

Feb 2, 2022

Attendees: Rich, Chris, Jared, Cara, Matt, Leigh, Kristin Carlson, Rick Weston, Neale, Claire McIlvennie, Chris Neme, Jill Pfenning, Geoff Hand, Emma Hanson, Tom Knauer, Johanna Miller, Greg Morse, Ken Pulido, Dave Farnsworth, Malachi Brennan.

- Updates on CHS in the Legislature: Broad overview in HET committee - questions about roll of biofuels. Will be looking at life-cycle. Geoff will be testifying on dormant commerce clause. [Draft of the bill as it now stands](#)
 - Legislators have had a few questions that keep coming back: jurisdictional question, life-cycle analysis, cost, who are the obliged parties, concerns about geographic inequity (Chittenden vs other areas), how they are likely to fare (esp with businesses)- not surprising list, with process proceeding nicely;
 - Unsure of timeline to take action regarding interaction with the federal level due to limits on ARPA funds.
 - Wanting to connect CHS and Wx. How do we best advance the two programs in parallel?
 - State used to have to put \$3 for each \$1 from the Federal govt. How to bring both pools of money to be used. Budget writers looking at it
 - ⅓ of Clean Heat credits below 185% of federal poverty level: 25% below 200% federal poverty level, so around 20% of VTers below this new FPL guideline vs AMI for ARPA dollars: if you cross over 300% FPL to counties, it deviates: what is this % number going to be?
- CHS Economic Analysis
 - Analyzing customer econ of heating & water heating, with working group (Chris, Leigh, Mei, Jared, Ken) nailing it down in the next week: propane is cost-effective to fuel switch even when including capital costs to switch: bills go down; same with gas; adding pellet stoves and other features into the mix
 - **Rick Weston, Dave Farnsworth, and Claire McIlvennie have all offered to review the analysis.**
 - Best with variant on it with effect from different supports baked into programs already
 - Is Wx being incorporated? They can be one of the next ones to look at, but were taking a first crack with electrification measures
 - Getting an economic report ready so that the PUC has less of a lift in the future?
 - Legal memo: good to get feedback on it; really helpful to get some sort of graphic with chain of commerce with these types of fuels in VT, to help people understand the whole sale-retail relationship occurs
 - Fuel dealers do have to submit their sales over a certain size, so there would be some documentation of this purchasing process, but more difficult to get it disaggregated

- Just struggles to be fully clear about amounts of fuels in each location/ from where, as federal law makes things tricky for Fuel Dealers
- CHS workgroup activities for the next weeks (tasks that may be needed by the full group vs the communications/outreach group)
 - Other updates: none really offered
 - Legal analysis work group: going to testify, get questions, to float by group if needed, no other work foreseen
 - Economic analysis work group: will be helpful for others to take crack at some other measures; **Chris to send out to the group that met last week plus, Rick, Dave and Claire after some tweaks - probably Thurs**
 - Communications group: Fast turnaround into overview, may not be sufficient for some other groups; comms and outreach that should occur to other stakeholders who are curious to know the guidelines of this
- Second half of meeting: Communications/outreach working group (all welcome, but some may choose not to stay for this working session)
 - CHS Communications and Outreach planning
 - CHS Outreach list: https://docs.google.com/spreadsheets/d/1kEiwaScCG-ZxnYf219UxTK_9IPXpE_wc-QIHhlcPiM/edit?usp=sharing
 - Already got a Digger article out
 - 3 key constituencies: grow coalition out to corners of the triangle: environmental groups in 1 corner (Far enough?), affordability groups (business interests, low & moderate income advocacy groups), fuel dealers– grow from middle into each of these areas
 - Also about who writes commentaries: some who want to know all the details, vs others who would just read a commentary
 - **Commentaries to come from: Rich and Chris, a fuel dealer, (VGS at the right time could), suppliers of clean heat products (Mark Stephenson and an HVAC contractor from another part of the state), especially those that would surprise the audience or unique pairings. Building Energy in Williston. VT Chapter of Refridgerators and contractors assoc or BPPA**
 - People who have done testimony?- as we have already mostly had people from all 3 corners; get intriguing pairings!?
 - **Neale will check in with Denise for a recommendation of a professional who could help run a campaign or give guidance about an action plan.**

Jan 11, 2022

Participants: Kristin Carlson, Johanna Miller, Brian Gray, Jared, Neale, Paul Quackenbush, Rick Weston, Chris Neme, Dylan Giambatista, Richard Cowart, Claire McIlvennie, Malachi Brennan, Geoff Hand, Tom Knauer, Greg Morse, Jill Phenning, Ken Pulido, Emma Hanson

Proposed Agenda

- CHS in the CAP - Moment to reflect on what this group has accomplished - Team effort got it to us this point “civil evidence-based dialogue”. Final white paper is published and available. Was recommended in CAP. Testimony has already started. House Energy and Tech is likely to spend a lot of time the week of Jan 24 on this.
- Legislative process - House committee is very interested in pursuing the recommendation from the CAP and from this group. Legislation is being drafted. Senate is taking testimony on this tomorrow. There has been some preface to this in other testimony - CHS being one of the biggest impact specific policies in the plan.
- Other updates:
 - VGS - Looking how this will disrupt their work. Looking at models of how they would be able to implement this. What credits would they buy or produce? What sort of regulatory framework would help to do this. May be the biggest change facing VGS ever.
 - Some other states are expanding to cover heating as well as transportation (Oregon).
 - <https://oilandenergyonline.com/articles/all/new-revenue-stream-home-heating-providers/>
 - Fuel dealers perspective - impact and costs to customers is biggest concern. But this is an opportunity as well. New revenue streams. 50% are looking at this through that favorable lens, 50% negatively.
 - Legislature will need to task the PUC with a lot of work on this - if it passes this session, wouldn't be in place until Jan 2024 - which underscores importance of it going through this legislative session.
 - Emma - will be testifying on Renewable energy standard. Tier 3 - to qualify has to be EPA certified, for Tier 2 - there is a sourcing guidelines. Have to be enrolled in use value appraisal. Can not do forest to non-forest land conversions (no net loss).
- Update on jurisdictional issues -
 - Dunkiel Saunders - did pro-bono legal research not for any client. Probably a couple more reviews in the next week of so before it is released:
 - Jurisdictional question - does VT have jurisdiction? Yes with a high level of evidence. State regularly acts to protect public health and safety, and this is along the same lines.
 - Does Federal law have any laws that would prohibit this through dormant commerce clause (restricts economic protectionism) - always challenging to interpret. There are a lot of applicable cases such as cases brought against CA low carbon fuel standard. There is no certainty, but it is very defensible if applying at the wholesale level. If at the retail level it is even clearer.

- Or preemption (does a federal law already cover this). - There are a lot of federal laws esp on natural gas sales, but none of those preempt the proposal as outlined.
- Important to frame this as addressing public health and safety, grounded in environment not economy, and based in GWSA. Also the person/company doing the work does not have to be Vermonters. Intent can't be economic protectionism or local jobs. Is about modernizing how we heat.
- Communications - Clean Heat Standard White Paper, is great, but need something shorter for people who aren't going to dive into the details. People are already defining it without enough knowledge of what it really is. What is it? What is it designed to do? Are there pieces that should be changed or added to? What is our process for moving forward a communications strategy?
- Don't want to conflate the cost of fossil fuels with the cost of energy
- Start with the Benefits for the costs and the details.
- Be less antagonistic to the fuel dealers in messaging. Make sure and refer to creating a level playing field for all energy providers. (Bullet 3). Creating a regulatory environment in which ff companies can evolve to new business models that are environmentally and economically competitive.
- Just transitions framing around protecting impacted communities.

Comms Volunteers: Chris Neme, Rich Cowart, Neale/Dylan, Rick,

In the early days it is likely that a CHS won't be expensive. There are already a lot of activities happening that would create clean heat credits. Can EAN look at this question? How close are the current pace of change activities for meeting what the standard would be under clean heat? Is it closer to what RGGI does for electricity? (but if this roles out in 2024 we have one year to meet our targets). Though 2030 is about 3x greater than 2025's targets.

Next meeting in less than a month. First Tues in Feb
Communication m

October 4, 2021

Participants: Rich Cowart, Leigh Seddon, Ryan Lamberg, Emma Hanson, Geoff Hand, Malachi Brennan (Geoff's office), Tim Briglin, Tom Knauer, Jared Duval, Neale Lunderville, Chris Neme, Greg Morse (VGS), Rick Weston, Kelly Launder (PSD Efficiency and Resources Division), Cara

1. Comments on the Whitepaper - reflections on things that should be amended, added to
2. Hear from Geoff and Malachi about reflections about jurisdictional questions in the policy
3. Outreach and education next steps.

- Andy Flagg - PUC analyst who used to work for RGGI inc. He is concerned about the portion of the paper that frames this as a choice between two systems that might cast cap and invest systems in a bad way. Wants to make sure we don't cast RGGI and TCI as negative.
- Leigh - the discussion of the two options at the start of the paper might not be helpful anyway.
- Jared - Draft in Google doc. No cap and invest framework ready to go for thermal fuels. Some folks want to link with the Western Climate Initiative and possibly link with TCI and RGGI. VT can develop this much more quickly than a cap and invest program.
- Emma - Pleasure to read the paper and see how thoroughly and appropriately advanced wood heat was included. Would be helpful to have the first page help to be very clear to describe the program.
- Neale - How VGS will treat their energy efficiency utility (like Tier 3, established under statute and regulation). May overlap with obligations under a clean heat standard. Probably can be dealt with the same way as Tier III)
- Jared - Science and Data Subcommittee of climate council - agriculture community is concerned about emissions reductions relative to scale - and whether they would be required to reduce emissions by 16%. CHS is designed to meet thermal percentage. If ag can't reduce by 16%, thermal and transportation might need to be higher. Paper can be changed to make that possible.

Structure and Jurisdiction

Geoff - Initial research and review of cases and material - Need to make sure that it isn't seen as interfering with interstate commerce. Preliminary and high level feedback. Does the state have jurisdiction? Still waiting for a little more information in terms of the architecture of the actors. Focus on wholesalers selling into the state - preliminary thinking - that shouldn't be a jurisdictional issue. Should be proper state jurisdiction. Dormant commerce clause -

1. Does the statute discriminate against out of state actors (reasonable argument that you are not - though don't have instate actors other than VGS which is a regulated utility),
2. Regulation wholly outside the state's boundaries? (don't think this applies - activity and commerce within the state?)
3. Are you imposing an excessive burden vs the benefits? - they typically look at the purpose. (nothing that should prohibit this).

Richard - are there other examples from other states?

CA - low carbon fuel standard

Emma - if it positively affects out of state pellet dealers? Chris and Rich - yes that could create credits. Not just pellets. An efficiency program from elsewhere could do the same.

Neale - need to make sure VGS doesn't end up with all of the regulation because they are easier to regulate.

Jared - Looking at life cycle emission of fuel. Have always thought of this as applying to wholesale importers of fossil fuels. In terms of wood - treated as carbon neutral. If there were a life-cycle emissions factor applied to wood heat?

Rich - not trying to tackle lifecycle analysis. Just for fossil fuels. Otherwise you get drawn into life cycle conversations around electricity too.

More info on how sales currently occur would be helpful. Need to be able to show the commerce is not “Wholly outside the state boundaries”. Transactions are occurring within the sales in vT.

Any fraction of fuel supply that could be argued to not be jurisdictional - is likely to be jurisdictional as soon as a truck crosses the state line.

Currently a retail tax to the fuel dealers.

Outreach -

Workshop with environmental groups (VPIRG, Sierra Club, VNRC, REV, Adam Necrasson, and Rebecca Ramos) - Interesting session. Generally both support for CHS alongside

Weatherization at Scale. Concerns and questions include

- If we fail to do lifecycle analysis properly - we could be in danger of enshrining bad policy. The design as it has been written in the whitepaper should do this right - but nervous that bad stuff will be permitted.
 - Independent verification could help with that. CA LCFS: <https://ww2.arb.ca.gov/resources/documents/lcfs-life-cycle-analysis-models-and-documentation>
 - There are good analysis already for biofuels from CA that we should probably use instead of recreating the wheel.
- Does this favor biofuels over electrification? No it is just based on tons saved.
- Concern based on what they have seen from Tier III. Electric utilities are prioritizing projects that use electricity instead of efficiency. Would fuel dealers to the same and do the transition in the way that best serves them.

Ryan Lamberg -

- Worked on low carbon fuel standard out west. Biofuels often come first to market because they work in equipment that we have. Lifecycle needs to be at the core of the conversation.
- Recognize the possibility of inherent bias. That is part of why Tier III should stay in place - to help balance. Customers won't accept things that are really more expensive. What other kind of policy framework would set up a different dynamic?

Suggestions on outreach.

Webinar - Intro, followed by Rich and Chris. Describe what the CHS standard is and how it works, not as much the deliberation. Important to note that this has been tried and is working elsewhere. People get nervous when VT is trying something totally new and unique.

There are several things that would need to happen before this is adopted by the climate counsel. But they need to understand it.

Without CHS it will be very hard to meet the mandate.

Aug 3, 2021

Participants: Rich, Chris, Jared, Leigh, Cara, Tom Knauer, Jeff Monder, Greg Morse, Rick Weston, Ken Pulido, Claire McIlvennie

Tentative Agenda

(1) updates on feedback received and refinements to the draft white paper

- Relationship with Tier 3 - Feedback from GMP, BED perhaps others. More clarification going into the paper about 1) Tier 3 is a subset of a Clean Heat Standard - Tier 3 projects would have both a Tier 3 and CHS credit. 2) Will add detail about how Tier 3 has made a very good start in this direction.
- Coordination between CHS and other policies (eg, can we make sure CCHPs are addressable by the electric utility in order to earn credits for it?) Overall CHS sets pace of how far we want/need to go. Any actions otherwise creditable toward that goal can earn credits. Like with Renewable Energy Standard. (Example - A rental efficiency ordinance to improve equity - something like that could help generate CHS credits that could help support the project). Want to keep the program very open to allow people to come into the program any way they can.
 - Would a CHS change criteria used for setting efficiency budgets for VGS? There might be rate implications. Like RPS regulations for electric providers.
 - Would be useful in the paper to shared some examples about how this works for regulated and unregulated providers
- Bring in social equity earlier in the paper - More details about social equity being advanced through program design.
- How to treat voluntary RNG, existing and new - Should count toward earning clean heat credits just like everything else, making sure the provider doesn't get two credits for the same action.
- Administrative burdens, state staffing levels and TAG costs -
 - TAG itself isn't a super expensive process in Tier III (GMP bill for 2020 was probably 35-40,0000 and that is 75% of state). There are also admin overhead costs at each DU. Those numbers would be in the annual claim reports. That was several hundred thousand dollars for GMP. Process of tracking credits and coordinating activities is an IT task needing a more sophisticated system than currently in use - there will be a system component to that pricing. There are also staffing implications for the staffing and board - at least another 1-2 FTE for process, policy and rule setting, compliance. Heavier lift in the earlier years than later.
- Multi-state possibilities? (not something we want to wait for)
 - Don't need other states to make this possible. Can't wait in VT - we are the only state with a 2025 obligation, other states start at 2030.
- Deliverability – pipeline vs liquid fuel rules

- There is a distinction between bundled vs unbundled RNG. Bundled means that the company is acquiring the emission reduction rights and also the transmission access rights necessary to show the gas molecules could in theory be delivered. Bundled would be considered deliverable - as would RNG that is being trucked into the state, or within the state (like from a landfill in VT). Unbundled - where they don't own the transmission access rights - off the table for now unless there is later a bilateral or multilateral agreement with other states that brings this in later. Also need a mechanism to make sure there is no double counting. Perhaps a registry. Bundling is market tested approach that keeps a strong CHS, strong credibility. This also seems to align well with fuel dealers and what will be expected of them.
- Default delivery agent and likely small role thereof
 - Agency of last resort. No one is forced to use them. Need to make this more clear in the text.
- Legal research needed on jurisdictional propane systems and on point of obligation
 - Still waiting on legal opinion. Seems to be high levels of agreement in general. Leg council is unlikely to take this so a lawyer is likely to have to be retained for this analysis (this workgroup still has \$12.5k which could be used to help move things along). Should be able to get an assessment for \$5k (perhaps get the overview and then add the details as an appendix later). Harvard clinic? John Hollar? Darren Springer? VLS clinic? Rich will reach out first and may follow up.
- District heat option: Should add it into the paper as an option. Would be creditable. Each project would also be unique and need to be undertaken separately.

Who gave comments? Bournes, GMP, VT gas, Fuel dealers, BED, Tom

How to avoid benefits deserts - if obligated entities find low cost ways to meet the standard, they might be in certain geographical areas and/or demographics. Social justice/economic carve outs would need to be designed in to address this. Perhaps with a higher weighting in earlier years. Need to make sure equity is built in whether a carve out or some other way. Need to make sure that there are definitions (ie how to classify low income) and data to support social needs.

(2) discussion of outreach.

- Legislator outreach - Conversations with legislators who are quite interested in the topic. "Wow this is interesting, it might work, we might be able to move on it". Have spoken to members of the climate caucus, Pearson and Copeland-Hanzas. Will need to be in front of jurisdictional committees - House might lead on this.
- No official outreach to administration yet. That will have to happen. (Though it has come up as part of Climate Council, which Admin. Is actively involved in).
- Biofuel industry conversations - Productive conversations with Matt Cota and biofuels dealers.
- Time to talk about the program with people personally at this point - especially legislators. Practicing to talk about it succinctly. At EAN summit there will be a

chance to talk more openly about it too. Simplicity campaign - trying to be as succinct as possible - Rich putting together a graphic on this.

- Add a longer event like the Weatherization at Scale Coalition unveiling.
- Need to update webpage for CHS on EAN webpage.
- Climate Council recommendation for CHS

Main remaining question is the legal question. Aside from that, should be able to finish the white paper draft in next two weeks.

June 29, 2021

Participants - Rich Cowart, Chris Neme, Jared, Cara, Don Rendall, Claire McIlvennie, Jill Pfenning, Greg Morse, Rick Weston, Ken Pulido, Tom Knauer, Leigh Seddon, Gabrielle Stebbins

Meetings - Set meetings every second week. Skipping next week.

Work forward from a desired publication date?

Public end of July?

Review and engagement.

Climate council won't want this much detail on CHS. They do need more than 2 slides. They might need the executive summary of this document.

Feedback:

Who?

What? Specific topics or questions

How do we gather feedback?

Marking up paper

Webinar plus breakout rooms to discuss

Individual meetings

Received feedback from VGS, GMP, EAN, Tom,

Major comments from GMP -

- Point of obligation - Does VT have the authority to impose obligation on wholesalers? Would that keep wholesalers from selling to VT? How would they prove they had done it?
- Intersection with Tier III -
- Attribution - If obligated utility is doing Tier III - how do you separate? If more than one party is putting funds into the same project.
 - Criteria - 1. Easy to administer. 2. Minimize double counting. 3. Encouraging collaboration
- Counting credits differently between Tier III and CHS might be seen as an issue.

- Different units too (energy vs GHG Emissions)
- Default provider
 - Would this create a new statewide entity (or be taken on by someone who already has this experience).
- Is a legal section of the paper needed?
 - There is still EAN budget if needed for a legal review.
- Questions include
 - Does VT have the authority to impose obligation on wholesalers?
 - There is an analog in California and probably elsewhere that should be looked into.
 - Could add to paper that it is ok to change the level of obligation to the fuel provider.

VGS - comments

- Focusing on things that will happen in Vermont. RNG and biofuels may be sourced outside of Vermont. Would things have to be burned in Vermont to count? If it is added into the pipeline anywhere in US that can deliver to VT it should be creditable? But that can lead to the question of why biofuel has to actually be delivered to VT in order to count. Related to deliverability standard. Having a deliverability standard allows VGS to get best price, but also to be selective around other criteria (sustainability for example).
- After 2050 there is the possibility of offsets in the GWSA, but not before. Analogy with RES for electricity.
- Hard to scale up local RNG projects in the short/medium term
- There is a large supply of potential RNG out there - how would there be any change in VT if we allow for deliverability standard? Would this just be Vermonters paying for digesters etc put in other places?
 - Obligation starts fairly low - easy to satisfy in the early stages - without importing RNG.
 - If out of state projects work for RNG, why not for efficiency, fuel switching, etc. RPS boundary exists for Vermont despite electric grid tie-ins. Could create a boundary as well for RNG to keep the program from being washed out by getting credits from a huge area far from Vermont.
 - RPS works in part because other states have similar obligations, that would be true in terms of CHS and RNG.
 - There could be a declining set aside allowing for the current limits on RNG
 - In terms of the RPS there are other benefits to instate generation, like reliability, which might not have an analogy with CHS.
 - Would multipliers apply to RNG - (for example a landfill project that is captured methane that might have been off-gased)? Some sources of RNG have a better life cycle effect, but VGS isn't arguing for a 20 or 30x credit.

