## HEET's Introductory Comments for the GSEP Working Group

The Department has recently issued its order on the Future of Gas (DPU 20-80), the summary of which was titled "Beyond Gas." The decision has been made. The state *will* move off of gas. Now the question is not *if*, but *how*.

### The Dilemma

However, meanwhile, as part of the Gas System Enhancement Plan (GSEP), the gas utilities are spending over \$800 million per year installing new gas mains in replacement for old gas mains. These pipes have a lifespan of well over 50 years and are paid back over that time period by customers.

Dorie Seavey's presentation to the GSEP working group showed that from now until the end of the GSEP program (currently projected to be 2039), an additional \$34 billion worth of new gas pipes will be installed (including return on equity) and if paid for by customers in the normal way, they would not be fully paid for until 2097.



#### **Stranded Assets**

Since the Commonwealth has a net zero emissions mandate of 2050, these GSEP pipes being installed today are thus very likely to not be "used and useful" through their lifespan, but instead to become stranded assets paid for by the state. We must stop this installation of future stranded assets as quickly as possible.



#### **Rising Energy Burden**

Meanwhile, as customers retrofit their homes to use air source heat pumps, fewer and fewer customers will remain on the gas system. However that system will have the same number of miles of pipe to maintain at the same cost. Thus each remaining customer will have to shoulder higher and higher bills on the way to those stranded assets.<sup>1</sup> The higher gas bills will inspire more customers to move to heat pumps. In the end the only ones left on the gas system are likely to be those who cannot afford a new heating system. This is not the sort of just transition we want for the Commonwealth.



Additionally, as the gas utilities' revenues decrease, they will be able to afford fewer workers, meaning that the safety of the system will possibly suffer.

#### Safety

Safety is the reason that the GSEP was started. As the gas utilities and NEGWA/USW have frequently pointed out during the GSEP working group meetings, the most dangerous type of leak-prone pipes are small diameter cast iron mains. This type of pipe is brittle enough to potentially crack during a frost heave, allowing the gas to then migrate underground into nearby buildings. Small diameter cast iron pipe has thus wisely been prioritized to be replaced by the GSEP. Since the GSEP started, over 40% of all small diameter cast iron mains in Massachusetts

<sup>&</sup>lt;sup>1</sup> Who Will Pay for Legacy Utility Costs? Lucas W. Davis and Catherine Hausman, https://www.journals.uchicago.edu/doi/abs/10.1086/719793



have been replaced.<sup>2</sup> Thus our gas system now is much safer than it was before the program started.

However, unfortunately, that increased safety has not been demonstrated yet in the data. According to the Pipeline Hazardous Materials Safety Administration's (PHMSA) database, in the 11 years before the GSEP started, there were 3 deaths and 24 injuries. In the 8 years of PHMSA data since, there have been 2 deaths and 27 injuries.<sup>3</sup> The majority of those injuries, as well as one of the deaths, happened during the Merrimack Valley Gas Disaster. This disaster was caused by a mistake made during a GSEP gas pipe replacement. This disaster underlines the fact that no matter how much care is taken, gas is explosive and inherently dangerous.

#### **Electric Grid Impacts**

In order for all of our energy needs to move to electricity, the electric grid will have to be upgraded. Since the gas system at peak can contain at peak load four times the energy of the electric grid, the needed upgrades are extensive.

Air source heat pumps are the most popular way to retrofit a building's heating system from gas to electric. These systems are reliable and extraordinarily efficient, but cold outside temperatures decrease their efficiency. On a cold February morning, a million homes in the Greater Boston Area on air source heat pumps might create a very high electric grid peak.

The higher the potential electric peaks, the more the grid will need to be upgraded, as well as the more renewable energy and storage will need to be sourced. The Electric Sector Modernization Plans are currently going on. National Grid ESMP includes a projection of increasing its investments in the electric grid seven-fold within the next five years.

<sup>&</sup>lt;sup>2</sup>Pipeline Hazardous Materials Safety Administration database shows the mileage of small diameter cast iron mains in MA have decreased from over 3,800 in 2010 to less than 2,250 in 2022.

