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Comments -

General:

Yes, the climate around us is changing – mostly naturally occurring, but surely impacted human related actions (burning fossil fuels, 7+billion people, cutting down millions of acres of rain forests, paving millions of acres of land, draining/damming/diverting rivers, etc.)

Vermont's contribution to this effect (climate change/global warming) is extremely marginal (as in a decimal point followed by a whole bunch of zeros). If Vermont's total "pollution" contribution was reduced to zero, it make absolutely no measurable difference.

Hence, we should not be headed down the path of bankrupting ourselves and making our state un-affordable to live in – in order to "save the planet".

But as the old saying goes – "if you are not part of the solution – you are part of the problem."

So let's do this – but it has to make sense, it has to be affordable, we have to have realistic goals, and we need to think our planned action all the way through (such as - increased demand for storage batteries comes at a significant environmental cost).

So first off the goal has been to be 90% renewable energy by 2050. I have yet to read anywhere exactly what that will look like.

For electricity production - wind has an effective production about 24% of the time, solar 14% (nobody cleans the snow off from solar panels) . They all have own their environmental issues. We also have no storage systems (batteries) for times when these systems over produce.

Hydro – that is pretty much all developed, and **nobody can or should claim Hydro Quebec or similar as renewable energy.** It is major ecological disaster, flooding millions of acres, impacting flora, fauna and native peoples. Rivers and lakes swallowed up in the waters behind the dam, rivers that now flow the other way. And all those millions of submerged trees off gassing methane – major GHG. Massive transmission lines and corridors created to move that power from the dams to a final destination.

As the Connecticut River dams go through the 50 year relicensing process the way they are operating is going to be curtailed somewhat because of environmental concerns (long over due action). Certainly not adding more.

Other than small projects – not much new in the way of hydro to add.

Renewable natural gas is the new buzz word – really fancy word for methane (GHG) that is derived from methane plants at large farms (never going to be a big player in the picture), landfills (Coventry) never will be any more new landfills, and sewage treatment plants (another small source). While it is good to get methane out of the air, it still has the combustion by product of CO2 (and more). Not really a desired “renewable” product.

BioDiesel – Another bit player in the world of energy.

Wood - For this report, wood is considered renewable. Huh? We cut down trees who serve/work as an air filter – removing CO2, storing the carbon in the tree, and exhaling O2 back into the air. Pretty good system But the tree that is cut down is no longer a filter, a new tree to effectively replace it is 30 years out. And when it is , wood releases CO2 into the air (as well as a lot of other pollutants and carcinogens). There is no such thing as good CO2 or bad CO2. Same environmental impact. I have never considered this truly as renewable energy. Absolutely it should be in the energy mix. But keep in mind it does contribute to CO2 emissions.

Natural Gas -For some fuzzy reason natural gas appears to be often times not considered to be a fossil fuel. Then what is it? Some of it comes out of the same wells that liquid petroleum does. It is certainly not renewable. And when burned emits CO2. Because it burns cleaner than the other fossil fuels (oil, coal) we tend to give it a pass.It is certainly one more tool in the shed to shift our energy usage. And a tool that is available in only a relatively small portion of the state. To expand the use of this statewide, it would require many hundreds of miles of buried lines (think how well this went over in Rutland/Addison Counties. And of course the ongoing leaks (methane)

Solar hot water heating systems – maybe I missed it, but I don’t see these included as part of the 90% discussion. They serve to preheat the water entering the primary hot water tank/system. All of the energy generated is stored in a battery (hot water tank), and is available upon demand. Doesn’t require ongoing subsidies by rate payers, relatively low cost and short payback. Any qualified heating contractor could install one. Basically changing out a fossil fuel fired boiler for a solar powered “boiler”. I’ve constructed three of them – bought all the components at F.W. Webb.

More realistic plan would be to make **nuclear** a major component of our energy mix which of course has it own long term issues, but does not emit greenhouse gases or CO2. Takes up very little space and the new smaller compact units could be placed strategically around the state. We could then get to a 90% non CO2 emitting energy supply.

So again – how do we get 90% renewable under the plan?

And the report speaks of the economic impact of clean, local, renewable energy versus the nasty fossil fuels for which we exports hundreds of millions of dollars both out of state or out of country to companies that sell us these products. Another myth.

How much money do we send out of state or country for electricity? Green Mountain power is Canadian owned as is Hydro-Quebec. Almost of our in-state hydro is owned out of state, as are most wind and solar arrays And renewable electricity is not cheap or economical – it wholesales for many times more than fossil fuel derived electricity.

The majority of wood pellet manufacturers are out of state (NH, ME, NY) or Quebec. Only one currently in Vermont?

Yep - cord wood is locally grown, harvested, processed and delivered.

The easiest energy/fuel to save is that which is not used.

Which brings to building weatherization projects.

Instead of trying to electrify everything – go with the easier, low hanging fruit – weatherization. Vermont has very old housing stock, poorly insulated, aged heating systems, etc.. Vermont also has a lot of low income and middle class residents who can't afford to weatherize. Weatherize to me also includes where needed revamping the heating system, etc. Fuel not burned is fuel saved – gets us to our goal of reducing CO2 emissions in an affordable manner. Still can declare victory.