- Next steps?
 - GMP's issue on wholesale suppliers. (Chris can reach out?)
 - Further conversation around gas and RNG conversation (Chris, Don, VGS staff).
 - Wait 2 weeks to share?
- The group authorizes spending on legal counsel
- Rich commits to conversations with VGS and GMP.
- We will meet in a couple of weeks with answer to thorny questions and then get ready to reach out to fuel dealers.

June 22, 2021

Participants - Rich Cowart, Cara, Jeff Monder, Neale Lunderville, Rick Weston, Tom Knauer, Claire McIlvennie, Chris Neme, Dave Farnsworth, Ken Pulido, Leigh Seddon, Jared Duval, Jill Pfennig, Greg Morris, Gabrielle Stebbins,

Recording:

https://us02web.zoom.us/rec/share/RNK3a8x7SZeton6PCjgC80MoqwNGXHzYZACrj1bVDUuYAMobLhRty1hz_jz7umSD.3gDbPyVsTZuwE8CL Passcode: 7@m&iPv0

Also like to plan the outreach and action steps to take up next.

- Representation - There are a lot of Responsibilities that need to be assigned - not everyone who has an assignment is included in the group at this point.
 - Fuel dealers,
 - PSD
- **Should efficiency count** as an eligible, creditable resource under the CHS? Early on, we said "no" but since the main goal is to meet -40% and this requires both EE and CH, perhaps all resources should be countable. This draft says "yes" – so we should discuss
 - Two blades of a scissor - both needed
 - Elegance and simplicity to get to CHS goals. Need to keep an eye on interactive effects, but want to leave flexibility in how to get to the amount that needs to be added up to.
 - TAG process will have to deal with interactive effects - could be done by having number of forward year credits declining through time. (ie perhaps 10 in year one, declining year by year into the future for the number of years Wx is deemed to earn).
 - GWSA gives us that trajectory.
 - Efficiency can also come about through getting a more efficient technology that doesn't get you all the way to fossil-free. Both are valuable as part of the way to get here.
 - A furnace change out basically locks you in for many further years. Weatherization is less known in terms of interactive effects (if you change out to a heat pump a year after weatherizing the weatherization savings are less than if you had kept a fuel oil system for example).

- the strength of the “lock-in” related to different fuel sources. Because fuel-oil boilers can be run on B100, gas boilers can run on RNG. Lock-in seems most problematic for new propane installs, for which there is not a low-carbon alternative currently available in the near term or projected to be available in the mid-term.
 - What if the furnace/boiler type of efficiency were allowed to count up through a certain year such that none of those measures would persist for longer than the end date of the CHS?
 - Credits need to be worth a specific amount of GHG emissions reduction, any adjustments on equity should be made in policy not in the amount of credits given.
- Should **industrial thermal energy** be counted in the baseline, mandatory reduction fraction, and creditable actions? (and does this in effect mean all industrial fossil use – are there any non-thermal industrial uses in Vermont?)
 - Tier III differentiates between household programs and larger custom projects on the industrial side.
 - Industrial should be included. Otherwise there is too much pressure on households, and that is who we are most concerned about.
 - That also aligns with how the state measures emissions.
 - This seems pretty unanimous.
- **Life cycle analysis:** the text describes the difference between external emissions (eg pipeline leaks outside of Vermont) that are not counted either in Vermont’s baseline nor among creditable actions on the one hand, and the need to consider lifecycle net impacts when giving credits to biofuel substitutes. Is this the right approach?
 - Biofuels treated differently from other measures in 2 ways - not just at point of combustion, but includes lifecycle impact and attribution (not being counted in another place)
 - This may make sense for the time being. Cadmus and EFG are doing a review of VT’s current GHG methodology and may add life-cycle elements - which would give ability to do more integration.
 - ANR currently doesn’t count biofuels other than wood.
- **Should Tier 3 credits count** towards meeting CHS mandates? – i.e., should Tier 3 act as a specific “carve out” of the larger CHS mandate, keeping utilities in the game at least for that portion of the overall goal? If so, can those credits also be used by obliged entities towards their own obligations?
 - There may be initiatives other than just Tier III that apply in the same way (EVT incentives, RGGI revenues). District energy
 - It will lower the cost of compliance while hitting targets
- **Should the PUC be given the roles we assign** to it in this draft, or should those roles be taken on by one or more different supervisory agencies?
 - Yes. It is built for this kind of a process. With electrification as a critical strategy for climate change we will need to look at least cost, long-term electrification solutions.
 - Electrification will be in the center of this, but there are other solutions like biofuels, advanced wood heat, efficiency, etc.

- Do we think the PUC is interested in this? It depends on the chair and staff
- Coordination is important and funding for staff/administration to support the work.
- Here's the article I was referring to: <https://energynews.us/2021/06/16/maine-utility-regulators-cant-consider-climate-in-their-decisions-a-bill-headed-to-the-governor-can-change-that/>
- Funding idea for PUC administration could come from a small charge attached to program pricing for the credits.
- This draft says **attribution does not matter** (except for Tier3, where utilities must show the results of their work). We don't care WHY an action was taken, we just want to them to add up to the amount of CH that should be added each year. Credits can be acquired from any measure by any obliged entity.
 - Synergies make sense.
 - Keeping underlying assumptions consistent.
 - Many layers of benefits
 - Add examples to the end of the paper that shares how different options might work as an appendix.
- **Energy justice and equity** in the application of the CHS. This is new text, but following the lines of the conversation we had a while back. I have proposed some specific metrics. Reactions?
 - Question about the placement of the section. And separating the background from the implementation pieces.
 - Need to mention the renter population explicitly
 - Statewide rental efficiency ordinance - setting a floor for statewide rental units.
- Any other questions you would like to raise !

Richard and Chris would like detailed feedback by the end of the week - If there are significant changes e-mail the group and call them out in detail.

Next steps:

- Complex to understand how it affects finances for an obligated entity.
- Incorporate feedback into this draft and then talk about process timeline and goals, using what we have already drafted. Jared and Cara to t that up.
- What materials would we share with other stakeholders? Executive Summary? Slide deck?

May 18, 2021

Participants: Chris Neme, Cara Robeck, Tom Knauer, Jeff Monder, Jared Duval, Neale Lunderville, Rick Weston.

Continuing to walk through Chris' draft labled May 18

Options for Acquiring Credits

- Generate credits
- Contract with other parties to acquire credits.
- Buy on open market
- Assign their obligations to a default provider - designated statewide.

General agreement on these as the options.

- This works at the wholesale level, but may not work if we chose to go to a lower level because of competitiveness.
- Fourth option may be the same as non-compliance, but maybe the payment happens first to allow for financial continuity.
- May want to rationalize non-compliance payments with Tier III (Or maybe not)
- NCP Premium - Set it at the societal cost of carbon instead of 25% premium?
 - Climate council contractor will be looking at social costs of carbon.
 - Ends up being behind when payment would have happened - another reason for a higher premium.
- Who is the default provider?
 - EVT? Do we even make a recommendation in the white paper?
 - They might be providing some of the compliance credits, does that make it a conflict? Probably not?
 - Could also be Clean Energy Development Fund
 - Competitive solicitations makes more sense.
- Note that clean heat standard in CA is quite complicated at this point
- Will off-sets have to be in VT? If it is a delivered fuel, a heat pump, etc. In a pipe system, conceptual principle of deliverability. If it touches the north american grid it might be considered deliverable.
- Blockchain type system - each of the projects have to be able to know that only one person is buying the renewable attributes. Tracking system (auditable and verifiable) to make sure we don't double-count. Would need to be regional, beyond just VT. MA is doing a lot on this as well.
 - Could also be connected to Ag/waste management....
- Double counting concerns
 - With Tier III - wouldn't happen. We need a 40% reduction, Tier III can get us to a certain part of that, but they still count toward that, like a carve out
 - VGS buying renewable credits from RNG outside VT - how to know the provider hasn't sold the same credits elsewhere.
 - Dairy manure methane as negative is only true if there is no agriculture regulation that directly affects those same emissions.
 - Some in ag community feel that biogenic methane should be treated differently than geologic methane.
- Spot audits - Tier III does something like this for statistical relevance

- Offsets - blockchain is being used for corporate verification of forestry offsets and other things: <https://www.usv.com/writing/2021/04/tokenized-natural-assets/>
- Tying equitable distribution of NCP to make sure that the most needed changes take place in terms of lower income, renters, etc rather than low hanging fruit. Without reducing carveout for lower income projects.
- Some of the revenue growth generated through this could be used to support low income customers who are still on the systems.
 - Rate design may be impacted by reduced number of folks on the system.
 - LIHEAP like transfer of funds to low income.
- There is already a market for heat pumps - it is happening anyway, so how much funding do we put toward it when there is already momentum in the market beyond the target of the distribution utilities.
 - If a lot was going to happen anyway the price to pay for them will be lower.
 - Math may be hard to work out
 - Premium for fuel offset projects targeted to low income customers.
 - This framework could conceivably also be applied to transportation fuels (especially if we are not joining TCI) - make a note that we haven't explored in depth, but that it could be used for transportation too.
 - Similar structure, but parallel? Or allowing trading across?
 - Chris will update and resend. Request to send Chris any additional comments or concerns before the meeting next week.
 - Assuming we won't have a meeting next week.

May 11/2021

Participants: Tom Knauer, Cara Robeck, Jeff Monder, Neale Lunderville, Claire McIlvennie, Rich Cowart, Dave Farnsworth, Chris Neme, Jared Duval, Brian Gray, Leigh Seddon

Updates - Riley Allen appointed to PUC starting there in a couple of weeks.

Walk through policy outline

Changing baseline to most recent year of fossil fuel savings - % numbers need to grow faster because it is a percentage of a decreasing fossil fuel use.

GWSA statutory targets relative to 2018 numbers - these should be the goal.

- 14% reduction by 2025
- 40% by 2030.

Because you are taking percentages of declining percentages as years go on (not based on baseline year),

	increase in % of previous year fossil fuel sales requiring credits	Total % of previous year fossil fuel sales requiring credits	remaining fossil fuel sales	Annual Increase in required credits	Total credits required if based on previous year sales	Statutory targets (vs. 2018)
previous years			100.0			
2023	3%	3%	97.0	3.0	3.0	
2024	4%	7%	93.2	3.8	6.8	
2025	5%	12%	88.8	4.4	11.2	14.0
2026	6%	18%	84.0	4.8	16.0	
2027	7%	25%	79.0	5.0	21.0	
2028	8%	33%	73.9	5.1	26.1	
2029	9%	42%	68.9	5.0	31.1	
2030	10%	52%	64.1	4.8	35.9	40.0

Two separate obligations and one thing can help you meet both of them. Incentivizes working together between gas, fuel oil, electricity utilities. Want to get to 40% in the least cost way. Discussion about whether it makes sense to have separate or combined goals. Wanting to have a least cost option.

- Jeff - concerned that there isn't a need for GMP to sell the credits. - issue of "but/for" and whether you get less carbon credits.
- Chris - could leave to the Commission to figure out how to get to the targets.
- Jared - Which baseline you use makes a difference, especially for 2025. Statute doesn't say what year is the baseline for proportional reductions. Some sectors may be able to more cost effectively reduce emissions than others.
- Can provide predictable reductions, pro-rata proportion will value between market shares.
- Brian - concerned about higher costs for customers. Generating credits through efficiency (and heat pumps) allows for more diversity
- Have been talking about weatherization being parallel instead of integrated. Why couldn't it be part of this work?
- If weatherization is included there would need to have a series of credits for the lifetime of the measures, worth more in the early years - which creates a greater incentive in the earlier years.

- Efficiency reduces how many credits need to come in, but how much and for how long.
- Deemed savings in Tier III are accounted as an average.
- Allowing weatherization in the program might allow for more alignment over time.
- Weatherization is really important for making clean heat options more effective.
- If you include Wx as a measure, is there a way to incentivize folks to weatherize and install clean heat (ex. heat pumps) at the same time? I.e. with a credit multiplier or some other mechanism
 - some of the DUs offer differentiated incentives for HPs based on whether the residence is weatherized or not.
- Concern about keeping costs affordable - especially for those left behind not making changes.
- Spend the first years focusing on lower income customers? Higher cost but more just.
 - Which also address issue of renters.
 - This will be more expensive, but also the upper income folks use twice as much fuel. So less savings.
- Stimulus funds could go towards LI programs with higher costs
- Cost analysis is of interest. VGS/Neale might be able to provide this within a week or two.
- Vt Fuel dealers had modest numbers when they presented.
- EAN pathways model would be good to look at for scale of ideas.

5/4/2021

Participants:

Riley Allen, Cara Robeck, Chris Neme, Jeff Monder, Rick Weston, Claire McIlvennie, Jared Duval, Leigh Seddon, Neale Lunderville, Dave Farnsworth, Rich Cowart, Tom Knauer

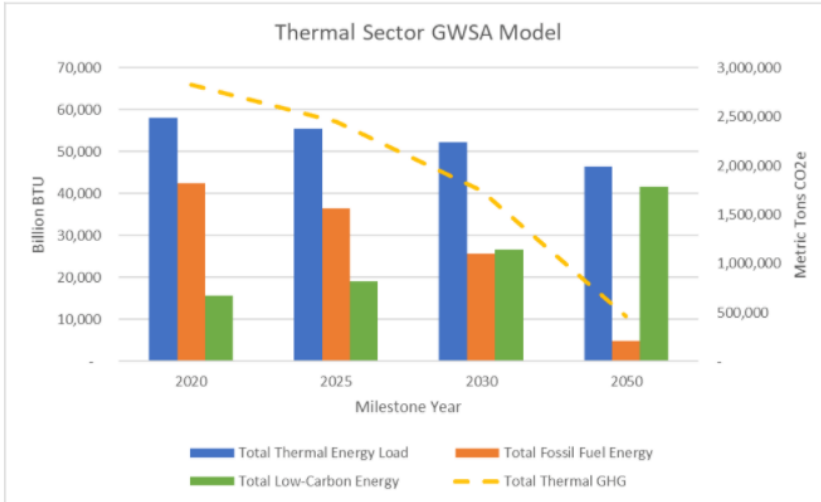
Leigh - Presentation of Thermal GWSA Scenario

Background:

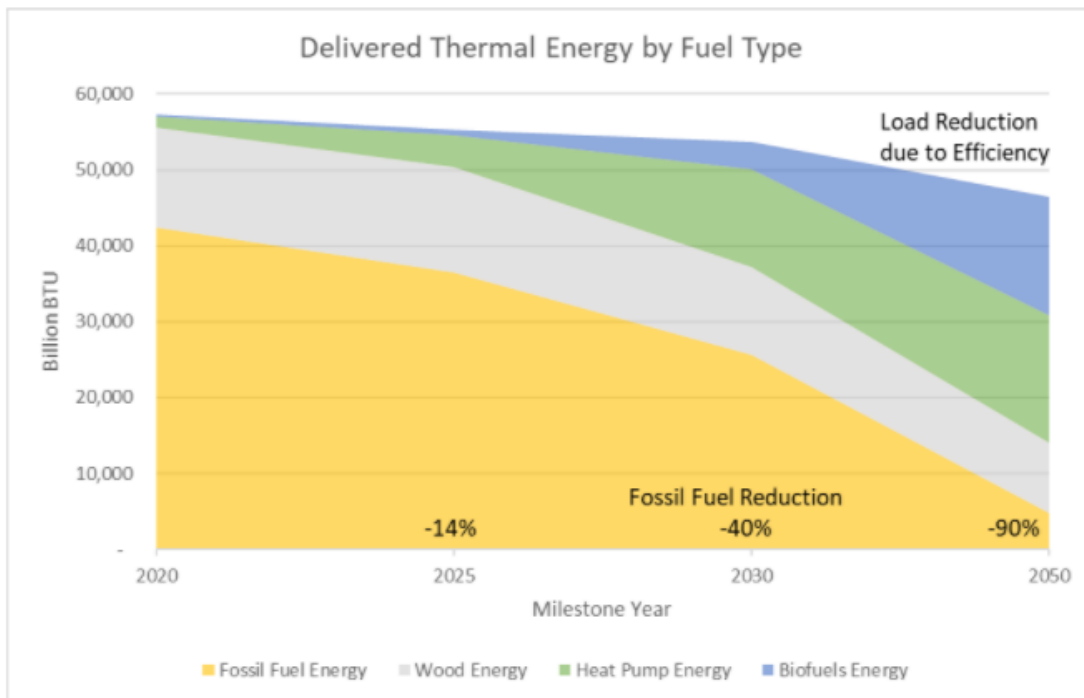
- Model annual thermal energy loads and fuel use to meet the requirement of the GWSA and the CEP goal of 90% renewable fuels by 2050
- The workbook is based on the assumptions and low carbon pathways presented in EAN's GWSA Pathways workbook, version 2, released April 2021
- Weatherization & Efficiency are modeled as load reducers for the three sectors (R 20%, C 15%, I 10% by 2050)
- Fossil Fuel reduction is modeled as a proportional annual reduction in sales

(therefore GHG) for each fossil fuel type.

Milestone Year Changes



The Transition to Low Carbon Fuels

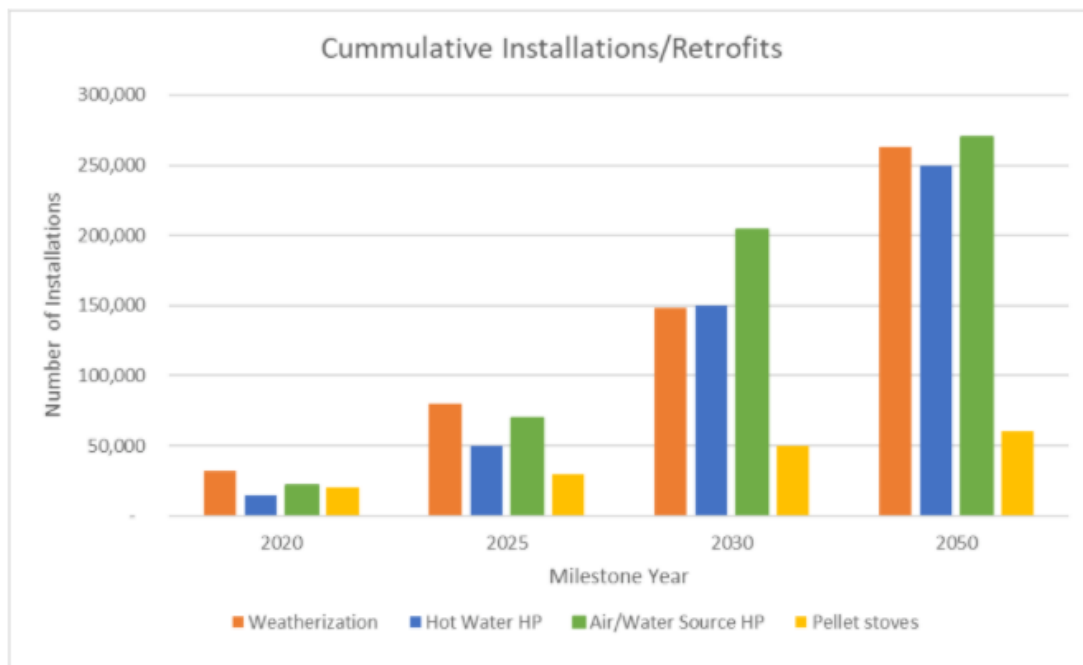


Clarification - 2018 baseline.

Modeled biofuels based on CA - though this is a little more conservative (we aren't using a negative number for biofuels, using 0 instead). ANR will need to create a model for biofuels. Itron and VELCO high numbers are being used.

