GSEP Working Group

Meeting Date: October 20, 2023 (held virtually)

Minutes

Final Minutes – Approved at November 6, 2023 Meeting

Attendees:

- Jamie Van Nostrand, Chair, Department of Public Utilities ("DPU")
- Carol Pieper, Senior Counsel, Legal Division, DPU
- Senator Michael Barrett, Senate Chair, Joint Committee on Telecommunications, Utilities, and Energy
- Mary Gardner, Assistant Attorney General, Office of the Attorney General ("AGO")
- Sharon Weber, Deputy Division Director, Air & Climate Programs, Department of Environmental Protection ("MassDEP")
- Shevie Brown, Gas Policy Analyst, Department of Energy Resources
- Amy Smith, Director, Gas Division, National Grid
- Tom Hart, Vice President of Gas Operations, Eversource Energy
- Kristen Jardin, Director of Rates and Regulatory Affairs, Liberty
- R.J. Ritchie, Esq., Liberty
- Robert Furino, Director, Clean Energy Transition, Unitil
- Christopher Leblanc, Vice President, Gas Operations, Unitil
- Alex Soter, Esq., Berkshire Gas
- Jenifer Bosco, Senior Attorney, National Consumer Law Center ("NCLC")
- Pete Dion, General Manager, Wakefield Municipal Gas and Light Department
- John Buonopane, United Steelworkers, Local 12012 ("USW")
- Nicole Horberg Decter, Attorney, USW
- Heather Takle, President and CEO, Power Options
- Audrey Schulman, Co-Founder and Co-Executive Director, HEET

- Jonathan Buonocore, Research Scientist, Boston University School of Public Health
- Priya Gandbhir, Staff Attorney, Conservation Law Foundation ("CLF")

Moderator – **Carol Pieper, DPU** - Welcome. Noted that meeting is likely being recorded via Zoom by member of public. Took roll call. Approving draft minutes from October 2 meeting.

Presentation: GSEP Cumulative Costs –Dorie Seavey, Groundwork Data

Explored the research question how much new GSEP investments are likely to cost over time, fully loaded with return of capital costs and investor return. Based on the forecast from the Future of Gas consultants with no adjustments, found that utility GSEP capital expenditures from 2022 through 2039 was $15.9 billion. Found that the cost to ratepayers was $34.4 billion (in 2022 dollars), excluding operations and management ("O&M") expenditures and property taxes. All input numbers came from the independent consultant's report The Role of Gas Distribution Companies in Achieving the Commonwealth's Climate Future of Gas, Appendix 4, filed in D.P.U. 20-80. The independent consultant projected that a total of 4,206 miles of main will be replaced by 2039, which is 70 percent of the initial leak-prone pipe inventory that GSEP set out to address in 2015. We still have a long way to go.

The Future of Gas independent consultant found that the local distribution companies ("LDCs") would each have the following share of the $15.9 billion in capital spending between 2022 and 2039: National Grid/Colonial – 2%, National Grid/Boston – 66%, Unitil - 1%, Eversource/NSTAR – 18%, Eversource/EGMA – 11%, Berkshire Gas – 1%, and Liberty – 1%.

The modeling assumptions used to calculate the GSEP cumulative costs include:
(1) replacement miles and gas capital expenditures projects as provided by the Future of Gas independent consultants; (2) actual pre-tax rate of return; (3) GSEP end dates as specified by each LDC; and (4) 2% escalation rate. O&M expenses, property taxes, and depreciation and return on investment for prior GSEP spending (2015-2021) were not included. The inputs were entered into a 60-year straight-line depreciation model, which resulted in a cumulative cost of $34.4 billion (in 2022 dollars) for remaining GSEP capital expenditures. Payback will continue through the end of the century.

GSEP cumulative costs are critical for evaluating whether the spending is appropriate, economically and technically efficient, recoverable, and in the public interest. LDCs must provide no more than a five-year forecast for GSEP spending. There are no public forecasts for GSEP costs. Such forecasts are important for protecting ratepayers in the energy transition.

The weighted average unit cost of main replacement (per mile) in 2022 across all six LDCs was $2.07 million. Per mile replacement costs have doubled over the last six years. Larger LDCs anticipate rising costs due to the shift of replacement projects to more urban areas, which is more expensive. Four of the six LDCs have hit their GSEP spending cap in their 2023 GSEPs and asked to defer some recovery to future years. When an LDC maxes out its review requirement with fewer, more costly miles, it may have difficulty keeping up with its GSEP replacement timeline. 2023 GSEP spending on Grade 3-SEI leaks and advanced leak repair is de minimis, about 2.2 percent of GSEP-approved spending.