 $https://portal.phmsa.dot.gov/analytics/saw.dll?Portalpages&PortalPath=\%2Fshared\%2FPDM\%20Public\%20Website\%2F_portal%2FPublic\%20Reports&Page=Infrastructure$ 

<sup>&</sup>lt;sup>3</sup>https://portal.phmsa.dot.gov/analytics/saw.dll?Portalpages&PortalPath=%2Fshared%2FPDM%20Public%20Websit e%2F\_portal%2FSC%20Incident%20Trend&Page=Serious



National Grid Future Grid Plan, Sept. 2023. https://www.mass.gov/doc/gmacesmp-draftnational-grid/download? gl=1%2Adfgptb%2A ga%2ANzUwNDI5MDE3LjE2NT A5ODEyMj0.%2A ga SW2TVH2WBY%2AMTY5MzkyMDE2OS4zNi4xLjE2OTM5MjM10TcuMC4wLjA.

#### **Electric Grid Upgrade Costs**

No one currently knows the total cost of this electric grid modernization work. Of course it will all be paid for in the end by customers. If electric bills increase significantly, that will have a negative effect on customers' desire to transition.

## **Ramping down GSEP?**

The Attorney General's Office (AGO) suggests slowly reducing the accelerated cost recovery funds allocated to GSEP and stopping the program by 2030. Although the goals of maintaining the affordability of gas customer bills and reducing the chance for stranded assets are critical, there are problems with this proposed solution.

By 2030:

- We will have installed over 900 miles of new gas pipe and spent approximately \$5 billion more on capital expenditures (~\$10 billion if you count return on equity).
- National Grid will have increased its investment in the electric grid seven-fold, raising customer bills commensurately. Higher electric bills will make electrification less attractive.
- There will still be at least 1,100 miles of the dangerous small diameter cast iron pipe left in the state. If there is one death caused by this type of pipe, there will be a push to reverse the decision.

## **Multi-solving**

HEET supports the AGO's desire to quickly stop the investment in new gas mains, but suggests that we can take a few steps more in addressing the GSEP.

Sometimes many large problems can provide answers to multi-solve the problems. If the gas utilities are allowed to install utility-scale non-combusting renewable infrastructure, then every mile of such infrastructure they install will:

- Mean one mile less of gas infrastructure and future stranded assets
- Help support the electric grid, reducing electric peak load, reducing electric bills in the future, and speeding up our transition to clean electricity.

One method of such non-combusting thermal infrastructure is a water-based thermal system. Because the water in the pipes can be heated or cooled *before* the extreme temperature arrives, it can act as a thermal battery, shaving electric peaks.

**Transitioning** - Water-based thermal systems can deliver heating, or heating and cooling. The systems can be:

- A. District energy systems<sup>4</sup> use a central plant to deliver hot or chilled water through pipes across a district. The temperature of the water can be provided through clean electricity. The technology is well proven and financially viable in urban settings. District energy systems exist on college or hospital campuses, military bases, and business districts, providing heating (and/or cooling) to hundreds of buildings. In Boston and Cambridge, there is for instance a district steam system run by Vicinity that is being transitioned currently to a six-stage air source heat pump and wind energy. The system heats over 65 million square feet.
- B. Thermal energy networks<sup>5</sup> contain ambient temperature water (generally between 40 and 90 degrees Fahrenheit). Heat pumps in each building take the heating and cooling needed from the water. Thermal energy networks (which include networked geothermal) are significantly more efficient and do not require central plants, instead maintaining the temperature in the system through local heat sources and sinks such as ice rinks, greenhouses, boreholes and bodies of water. This technology is also well proven and can function in urban *and* suburban areas since the temperature in the pipes is close to the temperature of the ground and thus does not lose much temperature across distance. Again, this is a proven, financially viable technology, and it is used by many large college campuses (currently University of Massachusetts Amherst, Smith College, Yale, Brown and Oberlin are in the midst of installations).

In both cases, the utility's role would be to maintain adequate heating and/or cooling for all the customers on the system.

#### Can Thermal Systems be Scaled Up?

New York and Colorado have both already passed legislation mandating their gas utilities install systems like this. New York is currently figuring out how to regulate these systems. Meanwhile Germany is far ahead of the US, having moved almost 40% of its customers off of gas in just 10 years.

