

Memorandum



July 12, 2017

TO: Regional Emerging Technology Advisory Committee
 FROM: Mark Rehley, Senior Manager, Technology & Product Management
 SUBJECT: Key Takeaways & Action Items – July 12, 2017

 To Committee Members,

Thank you for your attendance and participation at our July 12, 2017 Regional Emerging Technology Advisory Committee meeting. We appreciate the attention and support you lend to our Committee agenda items so we can move forward with your feedback and alignment.

Below are the key takeaways from the July 12 meeting:

TOPIC	WHAT WE HEARD	ACTIONS
Gap Analysis	There are a few areas in RETAC 2.0 that could be fleshed out based on a more comprehensive definition of Emerging Technology	RETAC members will fill in any missing projects from RETAC 2.0 that might have seemed previously out of scope.
Defining Emerging Technology	Comparing RETAC's definition with CEE and others would be useful for moving forward	The Steering team will gather and review the notes taken from the discussion to determine a working definition while comparing it to other groups who have done similar work
Items on the Edge of Emerging Tech	It would be valuable to discuss items that may be outside the scope of RETAC to determine what further research or information should be gathered	The next RETAC agenda will take time to discuss items such as electrification and whole building solutions to determine RETAC's role in these conversations
Potential 2018 Focus Areas	From Gap Analysis <ul style="list-style-type: none"> • Data centers (Imbedded) • Whole building approaches • Task / Ambient HVAC • Refrigerant Changes Steering Team Recommendations <ul style="list-style-type: none"> • Advanced Network Lighting Controls Regional Market Strategies <ul style="list-style-type: none"> • Heat Pump Water Heaters • Advanced Thermostats 	NEEA staff & steering team to go back and analyze 2-4 level readiness, those programs that will likely hit a program in 1-2 years NEEA staff to send out Survey Monkey with ranking question for gaps to determine which ones the group finds most interesting

ANNOUNCEMENT:

Please contact Mark Rehley if you would like to be included in further discussions regarding the use of RETAC 2.0 (the tool) and how this applies to the greater RETAC 2.0 vision.

APPENDIX 1: Full Meeting Notes – July 12, 2017

APPENDIX 2: CEE Readiness Criteria

APPENDIX 3: RETAC 2.0 Readiness Criteria



Welcome and Agenda Review

Review meeting tasks and desired outcomes

In Attendance

Suzanne Frew, Snohomish PUD	Kathy Yi, Idaho Power
Keshmira McVey, BPA	Kevin Smit, NWPCC
Jennifer McMaster, BPA	Mike Bailey, ETO
Ammi Amaranth, EPRI	

On Phone:

John Owen, Seattle City Light	Mark Heizer
Rem Husted, Puget Sound Energy	Rob Penney, WSU
Todd Currier, WSU	

NEEA STAFF: BJ Moghadam, Amanda Showers, Mark Rehley, Dave Kresta, Christopher Dymond, Geoff Wickes, John Jennings

Welcome and Agenda Review

Meeting Goals:

- Review status of Emerging Technology (ET) portfolio and ET activities
- Identify product and project priorities for 2018

RETAC 2.0 Database Portfolio Update – Dave Kresta

- Reminder of why we pursued RETAC 2.0
 - o Response to council's request
 - o To align, generate insights & opportunities, proactively manage pipeline, avoid duplication
- Open Questions Remain
 - o What belongs in the pipeline?
 - o Custom programs – many utilities have these but they don't often get talked about in the context of ET
 - o Inclusion – National labs/other research organizations – what should be included?
 - o What should be the annual cadence for RETAC meetings – theme today is 2018 planning & prioritization
 - o What should be the process to review product readiness levels (want to address relatively soon)
 - Jennifer – this conversation happened recently with CEE
 - Ammi – is there a definition for CEE's readiness level that's different?
 - We're trying to make it the same
 - They helped us start out with this
 - CEE stayed with mostly a narrative and subjective definition
 - It would be helpful to have both CEE and NEEA's definitions for the work we do
 - Mark – we still use TRL for their pre-commercialized definition, but the other definition helps get at some other necessary parameters
 - Ammi – we've tried to use the spider diagram attributes to get at this as well