We are modeling biofuels on top of what ANR is doing because they don't have a measure for ti.

Cumulative Installations & Retrofits



Heat pumps - not sized to do the entire house in the calcs by 2050 - complementary heating sources.

2050 projections are much more speculative than 2025 and 2030 - more hazy.

Chris Neme - original [CHS policy outline](#)

Changes - will need to be based on 3 year of actual sales. (to smooth out weather fluctuations, economy changes, etc). Three year average or just a weather adjustment/normalization.

Clean heat credits need to be associated with CO2e emissions rather than fossil fuels directly.

Eligible measures - May not need to address CCS or offsets yet. CCS might be paired with hydrogen. Longer term conversation.

Offsets not allowed until after 2050?

CCS may move into the allowed category.

Look at CA standards that already exist around deliverability.

Allow more flexibility in where companies work for economies of scale and flexibility in delivery.

Strengthen TAP process - Changes happen on a going forward basis.

Program needs to be about gross emissions

PUC doesn't currently approve the TAG

Triennial 3rd party audit for efficiency

Need to think about lifecycle of fuels? This program can rely on GWSA/ CEP numbers for the denominator, for numerator more of lifecycle would be helpful - lifecycle doesn't fit in ANR inventory. - Program should fit within the other work happening in the state - but we don't have to measure everything the same way. RPS doesn't wrap into the GWSA requirement

Feedback to Chris before next week and we will keep walking through the outline.

4/27/2021

Participants: Riley Allen, Cara Robeck, Chris Neme, Jeff Monder, Rick Weston, Claire McIlvennie, Jared Duval, Leigh Seddon, Neale Lunderville, Dave Farnsworth, Rich Cowart, Tom Knauer

Other thorny issues we might want to look at before writing a white paper - agriculture. Getting input from people other than this group (fuel dealers, etc).

Timing - draft by end of May, not final paper.

Jared - Heard from Matt Cota in terms of some questions related to EAN pathways Model. Substitute options are really RNG and Biodiesel through 2025 and 2030.

Rich - Hopes to have a completed draft that covers all topics by end of May. Thorny topics ahead

- reaching out to others - for equity conversation.
- Political reality check - with legislators who might be interested in the topic. To get read on what is legislatively possible in the coming year.
- Biofuels and woodheat pathways to think about how we count those emissions.
- Companionability, program coordination with weatherization and energy efficiency side of building sector. Discussion started at weatherization. Need weatherization and clean heat standard to work together.

Chris need to devote future meetings to the program coordination with weatherization, another one with ag sector, biofuels and woodheat, and outreach around equity, fuel dealers, political realities. Chris will prepare an outline with a cover for 2 weeks from today (May 11).

Important Context

- At high level, there are two types of compliance options:
 - Renewable fuel – RNG, biodiesel, etc.
 - Fuel-switching – to wood or electric (heat pumps)
- Different compliance options impact customers/equity differently
 - Renewable fuel imposed on all existing customers (Leigh’s note - some customers may be willing to buy RECs to be more “renewable” / Neale notes that is the VGS experience and more commercial than residential. But some of the costs will need to be socialized, though there could be a lower income rate to ameliorate impact. /Rich biodiesel is similar - can be marketed to different customers)
 - Fuel-switching requires voluntary customer choice/decision (and capital)

3 Types of Equity Considerations to Prioritize

1. Cost sensitivity

- Some compliance options will inherently impose higher costs/rates
 - E.g., socialization of higher cost RNG in price of gas
 - E.g., spreading of VGS fixed/sunk costs across declining sales would increase rates
- Lower income customers that stay w/current fuels cannot afford more

2. Accessibility

- For some customers fuel-switching could lower energy bills (*even relative to today*)
 - E.g., conversions from propane to high performance heat pumps
- Low income customers don’t have resources to afford large up-front costs necessary to switch
- *Maybe also some customers for which there are other barriers to such conversions*
 - *Race? Language? Other?*
- If unconstrained, obligated parties will find the cheapest conversions for themselves
 - Will be higher income and other demographics that are easier/cheaper to recruit
- (Rich addition - clearly a barrier for tenants)
- (Jared - in terms of resources to afford up-front costs - can be true if replacing a piece of equipment that is still useful, but when a piece of equipment has reached the end of its useful life and needs to be replaced, to what extent can we make sure there is no larger cost for the cleaner option than for the less clean option.) The

extent to which we can focus on equipment rather than fuels can lead to greater equity. A carbon price on a fuel where there is inelastic demand can feel like more of a penalty than an incentive, especially for renters who can't choose the system.)

- Chris - Switching a time of natural replacement - only have to support incremental cost rather than replacement cost. Doesn't eliminate issue where customers may keep a bad system limping along.

3. Job/business impacts

- Propane and fuel oil businesses likely to experience some adverse economic impact
- New jobs selling/servicing heat pumps & wood systems won't necessarily go to those losing jobs

Group focused discussion on first two of these. Didn't get to discussing response to the job impacts.

Other Potential Equity Lenses

- Renter vs. owner
 - Low income disproportionately renters
 - Renters have less (no?) ability to affect heating system choice
- Urban vs. rural
- VGS vs. delivered fuels (Jared - may need to distinguish between different kinds of fuels/ propane vs heating oil - may be easier for heating oil because of biodiesel than those who deliver propane only. There isn't a renewable alternative to propane (and the market in the SE isn't pushing for it). Chris - Sense that not many propane dealers in VT - larger companies and few. Rick - Yes many have been bought up recently. Rich - There will be competition for biofuels as other states in the NE also try to clean up - that will create price pressure on those fuels.
- Electric utility service territory
 - Different electric rates affect energy burden, heat pump cost-effectiveness
 - (Riley - There are solution sets there that we can keep in mind. Lower income rate discount. Load management.)

Sense of group is to prioritize impacts on low-income customers, but to keep these additional lenses in mind – especially as they affect both low-income energy customers' burdens and their ability to control energy options.

Policy Options for Mitigating Equity Concerns

Cost-Sensitivity Concerns

- Weatherization targeting
- Efficiency regulation
 - E.g., rental energy ordinances - require rentals to meet a minimum level of efficiency
- Rate design (gas)
 - E.g., PIP programs (percentage of income payment),
 - Encourage marketing of 100% green for those who can afford it. (Riley - When people pay extra for a fuel's green attributes, we don't want to double count.)
- Other government subsidies
 - E.g., LIHEAP enhancements

Accessibility Concerns

- Carve-outs
 - E.g., XX% of heat pumps low income
 - Ideally XX% is > LI share of population
- Prescribe differential rebates
- Different CHS credit values
 - E.g., low-income HP = 2x credits Attractive financing/leasing - Chris Note: This would be very hard to implement
- Attractive financing/leasing
- Equipment fee-bate policy
- (Jared - concern about timing and lock-in with equipment choices. Upstream folks can meet their goals through increased blending, but we are continuing to add fossil fuel equipment. If there is a cap to how much renewable you can blend in on RNG or on biodiesel. Need to not limit our vision to reducing GHG on a short term scale through these purchases.)
- Neale - Need to think about larger infrastructure too. If we want to be able to blend in large quantities of RNG or hydrogen then the pipes need to be kept up to the level where it can evolve to take those.
- Leigh - Pipeline system is really different than fuel oil. Very challenging to get beyond B20 in diesel. Less of an issue for RNG.
- Chris though getting enough RNG may be hard at an affordable price. Also concerned about mini-split heat pumps instead of a full home heat pump. This is also an issue of the short term vs long term longs.

- Dave - Affected communities will want training and employment in the facilitation of the heat transition.
- Chris clarifying - this is a job creation issue and who gets those jobs. That is already surfacing in some states.
- Rich - that has always been a goal of the Weatherization assistance program. Weatherization program has been successful in that kind of job training/recruitment, though there is a lot of turn over, which means there is a lot of funds spent on job training. Need to link to funding for job training and education/CTEs if this is a goal for CHS.
- Rich - In terms of short vs long term - want to be careful to avoid obvious design choices that lock us in, but technology is advancing rapidly - and we don't know what the full range of options will be in 10 years and what they will cost. Existing businesses need to see that this is a path they can travel. Will there be enough biodiesel for renewable heat in 15 years? Don't know, but if we are going to get a program that is acceptable to the state, these need to be part of the picture. This provides smoother ramps.
- Neale - Agree - there was once a push that electric baseboards seemed like a good idea. Now heat pumps are a good tech, but there may be new technologies that could be even better. Hydrogen might be big too in the future.
- Jared - There might be a difference in policy/ regulation re: installing new propane-based equipment (for which there is not currently a low-carbon alternative and may present a harder lock) vs. oil-based equipment (for which blended biodiesel or B100 can be a drop-in replacement).
- Chris - If we tie ourselves too tightly in the beginning it will raise the cost of compliance in ways that are not acceptable.

Observation:

Cost-sensitivity concerns require complementary policies; accessibility can be addressed through CHS policy design, though complementary policies can also help.

Just a first cut list that should be refined – ideally expanded. Group consensus is that we can lay out some initial pros and cons on options but ultimately present all of them for input from stakeholders (especially those representing low-income customers and those likely to be responsible for implementation – obligated parties, EVT) who may have better insights into what would work well and what wouldn't.

Riley - Two groupings we have made might limit our vision. Several pathways forward straddle the two groups.

Rich - Complimentary policies vs those that would be built in - you can envision a political conversation in which CHS includes cost sensitivity concerns from the very beginning.

Jeff - Tier III statute has an equitable component, but it is so vague that is very hard to know if you are doing it. Reaching low income populations is a challenge. Looking at the carve out is a

good tool. A lot of the low income population rent, so we need to address that.

Outreach Suggestions

- Community Action Agencies
- Other low-income advocates
- BIPOC leaders
- Renter organizations
- Multi-family building owners
- Fuel dealers
- Dave - Add lenders
- Jared - Mobile homes park groups?
- Neale - In Burlington looking at landlords - many have been supportive. There is a market advantage in having an efficient building.
- Rich - Might want to coordinate across the teams with weatherization.
- Neale - Even if Weatherization is a chapter or a bookmark we could split the load and do outreach together. Generally across all of the group-. We are a few weeks behind.
- Cara make sure and include workforce in these conversations - and making sure that we go to where folks are gathering as well as bringing people together.
- Claire - This is a Comprehensive Energy Plan year and there will be outreach surrounding that as well.

Chris - Draft by late May

Feedback from a lot of these groups in June to get to the council by end of June.

Rich - What to do in coming weeks.

- Conversation with fuel dealers
- Biofuels and life cycle costs.
- Legislators/Administration in terms of political reality
- Make sure that weatherization efficiency and clean heat go hand in hand.

Is there an order that would be helpful.

Rich - It would be helpful to our audiences to know how different options for meeting a standard over the next 5/10 years would look.

Jared/ Leigh - that is in the pathways. Leigh can bring an understandable report for the group for next week.

Rich - Can we ID the fraction of attainment that we expect to get from Tier III side by side?

Jeff - will be able to help with numbers.

Chris - can pull something together a start to the summary for early next week. Present something to the fuel dealers 2 weeks out?

4/20/2021

Participants: Chris Neme, Claire McIlvennie, Neale Lunderville, Jared, Jill Pfenning, Don Rendall, Rick Weston, Cara, Dave Farnsworth

Prioritization around a clean heat standard and having something to share - who would we want to get feedback from in terms of designing with equity in mind.

Rick - want to make sure this would have support of people whose primary concern is equity. Question about what we mean by equity.

Chris - need to decide on which parts of equity are most relevant to this proposal. Helps get us to the starting point. Low income customers are probably the most important and then workers in delivered fuels portion of the economy for different reasons. Racial equity lens is a harder one to bring in.

Dave - Is it helpful to divide the topic into access and distribution. Want to do outreach, make sure people can take advantage, get input and reflect input. Effects of the program (ie like raising fuels and protecting people).

Chris - Are these related? If you don't have access you don't get the distributional benefits or you get too much of the costs. Access allows you to get to the needs of the groups.

Claire - Need to be a focus on renters (which often but not always track with low income) need to focus on landlords

Dave - is workers in delivered fuels too narrow? Also business owners.

Neale - Urban vs rural. Total energy burden.

Don- Gets magnified in that high burden tracks with higher GHG heating fuels in general.

Jared - Commercial vs residential, part of the state - geographical.

Neale - If we are thinking about our clean heat standard plan. Then go out to groups to get feedback, I would want to include BIPOC and/or new Americans. They need to be at the table early on.

Chris - May well be that there might be racial or other reasons people might not participate. Should stay open to inviting input and feedback to inform whether that is the case. How is the cost of this policy going to affect different people? And will there be job transition issues

? May be less worried about cost changes for people who are better off. How to mitigate against adverse effects.

Neale - Identify one group that we don't need to help - those who have financial capital (who are often the first movers). Have a progressive incentive curve. Don't provide extra incentives for early movers.

Chris - Providing increasing renewable fuel like by VGS - no access issue, but a cost issue for those who can least afford it. Switching out a system - there is a cost issue. Unless people get help. In the UK - retail energy suppliers had to get energy efficiency credits, a lot had to come from weatherization, and a large carveout for low income. Carve outs are one potential way to deal with concerns about access.

Don - delivery mechanism for delivering carve outs. Knowing you can get it done.

Chris - EVT requires a certain portion of budget is low income.

Jared - Observation - The way we communicate about this will be different for different customers in terms of costs and benefits depending on fuel. Projections for people who comply via RNG or biodiesel, compliance will go up. For Fuel oil or propane who can reduce emissions via wood-heat or heat pumps, there is a high initial outlay - but then you can save money year on year by switching. CHS isn't an obligation on homeowners it is on upstream suppliers. Some compliance pathways save money over time. So there needs to be a careful/nuanced conversation about costs and benefits.

Riley - you have to start somewhere. Two issues - upfront costs and savings over time. Other - making and leading to fundamental changes outside the immediate influence of some consumers. Those 2 challenges are very different from each other. May overlap through carveouts etc. Need to think about those to impacts differently.

Chris - Keeps coming back to 2 buckets of solutions - 1. Increase percentage of renewable fuel - you have no choice about this as a consumer. For low income consumers are their policies to mitigate effects? Complementary policies around rate design, rebates, etc., 2. Switching to a different fuel which may save you money.

Neale - There are some crossover effects. Customers left behind on more expensive fuels end up having to pay more at a faster rate as others step away. To the extent we can move weatherization, it has an increasing equity impact, even if GHG impact becomes lower over time.

Jared - Could be worth modeling weatherization at scale along with a clean heat standard in combination.

Neale - May be underselling weatherization financial benefit of weatherization of fuel costs are likely to rise quickly.

Chris - Weatherization is a strategy - especially if targeted to low income residents, along with rate design, etc. Need to think about them as a package.

Dave - Customers more able to move to something else will leave a system which can strand fewer customers over a stranded asset.

Neale - VGS is exploring how to get into other kinds of business to offset that issue (ie heatpumps/weatherization). VGS has financially supported weatherization - but any changes are a regulatory issue.

Don- Paying to have capacity. If you were trying to wind a system down, you would do it strategically based on lines. That is a level of finesse that we aren't designing to achieve. Some of these things are more possible where gas and electric companies are combined.

Claire - assuming that costs for rng will be higher. Could market shift in unexpected ways?

Chris - Gas industry studies show we can't find even ¼ of needs by 2040 - and it is expensive. Hard to imagine costs at scale being only a modest difference.

Neale -Don't think they will come down in the near-term. Hydrogen could play a bigger role in the future - as a synthetic gas component. Prices are high, but technology is new.

VT may be in a first mover position to soak up RNG. But you lock it in at a higher cost than the markets may do over time.

Chris - In terms of mitigating costs on those who can least afford it, or switching technology and blending in costs vs investing capital for new heating equipment. Complementary policies through rate design - targeting finances to those most in need. Where you need capital costs to switch. Differential rebates, carve outs by income. Don't pick between the solutions, instead bring all the ideas into conversation with people who might be affected.

Riley - Loan loss reserve funds. Need to look at this from a business model angle too. Bring tools together in creative ways to accelerate adoption.

Chris - leasing and different forms of financing could help mitigate issues. If we just impose on fuel providers - they might figure things out, but that may or may not be equitable. ARE there things we want to require or do that specifically address the impact on lower income Vermonters.

Jared - Practical thought - if there is a carve out, equity would require that the carve out is for a percentage higher than the portion of the population that is at that income level. Another thought - would it be possible to weight credits by who they are supporting (a project that is for a lower income project is weighted more heavily).

Chris - that could push obligated entities toward supporting lower income folks. But it would be hard to get the right credit ratio to actually support lower income folks in the mix. Also have to be really careful with the carbon accounting.

Rick - bringing every tool we know to the table when we talk to folks would be helpful. If you have carve outs you will have differential rebates - they go together.

Chris - Low income programs tend to cost a lot more than programs for moderate/higher income folks.

Neale - Agree that carve outs and differential rebates go together. Need to make sure we keep transparency in order to make sure that people trust the system and that it actually reaches the intended beneficiaries.

Jared - Agree with simplicity being important. There will be differences in cost compliance in different parts of the state.

Chris - tradeoff - complexity adds expense. In the UK they went for cost efficiency without worrying about geography. Didn't even care if the company was weatherizing their own customers. Have to decide for which equity concerns you are willing to have things be less economically efficient.

Neale - understanding how this works for obligated entities, fuel dealers, contractors, customers.

Chris - and they could contract with someone else to do the work as well (EVT, or?)

Chris - Next steps - put a few slides together to share with everyone next week and make it into a pre-straw proposal that we could share with others we want input from to get feedback.

Riley - Talking about the levers,

Chris - Lenses to be aware of: 1. People for whom we are worried about adverse impacts or unable to access positive impacts. 2. People whose jobs are affected. 3. Other access concerns including racial.

Jared - And therefore here is a preliminary list of stakeholders we would want to reach out to for early feedback. Community Action Groups, groups serving BIPOC, etc.

Claire - Just transition subcommittee of the Climate council?

Jared - Almost every program is looking at this question of equity. Since the just transitions committee will be designing - a lot of these programs will be on the climate plan. Need to look at what agendas are going to be structured, we might want more specific questions.

Riley - might be able to help them by giving them a straw proposal or area to look at. Not just for our need, but also just asking for help and making sure they understand the dimensions of the questions.

Chris - Endgame for this group is to come up with a whitepaper with proposed answers drafted for different parts of the potential program and will present to the climate council, but we want feedback before presenting to the climate council. Have been assuming that we want to come up with an idea for stakeholder representatives that we would like to talk about to be able to finetune. Or do we talk to the council about this first and then bring it back to them.

Claire - Are there members on the subcommittee that

Jared - What comes out of the whitepaper - areas of consensus and key design points and decision points - could be a way to start a conversation that will have a number of decision points afterwards. It could be sufficient to say this group recognizes that this program needs to be designed with key equity ideas in mind - costs not being disproportionately born by low

income or people of color and that the program serves the needs of those communities. Elevate principles and commitments and some of the strategies.

Chris - If we can flesh this out as much as possible before giving to the climate council, are there people it would make sense to pass this by?

Chris will put together slides for next meeting to discuss this further. Neale and Rick offered to look at them.

4/13/2021

Participants: Jared, Rich, Cara, Rick Weston, Chris Neme, Claire McIlvennie, Leigh Seddon, Riley Allen -

Meeting recording: https://us02web.zoom.us/rec/share/Asu9_4HxQzPzbwHRDsxb3cQzcf-ny9vftvvhVG8vZDbkAvuq66DynDHc5wqcYpP.Ag_rLxZMMqANhr_V Passcode: R1+Jm.&Y

Summary of key points

1. Review full life cycle of the policy

If we want equity woven into CHS, we should review the full life cycle of policy development, implementation of policy, and assessment of impact to ensure equity is considered at each step:

- Who is at the table? How are we communicating these potential changes? Who are our partner organizations? (Procedural / inclusion)
- For CHS, how do we define equity? What are our equity goals? How do these goals interface with our climate goals? (Distributional / access)
- Where energy programs tend to look at economic or environmental inequity, are we considering the historic or current impacts of structural racism?
- Are we considering equity through other frames, e.g., language, gender, geographic, rural vs. urban, labor force transition, intergenerational
- What is our baseline data to measure change? (See: [EAN analysis](#))
- Further conversation:
 - Chris: Define equity for whom? Which do we prioritize? Need to define that before coming up with policy to address them
 - Riley: Report that Neale shared - they address racial equity, but then really focused on income concerns. Listening to Just Transitions committee I also hear a lot about labor impacts and disenfranchised workers. Need to center on one.

