To: Duane Jonlin, Seattle Department of Construction & Inspections
Email: duane.jonlin@seattle.gov
From: RMI
Re: Proposed 2018 Seattle Energy Code Water Heating Amendment
Date: March 18, 2021

On March 12, 2021, Seattle's City Council held a public meeting to discuss a proposed amendment to the 2018 Seattle Energy Code (SEC) that would require heat pump waters in all commercial buildings. RMI submits this letter in response to the City's request for stakeholder feedback about that code amendment. RMI is an independent, nonpartisan nonprofit whose mission is to transform global energy use to create a clean, prosperous, and secure low-carbon future. RMI's Carbon-Free Buildings program focuses on supporting policies and market transformation that will eliminate direct building greenhouse gas emissions nationwide. The amendment to the SEC would promote the full electrification of many commercial buildings and would be a helpful step toward reducing onsite emissions of Seattle's building stock. The proposed amendment would:

- reduce emissions from buildings;
- save costs on building construction;
- reduce stranded gas infrastructure assets; and
- support the installation of heat pump water heaters that will store water at safe and healthy temperatures, with no elevated risk of Legionella growth.

The Proposal Will Catalyze Emissions Reductions

Research by RMI has shown that electrifying buildings will reduce emissions in Washington. The *New Economics of Electrifying Buildings* report showed that a new all-electric home in Seattle would reduce emissions by 93% compared to a new mixed-fuel home.[1] The analysis considered the cumulative emissions over the 15-year lifetime of all-electric appliances installed today, based on a future projection of grid energy sources conducted by the National Renewable Energy Laboratory (NREL). These substantial emission savings arise because heat pumps are 2-4 times more efficient than gas appliances, and the electricity sector in Seattle is already 90% carbon free.[2] Given that Washington's Clean Energy Transformation Act requires the state to have 100% carbon-free electricity generation by 2045, an all-electric building built today will likely be a carbon-free building in the future.[3]

While multifamily residences and hotels are important occupancy groups that need to have all-electric water heating, they consist of only 40% of the square footage of all buildings that would be affected by the SEC update passed in February.[4] This amendment would apply to the other 60%. Water heating makes up 19% of the direct emissions from buildings nationally and by electrifying this end use, the City of Seattle is taking advantage of an opportunity to eliminate direct building emissions from water heaters as the grid becomes decarbonized.[5]

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[1] RMI, *New Economics of Electrifying Buildings - Seattle* (2020), https://rmi.org/insight/the-new-economics-of-electrifying-buildings/
[2] https://www.seattle.gov/city-light/about-us/what-we-do
[3] https://app.leg.wa.gov/RCW/default.aspx?cite=19.405.010
[4] Seattle Energy Benchmarking Analysis Report (2016) at 14, http://www.seattle.gov/documents/Departments/OSE/Seattle%20Energy%20Benchmarking%20Analysis%202016%20for%20web.pdf
[5] RMI, *The Impact of Fossil Fuels on Buildings* (2019) https://rmi.org/insight/the-impact-of-fossil-fuels-in-buildings/

The Proposal Will Help to Reduce Construction Costs

By requiring all-electric water heating, in addition to the already-required electric space heating, more buildings will be built fully electric. A fully electric building is frequently cheaper to construct than a mixed fuel alternative. Recent research by RMI suggests that when you include the cost of the gas infrastructure installed to buildings, the total system cost of dual-fueled buildings are often more expensive than all-electric buildings.[6,7] In *The New Economics of Electrifying Buildings*, RMI found that all-electric homes in Seattle cost $4,500 less than a mixed-fuel home, mostly due to the avoidance of an estimated $2,100 to bring a gas connection to the building.[8]

RMI's analysis is consistent with research conducted for the California Energy Commission (CEC), which found that all-electric construction produced substantial capital savings in all climate zones modeled. The CEC analysis found that a mixed-fuel medium sized office building in California costs between $45,029 and $96,106 more than an all-electric version, with the cost-differential varying by climate zone.[9] The CEC also found that a mixed-fuel mid-rise residential building in California costs about $14,400 more than an all-electric version,[10] and a mixed-fuel hotel costs between $1,277,845 to $1,284,121 more than an all-electric version.[11] Given the high cost of construction in Seattle, code measures that can both reduce carbon emissions and upfront construction costs should be embraced.