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- Mike – the subgroup looked at this last year; our focus was the unique needs of programs and need to show cost effectiveness and can a utility program implement this; we found most CEE efforts were set at a lower bar for data quality
- Mark – we're at the beginnings of testing this idea and would love your perspective if you think there are things you have that would be useful (Ammi)
- Ammi – Steve Stella in Charlotte could come speak (Scout)

ACTION ITEM: NEEA to follow up on CEE call regarding readiness levels

ACTION ITEM: Mark to send Ammi both CEE and NEEA's definition for readiness levels

ACTION ITEM: In Q4, RETAC will look at readiness levels, ET Advisor for Technology Innovation (Steve Stella) to come speak (Ammi will reach out)

RETAC Update

- Added the ability to capture electric and gas related projects, or both
- Now 77 products, 105 projects

Review of Product and Projects Report

- Histograms: products by readiness levels
 - Pretty balanced (market, product and program levels)
 - Qualitatively, a good balance
 - Suzanne – can you remind me what the levels are?
 - Each level has a narrative definition in criteria
- Histograms: projects by readiness levels
 - Looks a little different – skews toward higher levels around readiness
 - Mike – for ETO, we can't work on anything that isn't commercially viable; it's not necessarily good or bad, but it may be the nature of us as a group
 - Keshmira – we didn't include ours because we decided it wasn't ET (narrow scope)
 - Much more at lower readiness levels that we didn't include (BPA)
 - Mark – there's been a criticism of ET work in region that we operate a little too ad hoc; but we understand pretty well what our strengths are, and we do have a fairly level pipeline; I was very excited about the data – it looks reasonably reasonable
 - Ammi – a lot of what we do is the early-on stuff
 - Christopher – is the savings potential broken down by readiness?
- What other slices or views do you think would be interesting to look at?
 - Christopher – it would be nice to know where the savings are

ACTION ITEM: include report/histograms directly in the packet next time (instead of a link)

Table in packet: Products with Regional Potential and Readiness Levels

- What other info would you find useful in the quarterly report?
 - Kathy – it would be nice to have definitions of readiness levels within this packet & a column of number of projects for each product
 - Suzanne – If we already have a product in there, do we need to add in our project?
 - Dave – yes, we don't want product duplicates, but we want to know what projects everyone is working on it
 - Suzanne – how big does a project have to be to be entered in?



- Dave – you can have projects in here that are even just wish list items
 - As we evolve in product categories, we might move from the specific to the more generic
 - Kathy – can you tie more than one product to a project?
 - Mark – yes, and you can link products together as well
 - Mark – our report for the first time looks a little messy but was an output from this data base, so it shows all the products we're working on – in future, we could start tracking what areas we're interested in
 - Suzanne – with the reports, you'd be able to pick any product and pull up all the projects it's mentioned in? Yes.
- Comments on usefulness of reports linked in packet? (we'll try to send this out ahead of time)

ACTION ITEM: add a way to flag stale products in the database (automate back to the person who entered it – Suzanne); distinguish between wish list items and other active projects in doing this? Need to decide how to handle this

ACTION ITEM: Include readiness criteria definitions (in packet) near table for ease of reading

- Additions since June 19 (we will go through new additions to database since last meeting at every advisory committee)
 - Keshmira – how will we reconcile projects that we're working on with Snohomish or other utilities if we're automating uploaded files? – someone is going to have to QC that
 - Dave – maybe we do this as part of the review; there's no way to automatically reconcile with things that are already in the database
 - Keshmira – Hope Works is very unique because it doesn't necessarily tell you enough of what it is

ACTION ITEM: Steering team to review this potential problem of reconciliation

- Dave – if you have different research objectives, then different projects, but if the research objectives are the same, then it should be one
- Mark – a reminder that this is a meta data base, not findings – more of an awareness tool
- Mike – intended to be a teaser to reach out

ACTION ITEM: one month prior to each RETAC meeting NEEA will send out report of new stuff that was added and RETAC members should look at and flag anything that looks like it might need to reconcile and done by the time we have our meeting

- Kevin – but if we do have a report, we can link that in if we want
- Additional Gas products added – see slide
 - To filter out, just focus on electric only savings products
 - We will need to monitor and come up with process to talk about these dual products in this meeting
 - Ammi – is there anything about heat pump water heaters in gas?



