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Externalizing the Costs

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The extreme weather has been cruel around the globe this past summer. For months the Earth has set new global temperature records. There has been severe flooding in many places; record temperatures in the Middle East and devastating fires in California. More lie ahead this century, as our society struggles to reconcile past and future ways of doing things.

Let's consider where we get the electricity for all the appliances and gadgets that are now central to our lives. Historically the rise of our industrial society was powered by fossil fuels, which were viewed as an amazing source of power laid down a few hundred million years ago that was now ours to exploit. We were grateful as engines replaced horses, our lives speeded up and we became rich with possessions. We did not think of the fossil fuels as millions of years of stored sunlight. Until 40 years ago, we were oblivious of the fact that burning them in a century or so would change the atmosphere, and upset the stable climate that life on Earth has enjoyed for the last 10000 years.

When Vermont was settled, our power came from dams on rivers and windmills that ground flour and pumped water. We grew crops to feed ourselves, our cattle and draught animals. All this energy comes from the sun, which drives the weather with the wind and the rain. Every year it is renewable. We now have much bigger dams on rivers, and we must make choices between free-running rivers that support more fish, and dams that produce more power. We also have to accept that in dry summers with less flow in the rivers, we will get less power.

As the technology has got much cheaper, we now have fields of solar panels converting sunlight to electricity. A field of corn converts only a few percent of the sun's energy into the crop during the growing season. A solar array converts an astonishing 15-20% of sunlight directly to electricity, whenever the sun shines. Of course there is less sunshine in the winter and none at night, so we need electrical storage if this is a primary source for our power. Fortunately the price of battery storage is also falling rapidly. Last year, 43 megawatts of new solar arrays were installed in Vermont, but some argue that large solar farms are an ugly industrial transformation of the Vermont landscape.

The power from the wind goes up steeply with wind-speed, and the area swept by the turbine blades. To supply sufficient power, wind turbines must go on high elevation ridges in Vermont, where the winds are stronger. Again the technology has advanced greatly, and newer turbines stand 500ft tall and generate 3 megawatts of power with sufficient wind. Of course there are windy days and calm days, so electrical storage is again needed. But large wind turbines on Vermont's hills are also described as industrial eyesores. In addition, under some wind and atmospheric conditions, the low frequency sound vibrations from turbines can carry to nearby houses.

Old nuclear power plants are closing across the US, and few new ones are being built because they are so costly, and the risks of failure are huge. And no-one wants to discuss their legacy of radioactive waste, and the plutonium that must be stored safely for a thousand generations. Even the small Vermont Yankee

reactor, now in shutdown mode for the next fifty years, has left the state with enough plutonium to build a few hundred nuclear weapons. We did not plan for this.

This illustrates the conflicts that we must face and resolve in society. We want the products of our industrial world: appliances, cars, cell phones, computers and the web, and the employment that goes with them. But we don't want to see or live near the industrial infrastructure that supports our lifestyle. Electricity should come silently from a wall socket as it always has. If it comes from burning coal and destroying mountains in W. Virginia, they are not our mountains; and we can avoid going there and seeing the destruction. If electricity comes from burning fracked gas mined elsewhere in the US; well it is not our water that is being polluted. We can piously argue that wind turbines will kill some birds and bats, but ignore the staggering deaths of wildlife on our roads, and the birds killed by domestic cats.

These choices are difficult for us all. Our sense of entitlement encourages us to believe we are free to choose the gadgets we like (that have been successfully marketed), while hiding from the price that people elsewhere and the planet itself are paying on our behalf. The economists call this externalizing the costs. Our economy has indeed grown by freely dumping all the waste streams from our industrial society into the air and water, or simply by burying the trash.

More food for thought and discussion this winter as we recover from the fall elections! Meanwhile, my brussel sprouts and kale are delicious, I have boxes of winter squash, and the woodshed is full.