

TOWN OF BEDFORD
June 27, 2019
ENERGY COMMISSION MINUTES

A meeting of the Bedford Energy Commission was held on Thursday, June 27, 2019 at the Bedford Meeting Room, 10 Meetinghouse Road, Bedford, NH.

Present: Jeff Kerr (Chair), John Russell (Vice Chair), Chris Bandazian (Town Council Liaison), Catherine Rombeau (Town Council Liaison Alternate), John Schneller (School Board Liaison), Bill Foote (School Board Liaison Alternate), Bing Lu, John Russell, Sarah Braese, Tim Paradis

Absent: Andrew Gillis

- I. Call to Order – Chairman Kerr called the meeting to order at 7:03 PM.
- II. Quorum Count: 5
- III. Approval of Minutes – May 23, 2019

MOTION by Mr. Bandazian to approve the minutes of May 23, 2019. The motion was seconded by Mr. Schneller. Vote taken – all in favor.

- IV. Reports of Members and Committees
 - a. Legislative update
 1. Group net metering 1MW → 5MW
 - A. Affects the ability to lease out landfill for PV

Mr. Bandazian reported that there is no change in the bills we have been tracking. HB 365 (the bill for an increase in the net metering cap) is on the list for potential veto override which will be voted on in September. There was committee activity on the bills related to updating building codes, but they have not been enrolled yet. They continue to pursue the bill on the systems benefit charge. Some bills that don't directly impact town government were vetoed: One was to correct the statute to eliminate WREC sweeping which artificially depresses the price of WREC's, and the other was to set a goal of electric vehicle fleet for the State by 2039 with exceptions.

The renewable energy fund bill increasing municipal and school board grant potential from \$2M to \$5M was retained in the House committee and will come out after September.

- b. School projects

Mr. Schneller reported that at the end of the school Board meeting there was discussion about the school board working with the Energy Commission and the town on a comprehensive solution for food waste, plastic disposal, etc. at the schools. Mr. Schneller talked on the phone with Jeff Foote, the Director of Public Works, and found that it costs \$84/ton to recycle plastic and paper and \$72/ton to throw plastic in the waste disposal bins which get shipped to Haverhill, MA to be

burned; so we save taxpayers \$12/ton by shipping plastic away to be burned. We ship 1,200 tons for recycling and 8,000 tons for burning. Jeff Foote thinks approximately 10 % or more of municipal solid waste is food waste. Mr. Foote feels we could do better but thinks initially we could get a 50% capture rate. As part of the plan to improve the transfer station he is looking to reconfigure the upper portion so that town residents could take food waste there. He will be in the position to present something to the Energy Commission in mid-to-late August.

V. Special Orders

a. Speaker – Kevin Doherty: Net zero ready house in Bedford

Chairman Kerr introduced Kevin Doherty who built the first net zero ready house in Bedford, NH. Mr. Doherty explained the difference between net zero and net zero ready. Net zero ready simply means that the builder does not install PV panels on the roof, leaving it up to the new homeowners to install them. This makes more sense because in Year 1 the homeowners can receive a 30% federal tax credit for the PV panels; therefore, the builder does not install them. Once the PV panels are installed on the roof, the home is then considered net zero. Net zero means that in any given 12-month cycle the home is producing enough electricity on site to handle all of the electricity needs for the house (hot water, heating, cooling, plug load and all of the utilities for the house). For example, in the middle of winter, when the sun is lowest, the home is not making money, but rather buying electricity from the grid. On sunny summers days the home is feeding electricity from its PV panels back to the grid and the meter is spinning backwards. If you are net zero, when you look at your usage over a period of 12 months you paid \$0 for electricity because you put as much back into the grid, as you took out. Some homes even end up being net positive, and the extra electricity being produced could then be used to power an electric car.