- Think it's already in there, these were just added since report was published
- Discussion & Actions
 - Was this the right level of detail for quarterly meetings?
 - Suzanne – how do we keep this going based on the data?
 - Mark – we're looking for, is the way we're acting today, meeting those goals?
 - The real call to action – please review the list and make sure everything is here – need help? Call Dave

Gap Analysis

- We want to take a look at what the 7th plan had in it and compare to the list we have today, checking to see if we have any gaps here?
 - It might be okay if other organizations (CEE, etc.) take the lead on some of the gaps
 - This is about who else is doing stuff as well
- Kevin – presenting spreadsheet by potential savings
 - This list is comprised of new measures from 6th plan (some ET, but not all)
 - A lot of the list is lighting because they're LED/controls
 - N/A = not really ET but new in the 7th plan
 - Not seeing any gap on the commercial side? Not much in data centers, EV chargers, water cooler controls
 - Ammi – do you have anything about whole building controls? No
- Slide – Commercial Comparison
 - Shows 7th plan, RETAC, and CEE side-by-side
 - Mike – for whole building, we've identified that it's a process thing, and therefore didn't include it in the database
 - Mark – there is a stream for different deployment mechanisms that is included in CEE
 - Ammi – looking at the whole building (not widget by widget)
 - Mike – for us, not in the database, we do not put in here all of our completed stuff (Path to Net 0); for particular items, even the Nest and the Power Strips, we have the same feedback, there's a disconnect between the definition of ET
 - Will have this conversation this afternoon
 - Kevin – there's a little more potential with whole building that really just displaces potential at the moment
 - Ammi – from our perspective, it's not just energy efficiency; whole building includes DR, ancillary power, etc.
 - Suzanne – is the intent to fill in our database to meet the 7th plan needs?
 - Mark – so that's the question – how far do you go in the pipeline; even within NEEA, we have almost 3 definitions
 - Kevin – the plan will likely be looking to this group to pull something in, but it will be cyclical
- Possible Focus Areas
 - Data centers light
 - Lighting controls light
 - Keshmira – there's nothing more "technically" to be done on these two; so this might be another activity "MT"
 - Todd – Rob has been able to get through the E3T database – we've got stuff on data centers (a lot of info that could help shape projects)
- Residential Comparison
 - There's a transportation component that CEE is doing
 - The behavioral component stuck out to me here (a lot in here)
- Industrial/Ag Comparison

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- There are things missing from Industrial because it's not being actively scanned...we should be putting these in
- Mark – I would love a wish list about what programs are ending because cost effectiveness or potential hasn't been fully realized, etc. (would love this data)
 - BPA tracks
 - This is a data stream we don't have visibility into
 - Mark – one of the next phases here is to see if we can get program managers involved in this
 - Todd – what we did learn is that there is overlap, but we did identify some opportunities to augment info that is in the RETAC database already; also identified some things that could be incorporated; there are about 10 different data center entries in E3T databases
 - Mike – lots of work on new construction dedicated data centers but don't consider new tech; created a new internal benchmark
 - Jennifer – our transmission planners are asking us to work with LBNL to get a roadmap and work with DR
 - Geoff – Google has identified a place in Denmark that's channeling waste heat to hundreds of thousands of homes
 - Kevin – do we need to link up data centers in RETAC 2.0?
 - Ammi – the large data centers are attempting to locate data centers right next to power plants; the EE folks in utilities do not consider these large companies as opportunities for EE – but they're very interested in micro servers in the emerging data centers
 - Geoff – there's no way to manage micro-servers as a program
 - Mark – we're finding that technologies have to deliver more as well as be EE not just equivalence; have you looked at cloud migration? This has been one of the unknowns for us – are we seeing load shift or grow because people are keeping the other as a backup?
 - Ammi – we're looking at this as well, but we look at it from a holistic perspective; we have data center experts in the company
 - Mark – maybe this is a similar collaboration with EPRI more around all facets of a particular market/area
 - Mike – let's first document what we've already done
 - Suzanne – we need to consider the customer side of it, tech changes have been driven by the customer, is it worth our time, or will the technology change come from the customer?
 - Mark – embedded data centers do have barriers, but the bigger ones, not so much
- Ammi's List
 - Personalized cooling/heating (EE & DR) – Roco (robot cooling)
 - It's got an energy storage mechanism
 - Home energy mgmt. systems (building mgmt.) (EE & DR)
 - Non-intrusive load monitoring (DR) – intense focus here
 - Energy storage technologies (including water heaters) (DR & ancillary services)
 - Data centers & whole buildings & Energy storage
 - Comm/Industrial – refrigerants & refrigeration – ammonia movement (low charge, commercially available) ADD SOMEWHERE