Presentation: Costs of Non-Gas Pipe Alternatives –Audrey Schulman, HEET

This presentation on non-gas pipe alternatives is in terms of GSEP only. That means we are discussing only methods that can be used to eliminate gas use entirely on a street, otherwise the unsafe pipe is still in use.

How do we compare the costs of air source heat pumps and networked geothermal? Air source heat pump involves a single unit and can be either a "just-HVAC" retrofit or a "100% electrification" retrofit (HVAC, gas stove, domestic hot water, etc.). These two types of retrofits should not be compared because 100% electrification adds on average 35% to the total cost according to the MassCEC database on air source heat pump installs.

Networked geothermal involves the cost of the retrofits of many units, sometimes these retrofits are just- HVAC or 100% electrification, as well as the shared infrastructure in the street.

To do an apples-to-apples comparison, we need compare the costs of: (1) just-HVAC air source heat pumps retrofits to just-HVAC retrofits for networked geothermal; (2) 100% electrification retrofits for air source heat pumps to 100% electrification retrofits for networked geothermal; and (3) shared infrastructure of gas with the shared infrastructure of networked geothermal.

The installation costs of retrofits were calculated using per ton (energy it takes to melt or freeze one ton of ice) per year of expected lifespan. The ASHRAE expected lifespan is 15 years for air source heat pumps and 19 years for ground source heat pumps.

The data sets used to calculate costs were MassCEC 2019-2021 data (air source heat pumps), GSEP data (gas infrastructure), public docket data (Eversource and National Grid networked geothermal projects in (Eversource Framingham, National Grid's pilot project in Lowell) and one private install in the northeast where the installer kindly shared the data (Project X). Would love to have other people run the numbers. For networked geothermal, I used the public docket data on the Eversource and National Grid Lowell installs. With the National Grid install, the size and price are not yet fully established. So conservative assumptions were used of just one pilot with just 100 customers.

Project X is pricing data that came from a private installer who does a lot of networked geothermal. This is not a utility installation, but is useful for price comparisons. The installer kindly shared the info with the condition of anonymity. The site is in the northeast.

For just-HVAC retrofits, the cost per ton per year of expected heat pump life are around $400 for air source heat pumps (MassCEC data 2019-2021), around $330 for Eversource Framingham, and almost $500 for Project X. For 100%-electrification retrofits, cost per ton installed per year of heat pump expected life is $750 for air source heat pumps (MassCEC data) and a little less than $1,500 for National Grid's Geothermal pilot project in Lowell. The costs for National Grid are conservative and preliminary.

For shared infrastructure, a cost per customer was calculated. For networked geothermal, the cost per customer was calculated using the total cost of shared infrastructure per total number of units. For gas, the cost per customer was calculated using Massachusetts' total cost of leak-prone infrastructure per Massachusetts' total number of leak-prone customers (assumed that

350,000 customers are on leak-prone pipe). The cost did not include inflation or investor payback. The calculation did not include life expectancy. The shared infrastructure costs per customer are a little over $75,000 for Eversource Framingham, a little over $50,000 for National Grid Lowell, almost $50,000 for Project X, and a little over $25,000 for gas.

However, the learning curve assumes that as you make mistakes and learn over time, the cost of a new input decrease 20 percent less with each doubling of output. The results so far demonstrate this cost reduction since National Grid costs are lower. When you add fuel costs over the course of 50 years, the average cost per customer for gas infrastructure increases and is slightly more than Project X. These costs were calculated using basic assumptions and high school math.

Reduced electric peaks from the extraordinary efficiency of networked geothermal as a method of building electrification were not considered in this analysis. Reducing electric peaks will decrease customer energy bills significantly since peak load is when the most expensive peaker plants are turned on. We also will not have to source as much renewable energy and battery storage. Additionally avoided costs (electric grid modernization) were not considered. If we move that money from grid modernization to something else, we will have less fights over the placement of substations. Maybe electric utilities could pay for the customer retrofits out of avoided costs of those avoided electric grid upgrades. Water savings were also not considered in this analysis.