- Chris: Once you decide which population you are focused on - you can look at that through different lenses - 1) economics and ability to afford energy/heat. 2) Jobs and economic development for the people who most need good new jobs, 3) process and voice in the conversation - steering group.
- Riley: What is the essence of the policy? Different policies have different impacts and impacts and benefits can be shared differently. Policy levers can be framed around equity considerations.
- Rick: What do we mean by equity is really important question. Can't address all equity problems at the same time. Don't feel qualified to answer the question of what we consider equity. Need to have the right people to answer that question. Once we know our definition, we need to decide how we address that. What are the criteria associated with equity that will inform how climate policy is implemented.
- Claire - can't optimize for all things at once. Sometimes there is a tradeoff.
- Riley - Equity, could also be environmental justice, energy justice etc.
- Jared shared: <https://www.eanvt.org/tracking-progress/research-and-reports/energy-equity/>
- Rich - in most cases we would be defining equity as racial/income, but there are other groups that will be impacted (fuel dealers for example). Fairness - if the polluter is all of us, then the polluter pays principle applies to all of us, and we need to moderate impacts on those who can least afford to pay. Rate design is part of that too. Have to minimize the cost of the policy. Make sure those least able to pay benefit directly and first. Moderate costs. Make sure all parts of the state are well served. A set of guiding principles. Trying not to tie ourselves in knots by solving all the social problems while solving climate problems.
- Jared: The working definition that was developed based on all that research and interviews: "Energy equity is based on the principle that all people should have access to reliable, safe, and affordable sources of energy; protection from a disproportionate share of negative impacts or externalities associated with building and operating our energy supply and distribution systems; and equitable distribution of and access to benefits from these systems. Energy equity would

also mean that energy decision-making procedures are fair and that stakeholders have access to information and participation in said procedures.”

2. Consideration of policy Levers

Key policy levers to impact equity:

- What of the set of incentives, taxes, or other features of the system that are likely to impact generalized price levels or reduce costs? Are there progressive models to reduce impact on disadvantaged populations?
- What are some of the complementary policies that may serve to offset adverse impacts to targeted groups of particular concern? For example, if thermal costs will rise under CHS, could we target Wx or EV incentives as an offset?
- Discussion:
 - Riley - Trying to be aware of and mitigate the negative impacts and share complimentary benefits.
 - Claire - Could be helpful to review existing policy equity mechanisms that didn't succeed at improving equity (net metering for example).
 - Leigh - One of the key levers providing access to the benefits of new programs. Mitigating costs but increasing access. It may be more economically efficient to increase that access such as someone in Island Pond is excluded from VGS or a person who can't access heat pumps because they don't have capital or can't weatherize. There are many other access issues - income, timeconstraints and geography.
 - Jared - Also helpful to look at this from the perspective of how we design incentives - tax credits for example aren't accessible to low income folks and are regressive. Other programs are first come first serve open to all - this doesn't prioritize the folks who need it first. Mileage smart and EV incentives provide additional income based incentives to benefit people who need them more. A challenge is that it is easier to track what we can measure and we don't have much data in VT on racial inequities. Just Transitions had a presentation by Prof Bindu Pannikar <https://www.uvm.edu/seagrant/research-seminar-environmental-health-disparities-vermont>.
 - Chris - need to switch to cleaner technology and also cleaner fuels/biofuels. When installing a new technology. Policy lever could be that one in every x heat

pumps needs to be in a low income household. Clean heat standard will be just one of many policy levers and complementary policies will be needed.

Minimizing adverse effects of energy prices and economic development (ie. renewable gas from VT farms, new jobs installing heat pumps are accessible to people who really need them or at risk of losing jobs).

- Riley - Don't gravitate too quickly to income stratification. Recent program that didn't work - needed assistance for the folks at the lowest end of the income spectrum. Need an enabling program that helps people know about and access these. In terms of jobs - need to think about how this fits in the frame. Making sure to help those impacted, but not necessarily too widely beyond that.
- Rich - There was a fuel switching program this summer for loan forgiveness if you bought a qualified heating appliance - stove dealer was pitching the program that would forgive the first \$900 of the loan. It was not income sensitive. Outreach and direct enrollment assistance will be needed.
- Chris - that is a program design issue.
- Jared - Clarifying when I talked about first come first served - meant level incentives across all groups. Concerned that if we are going to be using some sort of measure characterizations from a TAG -like-process and attributing savings to a measure. Cost effectiveness vs equity - and making sure the incentives don't all go to upper income folks who would have done the work anyway.
- Rich - For the purposes of a CHS - not sure that attribution is as important. Need a certain amount of reductions in fossil fuel use. There are a dozen mechanisms that drive the uptake of renewables, in the end of the day we care about how many were installed, not necessarily in this case what made them happen. Interesting debatable point in terms of whether we care about where they come from.
- Chris - 46% reduction by 2030 is so large that most people will not be free riding. Equity point is important because otherwise people will go for what is easiest rather than equitable.
- Claire - Would that lead to the same issues with net-metering which has increased the cost of the system and who is and is not benefiting.

- Riley- Net metering was a huge net positive at first, but now the benefit cost ratios aren't what they used to.
- Chris - it was a transition policy to get things started.
- Rich - CHS may not have the same design issue.
- Riley - Lowest income portions of the population need the strongest incentive and that is where you will get the biggest movement, so you can get equity and GHG reductions that way.
- Rick: I agree with Jareds's point too, but will note that, from a societal perspective, the cost-effectiveness of a program is not affected by program designs that, say, reduce costs for certain participants (unless there are incentives that exceed the cost of the measures).

3. Crossover perspectives:

- Could CHS be used as a **wealth creation** mechanism among disadvantaged groups?
- Are their **new business models**/commerce developments that could support the broader economy?
- How can we support customers with **point of sale** programs?
- How can we add energy efficiency and clean heat metrics into the \$250 million in **ARPA housing funds**?
- Discussion:
 - Jared - CHS as wealth creation - example is people who work in the forest industry in the NEK who are losing work with paper mill reduction, so forestry for clean wood heat would help with that.
 - Neale - Another example is if companies and utilities are going to make investments in large scale energy projects - the capital will flow back to them. Can we consider community style projects or micro-investment so that they can create wealth from the transition.
 - Leigh - Even just making housing more affordable can make a big difference.
 - Chris - in terms of supporting customers with point of sale programs - Gabrielle Stebbins is doing a whitepaper on the concept of an energy efficiency resources standard and feebate for water heating equipment.
 - Riley - new business models - lots of cool examples like Posigen (<https://www.posigen.com/>) - weatherization and net metering.

- Neale - Could that be tied to ARPA housing funds?
- Rich - is there a way to be part of the conversation about how ARPA funds will be spent adding efficiency and clean heat.
- Neale - Heard from Maura that we should work to influence VHFA and VHCB. May be hard to do with the funds available now. Hard to know what will be spent right away because of the workforce. If money could be used over time may be able to increase. Some of the funds go through them. They set the minimum standards for a lot of the housing in VT.
- Riley - there is more money in different tranches - Climate change
- Jared - \$100 million for what gets identified in Climate Council process and another 100 million focused on climate space.

4. Data/models –

What are the relevant forms of data that will be most helpful to understanding both historic inequities and future impacts of a policy on not only economic cost/benefit but other dimensions of impacts?

- Maps (travel, energy burden, racial composition, labor market, housing types, language preference)
- Income tables
- Economic models (e.g., REMI or UPLAN) sector impacts
- Labor and household impacts
- Needed research, data, and analysis
- Discussion:
 - Riley - Need a framework for creating a base of knowledge. There is increasing frustration with limits of the data we have.
 - Claire there are interesting studies happening on energy equity that we could draw from. ACEEE, VEIC,

Helpful resources:

- A helpful document is [A Guidebook on Equitable Clean Energy Program Design for Local Governments and Partners](#) (Sep 2018) prepared by Cadmus Group for the Urban Sustainability Directors Network. (Effort had local support from BED & REV)
 - Neale - This report is a great starting point for the work.
- Just Transitions Subcommittee Environmental Justice Workshop

Rich - Having had this conversation can we deputize someone to ask the question of what we should do/add to whitepaper and program design to address the broad range of equity issues?

Riley - Can you give us guidance? What are the highest issues - narrowing the focus.

Rich - In the overall program design what is next after equity? Interested in sitting down with the sketch of a program design and talking to the fuel companies about how this looks to them and their recommendations to meet their needs as best we can consistent with our goals. Reps of low income communities and weatherization groups would be good to get as well.

Chris - trying to have something together to share with the council by May. We should outline the framework and run it by this group before sharing it. Has time next week.

Rick has more time after this week.

Rich - High level goal needs to be moderately cost effective reduction of emissions from the thermal sector. Looking to create a program that is flexible over time and doesn't choose technology winners from the beginning. Enables/inspires existing providers to decarbonize their business models. Need to recognize labor issues and provide training. Insuring ample opportunities and support for heating conversations in low income communities is a high priority and should be designed in. Need to insure that the design of the program anticipates geographic distribution of costs and benefits. Hard to envision designing a thermal efficiency standard that is explicitly racially sensitive, need help to figure out how it would be appropriate and administrable. Could be implicitly racially sensitive. The example of the vaccination process and BIPOC people getting prioritized. Want CHS to be racially inclusive and positive in respect to low and moderate income households. Controversial to discuss.

Jared - Ask the equity group look at from distribution and access vs procedural dimensions - next steps and timeline. Carbon pricing doesn't have to be regressive, it depends on design. It isn't inherently so. Need to create something with enough content to start a conversation, but it doesn't have to be perfect and complete and ready to implement.

Claire - Structural equity - accountability mechanisms are important too. Holding the program accountable to equity goals.

Neale - Happy to keep working on equity. Showing a graphical flow of how this works - to try to simplify. Blocking out who is responsible for what, how it works, how money flows. How do we target this that is sensitive to racial considerations. Burlington example - Tiasha Green - head of

inclusion and equity office did a survey of small businesses, new American businesses were passed over by PPP loans. Office raised \$300,000 to distribute to those groups.

Rich - agree that affirmatively designing the program so it is inclusive provides broad opportunity and that has to be one of the goals.

Chris - Have to address the fact that this will raise energy costs. So we have to talk about policy impacts to address that. LiHEAP additions, check cut to customers, many tools - offer a set of options.

Riley - thinking about public process - thinking about points where program can be ratched up and down to address equity considerations. Helpful to start to imagine ways we can introduce mitigating effects and open the floor to hear things we haven't thought of.

Claire- To what extent can we leave it open - this is a small group without a lot of expertise in this section. Humility in the report.

Rich - Do want to consult as we are designing the program with folks who are more expert at reaching into these communities. Suggest program design features that are inherently inclusive. Give people something to respond to.

Jared - Do you expect this to increase energy costs or fossil fuel costs (Chris said energy). I see how fossil prices go up, but that is different than energy prices. The overall costs of heating energy could go down if lower cost heating options are taken up. Before saying this program will increase energy costs we should be certain of that. Don't think it has to. The relevant metric is the net change in energy costs.

Chris - It is complicated and probably inevitable that for some customers the costs will go up, but not necessarily for everyone.

Neale - Someone's costs are going to go up, which makes the equity component that much more important because you don't want to leave behind people who need the reduced costs the most.

Rich - it doesn't necessarily follow that when someone's costs go up others go up (GMP and electrification as an example - more electrification brings costs down for everyone).

Equity work next week at this time.

4/6/2021

Participants: Jared, Rich, Cara, Rick Weston, Claire McIlvennie, Chris Neme, Leigh Seddon, Neale Lunderville, Don Rendall, Dave Farnsworth, Tom Knauer

[Video of meeting](#)

Passcode: u2*FJ9!+

Updates - Covid money and infrastructure money coming to Vermont. Link Standard to mechanisms that would make it easier for people to quickly conform to the standard, such as incentives.

ARPA money information coming out soon - will need to make sure clean heat and weatherization end up in that conversation.

Dave - What mechanisms?

Rich - Make sure fuel switching is in the conversation alongside weatherization.

Jared - Looks like 200 -250 million towards climate and clean energy. Very different phase and challenge. Initial work has been on scale and pace of needed adaptation. Now we need to look at the best way to invest the available funds to get there. Have more sense on efficiency and weatherization to design to the right level. Lessons learned from the mistake in the UK.

Probably need to be increases in grant funds, but don't want all the funds to go to grants. Need to do full analysis to let it do as much good as possible over the long term, cost-effectively and equitably.

Chris - We have known how to weatherize homes for 30 years, and it hasn't changed much in 30 years. The issue is how to get traction and funding in the market. The situation in fuel switching is slightly different. We still need a technological solution for hydronic heating. On RNG there is still needs for research to know what will work at scale. Need a better structure.

Rich - How to invest quick money for long-term good. Technology mix is still being developed. Create institutional resources that are structures that will continue to grow over time. On-again/off-again programs clearly don't work.

Neale - The administration is already thinking about some of that. ARPA money is time-limited, but might replace general fund money, that allows general fund money to be put in some sort of "fund" that could be used for revolving loans. Need to be strong around the need to set things up for long term benefit with our investments instead of spending it for one-time needs.

Chris - Like an endowment.

Rich - Examine this at a future meeting.

Admin request - Folks in this group are volunteering to do research etc, but

Formerly approved up to \$6250 to lead writing of the paper and approved the idea of having Chris help.

Jared recommends that we use half of the available \$25K budget, up to \$12,500, for completion of the white paper, and reserve the other half for additional research, communication etc after the spring. There was general agreement.

Goal for today

1. Understand the numbers and pathways better - Leigh
2. Have a thoughtful conversation about how to build equity into the clean heat standard - Jared

Jared - Energy Equity research by EAN interns. [Slides here](#)

- Note- American Community Survey data is self-reported and wouldn't reflect money spent in grants (like LIHEAP).
- Slide 4 should be titled electricity and thermal (not total energy)
- Question about whether wood might be a secondary fuel in more homes? Might want to look into that further.
- Chris - EVT already has authority to help on electric resistance heat - but it is hard to overcome the split incentive.
- Rich - We should start a list of policy approaches that can direct an appropriate amount of attention and benefits to communities of need and lower income households. As EVT has done.
- Chris - solutions are different for portions that switch people off of fossil fuels to electricity and wood - these could be income based. Solution is very different for switching from fossil fuel to a renewable biofuel.
- Cara - Need to address the split incentive with landlords explicitly.
- Dave - In CA there is a tariff-on bill financing that is designed to be stacked. Verdict is out in terms of saddling lower income renters with longer term on-bill.
- Chris - might need complementary policies including a statewide energy ordinance.
- Rich - complementary policies to the clean heat standard. CHS will exist alongside EVT, Tier III etc.
- Jared - elevate simplicity, freedom and choice. Consumer protection. Nudges around choices that could protect consumers and add to resilience. Don't want to encourage dependence on single source heating systems in unweathered buildings. Cost savings on heat savings depend on which utility you are in. There are also system benefits in different areas of the state. Wood heating - decline in pulp and paper means there is wood to burn, but wouldn't want population density.
- Dave - Can we address split incentive by having a landlord have to comply with energy standard, with grants and incentives.

- Chris - Boulder experience with rental energy ordinance - put in a standard that rental owners would have to meet in 10 years, but then put money in place for early adopters. Also gave an efficiency score.

Leigh - Pathways numbers - [Slides here](#) : Balancing of fuel sector isn't in the Pathways model yet.

- We have the pathways, but the change is a lot and comes quickly.
- Rich - Very useful to think about thermal load like we think about electric load - we have a load to meet and need to design a system to meet that. Reduce through efficiency and weatherization.
- Leigh - fossil fuels have to be brought down, and need to backfill the need with low carbon sources.
- Rich - advantage of a clean heat standard is that we don't have to know the exact numbers of what is needed in terms of specific technologies.
- Chris and Leigh - Population growth and new housing may make it even harder to meet the goals.
- Discussion of ACP and marginal abatement cost.
- Canadian gov ramp up to \$170/ton
- CO2 cost effectiveness model from PSD shows a lot of thermal measures are less than \$100
- Leigh - Wood is necessary to back up the supply until 2030.
- Rich - Question about wood heat. 20% of thermal heat is from old wood stoves. The penetration of pellet stoves in the model is much slower than heat pumps.
- Jared - when we set the numbers we took commitments by fuel dealers/VGS. With wood we used a report that showed the amount of wood resources available on a sustainable basis. The analysis is 5 years old, and there might be more wood available for heating given continued reduction in paper. For Heat-pumps we didn't have that sort of report, and they have been scaling up quickly.

3/30/2021

Participants: Jared, Rich, Cara, Rick Weston, Claire McIlvennie, Chris Neme, Leigh Seddon, Neale Lunderville, Don Rendall, Riley Allen, Dave RAP, Tom Knauer

[Meeting recording](#)

How should a CHS interact with/learn from Tier 3?

Should credits show up when a measure is installed, or when it is realized.

Next steps - Partners conversation - Outreach to Fuel Dealers.

Design considerations -

Equity, justice, fairness.

Resiliency (back up and complimentary systems) - Natural nexus between heat pumps and grid resilience, and rate design. But should this be part of a Clean Heat Standard? Energy Efficiency and a CHS. - Know it is essential, is it part of a CHS - "heat balance question".

[Rich's slides](#)

Jared - Weatherization only gives us 20% of needed reductions by 2025 and 10% by 2030.

Neale - Weatherization is a resiliency measure if we aren't as quick to roll out clean heat.

Leigh - And heat pump program needs to work in tandem with weatherization.

Rich - don't want to cut back on weatherization, but do need to understand how much has to happen through clean heat.

Leigh will do a chart looking at how savings would happen as these programs roll forward.

CHS and Tier III - How should they connect?

1. Tier III does it all
2. Comprehensive CHS (obligation on fossil providers) replaces Tier III - does it all
3. Hybrid CHS: Keep Tier III and add a fossil CHS
 - a. If hybrid, on what terms? Unified program, market segmentation, tradable credits, or totally separate obligations.

Tier III math

Request that Leigh (and others) get a more complete estimate of Tier 3 savings.

Option 1 Tier III does it all slide - Comments

- Tier 3 regs can be met by retiring tier 2 credits too.

- Worry about parallel structures doing the same thing. Seems issue

Option 2 - CHS replaces Tier III slides

Option 3 - Hybrid CHS - Unified program. Including Tier III and fossil dealers.

Dave - Two sectors have carbon in common, but don't have a lot of other things in common including ability to deal with this complexity. Don't want them to compete with each other?

Rich - Is competition good to get quick tons avoided?

Chris - Total targets assigned to fossil fuel dealers. If electric utilities are getting some of this done, they can sell that. Allowing them to want to collaborate and coordinate.

Rich - Do we envision Tier III continuing in addition to the CHS and they run concurrently.

Riley - Likely to be some sort of a hybrid - range of possibilities include keeping Tier III and add

Obligated entities still likely to be wholesalers.

[Chris' slides](#) -

Questions and discussion: If you recognize the whole life-time reduction in the first year, you would have to change the measure. But hard to set targets that way if there are multiple options for compliance.

Hard to measure compliance. Accounting measure needs to align with annual measure because of how the GWSA works.

Rich - had thought we should do this the way Tier III does, but has changed mind. Concerned about how this might impact fuel dealer who might not know if they will be in that market for 15 years.

Riley - Could assign 15 year vintages of credits in one year. Doesn't all need to count in that year. May be able to enhance value of a prior investment.

Could sell them as 15 individual years - like an annuity. Program needs to give participants the trust and mechanism to allow for monetization of credits up front.

Rebate that represents the net present value of the 15 years of credits. - But can only retire 1/15th of the credit per year.

Future topic

- How could a clean heat standard - having a standard apply not just to thermal fuels, but also to transportation fuels. Tier III doesn't distinguish between the two for measures. This design could be useful far beyond VT. If TCI falls apart, what happens then? Expand CHS to cover transportation?