ACTION ITEM: Rob & Todd will send a document in later today or tomorrow with their analysis

ACTION ITEM: revisit data center question, Ammi will contact coworker to reach out to NEEA

ACTION ITEM: group will review all aspects and components that are being researched (data centers) for future discussions

ACTION ITEM: NEEA will add refrigerants & refrigeration to the list in RETAC 2.0



What is the scope of ET? Nick Leritz

Background

- Regional pipeline broadens scope
- ET definitions have evolved
- Shortened product improvement cycles – we're in a period where new products and performances are coming out faster than they ever have before

Breakout into Groups – World Café

Individual Notes from folks on the Phone:

What is your definition?

- Not market ready, anything from a concept to prototypes to a number of technologies being used on planet
- Very broad from the 7th plan to our IRPs
- Hasn't moved to mass production
- A little further back down the pipeline, UL approved, but not just a concept
- Equipment, widgets and strategies.
- Bonneville it only electric and commercially available, include DR.
- What about a product you know does not work, lean toward including it because otherwise it may keep resurfacing?
- Err on the inclusion. New and emerging.

What other definition exists?

- Somebody should be paying attention further up the pipeline, what are the gaps in capability and who should be addressing it? just don't think it should be part of RTAC 2.0
- For program manager it is more difficult. Duct sealing 5 years ago it was being called emerging by pms.

Cycle back into ET?

- Compressor that could go on any heat pump is it the compressor or heat pump? It makes it complicated
- Advanced rooftop control - features that significantly impact the energy consumption or EE of an established product
- Can be something as small
- Pre, comm, or post commercial, the filtering criteria is based location and CO2.

When is a product no longer an emerging technology?

- When they get it and want it, let it go! (LEDs)
 - ML -- this stuff is not linear, new adaptations.
 - CO2 refrigerant is a good example, DHPs are good example -
 - Gap analysis: tech, marketing gap, contractor gap,
 - What are the markers? Need to include big and small, east and west. Need to
 - New Applications!
 - Poor use of compressed air that should be replaced by direct drive
 - Needs to include NEBs., non-energy non-benefits or non-energy drawbacks.
 - May not be able to have a perfect definition
 - Depends on good classification and the ability to filter well.
 - Will require really good communication ongoing
- Potential technologies for market transformation, cheaper products? new components? new features? it can mean a lot of different things.



GROUP SHAREOUT

What do you believe your program managers/executives thinks of ET?

- They think it's just a technology, a product - anything not in a program (can see the potential, but they can't use it to meet the goals/set goals, etc.)
- Maybe they're interested in technologies beyond EE - to disrupt or enhance business (and they want to know early enough so that they can do something about it)

When does tech cycle back?

- They don't; they never cycle out - there's a cadence that makes tech require less effort
- It's more about how much effort you give to it at any given time
- When it moves to a different application, the effort increases and then goes back down again

When does ET stop being ET?

- "Why does Kesh care about you?" ☺
- When tech moves from labs and R&D to NEEA to market programs
- Technically ready through version 1 of a redesign - momentum savings would always be run on that & when it's an EE measure
- YOU = RETAC & spillover effect & momentum savings
- We don't think we should take them off or out of the database, we should just change the attributes
- It's ready when there's overlap with program folks
- RETAC should be making recommendations to programs as well as tech to send to the "trash"
- 3 tier flag - this is "done" or "trash" or it's somewhere in between, maybe not going well and needs to be reevaluated to get it to where it needs to be ("the living dead")
- The ones in the middle is a tougher decision to make around moving forward or not - how do we come up with the classification markers to identify these various classifications?

What is your definition of ET?