<sup>&</sup>lt;sup>4</sup><u>https://www.energy.gov/eere/amo/articles/combined-heat-and-power-technology-fact-sheet-series-district-energy</u> <sup>5</sup><u>https://www.technologyreview.com/2023/10/04/1080795/us-thermal-energy-networks/</u>

# In 2013 almost half of new homes in Germany were hooked up to the gas grid. It is now close to 10%.

an-Mai 23	10,9	54,3		26,8	4,6
2022	17,4	50,7		23,7	4,9
2021	26,2	43,6		22,7	4,5
2020	33,2	35,5		24,4	4,1
2019	36,7	29,8 29,8 <b>2</b> 9,8		26,8	4,2
2018	38,6	28,8		25,2	4,4
2017	39,3	27,2		25,2	5,5
2016	44,2	23,	3	24,0	5,3
2015	50,3		20,7	20,8	5,3
2014	49,9		19,9	21,5	6,1
2013	48,3		22,5	19,8	6,4

**Legislating in a time of uncertainty** - The time for action is now. GSEP will end soon. The electric grid upgrades will start by 2025. Every year more money will be sunk into two sets of systems without a plan.

Unfortunately, although we know air source heat pumps, district energy systems and thermal energy networks work effectively and are financially viable, we don't know what system works best where. Nor do we have the local expertise and equipment to scale at the speed needed.

Although this lack of knowledge creates uncertainty, there are ways to move forward now so as to learn as quickly as possible and not waste time or money.

### **Suggested Actions**

- Stop the installation and investment in new gas pipes as quickly as possible.
- Mandate non-gas pipe alternatives (NGPA) wherever financially and technically viable The gas system needs to be "right-sized" to maintain a reasonable ratio of customers to infrastructure. Rightsizing this ratio will help keep energy bills affordable and stop the spiral down into stranded assets. This rightsizing can be performed through non-gas pipe alternatives:



- A. Advanced leak repair where appropriate<sup>6</sup> to reduce or eliminate emissions for a decade or more until a pipe can be retired or transitioned
- B. **Retiring gas pipes** where appropriate, while moving the connected customers to electric appliances such as air source heat pumps.
- C. Transitioning street-segments to water-based thermal systems.

Both retirement and/or transition of a gas system can be performed (while maintaining safety and reliability) by starting at the distal ends of the gas system in each neighborhood and maintaining two gas feeder pipes into the area until all other gas pipes are removed.



This sketch was created by a gas municipality expert to explain the steps by which a low-pressure cast-iron system could be transitioned or retired in steps without affecting safety or reliability.

• Integrated street-segment based, phased plan - If you are about to do a major renovation on your home, the first thing you'd want is a blueprint of the building, including information on where the electrical wiring and pipes are. With that blueprint, you could create a specific and phased plan to help ensure that the work happened as smoothly as possible and for the least cost. Moving more than 1.6 million gas customers in the Commonwealth off of gas is a much larger and more complex project than any home.

<sup>&</sup>lt;sup>6</sup> Advanced leak repair is already allowed as part of the GSEP statute. It is a less expensive set of techniques that can be performed on large diameter pipes that are not correlated with catastrophic breaks from frost heaves.



In order to figure out where to use which NGPA we need a plan. Gas and electric utilities need to share blueprints –mapping gas and electric system capacities and constraints, local energy needs, building stock and geology– to begin to create an integrated street-segment-based and phased plan to transition the system with the greatest speed and equity and for the lowest cost.