Next steps

Leigh and Jared - work on how big the goal is, how big Tier III is. Leigh taking ownership of that using Pathways analysis.

Riley, Neale, Claire, Building in equity and social justice overlay into this program. (Jared will share data from EAN intern last year).

Not ready yet for Fuel Dealers.

3/23/2021

Participants: Jared, Rich, Cara, Rick Weston, Brian Gray, Claire McIlvennie, Keith Levenson, Chris Neme, Leigh Seddon, TJ Poor, Jeff Monder, Neale Lunderville, Rich Cowart, Mary McGinnis, Don Rendall, Riley Allen, Dave RAP, Dave Westman

[Meeting Video](#), Passcode: ^Vs5EtHY

Goal: Learn about how Tier 3 has been operating in Vermont.

GMP Presentation - Mary McGinnis and Jeff Monder

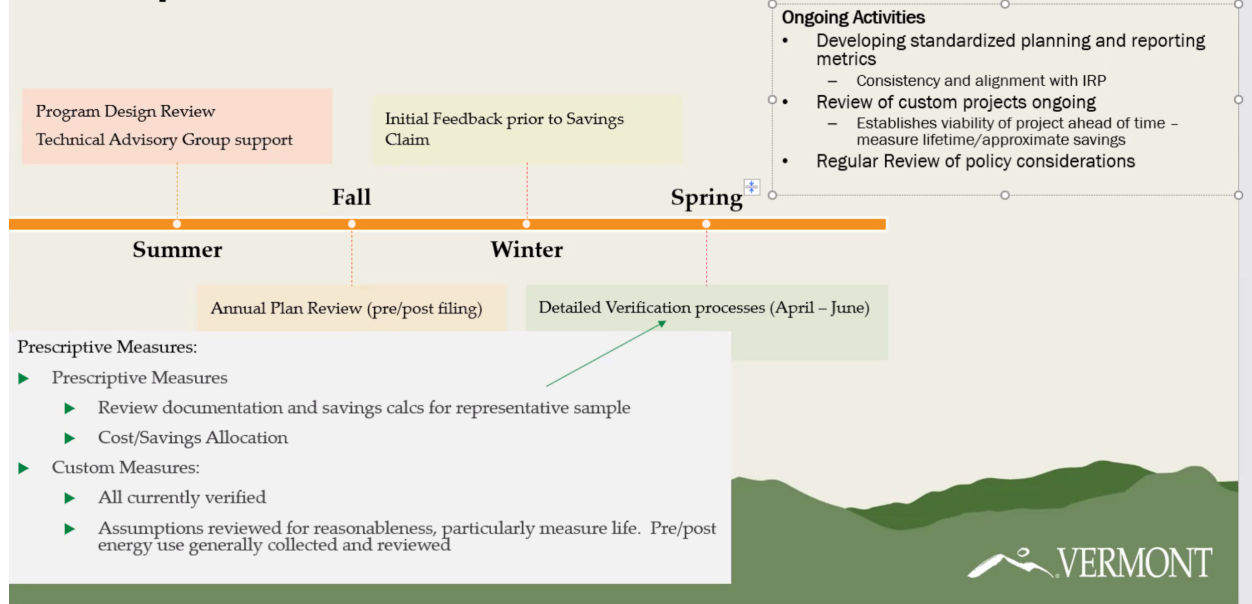
GMP Renewable Energy Standard - Tier III Considerations

- Planning for Tier III Obligations
 - Energy Transformation Projects -
 - Beneficial Electrification to reduce fossil fuels, reduce carbon, and create savings for all customers thru increased MWh sales.
 - Integrated Resource Plan (IRP): Observation and forecasts
 - Collaborative work with the TAG, DPS, EVT : Perspective measures plus custom C&I projects
 - Annual Tier III Plan: 2020 RES Tier III MWh savings target was 4% of rentals sales
 - 2020 Actual savings were double the goal with 218,000 metric tons
 - These claims will be vetted by DPS - claims rest against the charge they would pay if they fell short.
 - Load management is critical
 - Have to show a net reduction in fossil fuel use, have to net out the increased grid consumption from the fossil fuel reduction. Get to claim the number of years of expected life of the item.
 - Riley: Cold climate heat pumps were almost double what was expected this year, were the incentives the Motivating factor (Or COVID, or???)
 - Jeff: Boost put in last year and increase of uptake corresponded directly.
 - Brian: Motivation by the doubling of incentive AND being home so much this year.
 - Rich: How much are those heatpumps going to result in decreased GHG emissions. Target is set based on forecast retail sales in a year. Retail sales were in the 4million MW range.
 - Deemed savings are credited in the year the measure is installed (15 years of CCHP for example).
 - Jeff - question of how much GHG is assumed to be reduced by a measure. Recent study reduced deemed assumption. Continue to recalibrate.
 - TJ - savings you can cost for a project is different from the full savings counted in the GHG inventory.
 - Rich - this is a design question for us. For CHS we are interested in the outcome, not what got us there. CHS likely to look at result/ not causation.
 - TJ - When evaluating one program vs another you do want to include the causation.



- Prescriptive Measures and Custom Projects
- Policy and Implementation Considerations
 - Societal costs and benefits, how with the costs and measures we choose impact , what is the long term effect on community health, utility infrastructure,
 - Integrated planning
 - Equitable benefits from programs across all rate classes
 - Tracking credit for decarbonization
 - Program results review & verification
 - Benefits of coordination with channel partners
 - Optimizing efficiency during decarbonization measures and projects
 - Regulatory review process.
- Discussion:
 - Jeff - work closely with EVT - installations matched by GMP's rebate process. Coordination has been really valuable. Split the thermal credit between GMP and EVT. Have to make sure the credit is only taken once. Would a CHS program on an unregulated fuel make this more complex?
 - Chris - At first this was a lot to work out.
 - Rich - Should CHS apply to electric companies? We have started saying it should apply to fossil fuel dealers, but maybe it should apply to everyone in relation to the fossil fuel energy they provide. Option 2 - we have Tier III so they already have the requirement they need. Option 3 - They are already obligated.
 - Jeff - Tier III program appeared at first to be a lot, but as we look at it now and do present value analysis, we are putting a considerable amount of money into this. But looking at this as an investment - this has worked well for our customers. Present value of the technologies over the life of the measures makes sense. Program is working the way it is supposed to work.
 - Rich - It is beneficial and working, but it is different to say it should exist side-by-side with a CHS on the other providers.
- DPS:
 - What is the department doing in terms of Tier III?

Department Tier III Activities



- The measure life is really important because you claim it all in the first year. There is no mechanism to retroactively adjust the savings if new research indicates different savings.
- TJ - that happens regularly in efficiency programs across the country. Have to go on agreed assumptions and make changes prospectively instead of retrospectively.
- Jared - tier 3 is about fossil fuel reductions, not necessarily GHG reductions. CHS might need to be different.
- Chris - Savings get claimed in the same way around the country/world. Unfair to change the rules after the fact if they are working based on best knowledge at the moment. But can continually improve the process.
- Rich - How big is Tier III? What fraction of fossil heat load in VT has been reduced cumulatively by Tier III activities?
- TJ/Keith - don't have this at the moment. GMP is about 85%
- Jeff - GMP spent a little over 10 million in 2020 on tier III. If you look at gross program costs it was about \$30/MWh for the credit we got. The forecast revenue from retail sales from the life of the measures net at \$47/MWh positive.
- Rich - Should we then make Tier III 10 times bigger?
- Keith - It would need to be balanced with peak shaving etc.
- TJ - Tier III will continue to grow.
- Jeff - practical aspect. Tier III build on customer's willingness to accept heat pumps - 10k in 2020, could we have done 30k in 2020? Probably not. Not

- enough customers or installers. In terms of EVs, adoption is hampered by a lot of factors. These programs accelerate change, but don't make change happen.
- Riley - There is a utility benefit. There are reasons for the utilities to make these changes even without Tier III
 - Jeff - Tier III is beneficial in freeing up the funds for this purpose.
 - Rich - If anyone has the fossil fuel savings due to tier III we would love these details.
 - TJ - Program design - Standardized planning and reporting mechanisms is important. Regular review of policy is important. Tier III had a review every 3 years. Not to assume we will get it all right the first shot.
 - Brian - Are savings goals proportional across all utilities?
 - TJ - Yes, but VPPSA utilities started 2 years later.
 - Rich - Heat Balance change - what fraction of savings comes from efficiency, and what comes from heat type? Coordination between weatherization and fuel switching.
 - Dave - Coordination - when bill passed interpreted that DUs had to find savings directly from customers, and seems as competing with EVT policies. First area of coordination was a savings split, but no one really liked that approach. Only getting half the savings out of inputs. Over time EVT delivered efficiency savings, and DUs delivered savings on fuel switching. EVT also works on supply chain, workforce, DUs work on the customer fuel switch. How can we pair fuel switching with fuel switching. Not as cost effective to weatherize after moving to a more cost effective heat source (CCHP). Not as many savings.
 - VEIC also administers the TAG program, which seems to be working exceptionally well. Utilities decide what they want to look into: EVs, lawn mowers, etc.
 - Q&A:
 - Rich: What is governance and review structure of the TAG?
 - Dave: Run by the DUs, though they contract with VEIC to do the work. VEIC as moderator and administrator.
 - Rich: Does the PSD or PUC look at the numbers to make sure they are as good as they could be?
 - TJ: PSD is part of the process. Report gets filed with the PUC and things could get rejected, though in practice that hasn't happened with Tier III TAG, only rarely for EVT TAG.
 - Dave: Regulatory backstop is useful. Good that it isn't used very often, but helps to resolve issues.

- Rich: If we created a CHS that applied to fossil providers, should there be a new TAG created, or should we expand membership of an existing TAG, or abandon the TAG altogether?
- Dave: Tier III TAG is important in order to have consistency across assumptions.
- TJ: Doesn't have to be the same entity as long as there is consistency and relevancy. Could be a different group as long as there is a constant thread.
- Riley: Have to include the new players in the process, or maybe subcommittees to be efficient with people's time.
- Rich: What about regulatory oversight of something that would pertain to new and different obliged entities? Point of regulation as far upstream as we can get it.
- Jeff: Regulatory framework with the same types of bodies is important for consistency and functionality.
- Don: Questions for GMP - calculation of lifetime carbon savings, how does that translate to annual savings?
- Jeff: Calculations are done on a one year basis and multiplied by the life of the measure.
- Don: of the 10million invested in Tier III in 2020, what portion was invested in EVs, load management, and thermal sector?
- Jeff: Heat pumps - around 60%.
- Riley: How often does the TAG process take place? What is the workload?
- Jeff: five meetings a year, approx once a month leading up to the report due in Nov.
- Dave - EVT once a month year round. Each DU sends
- Rich: Parking questions: How do we link up fuel switching with efficiency/building envelope improvements. Should a CHS insist on that one way or the other? Need both, may need the simultaneously particularly for CCHPs.
 - Existence of a Tier III in parallel with a CHS on fossil providers. One option: fossil providers to secure credits any way possible - pay EVT for them, buy from GMP... Most efficient way of driving change. GMP has relationships with customers, which is what makes transformation work. Credits become marketable.

Participants: Rich Cowart, Chris Neme, Don Rendall, Tom Knauer, Leigh Seddon, Claire McIlvennie, Riley Allen, Jared, Duval, Cara Robechek

- Next week will be on Tier 3 - which seems a good analog or model for the CHS, but applied to a different set of obliged entities and CHS would go deeper into the supply chain.
 - Riley requests questions or specific interests in advance
 - Chris - Someone from PSD (how does the verification process work, Jeff Monder from GMP and Mary McGinnis (planning process to comply and implementation issues), someone from VEIC (TAG process - how assumptions for credits are developed and updated) Dave Westman.
 - Riley - There are concerns (“but for” in calculations is hard to calculate and get right).
 - Rich - Clean heat standard could have a self correcting structure, in each period deemed savings on the basis of the period before. (In terms of climate - don’t care as much about “but for”, only absolutes). Obligations follow the actuals.
 - Chris - It does matter how offsets are calculated though. Use a certain set of deemed assumptions until they get updated. Assumptions will continue to get better over time.
 - Jared - A lot of consultant and jurisdictional attention is being given to accuracy of measures, and that is only increasing. Many states have Global warming solution acts, so the burden on VT to do independent work will decline. It will become more of a literature review than trying to develop these out of whole cloth.
 - Chris - Aggressiveness of obligation between now and 2030 means that we need to make change, and we can continue to refine as we go. We need to get something good on the table and make progress towards it.
 - Leigh - LCA on many of the fuels is getting very good. But we need to know how many gallons of what kind of renewable fuel, and the state doesn’t track that yet. We do this tracking for petroleum.
 - Don - Easier on the pipeline side, liquid fuels is harder to track. Isn’t the “but for question” a good problem to have - extra savings?
 - Riley - Don’t want ratepayers to pay for things they aren’t necessarily getting (in terms of the “but for” problem)
 - Rich - multiple forces need to come together to make these things happen. Trying to design a CHS around simplicity in terms of showing that carbon savings have occurred.
 - Chris - There are multiple things pushing in this direction. How do we get them to work together.

- Riley - Critically important
- Chris - When Tier 3 first came about that friction happened between other utilities and EVT
- Slides: Chris Neme: Vermont Clean Heat Standards “Customer Boundaries”
 - Options for Addressing Industrial Sales
 - Included in both CHS goals and reduction options
 - Goals based on total sales to all customers
 - Reductions can come from any customer
 - Excluded from CHS goals, but allowed as reduction option
 - Goals based on REsidential/Commercial sales
 - But reductions from industrials could count toward goals (like offsets)
 - Including Vs Excluding in Setting CHS Goals

Rationale for Inclusion	Rationale for Exclusion
<ul style="list-style-type: none"> ● VT needs to address all GHG emissions ● Forces optimized use of potentially limited low-carbon fuels <ul style="list-style-type: none"> ○ Maybe niche industry-only applications -hydrogen? ● Symmetry w/ electric RPS ● Symmetry w/ EERS ● Gas System Cannot Identify which customers get RNG molecules 	<ul style="list-style-type: none"> ● Uncertainty about whether biofuels are applicable to all industrial uses ● Politics?

- **Draft recommendation: Include Industrial sales in goal setting for all fuels**
- Conversation:
 - Riley - Do we include offsets in program? Or is it an off-ramp from the program? Cost benefit question. Is the incremental challenge worth the extra burden? Add later?
 - Chris - Need a 40% reduction from 1990 numbers. Try it in for a few years and see what we learn? Could take it out later.
 - Rich - Politics? How important is that?
 - Don - If we leave out industrial sales that would be a big chunk excluded, RNG is easier to add to the system, everyone gets the same system. Industrial should be left in. Gives industrial customers opportunity that many (though not all) are looking for.
 - Leigh - EIA thinks industrial is 12% of BTU, 15% of GHG
 - Riley - agree it should be included. Not all industrial is alike, some have to compete more regionally. Case for nuance.
 - Jared - 3 additional bullet points for inclusion: equity, efficiency and politics

- [Rich Slides discussion](#)
 - Riley -
 - Don - Should ramp be linear or algorithmic? Algorithmic is much easier to achieve.
 - Rich - Discussion of boundaries of analysis -
 - Don - there is a difference between pipeline fuel and liquid fuel in terms of what Rich is calling “tier 1 and tier 2”.
 - Leigh -
 - Tier 1 is like out of state wind
 - Tier 2 is like in state electric, physically in state.
 - Jared - Shared spreadsheet about proportionality and GWSA.
 - Have to use life-cycle emissions - Jared and Leigh
 - Riley - trying to meet baseline of 1990, which doesn’t have those life cycle incorporated.
 - Chris - does changes in fracked gas make a difference overtime?
 - Jared - Lifecycle may simplify the sustainability standards
 - Tom - Low income could be a minimum standard instead of a bonus for that
 - Chris - if you give a bonus it would decrease the savings.
 - Leigh - Have to realize the inequality in the system - lower income pay more of their income on energy. So need to do better than proportionality.
 - Landfill gas:
 - Not all biofuels are equal. It is complicated to parse them out. Maybe in the policy just state that not all biofuels are equal and defer the differentiation and assumptions to the TAG process. TAG needs to be set so that we aren’t double counting with Ag reductions.
 - Leigh - California distinguishes these.
- Tom: When do you expect to have this all packaged up? PUC could do a weatherization study and has been also asked to look at clean heat in about 6 months..
 - Rich expecting to wrap this up in May. And hope it would be useful to the PUC.
 - Riley - this group lacks the processes that the commission would add.
- Don - would like to revisit weatherization to not be an excluded category.

3/9/2021

Participants: Rich Cowart, Jared, Leigh, Tom Knauer, Brian Gray, Jill Pfenning, Claire McIlvennie, Tom Murray, Neale Lunderville, Chris Neme, Don Rendall, Riley Allen, David Hill

Neale - Weatherization at Scale and working on a clean heat standard

1. 25 million for weatherization, 16 million to fund the idea of going to scale. Initially to go to VHFA. VHFA and EVT have been working on a different allocation. Which is still being fine-tuned
 - a. 2 million to workforce access through EVT,
 - b. 5 million to go to existing programs incentives,
 - c. 9 million to VHFA to continue to extend loan incentive programs to moderate income, and seed money to on the meter/on-bill.
2. Sen Bray putting in a bill that we had hoped would be a big framework, but it has been scaled back. It is the start of the process. First version renamed fuel-tax as thermal efficiency benefit charge (as per Act 62 report), but there has been strong pushback against that. Framework will be somewhat less than we had hoped for. Fewer opportunities to move clean heat standard into it. What will probably remain in the bill ins initial work by the PUC to look at the scale of what we need to do weatherization in the state - which could be a good way to leverage clean heat as part of the same work.

Rich - Is Sen Bray scaling back the ambition of the earlier draft in order to pass something this year that could leverage action next year? Vs holding off to next year to do a bigger bill.

Neale - What I *think not what I know*: I think Sen Bray is still thinking about this as a 2 step process. Being able to leverage work for next year. Hooking CHS work to that train could be good.

Tom - Testified on this today - They offered concise language asking PUC to develop criteria to guide how large a thermal budget should be and who should be working in the space. This would look at criteria and objectives to guide thermal budgets in the same way that electric and VGS efficiency is already set up.

[Renewable gas education](#) (presentation linked) - Tom Murray - VGS VP for decarbonization technology. Innovation leader on Renewable Natural Gas.

Next year 4% will be RNG - biggest % of any gas utility in the country. Could be at 10% by 2025.

Goal is NetZero GHG emissions for VGS Customers by 2050

RNG is very cost effective emissions reduction measure

VT well suited to do hydrogen pilots - creating hydrogen from excess electricity and then adding to the mix.

Looking at utilizing gas infrastructure so not looking at beneficial electrification

Don - Looking forward to 2030 - What % of RNG do you think we can achieve. Where does it come from? (manure based? In state? Other sources? Other places?)

Tom - ½ manure, ½ landfill in our region to get us to 10%, next 10% is a question. Landfill gas is cheaper. Looking at Farm systems too some involve trucking RNG to our system from new farm systems.

Chris - Struggling with the numbers in the presentation in terms of benefit of RNG vs beneficial electrification. As the grid gets cleaner, doesn't natural gas need to get to 100% renewable to match.

Rich - Part of the math is that keeping farm methane out of the atmosphere is actually GHG negative so it doesn't take that much to offset

Chris - double counting though because ag also has to make reductions

Riley - Seeing a massive uptake of CCHP- 10,500 in 2020. Significant growth. Electrification of heating is probably not the cost effective path. How much growth in heat pumps in VGS territory?

Tom - People who got heat pumps a few years ago have had no decrease in gas use - using mostly for air conditioning. They put a single head system in a house that would need multiple heads. We would like to help get heat pumps out there. If part of a smart system we could let them know to use the heat pump when it is more advantageous.

Chris - Looking at slide 6 - ICF numbers look overly high.

Tom - we can get the gas we need for VT if we have the standards and commitment because of our size. Have to reduce load and also electrify some. At a national level it is harder to reach everything. We have to figure out how to do this in the next decade.

Chris - No one thinks we can get close to full renewable NG nationally.

