LOGIN at 6:45PM

MAKE KEN DOLSKY Co\_HOST SO HE CAN SHARE SCREEN!!

Building-electrification/2022-4-21/2022-4-21-script.doc

SIT STILL! WELCOME TO OUR 6th WEBINAR ON HEATPUMPS AND BUILDING ELECTRIFICATION THANK YOU FOR JOINING US

TURN oN RECORDING!

* TONIGHT WE HAVE 2 guest speakers. For the 1st 30 minutes, I will discuss Building Electrification and heat pumps. Or the next 15 minutes, Ken Dolsky, our featured speaker from EmpowerNJ, will discuss methane’s extremely powerful role in global climate change and as a toxic gas in your home.

QUESTIONS TO THE END: my wife, Pat, and I lead or are principles in several organizations (look us up later- near last supplementary slide in this deck). A quick story about me. I am a long-term environmentalist. Just over 5 years ago, our lives changed. Pat and I attended one of Al Gore’s free 3 day training program, called “Climate Reality Project”. We came back as strong activists, pushing our local community to move toward clean energy. Now We attend town council meetings, know all elected and managers of the town. We have organized petitions signed by 300 residents, created rallies, and held marches with megaphones,

SHARE SCREEN > DISPLAY 2

SLIDE 1

We expanded to cities around us. Then last year, we expanded our activism to the state of NJ because of the bigger GHG goals.. Last year, we organized a 50x30 team, and successful got Governor Murphy to sign an Exec. Order declaring a first ever NJ goal of 50% total GHG reduction by 2030

We are now using that 50x30 goal as a potent lever. currently 80% of NJ buildings are heated by fracked gas. All NJ long term plans call for the elimination of fracked gas. Our goal: move all residents and businesses to install highly efficient electrically—powered heat pumps. BUT the heavy weight gas industry has frozen any positive movement

SLIDE 2

And are NOW focused on “Building electrification” –

1. My story tonight is about “NJ’s Journey Netzero Building Electrificiaotn”
2. We lead a group of about 60people, called the 50x30 Building Electrification Team”. We report to Sierra Club NJ Chapter, and have guidance from a Senior Advisor from EmpowerNJ Our goal: eliminate GHG emissions from NJ buildings, which currently contributes 26% of all of NJ GHG gas emissions Several subteams; I invite you to join!
* Write docs and letters to convince the governor, and his agencies, to develop regulations & rules favoring building electrification
* Work with our NJ senate and assembly members to write suitable legislation
* Hold this monthly webinar on “Building electrification”
* Help develop “building codes” so that both new construction and rehabbed buildings wil be highly energy efficient, zero energy ready (ready for heatpumps and solar roof panels), or zero energy- meaning already net zero when sold
* If this sounds attractive, then join US@ - I will repeat this message at end

3.For background, here are the basic NJ laws and regulations that guide us. )

4. One of these documents is the 80 x 50 report card on NJ. In NJ, THREE sources emit 87% - the vast majority of NJ GHG that cause climate change.

5. A summary of the bar chart: showing JUST the 3 major sources of GHG in NJ: transportation, buildings, and electricity generation

6. a move to EVs is occurring rapidly, and NJ is on the bandwagon with building charging stations and incentives. But there is little movement to reduce emissions from buildings – and NJ needs movement to reach the governor’s goal of 50% reduction by 2030.

7. We looked at current projections. NJ is projected to exceed the governor’s own 50% reduction by 2030 goal. An exceed it by about 13 million metric tons of emissions per year.

8. ENOUGH of the high level stuff. Lets shift to what YOU can do for your home. The Energy Master Plan promotes Energy & Conservaiotn- I highly recommend everyone take advantage of nice discounts

9. Right Now, you can schedule a low cost subsidized energy assessment of you home If youlive in one of the named cities, your cost is $49. Otherwise, go to the web site shown, and schedule a $99 Home Energy Assessment
The point of reducing your heat loss: allows you to lower your cost of follow-on heating/cooling by converting to a heat pump!

10. Here’s my experience, 3 years ago. I followed the inspector, as he went thru my house from top to bottom for 3 hours. He used a fan in a sealed door to create a small vacuum, and looked for leaks with his thermal imaging camera. Although he took photos, I marked the spots with blue masking tape so I could find and fix later. He found two safety hazards, much to my surprise. My basement had an overhead main air duct that was falling- we quickly propped that up with a 2x4. And discovered my water heater was set too hot, and he lowered it to 120 degrees.. Instead of sending out for bids to fix the problems, I elected to fix my own problems.