_										
	Town Name	Town Code	WONUM	DESCRIPTION	Prioritization Factor	Cost Estimate	GSEP Footage	GSEP Mileage	Operating Pressure	Exst Diamete
	Acton	ACT	1508518	24-65 CONANT ST, ACT, COUNTRY CLUB & FAIRWAY RD	13.0	\$717,126.00	2,110	0.40	60	2
	Arlington	ARL	1127516	174-219 SUMMER ST, ARL, SUMMER ST PL & BRATTLE ST	20.3	\$967,907.25	1,475	0.28	LP	6
	Arlington	ARL	1207318	2-24 ORCHARD PL, ARL	4.4	\$309,436.10	470	0.09	LP	4
	Arlington	ARL	1471419	53-131 RHINECLIFF ST, ARL	26.8	\$1,338,416.07	2,375	0.45	LP to 25	4
	Arlington	ARL	1310396	53-75 DOROTHY RD, ARL	29.4	\$264,023.49	345	0.07	LP	4
	Arlington	ARL	1429163	62-179 FRANKLIN ST, ARL	44.7	\$2,531,481.97	3,575	0.68	LP	6
	Arlington	ARL	1198194	925-1115 MASSACHUSETTS AVE, ARL	29.5	\$982,259.19	2,900	0.55	LP to 25	6
I	Bedford	BED	1511469	281-314 GREAT RD, BED, PRIVATE COMMERCIAL COMPLX	15.0	\$1,222,738.96	2,815	0.53	60	2
	Belmont	BEL	1128007	521-563 TRAPELO RD, BEL, & 6-37 MORAINE ST	21.0	\$1,503,228.28	1,235	0.23	LP	6

Sample GSEP street-segment information from the most recent GSEP report showing the work that will be performed the following year. Exhibit NG-GPP-4



• Slow down and lengthen the GSEP program to allow for learning. The overall annual mileage of GSEP infrastructure installed each year can be decreased, while the program is lengthened. This will allow the truly unsafe small diameter cast iron pipes to continue to be replaced, while giving enough time for trials with NGPAs to be made. With the integrated energy plan, the Department would have the information needed to determine the future duration and speed of the GSEP.

- Iterate on the phased plan through regular reassessments with the greatest possible transparency of information. As it becomes more clear which non-gas pipe alternatives work best while maintaining affordability, the allowable or preferred NGPAs can be readjusted. Since regulation is a faster method to do this than legislation, the Department should be directed to perform this iteration and reassessment. Transparency of information will increase the trust of all stakeholders, while allowing more people to help provide potential answers.
- Require a greater percentage of NGPAs annually to reach 100% of GSEP. The least expensive way to affect a market is to give certainty. Clarifying to the gas utilities that NGPAs is the way forward through a gradual required ramp up in NGPAs will allow them to figure out how to get the work done, sourcing the expertise, materials and equipment. This required ramp up will help maintain the workforce we need to accomplish the mammoth job in front of us.
- Motivate action through a combination of accelerated cost recovery, pre-approval of funds and/or incentives. Most people and companies will not perform work without some money up front, and without a guarantee of getting paid the rest of the funds. Asking the utilities to perform a year's worth of expensive work without any of the funds up front, and to perform that work without a pre-approval of getting paid back is an effective way to stop that work. Thus HEET strongly encourages a mixture of accelerated cost recovery, pre-approval of expenditures and/or performance-based ratemaking to help increase the speed of the gas utilities' transition.

The one thing we know for sure is that we are wasting money and time now. Let's multi-solve the problems in front of us. Transitioning a system off an explosive and combustible gas, while keeping gas and thermal customers in a merged ratepayer base, will:

- Improve safety for workers and customers by replacing gas gradually with a non-explosive medium. After all, the safety problem is not the pipe. It is the gas. Without the gas in the pipe, the pipe cannot explode, no matter how old, leaky or brittle.
- Reduce the rising energy burden and the potential for stranded assets through right-sizing the infrastructure.
- Reduce emissions to allow future generations to live and flourish in the Commonwealth.
- Reduce the cost of the electric grid upgrades, resulting in a lower electric customer bill.

It's time to create a plan, to right-size the gas system through transitioning it to a safer, more affordable water-based system, decommissioning pipes where necessary. With data transparency and the right incentives, we can iterate forward to meet the Commonwealth's net zero emissions mandate for the least cost and at the greatest speed.



This is a time to build the future and the legacy we want.

With the greatest respect,

Audrey Schulman Co-founder and Co-executive Director, HEET

Note:

Some of the comments from NEGWA/USW seem to suggest a misunderstanding about the scope of the GSEP working group. The GSEP working group was not tasked with performing studies. Instead each member was selected for their expertise in various fields. The idea was that by working together, these experts will be able to make recommendations that will help align the GSEP statute with the Commonwealth's net zero emission mandates. The legislature and Department could then choose which of the working group's recommendations to enact, and how to do so in conjunction with state and federal law.