Mr. Doherty explained that getting a home to net zero is done by a combination of extreme heightened insulation levels and air sealing throughout the house so there is no air coming through holes throughout the house, triple glazed windows, and attention to detail as the house is being built. Getting a home to net zero involves the envelope going from below to the slab in the basement all the way up to the roof. There are ways of quantifying all of the products you put in the home, except for one. In that envelope you can design a wall with R-values (An insulating material's resistance to conductive heat flow is measured or rated in terms of its thermal resistance or R-value -- the higher the R-value, the greater the insulating effectiveness) that are known because the products have all been tested. For example, you can buy a window with a sticker on it telling you how they perform. The one thing you do not know is how air-tight the house is once it is done being built; so, a blower door test is performed at the end of the job. To do a blower door test an engineering firm comes in and blocks out a door and put a fan in it that evacuates the house at 50 pascals, and there is a constant pressure coming out of the house and they are able to monitor what is leaking from the house at the same time they are evacuating the house. State code, at this time, is 5 air changes per hour at 50 pascals. This is the one factor that must be proven at the end in order for a house to be deemed net zero. It is absolutely key to the entire net zero concept working. The house will perform as a net zero home if the air change rate was 1-1½ but anything under 1 is phenomenal.

Mr. Foote asked how the air in the home is kept healthy. Mr. Doherty explained that a necessary part of this is bringing fresh air into the home, but it is fresh air that you control. An energy recovery ventilator (which looks like a box with fans) is put in the basement, and ductwork going

through the bathrooms and kitchen is used to evacuate and pull air out of those spaces. That air goes through heat exchanger in the basement where fresh air is brought in at the same time you are exhausting air and the two air streams pass there and fresh air is dumped back into the living area, bedrooms and family room. It is about 80% efficient. For example, in the home he just built he is constantly exhausting 100 cubic feet per minute (CFM) and bringing in 100 CFM 24/7. This is a very necessary component.

Mr. Foote asked if the net zero home has forced hot air heating. Mr. Doherty that the home does not used forced hot air heating and explained that the heating loads are so low that the home can be heated and cooled by mini splits (heating and cooling systems that allow you to control the temperatures in individual rooms or spaces). In the home he just built he has 5 separate mini-splits (including one in the basement) and year round you are just taking energy that is available in the air and bringing it to a heat exchanger in the house and cycling it (it is both a refrigerator and a heat pump).

Mr. Paradis asked if specific mini splits need to be used. Mr. Doherty explained that historically some mini splits have experienced issues when it gets to 5-10 degrees, but the Mitsubishi hyper-heat mini splits are leaders in the field and good until 13-below-zero. They start getting to about 90% efficiency at 5-degrees, but they can easily power a house. The technology has come a long way. The reason mini splits can be used is because the house is so well-insulated. That's how you can power the whole home with solar collectors.

Mr. Doherty shared a sample of the wall used in the net zero ready home he built. The wall he used has 2x8 studs (a typical house has 2x6 studs). Outside of the 2x8 studs is a 2-inch R9 foam panel. Every stud and header in the home is insulated because the home is wrapped in insulation, so there's no thermal bridging. The 2-inch foam panel is nailed through the studs using 12 penny nails every 3 inches. Inside of the 2-inch R9 foam another 2 ½ inches of closed cell foam is blown in. Inside of that is another 4 ¾ inches nominal of cellulose. When it's all done there is R42 in the wall. Outside of the 2-inch foam panel is a self-adhered membrane (such as Henry's Blueskin) that sticks right to the house and is vapor permeable and waterproof. It allows vapor to get through it, but does not allow any water in. As a construction detail and for good practice, he also adds a rainscreen. Behind the siding is a ¾ inch gap that allows the siding to dry out every time it rains. It makes your siding and paint job last, and you end up with a 12-inch thick wall. There are other less-expensive ways to do this, for example double-stud walls where 2 walls are separated by 2-3 inches and you blow the whole thing with cellulose to achieve similar R-values.

On top of that, Mr. Doherty also insulated the attic floor. Another strategy would be to do the rafters if you were going to have any kind of heating equipment up in the attic, but in the home he built there was no need to do that, so they simply insulated the attic floor. On the 2x10 joists with plywood on top he put 3 layers of 2-inch foam on top of the plywood. He took the Henry's Blueskin and wrapped it up the wall and onto the attic floor, so even at the point where the rafters are sitting on the floor no air can get by to the living space below. 6-inches of foam and 10-inches of cellulose in the frame itself comes out to an R80 in the attic – completely airtight, and in the blower air-test it came out to be 0.3. Everything is vented. Above the foam is a cold air space and it looks like everyone else's attic except there are no icicles up there from moisture escaping the house. In the basement there is 1 ½ inches of mineral wool in the basement walls, and another 2x4

wall against that with 3 ½ inches of mineral wool, so the basement walls have an R21, and underneath the basement slab there are two layers of 1 ½ inch mineral wool which is an R12, so from the ground up the whole home is encapsulated and air-sealed.