11.He suggested my leaky attic trap door was wasting heat, and suggested a thermal cover. Here- is my subsequent installation : a zippered, insulted cover – sells for less than $100 at Home Depot. And I subsequently followed his directions in caulking and sealing
HTE

12. I would install solar panels, to provide all the future electricity I will need, but I am in deep woods

13. my web site electric.smiller.org has the answers: instead of rooftop solar, I should shop for community solar- which is just launching in NJ- and typically saves about 10% on your electric bill, compared to your local utility. , or ask you city to supply bulk purchases of renewable electricity, OR buy electricity from brokers of renewable energy. The brokers buy RECs- “Renewable Energy Certificates”. I have purchased 3rd party wind or solar electricity for 5 full years, and have typically saved 5 to 10% on my electric bill. My web site has a link to ~20 suppliers, which I rank order in price every 2 or 3 months. REGRETFULLY—renewalbe electric prices have been unusually high since fall. I encourage waiting a few months to allow prices to fall (I have a 3 year contract at a low price, so I am a happy camper.

14. I am planning to install all-electric future electrical appliances listed on the right. My primary box on right had NO spares. So I installed a secondary panel- see on the left-for al my future purchases

15. We have an older hybrid – gets 42 mpg. But NOTHING like this plug-in that has gotten 163mpg, over the 40,000 miles since purchase. Most of our driving is with the 30 mile battery range.

16. I am switching gears to describe my favorite topic: my experience with heat pumps. A heat pump is simply an outside air conditioner that has been modified to have a reversing valve- The freon flows one way for summer, and flows in reverse direction for winter.
Only a few hundred dollars increase in manufacturing cost converts an air conditioner to a heat pump.
This diagram shows a centrally ducted system.
The heat pump doesn’t actually create the heat. Instead, the heat pump, SAME as an air conditioner< pumps FREON, a magical chemical (but extremely potent GHG). That freon MOVES the heat from outside to inside or vise versa.

17 This is a ductless – usually called “Mini-split” heatpump. The central air handler is now hung on the wall, and has no ducts.

18. My 1st step to electrify. I replaced my old fracked gas pool heater with an electric heat pump, and have been happy with it for last 3 years. This is an AIR to WATER heatpump – the same as my future plans to replace my fracked gas water heater with to an air to water heat pump

19. My next step: late December, 2021, I went out for bid on replacing ONLY my 1st floor A/C compressor (the fan motor had broken), and swapping with a heatpump. Because I used same manufacturer as my furnace, the end result was NOTHING was changed except the A/C unit swapped for heat pump. Will talk later on how it is operationg.

The difference between a standard AC on the left: the heat pump on the right is on stilts to stay above winter snow, so the fins don’t get clogged.

20. My daughter added a home addition. I asked the contractor (the owner) how he knew about heat pumps- and he said he made it a point to read a l LOT of trade press in the evenings.

21. He recommended this high efficiency mini-split. It works beautifully. It has the air handler in the attic- easy to do with new construction- harder to do with remodeling. Instead of above the ceiling, an attractive unit is wall -mount and conceals the fan..
This gave me the idea to install a do-it-yourself heatpump for my daughter. Her house is quite old. The family room is an add-on room, from maybe 20 years ago, that is very cold in winter.. “Mr Cool” has a line of highly rated do-it-yourself mini-split units, which reviewers say they installed in ½ to 1 day of work. Components come pressuirized with R410A freon -outdoor unit, the wall-hung inside unit, and the freon tubes are all pre-filled. Connecting the units together breaks the seals, and the system equalizes .

22. My 3rd example of the effects of heat pumps- at my church. GHG emissions dropped SLOWLY during 20years of bulb upgrades, added insulation, energy start appliances. In 2021-22, heat pumps were installed, and rooftop solar panels were quadrupled to match the electrical load.

23. The result of all that work is shown here. I plotted the GHG emissions for the last 20 years. . Started in 2003 with 140,000 pounds/year of CO2.. Orange is GHG from burning gas. Blue the GHG from the grid. Numerous energy efficiency projects over the 2 decades slowly lowered emissions.
 2011 blip: A year+ trial of low cost wind electricity was dropped when the contract renewal price was too high. Two things in 2021, finished in 2022 2 have DRAMATICALLY DROPPED GHG:
 six gas furnaces were replaced with heat pumps. Other gas furnaces remain
 a large rooftop solar was sized to replace MOST of the church electricity
 IN Green, negative sequestration, by the surrounding woods is added in, the church GHG emissions are NOW NEGATIVE!!
MY TAKE, and RECOMMENDATION FOR ALL OF US: CLIMATE CHANGE IS NOT WAITING FOR US! Identify AND TAKE the Biggest Hitting GHG Reduction projects!

24 at church: 3 of the 6 heatpumps

25. solar covers all of suitable south-west facing roof – 4 X power about 37kw rating (~47 MWH/year – TBD)

26.STEP 1 I will show how to determine your house energy efficiency, or ability to retain heat. You can calculate directly- these are 3 slides showing how. OR learn how to use free software to determine heat loss. This software revealed that an uninsulated concrete slab floor will absorb 1/3 of the heat from a proposed heatpump. It pays to use a thick pad, and thick carpet for insulation.