It is far more effective to replace an old inefficient fossil fueled fired heating system with a new efficient one, mid 90% levels are achievable.. Heat pumps are something that can really only be used in a home that has been weatherized first. Heat pumps may operate at close to 100% efficiency, but the electricity operating them was not produced that efficiently. Advanced wood heat as a central heating system is extremely expensive.

Go with what we know and what works.

Let's seriously tap the Efficiency Vermont funding source for this. Enough with LED light bulb promotions already. And make it so more people qualify for this funding.

And speaking of serious - in 2016 the goal was set to weatherize 80,000 homes by 2020. Awesome. We in 2021 are at less than 20,000. Oops. But now a new goal has been set of reaching 120,000 by 2030. Not going to happen. Be realistic.

Funding - say average of a minimum of \$10,000 per home, for 100,000 homes is \$1 billion dollars. That is not going to be out of pocket. Where is that coming from? What if the average is higher?

And then we need serious manpower, and building materials. Both of which are already in short supply and not getting better. Contractors that are building new homes are certainly not going to switch to renovating old housing stock.

And just to make everyone's lives miserable, some bureaucrat come up with the concept of let's make every building contractor get state licensed. You clearly don't understand how the small contractors think and operate. How many new state employees do we need to administer this program?

Electric Vehicles

Let's think this one through. Great concept at first blush. Before we get all tingly. Need a pile of recharging stations – who is going to pay to build and operate them (My tax dollar?) EV's have the

same wear and tear on the highway that regular vehicles do. Equal play means equal pay. Need to figure out how to collect a “highway fee” at the time of each recharge , same concept as the gas taxes we pay to maintain the highways. Fee has to be on par with fees/taxes collected on an average motor vehicle fillup. How do we collect the fees from those who recharge at home? Time for EV to pay a sales and use tax at time of purchase as well. The wheels of state government need to be financed – again as a user based system.

People of all income brackets who run “clunkers” are not going to out and buy an EV. My tax dollar going to subsidize this? I hope not. I recently traded my full size truck in for a new model – gets 40% better gas mileage. My contribution to the cause. Not due for another one for at least 10 years, and I have no intention ever of driving a sedan or SUV.

And let’s seriously consider the environmental impacts of mining Lithium and other rare earth elements needed to build batteries. Not a pretty picture.

Net Metering -

Another unsustainable program. Through this program the state forces electric utilities to purchase all generated electricity from solar producers at retail market rates. Leaving them to pay only a token customer charge (covers billing, etc.). Yet net metered folks are on the grid 24/7 with full access to power when they are not producing their own. No contribution towards the cost of maintaining the electric grid – line men, storm damage, line clearing, new lines and poles, new equipment, and so on. That defaults to those of us who are not net metered and our rates are increasing because of it. See any social iniquity there? I believe they still do pay the Efficiency VT charge – not sure how this is calculated on a net metered system.

I am on Washington Electric CO-OP – which has as a utility met the goal of providing 100% renewable electricity. At this point, allowing customers to net meter does nothing more than increase the cost of electricity to the other members. Replacing utility based renewable power with customer generated renewable power makes no common or economic sense. Time to re-evaluate program.

Moving onto more specific comments -

Section 6

Looking through all the exhibits and narrative it is petty clear that no one really has an understanding of what percentage of homes and businesses use wood of any type for heat.

Exhibit 6.1 shows residential use of wood and other renewables at 23%

Exhibit 6.3 shows cord wood at 30% and pellets at 8% which adds up to 35%

Exhibit 6.7 does not show a price trend for **cord wood**, just **bulk** pellets, **bagged** pellets are overlooked as well.

Exhibit 6.8 shows wood use at 19%- 23% for owned homes, and 4% - 8.7% for rentals. Different total use as others above – but I would question the 8.7% on rental units (incomes above \$85,000)

other areas

Exhibit 6.8 Indicates that for usage several categories, utility gas has a higher per cent of households than- bottled, propane, LPG.

Considering that utility gas is only available along the upper Champlain valley – also question this outcome as well. As a thought might be attributed to how the survey question was written. As an example I am on the Barre Town Planning Commission – and as part of writing our energy plan we received a residential home fuel usage table from the CVRPC (table might have originated a Efficiency Vermont), that showed we had hundreds of residents using “gas”, and a whole bunch more who used LPG. Two unique answers. We don’t have natural gas available here. No idea what survey and/or algorithm was used to generate this chart or if anyone really looked at the outcome that it represented. Going if it was a survey to go with people checked “gas” when they really use LPG. Gas is what propane/LPG is commonly called. Just saying.

Exhibit 6.4 – heating degree days (HDD) vs fuel usage.

Several comments here.

1) The chart is HDD in New England not Vermont. Graph shows either 5,400 or 5,600 annual HDD. Vermont runs closer to an average of 8,000, (Fairbanks Museum weather info).