- The bridge in between R&D and programs
- Also a bridge in between proof of concept and field demonstration and field ready products/design strategies
- The real question: is it a handoff or a process?
- Handoff = completely into programs hands/no overlap
- Process = a relay where both carry for a bit (programs and ET)
- Is there still a question that exists that changes how we do things? (might be a defining criteria for ET)
- Will the answer to your question change the trajectory?
- Some programs will go with good enough information even with questions, does emerging end when we can book savings on it and then move on (ETO) - there's a gray area for taking or leaving RTF if necessary
- Gap: between RETAC's ET definition and other org's definitions
- Is there value in having a common definition of ET?
- Possible ramifications for considering too much as emerging technology casting doubt on credibility of savings
- If there is product evolution, there is uncertainty - this group could get involved to help define/differentiate the evolution (tech transfer or product improvement practice)
- The application aspect might be important to consider, more so than the technology itself (the technology itself may not be emerging)

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- More of the question seems to be around the transition between ET & programs
- Another question: ET to RETAC to RPAC
- What about the NWRG (Northwest Research Group)?
- ACEEE & CEE as well - emerging tech & practices

Host: Dave K

What is your definition of Emerging Technology?

Purpose of a common def. of ETT:
to ~~not~~ enable our vision

↳ ~~tech~~ adoption is less than it should be (tech or other barriers)
 - things that are "promises" (proof of concept complete) but uncertainty around it
 - Products → evolving products
 - Design strategies
 - Needs field demonstration

CA: CEC
Tech proven in lab but not demonstrated in field

CA: UTILS
Must be program ready < 2 years

Bridge between R&D & Programs
- Scans for "new tech" (beyond NEEA)
- Is there still a question that exists that would change how we do things?

Hand-off from ET to Program
Comm. v. Prod. - CE savings established - RTF

Value of ET before EE:
 DR
 Customer engagement/satisfaction
 Value-added services

Hand-off vs. transition
 → reduce uncertainty
 → answer a question that could change what we do
 → tech or other barriers
 → product evolution

ETD: Potential EE measurement in a program, PUE, etc.

Host: G. Wickes

When is an emerging technology no longer emerging and you are done with it?

Technically ready
 Momentum Savings
 Potential EE Measure

Smooth transition until uptake

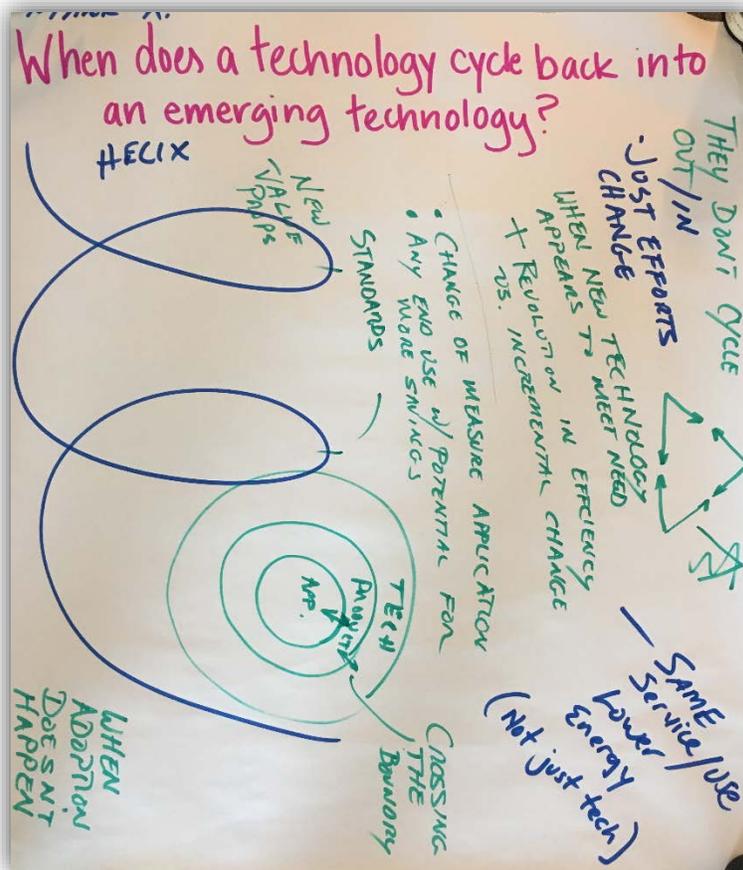
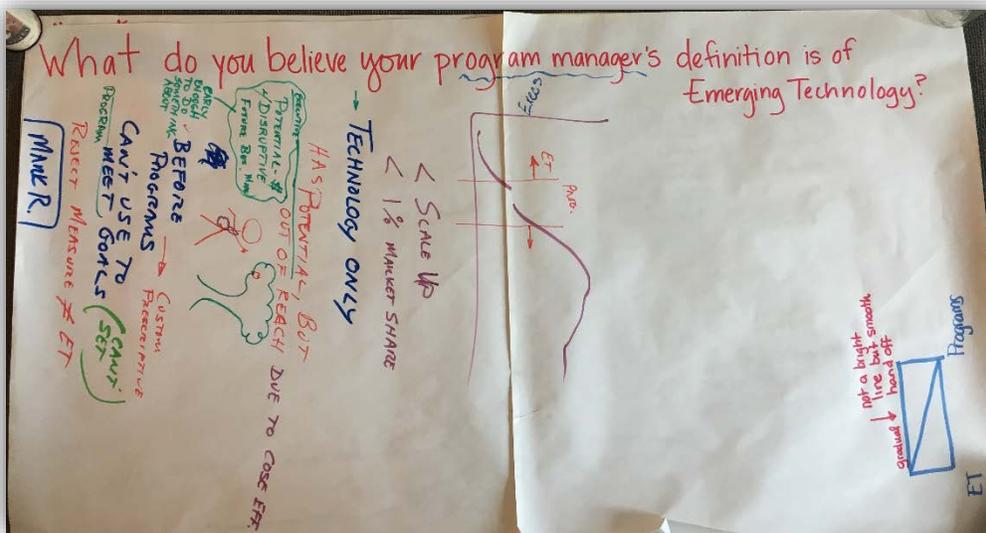
RETAC
 → **SPILLER (over-prepare)**
 → **SPILLER (under-prepare)**