Mr. Foote asked how you fight moisture from underground which would try and wick its way through the concrete or any seam or crack. Mr. Doherty explained there is a 6 ml. vapor barrier on top of it directly under the concrete pour, so between the concrete mineral wool (an insulation board made from basalt which waterproof and fireproof and is a phenomenal product) is used under the slab. Everything sub-slab is tied into the perimeter foundation drain of stone and pipe, so water is not wicking up through it.

Mr. Paradis asked why he decided to use this method to build his latest house. Mr. Doherty likes to be ahead of the curve energy-wise, and feels he is older now and nearing the end of his building career, so he wanted to take it a step further. He plans on doing this the next few years that he continues working. Mr. Paradis asked if any special placement of the home is required. Mr. Doherty said not every site would work for solar or net zero, and there are some sites that can be made to work. Siting is very important. In the subdivision on Wheeler Farm Road off of North Amherst Rd. that he just worked on there are 7 lots. In 5 of them solar will work easily. 2 of the other lots are more difficult and there is no way they will ever be net zero because they have pine trees next door which he does not own; however a solution on one of those 2 lots would be using a ground mount array in an area that is away from the pine trees and has exposure.

Mr. Schneller asked if geothermal could be substituted for photovoltaic. Mr. Doherty said there would be no reason to because it would be too expensive. Geothermal would cost \$40-\$45K to put in a home, and mini splits only cost around \$15K.

Mr. Lu asked if it makes economic sense and wondered how expensive it is compared to building a regular house. Mr. Doherty explained that construction costs would go up 5-10%, but don't forget, all of the measures you are doing like insulation and triple glazed windows allows you to put in a less expensive heating system, and you are not putting in a fireplace or chimney – so there are tradeoffs that work. Then you decide whether or not you want to put in solar. So, depending on how you live your payback is in 6-10 years. The sun shines every day....so if things are designed correctly, it's a guaranteed payback! Mr. Lu asked if an older house could be retrofitted. Mr. Doherty said it would cost more money to retrofit an old home and you are not going to get to net zero without spending a large sum of money, but it doesn't mean that when you start working on your siding or adding windows that you can't start adding insulation on the outside of the house in sheets. This would be the "best bang for the buck" and help you cut down tremendously without getting to net-zero.

Mr. Foote asked how big the PV units are sized for the homes that he builds. Mr. Doherty replied that it can fit 13KW; however, the energy modeling indicated 10KW would work, but because he exceeded some of the parameters in building, his homes may actually end up needing only 8KW. He will cover the roof with solar panels for aesthetic purposes because it looks better on the roof but will be putting in about 30% more than needed to actually power the house.

Mr. Paradis asked what he thought about solar roof shingles instead of large solar units on the roof. Mr. Doherty doesn't think Tesla and other companies working on solar roof shingles are getting very far with this type of technology. Tesla has put solar roof shingles on 3-4 homes and they are monitoring it, but they never talk about the output, only that they will be affordable compared to roofing, but he thinks they are comparing it to terra cotta roofing in California. Maybe it will happen someday, but as of today solar roof panels are the way to go. Chairman Kerr commented that the solar roof shingles seem to be more about aesthetics than efficiency.

Mr. Bandazian asked if there are any challenges with the permitting or inspections. Mr. Doherty replied that he has done 3-4 homes in Bedford and had no issues with the permitting. It's a pretty simple thing, and the town of Bedford has been great. He used Revision Energy, the biggest company in New England. He feels they are an excellent source and will handle anything that needs to be handled. Revision Energy even does mini splits and are getting into using other things too. Mr. Bandazian asked if he installed the appliances in the home, or if the buyer does that. Mr. Doherty said that he already put all of the appliances in. The appliances are energy-star, and he put in an induction cooktop, LED lighting, a heat pump water heater in the basement, and he provided for a condensing dryer rather than a dryer that evacuates to the outside which will avoid further heat loss.