Tom - get supply flowing and also weatherize, get electrification going as well. All in strategy. Electric side has been innovative for decades, thermal hasn't yet. Our toolbox is going to grow really quickly over the next 5 years.

Dave Hill - Testimony submitted to Illinois suggesting that they should study GHG reduction benefits from methane capture. Landfill gas is most economical, but most of the sites are already using the gas in some way or another. Farm manure often isn't being utilized. Type of gas and use of the gas both matter.

Chris - RNG is not one thing - they are very different in terms of impacts on GHG emissions

Tom - There is a highest and best use question though. RNG is often more efficient in thermal than in electric esp when other renewable electric sources exist. Marketplace isn't yet clear which is a challenge. Want more renewable, but also want carbon intensity to be zero or negative. RNG is like electricity in that it is all interconnected. Vermont needs to join the markets that exist. Pathways - has to be in the system.

Need to start thinking in BTU terms.

List of topics we want to address next

Think about how we a Clean Heat standard would work transactionally, what would it look like and how would participants interact?

How do we structure a standard that allows for max flexibility.

2/23/2020

Participants: Jared Duval, Cara Robeck, Tom Knauer, Leigh Seddon, Rick Weston, Claire McIlvennie, Brian Gray, Rich Cowart, Neale Lunderville, Chris Neme, Riley Allen

Don and Rich testified in the Senate Natural Committee last week to present the idea of a Clean Heat Standard. It was well received - but is really just the beginning of a conversation.

Pathways work - Jared and Mei: Started as Path to Paris and has been updated.

Three main Thermal Pathways: Electrification, Weatherization, Wood and Biofuels

Assumptions:

- Weatherization follows Wx at Scale Action Team. Decreasing impact of weatherization over time.
- Heat Pump water heaters increased significantly.
- Need to reduce emissions proportionally under the GWSA.
- Thermal is reducing a disproportionate amount of emissions because transportation can't get there.

Questions

- Rich - Why is it harder to do thermal than transportation?
- Riley - Numbers are suitably aggressive.
- Chris - heatpumps can't be ductless mini-splits, need to become more comprehensive
- If wood heat and heat pumps are in same home they don't get the same savings - interactive effects reduce impact.
- Everything is going to be aggressive/ambitious if we are going to get to the GWSA requirements.
- More detail on tree chart 47% of emissions, 40% of reductions

Chris Neme - Heat Pumps and heat pump policy.

- Long-Term needs
 - Full decarbonization of Individual Buildings
 - Need heat pumps to displace virtually all heating
 - Most Heat pumps installed today only displace 40 - 75%
 - Mostly ductless mini-splits which serve only parts of buildings
 - Maybe 40% for one head
 - Maybe 75% for multi-head

- Fine in short term, but not long-term
 - Need transition strategy
- Addressing long-term needs
 - Full home solutions available for forced air heat
 - Same efficiency as ductless but indoor unit is air handler
 - Can install electric resistance coil in air handler as back-up
 - Not aggressively pushed today
 - Limitation: only 30% of VT homes are forced air
 - Need solution for hydronically-heated homes
 - Converting to forced air - but added cost
 - Air-to-water HPs not really commercially available
 - Extremely limited, specialized order
- Additional Challenges w/Ductless
 - Multi-heads not nearly as efficient as promised
 - Manufacturers have work to do
 - Customer challenges in managing multi-fuel systems
 - Separate controls don't talk to each other
 - Widely varying levels of savings as result of customers not using systems optimally
 - Thermostat set point for HP needs to be higher than for back-up
 - Possible solutions
 - Short-term: customer education critical
 - Long-term: controls that can be integrated
 - Long-term: shift from ductless to central systems
- Building envelope Efficiency
 - Needed to minimize operation of inefficiency back up
 - Whether fossil or electric resistance
 - Minimize bills
 - Minimize winter spikes on grid
 - Need to ensure customer comfort
- HP tech keeps improving
 - Carrier/GE "Endure" produces heat down to -31F
 - Mitsubishi
 - Larger capacity for centrally ducted systems
 - New ductless - nameplate capacity now -5F (was 5F).

Leakage rates? In Japan some development of heatpumps using CO2 as a refrigerant.
Adding cooling as an additional energy use.

Topics for future meetings

- More time on Pathways assumptions
- Renewable Natural Gas - VGS can do this, but not next week. March 9
- Climate Council

2/9/2020

Participants: Jared Duval, Cara Robeck, Leigh Seddon, Matt Cota, Tom Knauer, NORA, Peter Bourne, Michael Trunzon (Representative of National biodiesel board), Thomas Butcher, Brian Gray, Matt Herman, Stephen Dodge, Rick Weston, Richard Cowart, Christina Cisneros, Claire McIlvennie, Don Rendall, Chris Neme, Sean Cota, 802-236-6551.

[Meeting video:](#)

Matt Cota - there is a growing movement figuring out how Liquid Fuel providers can move towards a lower carbon future.

Rich - clarifying this is an ad hoc working group, not part of the climate council.

Jared - clarified difference between EAN network and EAN membership.

Michael Trunzo- States have policies under development that use biodiesel both transportation and biodiesel. In CA biomass based diesel is growing very quickly. BMBD generates most of CA-LCFS credits. NE States talking about transportation and heating. NY and RI both have a 5% biodiesel blending requirement. Proposal to increase % in both states (NY 10% by 2025, 20% by 2030), (RI 10% by 2025, 50% by 2030). VT 7% by 2016 biodiesel blend if contiguous states adopt similar law, which hasn't happened yet.)

Matt Herman: Vermont uses 70% more diesel per capita than the average American. Smart policy drives cleaner fuels. Biodiesel is better for human health - 85% lower particulate matter (study in New Haven, CT). Pending study - societal value for different . Time-value of carbon reductions - shows that switching to biodiesel now rather than waiting for an electric option shows significant reductions.

Thomas Butcher - National Oilheat Research Alliance: Comparing No 2 fuel, Biodiesel, Renewable Diesel (HVO) EL and others. Biodiesel is most developed source. Biodiesel has less BTUs per gallon. Is defined by ASTM standards (D6751 B100, D396 up to B5) US296 - oil burner standards for B6-B20 blends (higher blends in progress). Tech studies on biodiesel ranging from B0-B100. Biodiesel burns well, PM are lower, CO are lower, Nox about the same. FLames are cleaner and less emissive, Can be burned as lower. Looking at seals and pumps- B0 showing same wear and impacts as B100. Biodiesel shelf life 1 year (no similar spec for petroleum).

Survey of biodiesel users shows generally no change for various aspects of use.

tbutcher@noraweb.com

Peter Bourne: Use recycled cooking oil. Have had positive opt in. Loss of dairy farms is leading to fallow fields - opportunity. Wood and cellulose are also opportunities. VSJF - study of farmers growing on biodiesel. Seeing solar fields taking over on prime agricultural land. Could have a processing plant in VT. Electricity isn't going to solve all our problems. There are multiple opportunities solar + biodiesel + other options: multifaceted.

Sean Cota: NEFI - Most of industry is multigenerational family businesses. 3000 family businesses compete in their local areas. Pay above average wages. Also do HVAC work. Industry voted to go to net 0 as part of Paris climate accord. EL - scores negative carbon emissions. We want to reduce carbon and can do so. Have fuels now. Let us let you go where you want to go. Count us in on the process.

Rich questions: Particulates, is much lower in particulates, not lower in Nox, a tiny bit lower in C direct emissions, didn't see a sulfur number. Total carbon is much lower - in lifecycle emissions. We need understanding of life cycle emissions of the different available fuels.

Matt Herman - Sources of data and CA - Argonne national lab 80-90% reused oil, soybean oil (80%, but they add 30% for land use change.) Seed companies have gotten yield games - more crops on less land. Growing animal field.

Sean Cota - Research on using waste cellulose are very promising and score very low carbon.

Michael Trunzo - NOx - some studies showing reductions in thermal applications.

- What is capacity? We have ramped from 20million to 3 billion in about 15 years. Industry wants to make 6 billion by 2030. There will be other liquid solutions as well (like cellulose). Important that all available solutions can be part of the solution. Writing a rule that is broad enough to insure sustainability criteria, but allow industry to bring a broad range of solutions. Making sure you are actually measuring CO2e and basing on that - CA did this well.
- Jared have been using B100 biodiesel for years in transportation and heating oil. For vehicles and heating equipment - there are warranty issues (above 20% voids warranties). Electrification is part of what we mean by "clean heat", but we also understand the role of fuel dealers and biofuels. Agree we don't want to pick certain technologies and fuels, but to leave flexibilities. How do we move towards B100 without further locking in problematic fossil fuels and how do we address warranties: You are really talking about the fuel pump (which is less than \$100 and on a 3 year warranty). So far we haven't been having issues with the fuel pumps. What we are seeing in the field is very few issues, a few seals here and there, but nothing different than petroleum diesel. Very few parts of the heating system are under warranties anyway. This is where government can be useful. If you have a state goal. Most of the retail companies are full service and do the repairs as well as selling the fuels. Generally

warranties only actually cover manufacturers defects for 3 years. A number of the manufacturers are moving beyond this.

- Rich - Financing in Weatherization - default rates are actually low, but concern is high. So maybe there is a way to insure what is necessary to override the warranty issues without spending much money and adding customer comfort.
- How will small fuel dealers make the switch to any sort of biofuels considering supply constraint? It will go “up the food chain” for those who don’t blend their own fuel. It is similar to the lowering of sulfur in heating fuel in past years - following NY, MA etc. As the region moves this way, VT smaller dealers will be better able to do this. A lot of biofuels will come via rail. QB standards do include heat too.

2/2/2021

Participants: Tom Knauer, Rick Weston, Claire McIlvennie, Chris Neme, Richard Cowart, Leigh Seddon, Neale Lunderville, Don Rendall, Riley Allen, Jared Duval, Cara Robeck

- Quick review of the [proposals for combined weatherization and clean heat program support from the federal government, as delivered to Senator Leahy’s office](#).
 - The \$200 million for rental relief doesn’t give a lot of flexibility, but it would be helpful if anyone has a chance to look at [the statute](#) to see if there are other avenues for using this to support renters “utility and home energy costs” by supporting weatherization and/or fuel switching.
 - New COVID relief funds - is there room in those for this sort of work. (Or allowing the use of those funds from the past that weren’t used to be wrapped into the new language).
 -
- Update on legislative action in Montpelier
 - Neale, Maura (VHFA), Bob Barton - Sen NR and Energy - gave info on \$25 million for weatherization - mostly supportive, some other groups wondering if some of those funds can be used for other things as well.
 - Sen NR and energy also interested in hearing about Clean Heat Standard. - support for more information being shared sooner.
 - Discussion about needs for policy driver and supports whether from the same source or not.
 - Rental Energy Ordinances: Weatherization set standard several years in the future with funds to help apartment owners to get to compliance. (Chris suggestion)
 - EAN data - more than 20% of lowest tertile of VT renter’s units are heated with resistance heating - highest cost per BTU. Jennah Slayton’s paper for us on “Energy Inequity and Burden in Vermont” available at <https://www.eanvt.org/tracking-progress/research-and-reports/energy-equity/>

- Short intro and discussion of the [DPS perspective on CCHPs](#) – Riley Allen (note follow up [clarifying e-mails here](#)).
 - Generally a good technology.
 - Starting to see a lot of heat pumps installed - more than 10k in 2020 may include water heaters. 30k cumulative installed to date approx.
 - Annual costs for fuel oil compared to fuel oil plus cCHP not that different (a little lower in GMP, a little higher in WEC.) VELCO summer/winter peak projections, they are explained in the draft 2021 Long-range transmission plan which is available here: https://www.vermontspc.com/library/document/download/7206/2021Plan_draft_toVSPC.pdf
 - Heat pumps plus EVs. EVs likely to scale up 2024/5. Impact on peak load may need a lot of transmission investments in different parts of the state. Tending towards being a winter peaking system. The challenge isn't getting heat pumps installed, the challenge is how do we do it optimally. Reduce leakage of CFCs and gases. Issue shown from a CA study. (Chris - there are systems being designed that use CO2 as refrigerant). - Ask TJ for details of the CA study. Calls for good program design. Not yet seeing a drop in carbon based fuels (which is an easier way to look at carbon emissions.) A lot are used for air conditioning and used heavily for that. Need to do baseline samples to see how these are being used. Hot water heaters and space heaters have different characteristics for controllability. Most of the installs in VT are ductless mini-splits - need to move to centrally ducted cold- climate heat pumps. Need to make sure the short term solution of trying to get heat pumps installed as quickly as possible doesn't mean we have the wrong technology for the long term.
- Next week hearing from fuel dealers and fuel dealers institute.
- Adding staff to support the Clean Heat project - Cara will support, group agreed to support Chris Neme having a contract to support the work. .

1/26/21

Participants: Jared Duval, Don Rendall, Rick Weston, Brian Gray, Rich Cowart, Neale Lunderville, Riley Allen, Tom Knauer, Leigh Seddon, Cara Robeck, Claire McIlvennie,

1. News items/discussion:

- **News on the Governor's weatherization proposal;**

Governor's address - 25 million dollars for weatherization \$5 million for BGS SEMP, \$4 million for WAP, \$16 million for VHFA for the weatherization work from the weatherization team (to be leveraged with other dollars to get closer to \$60million in work done).

Renewable Energy funds in budget - \$10 million - Affordable community clean energy initiative.
- low to moderate income support for community solar, storage, alternative generation

(community wind). Looking beyond a utility framework for community projects as well. Wood pellet stoves and heat pumps probably aren't included, more on generation. Money flowing through CEDF. In terms of clean heat and moving off fossil fuels - CEDF has one more year of funding (originally from Entergy settlement, some ARRA funds) has pushed forward advanced wood heat including supply chain - need to keep an eye out for funds once these scale down.

Congrats on getting Act 62 report out - it contains a lot about weatherization, but not much on fuel switching. Thermal efficiency benefit charge: for thermal switching as well as building shell. For all income levels, but makes sense to prioritize low and moderate income Vermonters. Gradually increase tax on fuel and direct all of that toward low income weatherization.

This group has been proposing a performance standard instead of a tax.

- **Evolving position of VFDA and possible outreach by this group**

Matt Cota said at Senate Natural Resources this morning: "A benefits charge without dyed diesel does make sense". Matt might support this in theory as it combines a number of taxes and fees and makes it administratively simpler for small dealers. Might make sense to create this structure sooner without raising it yet, but if it is simpler to administer it is also simpler to oppose. In the Act 62 report it is actually still discussed as 2 charges, to protect and augment the low income weatherization money. Rep from New England Fuels Institute coming to a meeting. Need to think deeply about how to integrate fuel switching (making sure biofuels are not mixed in at such a low level it really just locks in fossil fuels.

- **Outreach to the congressional delegation on policies that could advance clean heat**

There might be an opportunity for some federal funding. There is a group from the clean heat and the weatherization working groups working on proposals to the delegation. Almost have a final draft.

2. Major policy discussion: how would a Clean Heat Standard be designed to work with respect to pipeline fossil gas?

Don Rendall presented structuring a CHS for VGS, including:

How much Carbon can we reduce? What are the mechanisms that can help us over the next 10 years? Start with reducing customers' heating load through weatherization, then increasing proportion of renewable natural gas. Beyond 2030 looking toward "new innovation" - more hydrogen blended in? More fuel switching? People using rebates to get Heat pumps in VGS territory don't decrease gas use much from data so far. Clean heat standard for VGS would be 3 pronged -

1. RNG increase to about 20% by 2030, sources that have most positive carbon impact (CA res. Board data) - manure digesters have the best carbon value (negative!) per unit of gas - seems to be feasible both in terms of supply and demand.

2. Weatherization substantially increased.

3. Transforming model to energy services model including cold climate heat pumps, advanced wood heat etc. Building system or acquiring credits from other suppliers.

Clean heat standard group hasn't talked about credit trading much yet. Might be a possibility of adding offsets, from outside VT (limited? US wide?) . CA standard - RNG has to actually touch the system (similar parallel to ISO grid).

Further clarification: Digester in VT to date making electricity rather than gas. There is a study that blocks out the different kinds of RNG nationally (Neale will share).

Voluntary tariff exists, but VGS would like to socialize it across the full customer base and increase it. RNG \$11-20/MMBTU, commodity natural gas is \$2.75-3.75/MMBTU. Similar to the difference between net metering and wholesale electricity. Voluntary program at 100% doubles the price to heat a home. VGS goal is among the most progressive in the country on RNG. Electric utilities have a mandate for renewables. Fuel dealers don't. VT Gas as a regulated utility, should it have a renewable mandate? Hard to switch customers to gas from fuel oil because of current pricing, so a mandate on VGS without other fuels would create more disincentive to gas which has lower carbon than the unregulated fuels. Though also competing with electricity - and need to consider delivery of least cost eservice in terms of regulations - thus a standard that applies to VGS should possibly apply to all fuels.

Look ahead to Feb 2 at 4pm: Please get draft comments on whitepaper by this weekend. (We can dig into the paper every other week).

Hydrogen, district energy and geothermal for a future conversation.

1/20/ 21: Clean Heat Standard notes

Participants: Cara Robeck, Jared Duval, Don Rendall, Rick Weston, Brian Gray, Chris Neme, Claire McIlvennie, Jill Phенning, Rich Cowart,

Next steps:

- Everyone read the full document and make comments before Monday.
- Let Rich know what we should discuss at face to face meetings.
- Focus on gaps in the text that you might be interested in writing:
 1. Intro comparing various program design - (Rick is still working on the table)
 2. Pathway - what are we trying to fill? (start of paper). Jared to draft this.
 3. Creditable measures - need text on how we would measure. How measures would be creditable and how credits would be earned. A lot would be in an appendix or reference document. Someone will need to write this up. Volunteers are welcome. (Rich and Leigh or Chris? Can be based on work Leigh has already done).

4. Consumer protection and energy equity - how would the program accomplish this?
Flexibility devices in design - like multi-year performance, pool to sell excess credits, payment for alternative compliance, etc.
5. Quality control, monitoring and verification: Money for this work probably necessary.
6. Workforce development (or transition assistance to energy suppliers)

Rich: Heating fuel is pretty price inelastic, so a carbon cap doesn't do much to change behaviour, but revenue can be used to create change. Carbon tax or carbon cap both need to be invested well to make any difference.

Do we include Carbon cap/carbon tax in this draft or just describe a Clean heat performance standard?

Don: Renewable portfolio standard - build up rather than "squeeze from top down" sketch out a cap approach as an appendix to give policymakers something to judge this against. Focus on what we are advancing.

Rich: There are also reasons to prefer a cap: Measure carbon better than a CHS.

Chris: Upfront brief discussion about conceptual options (including carbon tax?) could be clarifying for policymakers. Making clear a cap or tax without using revenue have significant disadvantages. But could do as a hybrid with CHS if funds *are* invested. But for moment focusing on CHS.

Jared: Agree with what Chris said - Rich's framing is helpful. Framing - this is for solutions in the thermal sector to support affordability and carbon emissions reductions. Give all options on the table including the drawbacks that have made this group lean towards CHS - credit based approach. PUC report on Act 62 - time to move forward.

Claire: Agree as well that it would be helpful to have overview, and then offer a table of comparisons in an appendix of the report.

Rich: Where do we place the obligation? A cap would be fairly simple like TCI - upstream. Credit based- bottom up- more of an open question. Transform Heating service sector (as opposed to fuel sector). Develop -VT based companies employing local people providing service in a low carbon way. Need to build industry from scratch (like solar) or transform the heating sector. How do you nudge an industry to change its business model?

Jared: Fuel dealers - a lot of small providers might not be interested in the transition.

Brian: They know moving fuel from one place to another, many not even have a service team. They look like other revenue sources, but mostly in trucking (gravel in summer...) Having them offer heat pump weatherization or weatherization doesn't fit the model. Though biofuels can.

Chris: Not much of a difference between putting it on wholesaler or retail. If there was an alternate compliance mechanism a lot of fuel dealers might just pay it. Space for innovation if it goes upstream.

Rich: Going upstream is preferred approach based on this conversation.

Jared: Question about ramping up biodiesel as a replacement for fuel oil. 128 million gallons of fuel oil sold in Vt last year. Black Bear Biodiesel producing 300,000 gallons a year from waste oil from restaurants, mostly going out of state. It is at the margins.

