

## Transforming transport in Vermont

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On cold mornings in winter after a clear night when the temperature is zero or below, I need a balaclava, down jacket and no wind chill to walk down to the covered bridge in Pittsford. As the sun rises and is reflected off the snow and ice, I am reminded of the determined scientists who are studying the Arctic and Antarctic as they are being transformed by climate change. They live in cramped bunk-houses for weeks on thick ice. In the north, the sea-ice is shrinking and the methane release from the thawing Arctic tundra may soon accelerate the warming of the climate.

But in ten minutes, I can return to my wood stove and be warmed by the wood I cut and split a year ago. And the sunny afternoons that follow cold clear nights are often warm enough for me to work outside.

The January snow storm that dumped two feet of snow on the east coast cities went out to sea and missed Vermont. With little snow cover to reflect the sun, the winter climate has been rather mild. We have been eating spinach grown under glass all winter.

But I was still unprepared on the last day of January when mosquitos started hatching in the house. The next morning, February 1<sup>st</sup>, it was 50 degrees at sunrise for my morning walk and blowing a stiff wind. Two days of rain soon followed, the ground melted, and I was able to start digging under my rye cover crop on February 4<sup>th</sup>. Relatively mild weather continued until Valentine's Day when temperatures plunged to below -15 degrees, before rising again.

Awareness is spreading in Vermont that our energy system must change, so what do we need to do? We know how to retrofit our houses so that it take less energy to heat them in winter. The transformation of our electrical energy system to renewables is under way. Much of what is needed could be largely completed in less than ten years if we made the effort.

It is time to tackle transportation, which uses so much fossil fuel in a rural state like Vermont. Industry would like us to buy a lot of electric cars, so we can continue to commute alone. Electric cars with a 200-mile range at a reasonable cost should be available by the end of this year. But we should think about how to start the shift from using heavy single-occupancy-vehicles to get around. We have not made a change this big for a century, when trains and then automobiles replaced horse and buggy.

Uber has shown how taxi services can be improved by networking. Now we need networked passenger vans and private cars on our highways, so that I can easily get a ride from Pittsford to Burlington on Route 7. It seems that this would not be difficult to set up. China is leap-frogging over Uber, and rapidly developing a broad Web-linked transportation system.

Another revolution would be light-weight electric vehicles, derived from tricycles, rather than cars. Add an all-weather aerodynamic shell, and with only 10 percent of the weight of a car, it is much easier to get adequate range using lithium batteries. Yes, commuting would be a little slower, as they are currently

limited to about 20 mph, unless the rider pedals as well. However, the cost in both dollars and damage to the Earth is far less.

One fringe benefit of using an electric trike to commute would be that exercise improves health and productivity. Our sedentary existence is a huge drain on our physical energy and medical finances. We should start planning and building a real bike network in Vermont, so these light-weight efficient vehicles do not have to share the highways with trucks. In Europe, Germany has started down this path.

Globally, tens of millions of electrical bicycles and tricycles are now sold annually, but this county is largely ignoring this shift. We dream of 'solving' climate change without really changing the way of life that created it! Standing in the rain in early February reminded me of my youth in England, when I would have been amazed and delighted to have an electric tricycle.