Mr. Lu asked if the home is airtight, did that mean cooking had to be done on induction cooktops and gas burners could not be used to cook on. Mr. Doherty said you could use gas burners but he made the decision to make the home fossil fuel-free because there are lots of pollutants from pilot lights, and if you want a clean home, you want to have fresh air. If you wanted to install gas burners you would also need to install a much more powerful exhaust fan; a choice the homeowner has to make. He also separated the garage from the house, so no pollutants escape from the garage into the home every time the door is opened. It also looks more aesthetically pleasing.

Chairman Kerr asked where the mini-split condensing units were placed outside. Mr. Doherty said there are 5 mini split condensing units on the south side, and they are very small and quiet. Chairman Kerr asked if he ever thought about using a multi-headed unit. Mr. Doherty said the original design was for 4 mini splits in the house and one big unit outside. He was listening to the weekly podcast of some Maine architects called the Green Architects Lounge and learned that when you have a house that is as well-insulated as the one he's making that if you tried to put all of them on one big condensing unit outside the energy that any one given room would need would cause the exterior unit to keep short-cycling. This doesn't mean it wouldn't work, but it does make it get expensive. So, because he heard this information at an opportune time when he was trying to determine what he would be doing in the home - he ended up putting 5 heads inside (adding one to the basement) and put a paired unit outside for each one. The system is only being turned on when it needs to be turned on. Mini splits work best when they are running constantly and cranking along at a nice slow pace. Starting them up is what costs money.

Chairman Kerr indicated the Energy Commission has been discussing changes to building codes going through the State House of Representatives. He asked if Mr. Doherty is aware of any changes to the building codes and if builders would support them because they would make building a house more expensive. Mr. Doherty's opinion is that there will be lots of resistance in New Hampshire, but in Massachusetts and Maine there will be better reception to energy. He

believes the builders industry will fight it. The mandates should be out there. When builders find out how easy some of these things are, and when banks recognize the value of the energy savings when doing loan applications to lend money – he believes that is where the change will come.

Mr. Lu feels the buyers should drive this, and if you save the buyers money they would say, “Hey, I want this!”. It doesn’t make sense that the builders would push for this. Due to the type of work he’s been doing, Mr. Doherty thinks he is a good test case. When he started doing this, he thought it would be easy to get 1-1 ½ customers a year and that the customers would come to him. This hasn’t been the case. That being said, he is not doing a lot to market the home beyond having it on the market. He hasn’t yet listed it with a realtor. He typically builds custom homes, but the net zero house he has built is a spec house, because he wanted to have fun and build it on his own. People are not coming in droves, but 30-40% of the people who approach him about other lots in the development are amenable to talking about net zero. It all depends on how much money they have to spend. There are some people out there who would be amenable to spend \$40-\$50K extra on their house, but it will pay for itself in 7-8 years and then make \$50K in the following 7-8 years.

Chairman Kerr noted that real estate data bases have fields for a HERS score (Industry Standard by Which a Home's Energy Efficiency is Measured), but the real estate industry are not populating that field with the house information so the buyers can be aware of the ratings and what it means to the costs down the line. Mr. Doherty thinks it would go a long way to making this idea more popular if somebody (younger than him) did a 20-30 lot development in Manchester or Bedford that was net zero and you had 8 years of people going in there and being satisfied customers, and then another builder came along and wanted to replicate that and build more.

Mr. Schneller asked if he would consider doing out of state custom. Mr. Doherty said that he would not because, “I am old and whatever I am going to do is going to be in that subdivision, and then I am done.”

Mr. Paradis asked how he is advertising the homes. Mr. Doherty plans to post the homes on Zillow.

Mr. Doherty commended the Energy Commission for the things they were undertaking.

VI. Old Business

a. Green Business Award

1. Social Media promotion update

Ms. Braese reported that she sent some graphics out for the Commission’s review that would be good for use on social media, or in placing an ad in the town newspaper. Her proposed timeline was under the assumption we would award in September, and then again in April around Earth day. If we wanted to make the award in September, we should open in July, review in August, and award in September at the September meeting of the Energy Commission, and then shift the award month to April going forward so it coincides with Earth Day. Chairman Kerr likes the idea of having the award coincide with Earth Day. The group discussed that it would be difficult and time consuming to award twice a year, and difficult to garner people’s attention during the summer during vacation season.