According to the 20-80 E3 analyses, low-income customers who remained on gas had the lowest energy burden on networked geothermal. There would be no need to buy gas from out of state for heating, which would reduce price volatility and customer bills. Since the thermal energy is just beneath our feet, it would also increase reliability (from a reduction of possible single-point failures in distant locations). Since the only energy used is electricity, it would lower statewide emissions. New York and Colorado already mandate utilities to install geothermal infrastructure. The concept of gas utilities transitioning to networked geothermal was invented in Massachusetts, but the Commonwealth is now behind these other states.

Q&A on Presentations

Amy Smith, National Grid – I wanted to address the slide on leak repair in Dorie's presentation. I wanted to point out the two technologies we have for leak repair – sealing or lining pipe or CISBOT. There is some research and development that these leak repair technologies can be used on pipe that is 16 inches in diameter or greater. Large pipe doesn't get brittle like the small pipe. CISBOT and other techs extend the life of the larger diameter pipe.

Mary Gardner, AG's Office – About accelerated cost recovery. This is about safety and maintaining safety. Want an expert opinion on how we can maintain safety while reducing costs at the same time.

Dorie Seavey, Groundwork Data – Safety is a paramount concern. Utilities should have the ability to replace pipes that are super hazardous and dangerous. For other situations, are there cost effective ways of achieving safety without replacing pipe. Research shows that advanced leak repair can work.

Pete Dion, Wakefield Municipal Gas and Light Department – Is there any data on how much less would need to be invested in the electric grid without heating and cooling?

Audrey Schulman, HEET – Logic shows that networked geothermal is more efficient. Department of Energy report coming out soon showing how much ground source heat pumps affect electric grid impacts.

Priya Gandbhir, CLF – As networked geothermal becomes more mainstream, costs will be reduced as municipalities get used to permitting, etc. This will be something municipal officials become more aware of. Regarding safety with Mary's questions, one thing we know that will not help safety, putting more volatile substances in pipes in the ground. Moving towards geothermal or a greener system will be key.

Heather Takle, PowerOptions – Audrey had some great individual costs. Questions I have: (1) I don't think I saw this in Audrey's presentation, what is cost of electrical infrastructure to supply on top of the other costs?; (2) Have you thought about the costs to reduce the electrical infrastructure required with distributed energy resources included, e.g., controllable thermostats?; (3) What is the total cost of networked geothermal by street compared to GSEP?

Audrey Schulman, HEET – Networked geothermal cost per street will come down over time. If you factor fuel costs of 50 years, it will become less expensive very soon. Utilities would have more capital expenditure costs, but customer bills will come down. Gas workers can transition with minimal training. Regarding electric peaks, I can barely keep up with information around the gas system, let alone what is going on with the electric grid. People with greater capabilities should look at. There is a reasonable possibility that the reduced costs can go towards appliance retrofits.

Senator Barrett – I want to make sure I understand Audrey's point that geothermal would impose less costs or peak on the electric grid. Why does the network alternative impose less costs on the grid?

Audrey Schulman, HEET – The falcon curve paper that HEET did with Boston University (https://www.nature.com/articles/s41598-022-15628-2) shows that geothermal has fewer peaks than other energy types, radically reducing electric peak costs.

Amy Smith, National Grid – Grid modernization predictions assumes a winter electric peak.

Senator Barrett – I look forward to more discussion on this later.

Chair Van Nostrand – Will slides be made available?

Carol Pieper, DPU – Yes, if the presenters can provide the presentations to us, we will post them on the GSEP working group website.

Nicole Horberg Decter, USW – Dorie, what percentage of leaky pipe is in dense urban areas? I think that is relevant regarding energy alternatives. Audrey, what studies have been done on geothermal on dense urban areas?

Dorie Seavey, Groundwork Data – That is a good question. Perhaps that is something that the DPU has a handle on? I would be happy to research after this call.

Audrey Schulman, HEET – HEET has a map on its website showing the pipe replacement locations. It is not by percentage of dense urban area. Networked geothermal can be used in dense urban areas. The system gets most synchronous load cancellation in that setting, which maximizes dollars of energy savings. There are experts on how to place networked geothermal systems in dense areas.

Nicole Horberg Decter, USW – Does density effect the cost of networked geothermal?

Audrey Schulman, HEET – I assume it would be similar to the costs of installing the gas system. With gas there is more than an order of magnitude difference by density. It is $170 per linear foot in suburbs. The cost goes up to the thousands for more dense urban areas.

Nicole Horberg Decter, USW – Do your calculations address the difference in cost between urban areas? Or are there more generic suburban costs?

Audrey Schulman, HEET – There is only a teeny amount of data. In general, where gas is more expensive, networked geothermal will also be more expensive and vice versa.