Depends on WHO
 Why does each care about you
 - need -
 Effective collaboration

Not if only one utility participating
 Evaluate database

The RTF Wall is not an end point

TRANSIT CAN



ACTION ITEMS:

1. NEEA will synthesize notes
2. Task force will revisit before next meeting
3. Come back in October to agree to working definition (for RETAC) or to disagree - or to acknowledge RETAC's scope



Regional Product/Project Prioritization Discussion

Goals:

1. Guide each org. 2018 priorities
2. Maintain individual control of funds
3. Operate as a unified entity

Are we off-track anywhere?

Review Comments

- Work to establish a regional view on data centers (ACTION)
 - o Keshmira - Maybe this is a momentum savings?
 - o Mike - Particularly the whole cloud thing is exactly this (with IT, you cannot measure output)

ACTION ITEM: RETAC group members will curate data/information on data centers for next meeting

- Task ambient HVAC
 - o Efficiency potential (spacing out here)
- Whole building tech
- Electrification in general as a category (growing/efficient/storage/etc.) – does this have a role in this team?
 - o LLLC that adds in a control to store energy for off grid/emergency event
 - o Storage is pretty much out of scope for NEEA, but there is overlap with this tech and maybe we should be looking into this kind of thing
 - o Suzanne – has this been brought up to RPAC? We might need their approval
 - o Geoff/Mark – Jeff has been granted opportunity to define/scope DR specially funded project
 - o Mark – we could, within reason, look at this, not necessarily do a bunch of research, but maybe at least scope it out

ACTION ITEM: NEEA to scope out electrification as a general category as having a role for RETAC 2.0

- Lighting – BPA has a big push here
 - o In both commercial and residential
 - o Keshmira – this might be one where we could take another sub team to go look at
 - o Do we want to take this offline?



ACTION ITEM: steering team to take lighting offline to discuss next steps

- ETO – great time to do research in lighting but have challenges with lighting control issues
- Regional Consumer Products Market Strategy Recommendation
 - HPWH
 - Higher tiers of performance
 - Split systems
 - Advanced refrigerants
 - DR
 - Advanced Thermostats
 - **Regional workshop coming in October 2017**
 - Outline: market landscape, savings data, customer delivery
 - Likely a full day workshop (20-30 people), 1-4 from each utility
- 2018 Priorities Discussion
 - Focused or diverse investments?
 - Recommends: stay with diverse investments based on histograms
 - Top focus area?