Mr. Russell shared that we have 3 candidates: Trader Joe's, Whole Foods, and Hannaford on Jenkins Road. Chairman Kerr indicated that the Jenkins Road Hannaford has already won the award, but the group felt that it would be alright if a company won the award more than 1 year if warranted.

Ms. Braese asked if we should hold off until 2020 to give the first award, and the group agreed. Mr. Paradis said that would also give time to consider some of the new businesses opening in early 2020 at the Market & Main development including some established businesses who may have green practices in place and would be amenable to the publicity as they open a new location in Bedford.

Mr. Russell suggested that a group of Energy Commission members go visit businesses. Whole Foods has a baling machine; Trader Joe's is very clean; and the amount of food Hannaford donates and gives away is remarkable and they recycle at a rate of 86% - and nobody is really talking about it or aware of it. What they are all doing dovetails with "Recycle-Reduce-Reuse".

Mr. Paradis asked if others are doing anything similar to what Hannaford does with delivering food to local food pantries. Mr. Russell said that Trader Joe's definitely does and he believes Whole Foods does too. Trader Joe's is also switching all of their meat and vegetable storage from polystyrene to something that is compostable. Mr. Russell was very impressed how deeply ingrained in the culture the green initiatives are with the employees who work in the meat and fish department at Trader Joe's. Everyone is trained on this, and it is part of their culture and it is very impressive how they have achieved buy-in to their green initiatives. There are significant efforts being made and it would be great to bring it to the attention of people.

The Commission discussed the Green Business Award further and determined they would like to:

- 1.) Have a group of Energy Commission members visit the 3 businesses we have already discussed and canvas other local businesses regarding the award
- 2.) In the interest of time, use a PDF application form to start, but eventually move to using an online form that candidates can fill out for easier access.
- 3) Make an effort to push the award and talk to businesses to plant the seed now.
- 4) The award will take place in April for Earth Day and the deadline for application will be in February.

The Commission would like to visit/canvas Panera, Lowes, Target, Coastal Lumber, Goedecke, Flooring & Design and Harbor Group.

b. EV Charging Station Encouragement Project

Ms. Braese stated that this was on hold awaiting contact from someone at Eversource to find out what incentives they offer before moving forward. Mr. Bandazian will forward the name of our Eversource contact to her. She will report back once she has the opportunity to talk with them.

c. Tour of recycling and incineration facilities

1. MRF tour debrief

A. Post Bedford's quality results from WM MRF to see where we stand

a. Should target <10% trash in single stream

B. Transfer station article – Jeff submitted and Bedford Bulletin published

Mr. Russell reported that the tour of the recycling and incineration facility took place on Friday, May 24, 2019. In regard to the single stream that gets taken away on a truck, the biggest takeaway is that things are handled completely and the machines work effectively. The town's waste is put on a large industrial conveyor belt that takes it through many stations. To start, the cardboard is blown away and lifted up and put in a different line and the plastics are manually removed. Eventually it goes to a cardboard baler and the end result is a large bale of cardboard that can be repurposed. A lot of quality assurance is done – and at the end of the line employees pull out plastics. Plastic of all types including bags and toys seem to be the big offenders that gum up the machines, as well as aluminum cans.

We were happy to learn that there seems to be a market for Plastic #1, #2, and #5. Once baled and sorted it is not being incinerated. It is being recycled, repurposed and sold. Mr. Foote noted they are only getting \$20/ton for plastic #1, #2 and #5. Chairman Kerr said they used to sell for \$200/ton, so the economic reality of the Chinese National Sword policy is that they've lost 90% of what they used to sell for. Mr. Russell asked if we know how much they get paid for cardboard and paper.

From his research, Mr. Schneller indicated that they are premium products that they actually get paid pretty well for. From his town research, we are neutral on clean paper and cardboard – so it doesn't cost us any money, but we don't make any money either.