2) the total for heating fuel used excludes LPG. So is there any value to this chart??

The goal of 120,000 homes to be weatherized is not possible to achieve, take it out, set a more reasonable goal.

Net Zero construction for all homes and businesses by 2030 – also probably not a reasonable goal. Consider the significant added cost, shortage of builders and materials,

Builder Registration – NO!!, we have enough big brother already. This going to be expense to implement – think more state employees, tough to enforce, and totally not necessary.

200 amp service for new construction with the added thought of making it mandatory. Again a very expensive and probably not needed add-on for all new buildings. Just what a new home needs – more upfront costs. This requirement of course is predicated on everyone having an EV and charging it at

home in the late evening. Sounds good until you start adding the details. A charging system is another cost to add to home – what about all of the thousands of charging stations we are going to install across the state? This is redundant. Question from earlier part of this – how do we collect a “fill-up fee” to pay for roadway and bridge infrastructure? One of the goals on localized renewable generation was to avoid having to build out electric lines, etc. To accommodate the higher demand for electricity Well here we go – reasonably sure the transmission lines strung throughout communities and residential neighborhoods, and rural areas are not capable of handling the demand from all those EV chargers (and heat pumps), How do we address that?, what will it cost to upgrade?, who pays?, how long will it take to build out? Where do get all the additional linemen and materials required to do this?

Adding all those heat pumps raises a lot of the same questions. In terms of cost they can be expensive and – heat pumps are something you do after weatherizing a home.

I burn primarily wood, cut it, haul it, split it on my own land - other than the cost of gas and oil my wood is free. Heating oil used for the year is under 200 gallons. I can burn oil for a lot of years before I get to the cost of purchasing and installing a heat pump, My electric rate (Washington Co-op) is \$0.22/kW. There is NO financial incentive for me to do a heat pump. And this assumes I don't need to upgrade my panel box.

6.4.2.2 Advanced wood heat.

Nice sales job. Doesn't hold water. A centralized AWH is a very expensive system to install, with lots of moving parts (read high maintenance potential). Limited suppliers of bulk pellets, and requires periodic cleaning and maintenance. At what cost? They do emit CO₂ and other nasty air pollutants (something fossil fuel doesn't). Installing a new high efficiency burner propane or oil fired boiler would be more economical, and have substantially lower CO₂ lower emissions than an AWH system. Currently there are huge subsidies for whole house AWH – what happens when those g away or if kept where does the money come from?

Back to where I started on page 1 – keep it simple, keep it affordable, keep goals and outcomes achievable. For the cost of a single AWH central system we could replace/upgrade fossil fuel fired units in multiple homes.. Much better air pollution outcome. Much better use of our money.

Pellet stoves are not at all equal to firewood stoves. Need frequent cleaning of the heat exchanger, require electricity to operate the blower (not much good in a power outage). Yep a chunk stove does require a once yearly chimney cleaning. Both produce CO₂ emissions, both contribute to forest health. Chunk wood is cut and delivered locally (employs local people) , pellets are primarily from out of state . Pellets often are delivered in **plastic bags** (wet ,or damp pellets don't burn well). New wood stoves are equipped with catalytic converters and are relatively efficient.

This plans seeks to have **35% of Vermont's total thermal demand met by wood by 2030**. Another unrealistic goal. Do you think businesses and manufacturing facilities are going to shift to wood for heat. Most likely not. Schools made a good run at for while, that seems to have tapered off. Cost of chips, wood chip storage, maintenance, etc. Not going to happen in the private sector. They want the heat to be on, seamless from day to day, no distractions.

That leaves the residential sector to pick up the slack. Looking a the wide range of values presented throughout this report for % of homes burning wood (as high as 35%), I would guess there is not a lot of growth remaining. Burning wood is a life style – you have to want to it - it is messy, it is time

consuming, somebody has to move those bags of pellets or chunks of wood, take out the ashes, and it needs to be done without burning the house down, Definitely not something a landlord sets up in a rental unit. Doesn't lend itself well to urban areas, housing complexes, etc.

Truth in advertising here – I have been involved with burning wood for heat for most of my life. Current home was built 35 years ago and has an oil fired hot water heating system with a wood boiler add-on. I burn 5-6 cords of firewood per year, cut and process it myself. Do it yourself fire wood means for me each piece of wood is handled a minimum of 6 times before it is actually burned. Firewood received split and delivered, is 3 or 4 times. Something you have to want to do. Not for every one. A cord weighs a ton – can be good exercise.

Days when I am tired, lazy, or just plain sick of going down the cellar stairs to add wood to the firebox – I go to the wall and turn the dial – oil is a wonderful thing.

And for a wood fired hot water boiler when the power goes out (shuts off the hot water circulator pumps) , that can be a bad thing if fire is hot enough to create steam. If nothing else the house starts to get cold. Being at the end of a dead end road in a rural area – I always have Plan B – generator. Back to it is a life style.

So final words -

Keep it realistic, affordable, use common sense, stop thinking we can save the planet, go for a better quality of life

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