With readiness, if you see a lot of stuff cued up at a certain point, you will start bringing in utilities for those things – how well coordinated are we with those?

- Mike – we have different rules that we play by
- Geoff – let's create some economies around the products being offered to utilities
- Suzanne – finding measures that are not at the program level
 - If we can be in front of the issues as things hit the market, that might be a better value (around the 2 - 4 level), the things on the cusp
- Mark – we could take a look at those things on the cusp and make sure we've had the conversation on how they will progress

ACTION ITEM: NEEA & steering team to go back and analyze 2-4 level readiness, those programs that will likely hit a program in 1-2 years

ACTION ITEM: NEEA to send out Survey Monkey with ranking question for gaps to determine which ones the group finds most interesting

- SURVEY MONKEY: get ranking on which ones you think are most interesting
 - Work plan for data centers
 - Something for personal HVAC
 - Refrigerants
 - Regional Market Strategy work around HPWH/Thermostats
 - Task force recommendation around lighting
- Jennifer - What might already be going on in gov't that the gov't has an obligation to make accessible to utilities? (Energy Solutions?) Teddy – let's prioritize tech that's ready; WILL SHARE TO GROUP

ACTION ITEM: Teddy/Jennifer to share information to group at next meeting

- Kesh – what about tier 2 advanced power strips?

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- Mike – doing research on multifamily now; results within a couple of months (for entertainment not office); Tom with Avista was going to do research for office
- Cyber & fire code issues (Kesh & Mike)
- Ammi – will this group's prevue expand beyond traditional EE (to storage, DR, etc.)?
- Mike – started looking at EV charging stations; determined that it's outside our core area
- Kevin – for the council, these things don't fit as EE
- Mark – there may be an opportunity to redefine EE with our board

ACTION ITEM: Keshmira to send out project email to group & ensure all of RETAC is on Showcase Webinar distribution list

- Kathy – interest in doing more regular webinars to hear about and vote on technologies
- Keshmira – have worked with Showcase webinars, maybe we pull in not just BPA projects, but other utility projects (conduit & biweekly emails); they're starting to write short summaries as well; if you have ideas, you can email me as well; we'll make sure all of RETAC is on distribution list
- Todd: send info to group re: showcase webinars

MEETING FEEDBACK:

- Jennifer – liked the breakouts with diff. mix of people
- Suzanne – really good meeting; bread a little stale on the turkey sandwich
- Keshmira – great discussions on moving forward collaboratively
- Geoff – should we include California?
- Mark – if this group is open to expanding the membership
- Mike – possible to coordinate with California for cannabis customers because we lack fundamental data and universities and BPA can't help
- Is anyone opposed to us inviting some people from a broader audience?
- Mark – maybe we take the 4th quarter to talk about membership, gas, EV, storage, electrification, the edge

ACTION ITEM: 4th Quarter meeting will discuss membership, gas, EV, storage, electrification, etc.

- Mike – have we talked to BC Hydro?
- Mark – a little, but they're more around electrification
- Kesh – should we invite Kim from CEE
- Ammi – what we could do, if you find any EPRI products that could be useful for whole group, let me know – I can make a case for zeroing the price for that product

Draft New Opportunity Prioritization Criteria (2016)