Chairman Kerr feared that we would find stacks of material that cannot go anywhere and are piling up at the Materials Recovery Facility (MRF), but the good news is that is not happening. The bad news is that things could be more efficient. The Plant Manager told us if he had more money to put in a few more machines he could make the output higher quality, but there is no budget or incentive to do it because the prices they can get for it are so low right now. The issue right now (and we don't know how long it will last) is that it is costing more money to recycle than it is to put it in a landfill or incinerate. Should we make a change in our behavior based on that, or not? Chairman Kerr would like to find out if the MRF can provide the town with a report that lets us know what the quality of our recyclables are and adjust the rates accordingly; but that is not the case. The town has a contract that says if we go above 5% trash they can change our rates, but they've never sent us a report on that, and the town has also never asked for one. Right now, the assumption is that our contamination rate is 5% or below and according to the MRF we have better quality coming out of the transfer station than from curbside pickup because there is no quality control with curbside pick-up. He was hoping to improve the quality of our recyclables, but we are already below 5% and our contract doesn't give us any incentive to do any better than that, so there seems to be no reason to change any behavior at that point. Some members said they would like to see the town doing something with our more valuable materials, but our contract says we can't separate out the more valuable stuff because there is no incentive to do that and it all goes on the same conveyor. The only thing we could do differently when the contract expires is perhaps sorting ourselves or putting more in the landfill, but prices may change by the time the contract expires in 2021 (and there are two one-year extensions we could entertain to take it to 2023 if the town wanted to). We could come up with a contingency plan about what we would do if prices stay this way when the contract expires in 2021. That gives us some time to look at this issue,

monitor prices, and watch what is going on. If Chinese companies move to the U.S. and start processing recyclables here or domestic companies open up to handle it – either way we have two years to look at what might happen and modify accordingly.

Mr. Schneller has called on a number of people at Axion, the company that converts clean, diced plastic into railroad ties. They said the inbound quality that they are getting on #5 plastic (the hard plastic that replaces railroad ties and things) was too low. They can buy from Mexico and get the highest quality they need and even dictate quality and get a cleaner stream because labor costs are so low. He is unsure if the waste being handled in Mexico is domestic or if any is imported, but he could find out. We were not incorrect in thinking that they used to recycle, but 3-4 years ago there was a management change and although they seem dejected that they cannot do their own recycling, they can buy it cleaned and diced from the distributor now. Recycling just wasn't cost-effective for them. They would be interested in working with the town on Pulpit Rock and other bridge projects with their products. Their products are generally 4x more expensive than other products, but Axion is willing to work with the town on this because they are looking for beta customers. Their products will last 4-5x longer and chemicals are not leaching into the ground and they provide guarantees.

Mr. Schneller also talked with the Kirschmann recycling company out of Texas, but they will not be able to do anything with us because they don't have national collection capability and only work locally. They suggested burning the plastic, but Mr. Schneller told him that we have environmentally conscious people here who aren't sure that would be a good idea. The gentleman at Kirschmann said there are companies developing products and at volume the prices should come down. This may make an end user market more viable over time. Pulp and paper are traded commodities, so we could check the indexes for the prices on various waste streams, as well as consult a website called Waste 360.

Mr. Schneller talked to Jeff Foote at the transfer station and he feels strongly that composting would be a great way for us to get our cost down, and the result is an environmentally clean product that does not have leaching. Mr. Schneller is going to introduce him to a product that accelerates the composting and increases the PKN's and creates a higher quality compost and he is willing to do a side-by-side test with it. He thinks composting is the near term "low hanging fruit". Because our contract expires in 2021, Mr. Schneller feels we have enough runway to plan what we would like to do with plastic. In the meantime, Jeff Foote is making modifications so that composting can take place at the transfer station, and he will be prepared to talk with the Energy Commission and anyone else who is interested by August. Mr. Schneller is in touch with PhD at the University of New Hampshire Extension School who would be willing (though probably not for free) to do a side-by-side test of composting with microbes, and composting without.

Mr. Schneller is also looking into small scale waste to energy. There is an operation in India that seems to work when a lot of other operations in the area have not. He has made calls to a leasing company to ask about a baler if we decide at some point to bale our own plastic and paper. We would first need to look at volume and perform a spreadsheet exercise. Chairman Kerr thinks this is all good planning.

Mr. Bandazian reported that plastic to diesel is a lot more mature than he originally thought.