USES: 1. Use to PREDICT HEAT PUMP PERFORMANCE IN YOUR HOSE.. determine the required capacity heat pump OR to determine before and after you add insulation and sealing.

The heat loss is directly related to exposed area, the amount of insulation, and the degree to which the house is well-sealed against air leaks

FIRST: retrieve your records from you gas supplier on-line records. I captured a screen shot for my house in NJNGas territory
SECOND: either guess your furnace efficiency, or record the nameplate rating on your furnace or boiler. as you will see in a couple of minutes. –

27. STEP 2 If you don’t follow the math, then you make ONLY THE ONE CALCULATION shown in Bottom in BOLD PRINT The shortcut gives you the x, y coordinates which you plot in STEP 3

28 STEP 3: tells how to plot 2 points and draw a straight line on a graph. Your result should look similar to the red line on next graph:

29. FIRST PLOT: This is the “balance point worksheet” for a certain model “3 ton” Carrier heat pump. I think of carrier as top of the line and expensive. Probably 12 to $15K because all pieces must be installed new- they use proprietary signalling to each other- outside unit to the inside furnace and fan, to the thermostat. It is variable speed. The top horizontal wavy line is the carrier outside operating at MAXIMUM capacity. The bottom horizontal wavy line is minimum speed.
Maximum speed provides 20K BTU/hour at 0 degrees F. IT SEEMS REALLY GOOD- however, ONLY if it meets my house heat requirements. THE RED LINE is my whole house heat requirement, from the previous 3 steps. This carrier unit “balance point” is about 33 degrees. My house needs about 30K BTU/hour at 33 degrees. The Carrier heat pump provides 30K BTU/hour at 33 degrees. GREAT MATCH. However, at lower temperatures, my house heat load is too great- the Carrier is insufficient.. My house is about 40 years old. Two story, each floor 1600 sq ft I have two central forced hot air gas furnaces, one for top, one for bottom floor, each rated at 60K BTU/hour. My house has a large 2 story central foyer, that allows quite a bit of air flow between top and bottom. This means the 1st floor furnace will heat the 2nd floor-- to some extent. The Green line shows my estimated heat loss for the 1st floor, assuming it heats the 2nd floor, is about 2/3 of the total house heat. So you see the 1st floor balance point is about 18 degrees F.
The house thermostat is programmed to switch to a backup heat source. In my case, I wanted that source to be my existing 95% fracked gas furnace. Most vendors would propose using straight resistance heat below 18 degrees. In fact, the setting (not revealed- and fully automatic) is likely MUCH higher than the balance point to ensure optimum comfort. My objective is to minimize my GHG emissions- not necessarioly comfort: my wife and I have no problem adding sweaters when needed in day, or electric blanket at night. Carrier’s price might have been $10 to $15K.

30. Here's a low cost alternative: I have a 9 year old RHEEM furnace I wanted to reuse, including the inside heating/cooling coil is rated up to 36K BTU/hour – which I wanted to re-use. Here is the low cost RHEEM heat pump model I proposed. Balance point of whole house is IDENTICAL to the Carrier. Balance point of the1st floor was 24 degrees. I was happy to use my old gas backup furnace at below 20 degrees balance point.
The Rheem COP: Coefficient of performance predicts low operating cost.. I calculated that the cost of operating my gas furnace is ~equal to a heatpump with COP ~2.9 at 17 degrees F (depending upon gas price) But the vast majority of the time temps are above 17 degrees where the COP is 3 to 4. So, my new heatpump SAVES me money, compared to using my gas furnace (BUT STILL AWAITING ELECTRIC and GAS BILLs for analysis for a full heating season
I went out for bid, and bought this Rheem heatpump for $4900 installed.

I had the Rheem installed January 6. I am very pleased. MY EXTENSIVE TESTING shows this new heatpump heats my entire house down to 32 degrees F. Below that point, I have to supplement a bit of 2nd floor heat by turning on the 2nd floor thermostat.
AND, the 1st floor maintains a constant 68 indoor temp, down to 20 degrees (so these curves tend to be conservative). I set the 1st floor thermostat to turn off the heatpump, and turn on the backup gas furnace at 18 degrees.
THE RESULT: I reduced my GHG from the 1st floor by > 90%. I eliminated ~75% of my GHG emissions, for space heating, by replacing only one of my 2 outside ACs. I am immensely pleased

31. I conclude with more details about our 50x30 Building Electrification Team. If anything looks attractive, we encourage activists to signup to our email list and become as active as you wish.

32. THIS recording, the slides, and Q&A will be distributed to all who registered.

33. heres my email to reach me. AND my credentials as a Climate Leader

34 LAST PAGE- Make copies of this “Balance point worksheet” – Then follow steps 1, 2, 3 on your own

!!!STOP SHARE!!!

* Introduce Ken Dolsky- methane’s extremely powerful role in global climate change and as a toxic gas in your home.