Jill: What do we think the wholesalers would do differently to transform the market.

Rick: ACP needs to be "painfully high" - so they want to buy services instead of having their prices rise. Build the market for retrofitting, weatherization, etc. Supply side push.

Chris: Need to writeup what the eligible measures are: Weatherization and efficiency should not be an eligible measure because of how the measures stack. Can't count savings out forward over the life of the project because of other changes that might be made in the building. Efficiency is very important, but needs to be done separately in terms of allowances so you can be sure measures are delivering the savings you are looking for. Complementary policies needed.

Rich: Utilities have a lot of experience finding proposals for programs to address emissions reductions goals. Don't want to address efficiency and Weatherization with this proposal because there are already policies that cover those. TAG program has given us experience measuring savings.

Chris: Would this be on top of Tier 3 or part of Tier 3.

Jared: Funds EVT can spend on thermal currently shouldn't be scaled up (Act 62 points).

Rich: Some entity (entities) could develop scalable measures and selling credits.

Chris: ACP system - could be collaborative group(s) set up providing services for multiple obligated parties.

Rich: Conversation on what should count as eligible measures.

Jared: Anyone who can meet reductions should be able to be in the market. How to keep from double counting. Tier 3 isn't an emissions reduction program, it is a fuel reduction program. Needs to be a rationalization of programs, so that everything is additive.

Rick: Resolve that in the same way we figure out the reduction amounts.

Chris: Or not worry about double counting - **set target high enough to include Tier 3.**

Rich: This could allow coordination between different parties, teaming up to mutually meet obligations.

Don: Whose behaviour do we want to influence? Whole- saler? People doing work at premises level - make achievable for them.

Rich: Need right incentives for both obligated parties and delivering parties.

Chris: Delivery capacity will need to grow given the reduction curve we need to meet. Efficacy of measures will depend on the quality of the work that is delivered. Fuel tax on top of

obligations to create modest statewide fund to support market development. Promote quality standards, support training of HVAC technicians, QC work.

Rich: Quality control is in outline.

Jared: Is there another level as an obligated party - a threshold in which above a certain amount of sales you are obligated to protect some of the very small local companies. Market signals long term may be part of what made RGGI successful and some of the CA policies.

(Rick: Need to be careful with this to make sure we don't have unintended consequences.

Chris: Good to think these things through at this point. But not sure it helps us get where we want to go and makes it hard to account for from the wholesalers without providing much different in the outcome.

Chris: Split Consumer protection and energy equity into two separate categories

Jared: Using the paper as the agenda for the next couple of meetings is helpful at least for next couple meetings. Set a date by which people make comments/suggested edits.

Timeline? To align with Wx - a draft proposal would be ready for review by March 8.

1/12/21 Clean Heat Standard Meeting Notes

Participants: [Rick Weston](#), Cara, Tom Knauer, Rich Cowart, Don Rendall, Claire McIlvennie, Jared, Chris Neme, Brian Gray, Riley Allen, Gabrielle Stebbins, [Leigh Seddon](#)

- Rich hopes to put together an initial draft program proposal for next week or two
- Update from Leigh/Jared on the thermal pathways analysis (part of EAN's overall energy emissions reduction pathways analysis): EAN new Thermal workbooks have a proportional share for thermal (instead of more than proportional) GWSA says proportional to their share. TAG characterizations have also been corrected. Pathways are illustrative of savings that can be realized. Ready to delve into policy. Broke out industrial, residential and commercial. Mei and Leigh are pulling together as much known info as we have. To ID pathways including methods for each of the three energy sectors.
 - This is the language from the GWSA: "to provide for greenhouse gas emissions reductions that reflect the relative contribution of each source or category of source of emissions." Thus EAN work on this is focused on the 79% of emissions that come from Energy.
 - Rich: What fraction of current thermal fossil must be replaced by 2025, and how many fuel switches does that imply? Chris: read out numbers from the workbook inc 50k heatpumps and 10% RNG - daunting. Currently at 15k heatpumps, would need 50k by 2025. These numbers are incremental for 2025 2030 and 2050 are cumulative. Chris: Looking at workbook, beyond 2030 the numbers are less certain. Retrofitting heat pumps into more than ¾ of heating stock by 2030.

- Rich: Significant lift to 2025 to meet the mandates.
- Jared: Hoping to include high level overview in next Annual Progress Report and resource for climate council deliberations. To help people understand rough scale and pace. Getting feedback on assumptions at a couple of calls this week. Let Jared know if you want to join those calls.
- **Please provide feedback on Leigh's latest version by Tuesday January 19.**
- Lift to 2025 is actually lighter than lift between 2025 and 2030.
- Work of this groups should work on GWSA goals and also a program that gets us started on this path.
- Chris: May not be accounting for the overlap between weatherization and clean heat options.
- Rich: Problem of heat pumps in unweatherized units. Need parallel progress on weatherization. Two programs need to be unfolded together.
- Rick next steps on Clean Heat Standard program elements draft (see: https://docs.google.com/document/d/1PIHoo5D-byhf9zzspCJYMOH_7yfsLXVk/edit)
 - Adding complementary policies
 - Continuing to iterate on this.
 - Rick will put more time into the draft this week (Rick will reach out for feedback from specific people)
 - Rich: what does the typology reveal to date about preferred pathway?
 - Rick: don't know? Maybe a hybrid approach
 - Riley: Typology doesn't necessarily reveal a preference. Auction mechanism (absent reinvestment) is not as hard a lift. What you do with the money becomes comparably administrative elements. But the elements draft doesn't necessarily lead to a preference.
 - Rich - Do we anticipate that our report would lay out 2 approaches (plus possibly a hybrid) for the legislature. (Jared that seems to be where we ended last time) (Don thought we settled more preferences for not going with cap and invest, instead a hybrid or incentive based approach - because of political environment - informed by Governor's position on TCI. Need to make sure we don't overwhelm people with the program goals we would need to hit these goals. The numbers of conversations and weatherizations and the investment are daunting. Need to think about how we can present this in a way that is both objective and transparent and that doesn't get us stuck in the mud), (Rick clarifying Governor's "no-action" position on TCI in not wanting to add cost to fuel) (Riley clarifying the position is more "wait and see") (Don - but that puts us in a hard position to achieve what we want to accomplish. How do we get from here to weatherizing a significant portion of the housing stock at significant public/private investment cost.) (Chris: Weren't in agreement on credit vs investment approach a couple weeks ago. **Might be starting coalesce around the hybrid method at the last meeting.** Rich: Could get to hybrid from either direction, and will take some more work to figure out the most likely successful path. Don't want to give up before we start, but have to make sure we are taking weatherization into account.

- Rich: Near term opportunities to coordinate with Wx @ Scale group re: federal funding and programs.
 - Rich - cost of fuel switching should be rolled into cost of Wx. These should be offered as a package.
 - Jared - Helpful to be on similar timelines on proposals. Richard Faesy is working on the outline - initial draft by March 8. Could be working towards having a program proposal/outline and key considerations to allow rationalization between them. How does the conversation about this happen at federal vs state levels. Near term opportunity for federal level, but may be slower at the state level with more research and investigation.
 - Rich: State - immediate challenges of the day are a constraint. On the other hand we have an opportunity, Leahy will be chairman of appropriations, we should be bold, leveraging federal opportunities to support programs at the state level that pay for themselves, but need federal funding to get them off the ground. What we are doing as part of a bigger federal stimulus. Our ability to be ambitious is helped by federal programs. Pilot program. Wx group talking to Leahy and Sanders office. Initiatives should be bundled for financing. **Rich hoping to get meetings with the federal delegation with Chris Neme.**
 - Jared: Context from Act 62 report coming out at the end of the week? Are there recommendations we should be aware of? Tom - coming soon.
- Rich: approaches for counting credits/ deeming savings
 - Rich: Leigh has given thought to bundling things together by technology. Is there a simple path for a credit in a clean heat standard? In an allowance system measure at source. Leigh: relies on good characterizations (TAG group) for GHG savings, and guardrails in the program to not allow sloppy installations (heat pumps must be in Wx buildings and controlled). Don: Shows the importance of knitting these two programs together. Only allow credits for heat pumps in Wx buildings. Chris: that wouldn't fly. Couldn't put requirement in, because of constraints around increasing market share. Could have differentiated incentives for doing both, but can't prohibit them from happening not at the same time. Leigh: TAG group has different levels of incentive based on how well the installation is done. Chris: Interactive effects are difficult to add in. TAG is constantly reevaluating. Gabrielle - Having them tied together is needed, but probably can't be put into a program. Need to answer these questions to design program - subcommittees to figure this out. Chris: If we go down credit path - don't give credit to efficiency. Need efficiency, but through complementary policy. **Rich, Chris, Brian and Claire to be on the subcommittee to address this.**
- Advisory Group discussion (Jared)
 - Who do we want to make sure has a chance to review this work? List of names has been added to the [Clean Heat Standard Contacts spreadsheet](#) (Stakeholders tab) Rich requests that everyone keep this in mind.
- Riley: Question about thinking longer term to get the private sector involved in funding these needs over the next 5 years and longer. Rich: Wx group is focussing on that.

Federal funding would be the jumpstart and institutional development, but not for ongoing long term.

4:55: Overall timeline update: aim to align with Wx @ Scale group, i.e. draft white paper with program design options and considerations by March 8th (Rich leading).

01/05 Clean Heat Standard Meeting Notes

Participants: Rick Weston; Riley Allen, Claire McIlvennie, Chris Neme, Leigh Seddon, Jill Pfenning, Don Rendall, Brain Gray, Neale Lunderville, Cara Robeck, Jared Duval

1. Reviewed draft table comparing different program design models. See: https://docs.google.com/document/d/1PIHoo5D-byhf9zzspCJYMOH_7yfsLXVk/edit?usp=drive_web&oid=100921995943661466650&rtpof=true
 - a. Note: would be good to outline options re: what to do with revenues (RGGI example of revenue recycling into related programs).
 - b. Tom: Have we looked at administrative costs to manage credit vs. allowance-based system? Assume that an allowance-based system would be more complex/ costly (for example, RGGI Inc.)
 - c. Leigh: TAG Program about \$800K per year.
 - d. Chris: Credit system may be more expensive -- continuous process to update assumptions re: measures and obligated parties.
 - e. Riley: Working to identify functional elements of each vs. review of pros and cons of each. Ultimately, will likely end up trying to combine best elements of each (hybrid model).
 - f. To come: who manages market; who can produce credits; how to enter market for credits, etc.
 - g. Jared: Differences re: the topic of the certainty of emissions reduction... still unclear re: why one (allowance vs. credit-based system) would be more certain than the other.
 - h. Chris: Allowance system provides emissions reduction certainty if... and revenues invested in complementary programs from an allowance system has additional benefit.
 - i. Leigh: only certainty with an allowance system would be fuel dealers selling less fossil fuel. But has to be alternative compliance mechanism regardless. Don't see that an allowance system necessarily gives more emissions reduction certainty than credit-based system.
 - j. Chris: Depends on whether or not allow alternative compliance mechanisms or offsets.

- k. Riley: Desire to avoid price volatility, which is why offsets are desirable (and why a hybrid approach may be the way to go). Pure allowance structure gets you what you want but may be too politically scary re: price uncertainty.
2. Wx @ Scale group overview from Neale:
- a. Starting from a consumer perspective. Know that low and moderate income folks struggling with housing and energy affordability. How are we going to raise the funds and the right kind of funds to weatherize the 120K + homes for low and moderate income families by the end of the decade (2030). How to capitalize and grow a fund of money to invest in weatherization. Need contracting base and stability of funding to ramp up.
 - b. Have stopped thinking about this as a climate problem. Instead, going through door of housing affordability/ cost of living. Working closely with VHFA. VHFA and VEDA, as quasi-public entities, have own borrowing authority on their balance sheets without being put on net tax supported debt statement of the State.
 - c. Spending time on the question of how to bring different partners together to combine the right funding sources, program delivery partners, etc.
 - d. Sees Clean Heat Standard and Wx at Scale as train cars that at some point should link up.
 - e. Rick: We all agree that Wx is absolutely critical to the overall picture, including deemed savings.
 - f. Tom: Question: how to finance debt over time?
 - g. Neale: Looking at a Pay as You Save type-model. But that allocation only goes so far. So would have to look at other ways to pay back. Perhaps a weatherization tariff regulated by the PUC, based on a cost of service.
 - h. Chris: Some pilots in other parts of country that show Wx can make homes healthier. Demonstrate value to hospitals and get paid via health savings.
 - i. Rick: New Zealand study: report that showed that cost of Wx was more than offset by health savings.
 - j. Riley: TJ working on the above issue. Neale will connect with him.
 - k. Riley: Question re: possibilities for new businesses (ESCOs, etc.) that can be created to achieve/ deliver this.
 - l. Don: Stay focused on what will appeal to customers. How do we build a product that they want to buy.
 - m. Jared: Sen Bray has said that his top priority is weatherization at scale, will be a main focus of his committee. Rep. Briglin has expressed interest in a Clean Heat Standard.
3. Chris:

- a. Discussion of emissions reduction pathway analysis to meet 2025 and 2030 state goals. If you allocate each sector its proportional share, how feasible is that? One scenario
- b. Question: how to ramp up workforce to meet targets.
- c. Leigh: Took a decade to ramp up solar workforce.
- d. Brian: I will always be an advocate for Wx first. But don't have the workforce to do that at scale yet. What we do have is the contractors to do heat pump installs (3-4 hours vs. 3-4 day job). How much can we do heat pump installs before Wx efforts?
- e. Chris: about 54% fuel use in residential. Remaining 46% in commercial and industrial. About 1/3 of homes forced hot air vs. hydronic. Homes that have hydronic heating are more difficult.

Advisory Committee Nominees:

Brian's suggestions - My list is more boots on the ground that can talk with first hand knowledge about programs and issues.

- Sean Cota - New England Fuel Institute - discuss net zero by 2050 plan
- Chris Burns - Burlington Electric - Heat Pumps vs Natural Gas - Heat Pump metering program
- Geoff Wilcox - State of Vermont OEO - Low Income Weatherization - How to fuel switch at the same time?
- Jake Marin - Efficiency Vermont - Heat Pump expert

Jared's suggestions:

- Rep. Briglin
- Sen. Bray
- Peter and Levi Bourne (Bourne's Energy)
- Jim Malloy (Black Bear Biodiesel)
- Andy Boutin or Dave Frank (advanced wood heat experts & system installers) _
- Karen Glitman
- Someone from Efficiency Vermont? Kelly Lucci?
- Jeff Monder (GMP)
- Ken Jones (ACCD)
- Olivia Campbell Andersen (note: she recently requested to join the team -- wanted to check with group re: what role would be most appropriate).

Note: if we want to include legislators on the advisory group, it may make sense to schedule advisory group calls/meetings on Mondays (I know that Rep. Stebbins said that she will not continue to join our regularly scheduled meetings starting in January).

Riley suggestions

- I generally like Jared's list, but may be productive to keep the size manageable as others add names. We might also want to include a second stage in the process that allows broader reviews to actual proposals before they are live. I think TJ Poor might be useful at that stage, but am not proposing him for the advisory group as the DPS is already well represented.

Claire

- I'm not sure who this would be, but would it be appropriate to include someone from the UVM/academic community? Perhaps via the Gund Institute for Environment? Stephen Posner is the Gund's Director of Policy Outreach

12/22 Clean Heat Standard Meeting Notes

Participants: Rich Cowart; Rick Weston; Leigh Seddon; Tom Knauer; Leigh Seddon; Brian Gray; Gabrielle Stebbins; Chris Neme; Claire McIlvennie; Cara Robeck; Jared Duval; Riley showed up half way through

Introductions

Welcomed Cara

Agenda:

1. Technical assumptions re: thermal measures (esp. Heat pumps)
2. Pathways discussion re: thermal share of overall emissions reduction
3. How to link up with financing part of Wx @ Scale project (funding for major fuel switching effort should move in tandem with major weatherization initiative)
4. Start brainstorming advisory committee

1. Technical assumptions re: thermal measures (esp. Heat pumps)

Claire: Tier 3 Technical Advisory Group (TAG) process overview:

- Modeled off EEU TAG process and how those technical resource manuals (TRMs) work. Try to collaborate when possible/ when overlapping measures. Typically involved members include PSD, DU's, other stakeholders.
- VEIC administers TAG.
- Meets 4-5x/ year
- Discusses new measures for consideration
- Annual report to PUC
- Decision-making is collaborative. For prescriptive measure characterizations that go into TRM: each DU has one vote, decisions made by majority vote. PSD vote can break a tie. Any DU can sponsor a measure for review (or PSD could, or 3rd party could petition PSD to offer measure for review).
- If measure not approved, DU can pursue as a special (?) project or decision can be appealed to PUC.

Discussion:

- Note: Gabrielle's husband manages the TAG at VEIC, so we could ask him for an overview at some point if he wanted.
- Chris: some of TAG TRM measures look overly optimistic (esp. re: ductless air source heat pumps).
- Leigh agrees w/ Chris re: some measures may be overly optimistic re: fuel savings/ emissions savings. However, Leigh's approach to start has been to align with State standards. If things should be changed, should probably happen via TAG process.
- Rich: Do we want to piggyback on existing state process? If yes, and if we think existing numbers re: measure characterizations are too optimistic, then we may have to suggest corrective measures (re: process of re: numbers).
- Claire: Tier 3 TAG has more people at table than EEU TAG. Process seems to work well. Measures proposed to date tend to be those that maximize Tier 3 credit and that focus on electrification (i.e. not advanced wood heat as much to date). There is also a custom route, separate from prescriptive measures. Custom route tends to be high volume, well understood measures at a commercial/industrial (C & I) or large scale.
- Brian: what portion of Tier 3 measures are residential vs. commercial/ industrial? Would be good to see more residential type programs among custom measures. @ VGS, about 75% of custom savings came from C&I sector.
- Tom: VEC has gotten a lot of their Tier 3 satisfied by line extensions to maple producers.
- Claire will put TRM and last Tier 3 report into Google folder.

2. Pathways discussion re: thermal share of overall emissions reduction

- Chris: Leigh sent spreadsheet to Chris, they discussed. Chris suspects that the amount of emissions reduction attributed to ductless single head heat pumps is off by factor of two. Assumes displaces 60% of fuel use displaced (probably closer to 40%). EIA data suggests that heat load is perhaps 20% less than in TAG/TRM.
- Leigh: TAG uses COP of 2.4 certainly achievable but PSD studies have shown that the average is not achieving that. Average of idealized household at 83 MBTUs... May not be off by factor of two, may be 50% less... That said, when comparing heat pumps to other pathways, still a powerful pathway even if savings only 50% of what assumed.
- Gabrielle: Working on finishing paper for EAN on energy efficiency resource standard and equipment feebate program. Also working with NYSERDA and MA Clean Energy Center. COPs hover between 2.6 to 2.9. Importance of good building shell improvements to go with it to make sure customers are happy.
- Chris: Concern is less COP assumption than it is the reach of the heat of a single head heat pump.
- Gabrielle: Collecting fuel bill data -- room for improvement. The blessing is the curse with heat pumps. Need to be installed well in a good building envelope and need to be operated properly.
- Brian: In past year, Efficiency Vermont changed structure of rebates to include sub-standard heat pumps (same rebate as cold climate heat pumps). Performance and savings is different from true cold climate heat pump.
- Rich: Looked at Cadmus study. Seemed to me that Cadmus concurs -- their observed results were significantly less than TRM assumptions.
- Gabrielle: we can get much better savings depending on policy & program design and implementation.
- Rich: If we want to design a Clean Heat Standard that measures the savings and rewards people for doing that, we need to design a program that makes that behavioral follow on happen.
- Tom: For 2019, TRM is updating measure characterization to reflect the Cadmus findings. The 2019 TAG Tier III annual report and planning tool are available here. <https://epuc.vermont.gov/?q=node/64/147244/FV-ALLOTDOX-PTL>
- Rick: You can solve the investment problem by adjusting incentives. The operational/ usage issue feels like a tougher nut to crack.
- Brian: For example: some utilities giving higher rebate for heat pumps if have already had weatherization done.