Criteria	More Detailed Questions Behind Each Criteria
<p>TECHNICAL READINESS AND ENERGY SAVINGS POTENTIAL -Is the opportunity sound enough and large enough to warrant further investment of time and resources?</p>	<ol style="list-style-type: none"> 1. Estimated magnitude of technical energy savings potential with 100% market adoption across US and Canada <ul style="list-style-type: none"> • Market potential (units sold/year; existing units) 2. Estimated magnitude of unit savings potential (absolute, %, under what conditions) 3. Estimated magnitude of load reduction potential (absolute, %, under what conditions) 4. List of characteristics that indicate potential load impact benefits, taking into account timing of reductions in energy consumption during day and over the course of year—peak/off peak, seasonality, ability to shift load, load type 5. Timeframe for how quickly expected savings could materialize 6. Known energy and non-energy performance concerns and solutions that may address those concerns, as well as known non-energy benefits 7. Number of assessments substantiating the technical readiness information, other data available to substantiate the opinion, how sound the assessments and other information are
<p>CUSTOMER READINESS -Will customers want it?</p>	<ol style="list-style-type: none"> 1. How likely will customers want and be satisfied with the technology? 2. Number of assessments substantiating the customer readiness opinion, other data available to substantiate the opinion, how sound the assessments and other information are
<p>MARKET READINESS -What could keep the technology from success in the market? How significant are these barriers?</p>	<ol style="list-style-type: none"> 1. How capable are industry partners (manufacturers, distributors, installers, service providers, retailers, etc.) of delivering the technology on a large scale? 2. How long might it take to roll out the technology? 3. What does the cost reduction curve for this technology look like? 4. How many assessments are there to substantiate the market readiness opinion? What other information is available to substantiate the opinion?
<p>PROGRAM IMPLEMENTATION READINESS -How easy would it be for energy efficiency programs to incorporate the technology into existing or new programs?</p>	<ol style="list-style-type: none"> 1. What could keep the technology from success in energy efficiency programs? How significant are these barriers? 2. What does “done” look like from a program perspective?
<p>CEE FIT -Is the opportunity a good fit for CEE?</p>	<ol style="list-style-type: none"> 1. What are the characteristics of this opportunity that indicate it is strategically important for the energy efficiency program industry? 2. What characteristics of the opportunity indicate that it is/is not applicable across CEE members, such as a technology not being applicable in different climates, regulatory environments, or specific to an industry that is located in only a few geographic areas? 3. What is in place or missing for the opportunity to take hold? How does what is missing map to CEE competencies? 4. Does CEE already have an established presence in the area? Does CEE already have established relationships? If no, what would it take to establish a presence and relationships?
<p>PARTNER OPPORTUNITIES -Who is advocating the technology?</p>	<ol style="list-style-type: none"> 1. What other organizations are working on this technology? How sound is their work? What is the potential to leverage and complement those efforts? 2. What is the timing of partner organization efforts?

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Readiness Criteria

Market/Commercial Readiness						
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
<i>supply chain maturity/product availability</i>	Not commercially available or limited, pre-commercial availability	Commercially available outside of NW; Requires special order in NW	Commercially available in NW from 1 manufacturer through standard channels.	Commercially available in NW from at least two manufacturers; Stocked throughout region	Commercially available from 2+ manufacturers, well developed supply chain; Widely and easily available	
<i>presence of market failures/ lack of market maturity</i>		Existing market not ready, but similar to other successfully transformed markets warranting further efforts; Limited market awareness	Limited market research suggest market failures/barriers and opportunities to intervene; Growing market interest	Market characterization provides details on barriers and opportunities, some barriers already being addressed; Growing desire for product	Market is starting to function well and appears on path to sustainable, financial viability	
Product Performance (based on BPA's Measure Readiness Levels)						
	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
<i>Energy savings viability</i>	Concept not validated	Concept validated	Limited Assessment	Extensive Assessment	Comprehensive Analysis	Approved (by whom? RTF?)
<i>Fitness for use</i>	Claims of energy savings may not be credible due to lack of documentation or validation by unbiased experts.	An unbiased expert has validated efficiency concepts through technical review and calculations based on engineering principles.	An unbiased expert has measured technology characteristics and factors of energy use through one or more tests in typical applications with a clear baseline.	Additional testing in relevant applications and environments has increased knowledge of performance across a broad range of products, applications, and system conditions.	Results of lab and field tests have been used to develop methods for reliable prediction of performance across the range of intended applications.	Protocols are established and approved (by reaching RTF "approved" level?)

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APPENDIX 3

<i>RTF measure status(if applicable)</i>		Planning	Planning	Provisional	Provisional	Proven
Program Readiness	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
<i>Cost effectiveness</i>	N/A	Not cost effective, but preliminary analysis shows a pathway to CE	Not cost effective but shows pathway to CE with higher volumes, more competition, improved technology	Marginally at cost effective levels	Cost effective	
<i>Program delivery/interventions</i>	No program design	Limited program design	Preliminary program design, small scale pilots	Program design complete, larger scale pilots underway	Ready for full-scale programs.	
<i>Risk Assessment (Technical, Market, Program, Regulatory)</i>	No risk assessment	Limited risk assessment	Preliminary risk assessment complete - major categories of risk understood	Well-developed risk assessment - no major unresolved risks	Periodic risk assessment process in place.	