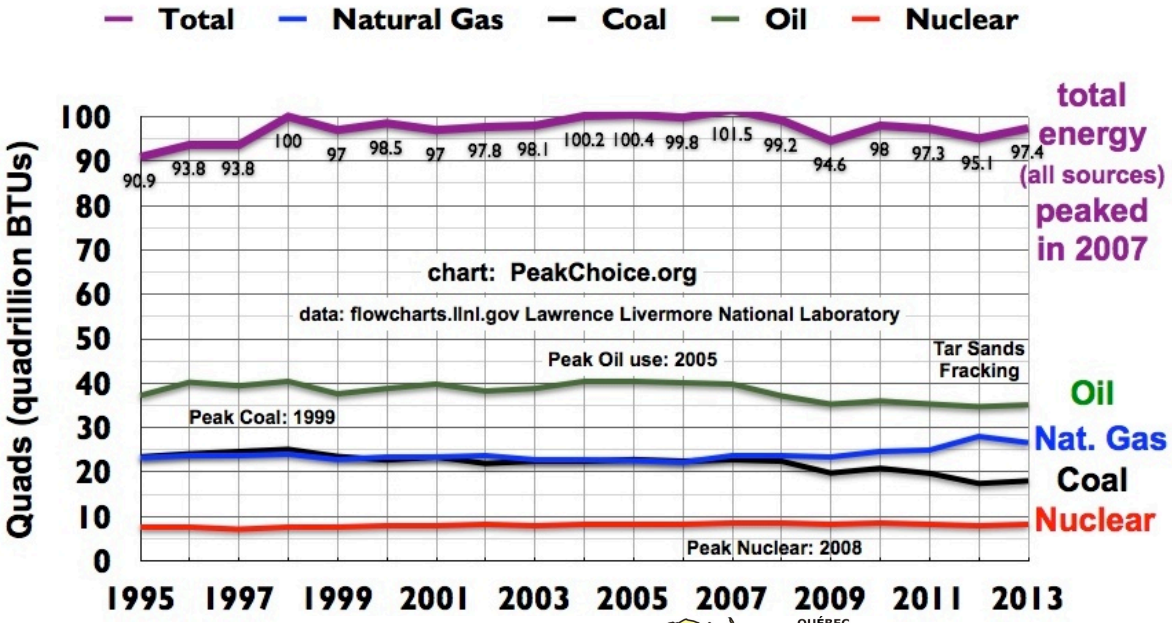
Searching for a Miracle: Net Energy Limits and the Fate of Industrial Society
by Richard Heinberg
www.postcarbon.org/new-site-files/Reports/Searching_for_a_Miracle_web10nov09.pdf

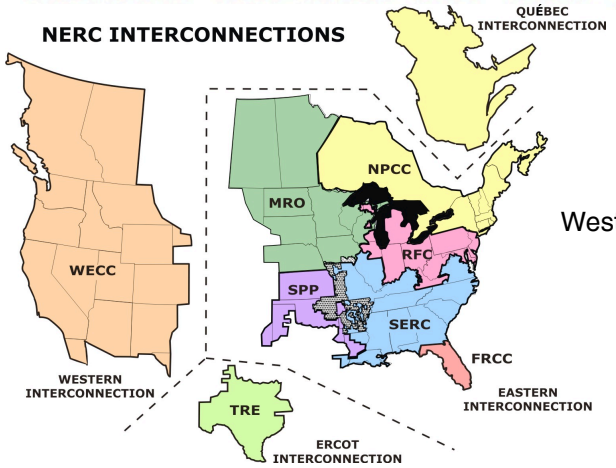
Future Scenarios: How Communities can adapt to Peak Oil and Climate Change
by David Holmgren (co-originator of permaculture) www.futurescenarios.org





USA: fossil fuels and nuclear





power grids:
West, Texas, East, Quebec

USA: "renewables"