Goldman Sachs has underwritten a \$260M plant in Ashley, Indiana, and a San Francisco company called Brightmark Energy bought an Ohio company called RES Polyflow that makes industrial scale pyrolysis equipment and BP is going to buy and refine the product. The first plant will have a groundbreaking this month. These are large operations that can handle 16-18 million gallons of diesel in a year. Chairman Kerr saw a piece on YouTube about a company in Southeast Asia with a 5th generation plant with the footprint the size of a large house that can handle 500,000 liters of diesel. His thought was that a lot of the plastic in the ocean is coming from Southeast Asia (not much is coming from North America); therefore, a lot of Southeast Asia companies seem to be doing things to deal with the plastics, and they are doing diesel to plastic which will help them to deal with their problems with plastic and the cost of diesel. He is not sure if it makes sense for us to do anything like that here in the U.S. on a small scale, since we don't really have a problem with plastics going into the ocean, and therefore, there is no need for a solution. Mr. Paradis noted that it is very important to look at the date stamp on many stories you read because they may have been written before we had a significant oil correction in January 2017. There are a couple of stateside businesses that had a refinery no bigger than the size of a moving pod costing \$2.5M, which might seem like a high cost for a problem that we do not even have; however he is unsure with where oil is now how economically viable a business like that might be and asked when Goldman Sachs underwrote their recent project. Mr. Bandazian said it was recent – the closing on their financing was April 16, 2019 and they expect to process 100 tons of plastic annually into low sulfur diesel and naphtha blend stocks and nearly 6 million gallons per year of commercial grade wax. It seems like something we don't have to worry about - the market will create itself.

Chairman Kerr wrote minutes of our offsite meeting with pictures and published it and hopes the members of the Energy Commission who couldn't attend can read it.

d. Landfill Solar

1. Waiting on HB 365 and SB 159 – Nothing to report.

e. Solsmart

1. www.thesolarfoundation.org

A. Start with Bronze level (Placeholder) Recognition after landfill PV is complete

Ms. Braese suggests that we start the application at the Bronze level. There are 4 criteria that must be achieved including:

- Provide a solar statement outlining the community solar goals (We will need help with this from the town).
- Earn 40 points in 8 different categories – 2 in the foundational which includes permitting, planning, zoning and development regulation. There are several different ways to achieve getting the necessary points.
- Earn 20 points in 6 different categories – construction, inspection codes, solar rights, utility engagement, community engagement, and market development and finance.

She will compile data into a reasonable format, send it out and see who we need to contact. We can start at Bronze and if we find out we have enough points in certain categories that would get

us to Silver level that would be great. By next meeting she can prepare a checklist of what we have achieved already and share with the Energy Commission on the Google Group

f. New Solar Up Campaign

1. Was the survey sent out? – No report was made in Mr. Gillis's absence.

g. Eversource bills to calculate demand charges

1. Bing looking at demand charges
2. Adding the pool and library to see if PV will work

A. May need to consider energy storage for pumps/motors

Mr. Lu received the demand charges from Mr. Bandazian and processed the data for the town pool and library. At the town pool we spend about \$10,000/year on the electric bill. About \$2,000 of that is the demand charge (20%) and \$8,000 is spent for on energy charges. The kilowatts are very high at 30KW considering the pool is only in use for 4 months. Trying to recover that 30KW through energy storage would probably prove to be difficult. From a demand charge point of view the pool is probably not the best choice to look at. The library is a different story. It has about \$12,000/year in demand charge (roughly 25%) and \$30,000/year in energy charges. We spend about \$40,000/year on the total electric bill at the library. The power level here is also pretty high at 50-70 KW (depending on the month), but the overall money spent is significant. To simply offset the demand charge would be pretty hard. Putting in a PV panel to recover \$40,000/year would also be hard. In summary: The demand charges are too small to justify energy storage, and the normal usage is too high to cover using PV. Our best bet may be to go back and look at the lights on the playing fields on which are 70% of what we pay is for the demand charge. It makes sense to look at those again and make sense of what is going on with the meters there. Mr. Lu will look at the meters again.

Chairman Kerr feels that if installation is half the cost of installing a solar array and we could achieve that using a volunteer group (if that's even a possibility), then if we got landfill solar that could possibly cover the cost to install a \$20,000 - \$30,000 array at the pool. Spread out over an entire year - at \$10,000/year that would be a good deal. You would be paying for it with money you got from the PV array at the landfill and getting a 3-year payback. It would be a good pilot project.