- Leigh: Agree -- rebates should be higher for controlled heat pumps. We want majority of heat pumps to be controlled, so folks don't play around with it as much.
- Chris: 1. when installed in inefficient building envelopes, performance not as good, customers don't like them, don't get used as much. 2. There can be different incentives for different systems/ approaches. 3. Single head system will often not meet half of building load even in efficient buildings.
- Chris: either have to have super-educated customers (difficult to do) or have integrated control systems (long-time coming). Difference between air systems and hydronic systems. This group will not solve that but our policy framework/ program design needs to assess measures correctly re: savings.
- Gabrielle: Technology is continually improving. Interesting to hear from them re: how smart ductless systems are. But ducted systems getting smarter and integrated controls are developing. About getting policy structure right re: plan, do, act, check.
- Rich: we also need to address advanced wood heat, biofuels. Installers to installers vs. end-use customers.
- EVT can currently claim savings for Wx in electric heated home or building but not in fossil heated home.
- Gabrielle: would be good to research how many heat pumps installed for AC will eventually get used for heating.
- Leigh: what are technical and policy guidelines that need to accompany heat pumps. They are the most problematic technology. Pellet stoves less so (if you buy wood being carbon neutral).
- **Chris, Leigh, and Rick will connect next week to continue this conversation. Chris will organize their meeting.**
- Leigh and Mei could present overall emissions reduction pathways in all three sectors at some future meeting...
- Leigh: Getting a handle on Wx is important. Right now modeling Wx at 3x current rate (but not as aggressive as heat pump modeling). Specifically 35K homes weatherized by 2030.
- Rich: one issue: degree to which fuel switching aligns w/ WX at scale re: pathways modeling (or whether those are modeled as separate measures).
- **Invite Neale to join next meeting on Jan. 5th. Richard too if available (currently busy until 4:45). Jared will invite Neale, Chris will see if Richard is available.**
- **Overall program design development: Rich, Rick, Riley, and Brian. Rick will coordinate their meeting.**

12/15 Clean Heat Standard Meeting Notes

Agenda:

- Review notes from last meeting.
- Come up with issues list (for further discussion/ exploration)
- Identify next meeting times
- Generate list of names to invite to be advisory (a larger advisory group in addition to the small steering group)

Rich: Seems clear that we want an upstream approach. But implementation of that is unclear and needs to be figured out, especially administratively.

Don: Putting up an allowance approach might be a way to emphasize the importance of making sure we get to where we want to go (especially re: 2025 and 2030 emissions reduction targets). Provides impetus for staying focused on carbon reduction as our particular goal here.

Rick: But does an allowance-based program inherently create greater emissions reduction certainty than a credit-based program? Or is that a matter of good program design either way?

Don: Either way, we need to center and prioritize GHG reductions. This isn't about creating opportunities to do cool things. Need to design a curve to meet the State's targets.

Rich: What's the realistic pathway? Re: the overall emissions curve, what portion of responsibility should the thermal sector have?

Leigh: It is looking like it will be very hard to move fast enough in the transportation sector by 2025 to meet that sector's proportional share of responsibility early on.

Whereas in the thermal sector, there are a lot more options already on the market. So the thermal sector may have to do a slightly heavier lift to get to 2030 goals than the transportation sector, relative to their current emissions. But transportation would then need to do more long-term.

Note: Originally, by 2025, 18% reduction in thermal emissions, by 2030 48% reduction, by 2050 91% reduction (based on meeting the milestone targets and having each sector meet its "fair share")

Need about 50K heat pumps by 2025 (displacing 45% of avg. 88 mil. BTUs); 30K buildings weatherized, 50K hot water heat pumps.

Re: question of whether that is plausible, Maine announced 100K heat pumps in 5 years...

Jared shared [Community Progress Maps](#) to share statewide tracking of heat pump adoption, via EVT data (about 20,000 in VT as of 2019, on a steep growth curve)

Don: Has anyone tested the assumption re: heat pump installations displacing fossil fuel?

Riley: Cadmus report said that consumers aren't using systems anywhere near optimal usage systems.

Leigh: TAG characterization didn't initially take into account non-ideal use of heat pumps. (Leigh's model assumes heat pumps used properly).

Don: VGS has not yet seen reduction in fuel sales in service territory due to heat pump installations...Specifically, fuel use was not significantly reduced in VGS territory among those customers that received Efficiency Vermont rebates for heat pumps.

Rich: Should we ask PSD or EVT or someone else to do some analysis of what we can actually expect for savings from heat pump adoption? We need to get savings... yes, it's true that we can't get savings if the units are not installed but we also need to make sure those units get used to generate and claim emissions reductions.

Chris: Most installations have been ductless mini-splits, which can lead to all sorts of problems (2 different thermostats operating 2 different systems), if customer is not keenly aware of how to manage two systems together.

Some tenants getting 60% savings. Some only 15%.

Chris – In part for those reasons, has become convinced re: central heat pump (air to air) systems. Only about 25% of homes in VT are forced hot air (most are hydronic).

Rich: Do we need a subcommittee to look at question re: measurement; technology options; technical support subcommittee?

Leigh: every technology would have to have a carve out in the program (do x and do it like y, then get credit).

Likely 5 carve out areas: Weatherization; advanced wood heat; heat pumps; renewable natural gas; biofuel

Rich:

- 1) How fast do we need to go?
- 2) Need for technical subcommittee to bear down on the range of technical options and expected savings and potential problems/ guardrails

We don't need to solve all problems, just need to identify and bound them.

Claire: For a credit system, are we expecting a deemed savings value? Or would a randomized control trial (RCT) evaluation at a later date be a way for measurement?

Rich: Assumption that there is no way to do this in a distributed way without deemed savings (just like Tier 3).

Jared: What technical work is happening re: the TAG already via Tier 3? Can we piggy back? Or can we make asks of them?

Chris: Behavioral issues get rolled into average savings in a technical resource manual. So the TAG is a natural starting point. But there are some technical issues (which type of heat pumps in what types of applications).

Riley: Sometimes the low-hanging fruit may be addressing the behavioral issues...

Claire: For instance, could someone identify a suite of heat pumps not being used properly, design an education program, and then claim those savings?

Chris: That could be a calculated value at the end.

Rich: proposal for next agenda:

Item #1: Look into TAG/Tier 3 process to see if it could be used for our purposes. (Claire)

Item #2: Technology opportunities report. A taxonomy re: different options. (Chris?)

#3: What's the pathway and how steep a curve do we need to be on? (Leigh)

Rich and Rick will focus on writing up the program design (perhaps with Don)? Including upstream vs. downstream; allowances vs. credits.

Riley: Makes me nervous to assume thermal pathways projections based on transportation pathway limitations. Has someone talk to Brian Wood? I'm worried Peter Walke has higher expectations for what the transportation sector can do short term (based on TCI analysis) than we do...

Leigh: step 1 was looking at reduction pathways proportional to sectoral share of responsibility. Based on conversations with VELCO and DEV, EAN trying to adopt their assumptions (for instance, 50K EVs vs. 90K+ EVs by 2025). Assume an extra lift in the thermal sector until transportation can more fully kick in.

Rich: Needs to be convinced that what we are modeling for each sector is technically feasible. I know we can't weatherize that quickly... which then means fuel switching in un-weatherized buildings...

Dec. 22 and Jan. 5 set as next meeting dates.

Rich: Send emails to Rich and Jared re: advisory group. Looking for both technical expertise and stakeholders.

Note: Advisory committee (productively advance work) vs. outreach list (be engaged as critics).

Dec. 8th 2020 Clean Heat Standard Design Group Meeting Notes

Attendees: Tom Knauer, Rick Weston, Riley Allen, Claire McIlvennie, Don Rendall, Brian Gray, Jill Pfenning, Leigh Seddon, Chris Neme, Jared Duval.

Question: Should we prefer 1) a credit based system or 2) an allowance based system?
Exploration of pros and cons (in reference to Don Rendall's slides).

Question 1: What do we want this to look like from a basic design approach?

1) Credit based approach – a tag or a credit (something of value) that attaches to a product or action trying to achieve, i.e. with a renewable fuel source (biodiesel, RNG, hydrogen, etc.). This value could be separated from the attribute and exchanged. For instance, value could be attached to advanced wood heat system or heat pump system – something with carbon reduction value that could be monetized. Related question: would we want to include efficiency measures in this approach?

Riley – RECs are attributes; there are also actions ... two different things to calibrate.

2) Allowance approach (i.e. cap and invest or cap and trade). Emissions goal/ baseline then allocate allowances based on emissions levels/ declining cap. Would reflect the baseline of what we are willing to accept. Would require responsible entities to achieve their limit on GHG emissions either through organic reductions or by acquiring allowances to cover their emissions over an allowed limit (examples: RGGI, WCI, TCI).

1 attaches a positive value, 2 attaches a limit.

Pros and Cons of each:

Pros of credit-based approach

- Targeting and rewarding positive outcomes
- Valuable credit that can be monetized, traded
- Can be paired with a performance standard (aiming for an outcome to be achieved if enough credits created).
- Could develop measures/ markets important to longer-term emissions reduction (i.e. an allowance system may be more likely – depending on how structured – to prioritize/enable prioritize short term actions that are near-term cost effective without incentivizing development of additional measures that are important long-term even if less cost effective in near term).

Cons of credit-based approach:

- Have to identify what will be credited
- Have to assign values to those things
- Have to figure out how to administer program that would require us to think about a variety of actions/ products (i.e. a lot more to it, with many more transactions)
- How to administer program in which those producing those actions could receive credits and then exchange it for value?

- Probably requires a lot of work on definitions, values, and administration and probably the broadest participant group in the supply chain.
- Credits only have indirect link to actual reduction in GHGs. Having credits doesn't necessarily mean you have actually capped emissions in any firm manner.
- More oversight required to make sure system not being gamed?

Note: Could have carve-outs for wood heat, weatherization, renewable natural gas in a credit based system in a way that may be more difficult in an allowance based system.

Leigh: Allowance system lends itself to cheapest approach unless carve outs not made clearly. Cost difference between pathways is substantial.

Pros of allowance-based approach

- Simpler
- Can be limited to upstream entities
- Can be set to emissions reduction targets
- Already have existing templates for it

Cons of allowance-based approach

- Starts to look and sound like carbon tax (i.e. more politically difficult?)
- Indirect link/ less ability to achieve desired sector outcomes (ie. how to get more Weatherization or fuel switching). In general, dollars will chase more efficient ways to reduce carbon – not necessarily invest in market development/ market specific approaches that are important over the long run.

Riley: opinions on dynamic efficiency?

Don: in an allowance approach, presumably the cheapest reduction activities are going to be the first ones that get invested in (that's how a rational actor would proceed if they had an obligation). Allowance system is most dynamic and most short term.

If trying to cut carbon as fast as possible, this approach is appealing. Should have confidence in market to invest in most innovative way to cut carbon without 3rd party source identifying those.

Chris: that depends on the discount rate of the entities that are decision maker.

Don: agreed.

Don: Can we have the best of both – performance standard with tradeable credits? Analog to Tier 3? Can we set emissions performance standard on upstream entities and require them to meet it by acquiring credits that are awarded at a distributed level for emissions reduction actions and outcomes?

Riley: RGGI has approach of offsets that could be worth considering...

Rick: With an allowance-based program, when auctioning off, then have \$ and what to do with the allowances. Obligation of upstream entities would have no interest in anything but buying allowances. If cap keeps going down, either they get out of their old model business or into a new version of a heating business.

Question: On the credit side, what happens in first year for obligated entities? Buy credits or make ACPs?

Don: options for obligated entities would be: a) create new business division to do creditable activity (say heat pump systems); b) reduce fuel sales; c) reduce carbon content of fuel; d) buy credits, or e) pay alternative compliance payment (ACP).

Riley: Tier 3 – utilities get credit for an action either through fuel switching or weatherization. Vast majority are focused on fuel switching (specifically electrification).

Tom: statutory goal of Tier 3 is fossil fuel reduction, not carbon reduction.

Chris: Views Tier 3 as a credit system where utilities are obligated entities.

Riley: Tier 3 presented a challenge when Efficiency Vermont and distribution utilities both pursued credit for same activities, which can be problematic re: economic and administrative efficiency.

Leigh: if you think about the thermal sector, the solutions could go way out of whack if one fuel switch is determined to be the one (most cost-effective) way to go and then we don't have activity in other areas.

Chris: I like the cap and trade system – elegant and easier to administer. But does have significant downsides that require guardrails. Actors will choose least cost with eye to next 3-4 years, not to next 20. Those decisions may not be in best long-term societal interests...

Also, for example, renewable natural gas (RNG) may not be best action for gas customer, but gas utility would have vested interest to push that approach.

Equity consideration– cap and trade, in going after cheapest stuff, can get reduction from wealthiest customers (who will take action with lowest incentives).

If you have a cap system that auctioned allowances and used revenues to invest, can more easily deal with equity concerns.

Straw poll: what are people's preferences between the two approaches?

Rick: with a credit system, where that which produces a credit is defined, you can begin to solve the problems re: equity, comprehensiveness, etc. With an allowance system, you may not get that. As a consequence you may not get the behavior you want... I am personally finding the credit approach to be attractive here. Note: It will be tagged as carbon tax too, even if it only indirectly affects price. Perhaps a credit-based approach with a high alternative compliance payment (ACP) would be best...

Chris: I think it's complicated and it would be beneficial to further explore both options while softening edges of each, given the discussion.

Riley: Kind of in the middle – like both. Tend to prefer to start with elegant market solutions. I don't see why don't fit neatly together. Revenues from allowances can be a mechanism that buys or purchases the credits.

Don: Agree with Riley. If we are going to cut carbon, simple design is preferred (both for administration of program and political buy-in). Starting with allowance-based approach and then having credits available to supplement allowances, while using auction proceeds to address equity, market development, etc. Preference for allowances with opportunity to supplement with tradeable credits.

Tom: Not going to weigh in. Re: how to set ACP, Tier 3 has an ACP (the Clean Energy Development Fund, focused on advanced wood heat), so going to be competition.

Claire: Find arguments on both sides compelling – at this stage, let's develop multiple proposals.

Jill: Generally, I prefer to narrow the discussion but in this case we should explore both for now so that if we pick one over another, we have a reasoned approach for why. Generally favor simplicity and ease of administration. Credit system with performance std. makes more sense.

Brian: From the perspective of the Energy Co-op of Vermont, credits would seem to encourage us to grow in the way we are already been growing and enable us to be more competitive. Can also see the point re: administrative complexity. Could see hybrid approach where we target efficiencies looking for.

Leigh: Leaning toward credit solution for way to match VT's policy. More I think about technical pathways, the more I see huge conflicts if thrown open to mkt. without guardrails.

Jared: For now, would like to further develop both approaches. Decision-makers and stakeholders will want to have options. And, in each scenario, there are important design considerations that we can highlight to improve either path. One question is whether a credit based approach is easier for VT to do on its own vs. an allowance-based approach. Recent history suggests that states have been able to act on their own to design and implement renewable portfolio standards with REC compliance whereas most allowance based systems have been regional in approach (RGGI, TCI, WCI). Is there something about allowance-based systems that is more difficult to do at a state level (perhaps regarding cross-border leakage effects?)

Chris: So we have a range of viewpoints. Given all of that, and that several think there is value in further developing both approaches, let's do that.

Question re: point of regulation (retail vs. upstream)

Rick – short answer is upstream.

Riley agrees. Still details to be navigated, but conceptually that's sensible.

Brian: torn. Upstream easier. But downstream seems to provide more options to companies... could benefit competitive position?

Jared: while we are all volunteering re: calls and research, we need a framework to be written up, and that's another level of work that will require focus, time, and should be compensated. Proposal to have Rich take lead role on paper, to be compensated by EAN, with Jared to write letter of agreement. All in favor.

Other:

Rick: it is important to identify and deem savings. How that would work or not work well
re: how to effect certain level of carbon reduction.

Tom: Tier 3 planning tool is a jumping off point.

Leigh: TAG group has done a great job at characterization. But what is the value of that credit and how is it earned?

11/24/20 Clean Heat Standard Design Group Meeting Notes

Participants: Rich Cowart (RAP), Rick Weston (RAP), Leigh Seddon (EAN Sr. Fellow), Don Rendall, Jill Pfenning (VGS), Tom Knauer (PUC), Claire McIlvenie (PSD), Riley Allen (PSD), Jared Duval (EAN), Mei Butler (EAN), Carolyn Wesley (EAN)

Discussion of Possible Upstream Points of Regulation

- Rick Weston and Riley Allen shared some brief slides, for discussion
- Note that there are a lot of parallels between this is a similar discussion around regulating transportation fuels through TCI that are at a sensitive state. We can potentially harvest value from that process
 - What is the goal? What is the point of regulation? Where are heating fuels coming from now? What does regulation look like?
 - Key design questions:
 - Who should be obligated entities?
 - How to apportion requirements among them?
 - Can we avoid leakage?
 - Would obligated parties refuse to play and leave Vermont?
 - Are their commerce clause objections?
- TCI is proposing to regulate the wholesalers - the entity bringing the fuel into the state. Different approach for "racks" in Albany vs Quebec.
- The Tax Dept know and taxes all the retail fuel sales, so that agency knows who is selling in the state. We can leverage that information. Two pathways: what we already

have through our system of taxation, or taking approach similar to what is being considered for transportation under TCI. Retail information could be used to discern quantities purchased at wholesale, not just to regulate retail providers.

- Pros and cons of upstream vs downstream:
 - From dealers: The more this regulation is outside the daily work of individual fuel dealers the better. Though this challenges the idea that we're trying to nudge the industry into being clean energy service providers. Would still allow for creative orgs to make money selling credits in Albany - this is the argument for upstream. Downstream would be to force more changes
 - Both a practical question and a communications/political question. How sympathetic will decision-makers and Vermonters be - more willing to add a cost to out of state wholesalers than their neighbors and fuel providers.
 - What is the behavior we're trying to encourage or disincent? At the retail level it might be about selling less fuel to your customers (weatherization, heat pump, etc.). It's hard to imagine how that translates if you're regulating at the whole sale level. What would the reward look like? How would we incentivize the behavior we want to see?
 - Wholesale level is a cap/trade or cap/invest where we're creating an opportunity based on price, but not a regulatory mechanism to reduce fuel.
 - If we have a CHS that meets our climate goals, then one way or another will be meeting our goal. If the wholesalers have to buy credits, then they're buying them from somebody in VT that's delivering a clean heat solution. The mechanism would be stimulating the delivery of those services in Vermont. Could still be an incentive for dealers because they have customers already and could take their margin.
 - Could wholesalers be required to buy their credits from VT energy businesses? Wouldn't necessarily want to restrict it that way, but if we're creating a credit market (pool) where qualified credits are certified and available. Fuel dealers would be invited to go out and earn credits. HVAC contractors could do the same. Recognize that fuel distributors may have more ways of helping the wholesalers meet the obligation.
- Upstream proposal seems promising and potentially solves a bunch of problems, but we have a lot more to learn about how people in this area of commerce would respond that the obligation would be on the wholesalers, but that crediting would be available to anyone.
- Where we go next: (led by Don and Rick, Leigh two weeks from now) what is a credit? How are credits earned? How do we turn actions (apples, oranges, and bananas) into credits that could be treated equally in a credit pool?
 - Karen Glitman wrote a report for EAN about how CA and QC carbon markets work, she could be a good thought partner.
- Not problematic to bring multiple options to decision and policy makers. We don't necessarily need to arrive at an answer. Lay out pros and cons and let decision-makers decide.

Update of Data Analysis for Different Scenarios

- Working over the past few weeks on how much carbon is in fuels and how much GHG comes off of them
- Breakdown of how many Mtons of CO₂e that come from each thermal fuel source (including electricity)
- Premise: Thermal sector should be responsible for 35% of our emissions reductions based on current contributions, and apply that to GWSA requirements
- Also calculated the delivered heat carbon intensity of fuels
- Created six different technology pathways to reductions. Tool to interact and increase and decrease pathways
- The updated analysis can be found here:
<https://drive.google.com/file/d/1xuyHEqHC0hAAXq3ZCTcK8pC2jD1j9bO7/view?usp=sharing>

Next Meeting

- Tuesday, December 8th 4:00 - 5:00
- Exploration of how to structure a credit pool