

Greening the Electric Power Supply

By Jim MacInnes
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Economic prosperity as we know it requires a continuing supply of low-cost energy. Michigan's electric power supply is aging and some of it must eventually be replaced. To do this and convert 25% of Michigan's transport system over to electric vehicles could require the energy equivalent of up to seven nuclear power plants (7,000 Megawatts) over the next fifteen years or so...depending upon the economic growth and conservation measures taken.

Most of the world's climate scientists believe that human activities contribute to climate change. This potentially adds to the frequency and severity of extreme weather events causing significant and costly damage to our built environment. We need to "green up" our energy supply in order to reduce green house gases that increase these impacts.

While America still has decades worth of coal and natural gas reserves, these fuels will eventually begin depleting and prices will rise...similar to the price 'ratcheting effect' we have experienced with oil. We don't know how long it will be before even these fossil fuels will become un-economic. Their combustion also generates green house gases.

Due to the multi-decade long transition time required to integrate substitutes for fossil fuels into our electric power supply, bold actions and substantial investments are needed now to develop new sustainable energy replacements. Large quantities of oil will also be required to build-out these projects and we must make these investments while oil is still affordable.

Sound 'risk management' practices support the need for a balanced energy portfolio. Preferences, however, may be given to those power supply options that offer a higher Energy Return on Investment EROI (lower cost), have low environmental impacts and present a low risk to society.

No one can predict accurately how our future energy situation will unfold or how to best respond to it. However, the IEEE-USA energy policy committee has considerable experience in this field and offers the following recommendations:

"To respond to environmental concerns, the future of electric power should be green (i.e. using energy resources that produce less greenhouse gases, including CO₂ and NO_x; or where carbon emissions are captured and reused as feedstock for useful products; or stored for geological time). Simple and predictable economic signals [such as a carbon tax] must be in place to inform investors in these technologies."

1. Expand the Use of Renewable Electric Generation

“Renewable electric generating technologies, particularly those that emit minimal greenhouse gases, must be deployed to the extent that they are technologically and economically practical, and have an acceptable impact on the environment and aesthetics. Such technologies include wind, sunlight, waves, tides, and underground heat (geothermal).” [They also list direct-combustion of biomass.]

2. Expand Nuclear Power Generation

“Nuclear power plants are the largest capacity power generation sources that emit negligible greenhouse gases. They have the ability to provide continuous base-load generation, regardless of the time of day or weather conditions. They also have a high energy density and small footprint, thus permitting locations nearer to demand centers. Nuclear power is, and must remain, an important part of a balanced portfolio of energy supplies.” [We use less than 5% of the energy contained in uranium fuel rods, and we may be able to extract more useful energy from it, or develop substitutes. Decades worth of uranium reserves are available but they are also subject to the same depletion issues as fossil fuels.]

3. Capture Carbon Emissions from Fossil Power Plants

“Coal is our nation’s most plentiful domestic fossil fuel resource; however, it is also one of our major sources of green house gases and other pollutants. The capture, transport and storage (sequestration) of CO₂ produced from combustion is a daunting challenge because of the enormity of the necessary infrastructure, loss of efficiency and plant output, and cost. Yet, this effort is essential, if we are to be able to use this fuel and mitigate green house gas emissions.”

We can also hope that a new ‘silver bullet’ energy solution may be discovered, but hope is not a strategy.

Wind power has a relatively high EROI, low environmental impacts and offers low risk to society. We will explore Michigan’s wind energy potential in our next report.

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