The geothermal or year-round/daily HVAC might be driving the high energy cost at the library. Water is run through the pumps of the geothermal unit all year long to keep the air at the same humidity in order to preserve the books. Chairman Kerr thinks geothermal is now falling out of favor, and the mini-split technology has become more impressive and efficient. Mr. Bandazian says the library has CO² sensors, so it's not running senselessly. He thinks they still have CFL lighting. Mr. Paradis has a nest system, and you can turn on "cool to dehumidify" and it warns that putting it on will significantly increase power usage. It makes sense that the cost would be high based on what the library is storing and the importance of reducing humidity. Mr. Bandazian says the building envelope at the library is closed cell foam insulated. It's not as tightly sealed as a building would be by today's construction standards, but it is a pretty well-performing building. A couple of years ago the power at the library went out for 1 ½ days in the winter and it still

managed to stay at a comfortable temperature, so it is a pretty well-sealed building. There may be small gains to be made as soon as they qualify for rebates again. If they go from CFL to LED lights there may be some gains too; however, some of the lighting fixtures are a little exotic and difficult to have access to. Perhaps we should have Eversource look into it to see why the power usage is so high.

h. Change transfer station policy to put recyclables in solid waste

1. Proposal to change resident sorting to reduce costs and be ready for any future changes in recycling policy
2. Maybe look at an outdoor screen again as part of the public education effort

This was part of discussion had earlier – we have 2 years to come up with a plan in case the price stays inverted with landfill vs. recyclables.

i. Town Solar

1. Pool PV array size would be roughly 67' x 60'

The PV size would be roughly 67' x 60'. This meeting is running long, so it will be discussed further at another time.

j. Plastic to diesel

1. Jeff Hudson

Chairman Kerr said that he posted on the Google Group an email we received from Bedford resident Jeff Hudson who feels there's no reason to do plastic-to-diesel because the cost of diesel was low enough to not warrant it. He was looking at it from a cost standpoint, not a reclamation of plastic standpoint. Mr. Paradis thinks he was also saying that the process was also inefficient and he was unsure how clean it would be. Chairman Kerr noted that from today's discussion we've learned that it is not really a problem we need to deal with right now.

k. Plastic (#2) to structural plastic wood replacement

1. The company Axion (www.axionsi.com) in Ohio takes #2 plastic bottles and uses them to create structural plastic beams. There is a 26' bridge in York, ME that is the first plastic bridge on a public roadway.

Chairman Kerr said it seems like we should target things that volunteers or Eagle Scouts could do, because we wouldn't be able to convince the town to fund it even though it makes good sense to do. He asked if we could get the word out about the need for volunteers to install this so we could be a beta tester and prove that it makes economic sense over time. Mr. Schneller indicated Jeff Foote is interested in looking at it. Mr. Schneller just needs to contact his company with measurements so they can put together an information packet for him. The sense he got from his discussion is that Jeff Foote would be willing to oversee this. Eagle Scout Troop 5 is always looking for service projects too.

Ms. Rombeau said it would make good sense to connect with the Conservation Commission about grant funding they have received to rebuild wooden bridges on the trails. She will touch base with Richard Moore of the Bedford Land Trust – he knows everything about Pulpit Rock and will know

if there are projects that need to be done. Ms. Rombeau will talk to him about what projects are planned and anticipated.

VII. New Business

- a. Clean Energy NH Member Meeting Discussion
- b. Survey of other NH towns' projects (on Google group under the heading "LES Solar Landfill Feedback)

Mr. Bandazian reported that Clean Energy NH's virtual meeting to solicit input for things they can do will occur before our next meeting. The town is a member of the Clean Energy New Hampshire group. Chairman Kerr would like to know what projects we could undertake as a town. Their website is a good resource to see what projects other towns have done; if they were worthwhile or difficult; and who the contact is in each town in case we would like to replicate any of the projects. The date of the meeting will be posted on the Google Group in case anyone would like to participate in the conference call. Chairman Kerr encourages everyone to look at the Clean Energy NH website too to see what's been done and where.

VIII. Reminders: Next upcoming meeting is July 25, 2019.

IX. Adjournment

MOTION to adjourn by Ms. Rombeau at 8:40 P.M. Seconded by Mr. Russell. Vote taken- Motion Passed

Respectfully submitted by,
Tiffany Lewis