Jonathan Buonocore, Boston University School of Public Health – To answer your previous question. This map on gas leaks [shares screen] comes from a paper that came out last year by Marcos Luna at Salem State and Dominic Nicholas at HEET. Gas systems exist where there are many people. Costs vary substantially depending on where you are. The paper shows that there is about one leak per two households in or around Boston.

Carol Pieper, DPU – Is this a public paper? If so, we can post it.

Jonathan Buonocore, Boston University School of Public Health – I got it through the Boston University library. I will check to see if I can share.

John Buonopane, USW – How long will the transition from gas to networked geothermal for all buildings and houses that use gas?

Audrey Schulman, HEET – I think it is very preliminary to answer that question. We calculated that the transition would take over 40 years given that it will take time to train drillers and to remove gas infrastructure.

John Buonopane, USW – I know that with gas pipe replacement, customers already have all the appliances. With geothermal, you are talking about a much more involved process. You only have so many resources. You still have certain parts of the state that will be on gas. If you are talking 60 or 70 years out, I think that it is important for people to know.

Audrey Schulman, HEET – Climate change is a historic event. We have to act quickly. To save money for the customers and not have stranded assets. We have to have every option on the table.

John Buonopane, USW –I know that gas has been around for a long time. To improve public safety, accelerated rate recovery increase the amount of pipe getting replaced. Why was advanced leak repair technology not considered at the time GSEP was implemented?

Dorie Seavey, Groundwork Data – Advanced leak repair has advanced since the time period that you are referring to. There are new PHMSA regulations coming out that could change cost recovery. There is technology that can extend the life of pipe to 100 years. GSEP allows recovery for advanced leak repairs and super advanced emitters.

John Buonopane, USW – I am not an expert. I know the technology has been around a long time. If you are talking about leak repair, that is one thing. You will have to transition people away from gas who maybe do not want to. To me, the best way to deal with it, is to replace the pipe.

Audrey Schulman, HEET – Bigger diameter cast iron pipe is not in danger of cracking.

John Buonopane, USW – I have seen such cracking. It happened in Stoneham on Franklin Street and in Everett right by the casino. If we had not responded the way we did, that would have been a catastrophe.

Audrey Schulman, HEET – According to PHMSA data, I believe there was only one cast iron large diameter break in the last decade in MA. We have to balance the risk with the cost of replacing pipe. If it costs $30 billion to erase the possibility of one cast iron break, how do we weigh that? We have to replace it with something that reduces the risk of stranded assets. It is way beyond my pay grade, but I am asking that question.

John Buonopane, USW – I have seen crazy things in the field. What about that apartment building in Everett that was near a cast-iron break? I have to believe $30 billion would be the amount included in a settlement. We should figure out how to spend that money.

Audrey Schulman, HEET – Gas will always be explosive. What is in the pipes does not always have to be explosive.

John Buonopane, USW – Gas will be here for a long time.

Audrey Schulman, HEET – We need to transition away from gas.

Senator Barrett – I want to thank John and Audrey for that discussion. There has to be a way to intelligently transition the gas system and do so safely. We should remove the accelerated cost recovery and go back to including gas replacement or repair in the rate base, which was the way it was before GSEP. We should pass a law that bans extending the gas system to new customers in Massachusetts. Given the astronomical costs Dorie computed, I propose removing the term "replacement" in the GSEP statute with "activity" as a more neutral term for repair, replacement, or retirement. DPU could determine when each activity is the one that is preferred. This change has not been considered in the red line. But it is a neutral way without preferring one activity over another.

Mary Gardner, AG's Office – Accelerated recovery versus safety is a false dichotomy. Having these costs recovered through rate base is the way to move forward with the energy transition.

Audrey Schulman, HEET – I wanted to respond to accelerated cost recovery component. The way GSEP is written with the accelerated cost recovery strongly incentivizes pipe replacement. We can change the language to use that incentivization to instead install networked geothermal.

Nicole Horberg Decter, USW – We want Massachusetts to have environmental security. We want a healthy planet. We cannot be naïve about what has happened in the past. There is a reason why GSEP was enacted. Because LDCs could not maintain pipe in a way that met their bottom line. Contractors do the wholesale replacement. We believe there is a safety imperative. If we do not keep pipes in good working order, bad things will happen. In rate cases that happened prior to 2014, pipe repairs and replacements were not happening. We have to consider some practical realities. Without consistent replacement, LDCs cannot maintain the safety of their systems. Right now, DPU is considering revisions to its 101 regulations, which include mapping and oversight by inspectors. Historically, it has been really hard for them to keep accurate maps. Giving up on GSEP is not a good idea; there is going to be a continuing replacement as the pipes continue to age.