The Proposal Will Reduce Wasteful Spending on Unnecessary Gas Infrastructure

By requiring all buildings covered under the code to use electricity for water heating, in addition to the all-electric space heating already required, the City will help reduce unnecessary expansion of the gas system. Recent research by RMI on regulatory solutions suggests that cities should adopt policies to stop the expansion of the gas system.[12] The expansion of the gas system is typically financed through utilities' rate base accounting, with the expectation that customers will pay the bill for decades to come. This method to pay for gas infrastructure is incompatible with the need to address climate change, and the new infrastructure is at risk of becoming a stranded asset as more and more cities adopt building decarbonization policies. A recent Gridworks report examining the future of the gas system in California explained that, as more and more customers leave the gas system due to rising costs from aging infrastructure and fewer customers, these stranded assets are expected to contribute to the "death spiral" that is projected to burden an ever smaller customer base with higher fixed costs.[13] As Greenlining Institute indicated in another recent report, the customers that are likely to be stuck with the largest bills

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[6] RMI, Heat pumps for Hot Water at 6 (2020), https://rmi.org/insight/heat-pump-hot-water-cost/
[7] RMI, Economics of Electrifying Buildings at 29 (2018), https://rmi.org/insight/the-economics-of-electrifying-buildings/
[8] RMI, The New Economics of Electrifying Buildings (2020), https://rmi.org/insight/the-new-economics-of-electrifying-buildings/
[9] 2019 Nonresidential New Construction Reach Code Cost Effectiveness Study at 11 (2020), https://efiling.energy.ca.gov/GetDocument.aspx?tn=233812-5&DocumentContentId=66459
[10] 2019 Mid-Rise New Construction Reach Code Cost Effectiveness Study at 8 (2020), https://localenergycodes.com/download/492/file_path/fieldList/2019%20Mid-rise%20NC%20Cost-Eff%20Report.pdf
[11] 2019 Nonresidential New Construction Reach Code Cost Effectiveness Study at 13 (2020), https://efiling.energy.ca.gov/GetDocument.aspx?tn=233812-5&DocumentContentId=66459
[12] RMI, Regulatory Solutions for Building Decarbonization at 7 (2020), https://rmi.org/insight/regulatory-solutions-for-building-decarbonization/
[13] Gridworks, *California Gas System in Transition,* at 5 (Sep. 2019) https://gridworks.org/wp-content/uploads/2019/09/GW_Calif-Gas-System-report-1.pdf

are also more likely to be low-income and disadvantaged.[14] Washington can expect a similar future given that about 28% of Washington's gas system is over 50 years old and Washington is continuing to expand its gas system with about 21,000 new gas customers in 2018.[15,16] Building all-electric buildings can help avoid building out unneeded gas pipelines, thus making the transition off the gas system more affordable and equitable for future customers. This all-electric water heating proposal would make all-electric construction more likely, thereby reducing expansion of the gas system, lowering gas utility capital costs and helping to make the energy transition more equitable.

Heat Pump Water Heaters Store Water at Safe and Healthy Temperatures, Without Any Elevated Risk of Water-Borne Bacteria

In addition to being 2 to 3 times as efficient as gas water heaters, heat pump water heaters store water at temperatures that are at least as safe and healthy as their gas counterparts. Some stakeholders have expressed concerns that heat pump water heaters may not store water at a high enough temperature to prevent against Legionella and thus should not be installed in high-risk locations like hospitals.[17] However, evidence shows that heat pump water heaters apply temperatures that keep buildings safe from water-borne bacteria such as Legionella. Recent research indicates that heat pump technology for water heating is safe to use in high-risk locations for Legionella, such as hospitals.[18] Heat pump water heaters are also capable of generating water temperatures as high as 140°F.[19] Water heaters at this temperature can kill 90% of Legionella in 2 minutes.[20] In fact, in most applications the recommended set point temperature for water heaters is 120°F to reduce risk of scalding occupants and stand by energy losses, while also minimizing Legionella growth.[21]

The buildings built today in Seattle will exist for decades to come and the City should require an all-electric standard to reduce stranded asset risk, construction cost and direct greenhouse gas emissions. The proposed amendment to the SEC to require all commercial buildings to install heat pump water heaters is an important step towards that goal.

Respectfully submitted,

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Associate
RMI

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[14] Greenlining Institute, *Equitable Building Electrification,* at 22 (Sep. 30, 2019) https://greenlining.org/publications/reports/2019/equitable-building-electrification-a-framework-for-powering-resilient-communities/

[15] https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/data_statistics/pipeline/annual_gas_distribution_2010_present.zip

[16] EIA, Natural Gas Annual Respondent Query System https://www.eia.gov/naturalgas/ngqs/#?report=RPC&year1=2000&year2=2018&company=Name&items=1010CT,1020CT,1110CT,1120CT

[17] http://www.seattle.gov/Documents/Departments/SDCI/Codes/SeattleEnergyCode/Publiccomment3Rothman.pdf

[18] Heat Pump Centre, Annex 46 Legionella and Heat Pump Water Heaters at 19 (2020) https://heatpumpingtechnologies.org/annex46/wp-content/uploads/sites/53/2020/10/hpt-an46-03-task-1-legionella-and-heat-pumps-1.pdf

[19] ASHRAE Handbook, HVAC Applications at 50.9 (2015)

[20] U.S DOE, Measure Guideline: Heat Pump Water Heaters in New and Existing Buildings at 16 (2012) https://www.nrel.gov/docs/fy12osti/53184.pdf

[21] Ibid