Jenifer Bosco, NCLC – I do not disagree on the safety issues. I support the comments that Senator Barrett made. I do not think the discussion is about giving up on GSEP but is about using it in a different way. It does not mean we would not have a use for GSEP as a planning docket if we took away accelerated cost recovery. Utilities have a responsibility to keep repairing and replacing leak-prone pipe. They would be compensated in a different way.

Audrey Schulman, HEET – Most dangerous pipe is small diameter cast iron. GSEP has cut the amount of small type cast iron in half. We are in a much safer situation than we were. If we keep going the way we are, customers will wind up paying more for stranded assets. My guess is there will be also less workers working on gas as more customers transition to other sources. That will not be safe.

Senator Barrett – I remember discussions about GSEP when I started in the Senate. The question of repair was not discussed but it needs to be. I want to note for the record that Nikki is not a member of GSEP working group. I think there should be a discussion as to whether non-working group members can participate just as if they were members. I appreciate your extra-curricular contributions.

Carol Pieper, DPU – That may be my error. Designated working group members have asked me if others could sit in, and I have said that it is okay. But maybe we should have a discussion about it.

Senator Barrett – I do not want non-members to take part in the discussions on redlining the GSEP statute, unless we decide otherwise. Not sure that it is legal to have non-members participate. I was involved in creating the GSEP working group statute, and I did not envision non-members participating in this way.

John Buonopane, USW – We have been meeting since April and there have been several people assisting GSEP working group members. I am frankly surprised, Senator. This has been going

on for months. I am not an attorney, and I need some help. If you are going to exclude non-members from assisting GSEP working group members, that is a big problem and a big mistake.

Senator Barrett – I had not realized up until now that non-members were taking part in the discussion. My preference is that people announce at the beginning that they are not members of the GSEP working and ask for permission to go forward. I am a very strong supporter of labor, and I am not opposed to its input. It is probably appropriate to surface the issue, which is what we are doing now.

Priya Gandbhir, CLF – In terms of what that drafting group looks like, I think it is important to not limit participation but ensure that there is an equal representation of voices in the room. I think GSEP working group members have the right to consult with others in their space. I imagine the LDCs will consult with each other. I will chat with Audrey and others in environmental groups. For drafting, I think it is important to have roughly the same representation as that outlined in the statute. LDCs should have one person represent them in drafting group. It would streamline things. It is not an issue if they want to have counsel represent them.

Audrey Schulman, HEET – Is there a way to have one person from each utility and then one person from each environmental organization, etc.? It just seems a little biased.

Jonathan Buonocore, Boston University School of Public Health – I am the only representative of public health on the GSEP working group. Making sure that all organizations have equal representation is important.

John Buonopane, USW – From the outset, the GSEP meetings have worked exactly how they were supposed. If we needed to pull someone in, we would consult the DPU convener. Now we are changing things after months of doing it. I think the call is that of the Chair. I see no reason to change what we have been doing.

Senator Barret – I do not think it is the call of the Chair. It is the statute. It really is the call of the legislature. I think everyone is acting in good faith. I want to hear what the attorneys for all the organizations have to say. My problem is not with the input. I did not know that the utilities had multiple people participating. My apologies to you for not catching it. When we enter the next stage, I am concerned about the overweighting of certain voices. I think the environment groups are underrepresented. I want to reign in extracurricular participation. Not so much on comments but on redlining the statutes. I am concerned about members bringing in groups of people on any side.

Mary Gardner, AG's Office – I want to propose for next time an agenda item. How do we logistically get this report over the finish line? Specifically, who is taking the lead on drafting the report? Are we going to have a system on how we agree on topics?

Priya Gandbhir, CLF - In the process of drafting, if we need to reach consensus by voting. Under the statute, we have technically different interests.

Heather Takle, PowerOptions – Just to clarify, PowerOptions is more like the AGO than an environmental group in that we advocate for ratepayer costs and minimizing them in the decarbonization transition we are required to do in the Commonwealth.

Carol Pieper, DPU – Sharon, can you do your presentation at the next meeting? We will discuss the remaining agenda items at the next meeting.

Sharon Weber, MassDEP – Yes. The presentation will be on Massachusetts' greenhouse gas inventory.