To: Duane Jonlin, Seattle Department of Construction & Inspections
Email: duane.jonlin@seattle.gov
From: Rocky Mountain Institute
Re: Proposed 2018 Seattle Commercial Energy Code
Date: September 30, 2020

Rocky Mountain Institute (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 Building Electrification program focuses on supporting policies and market transformation that will eliminate direct building greenhouse gas emissions nationwide. The 2018 Seattle Commercial Energy Code (SEC), as proposed by the Seattle Department of Construction & Inspections (SDCI), would promote the partial electrification of buildings and would be a helpful step toward reducing onsite emissions of Seattle's building stock. However, in order to put Seattle on the path to meet its climate goals, the SDCI should amend the code to completely eliminate fossil fuels from all occupancy groups in the 2018 code. A fully electric 2018 SEC would:

- reduce emissions
- create more climate resilient buildings
- apply to all building types
- improve indoor air quality
- be cost effective

A recent study published in Nature predicts that in an unmitigated emissions scenario, Seattle's climate will resemble that of present day San José, California by the century's end.[1] This climactic shift will increase the number of annual cooling degree days (CCDs) by over 700 and highlights the dual need to drastically reduce carbon emissions from the buildings sector and prepare for climate resiliency. Natural gas emissions from buildings consist of 31% of total greenhouse gas emissions of the City of Seattle.[2] With the State of Washington already committed to zero-carbon electricity by 2045,[3] going all-electric is an effective strategy for Seattle to reach its climate goals of reducing building energy emissions 39% from 2008 levels by 2030[4] and reaching net zero greenhouse gas emissions by 2050.[5]

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[1] Impacts of Global Warming on Residential Heating and Cooling Degree-Days in the United States at 9 (2015), https://www.nature.com/articles/srep12427
[2] 2016 Seattle Community Greenhouse Gas Emissions Inventory at 7 (2016), https://www.seattle.gov/Documents/Departments/OSE/ClimateDocs/2016_SEA_GHG_Inventory_FINAL.pdf
[3] Initiative 937 at 3 (2019), http://lawfilesext.leg.wa.gov/biennium/2019-20/Pdf/Bill%20Reports/Senate/5116-S2.E%20SBR%20FBR%2019.pdf
[4] Seattle Climate Action Plan at 8 (2013), https://www.seattle.gov/Documents/Departments/Environment/ClimateChange/2013_CAP_20130612.pdf
[5] *See* Resolution 31322 at 2 (2011), http://clerk.seattle.gov/~archives/Resolutions/Resn_31312.pdf

The proposed revisions to the SEC that will eliminate the use of fossil fuel-fired and electric resistance space heating equipment are crucial to help the city advance toward its climate goals. Space heating makes up 68% of direct building emissions nationally, the largest of any end use.[6,7] In 2015, the City of Seattle commissioned the Pacific Northwest National Laboratory (PNNL) to perform a research study to suggest improvements to the SEC to further reduce greenhouse gas emissions and increase climate resilience. One of the key policy recommendations of the PNNL study was to "remove electric resistance space heating as an option in the energy code" while also acknowledging that to "discourage a simple shift to oil or natural gas heating, such a policy should be paired with limitations on the use of fossil fuels."[8] The proposed code changes by SDCI follow this research recommendation.

An additional benefit of installing a heat pump system is that they are capable of both heating and cooling, thus increasing the climate resilience of a building. A fossil-fuel fired building could also become climate resilient by installing an AC system, but this would come at an additional cost of installing two different pieces of equipment, rather than one.

The proposal includes an "electric ready" update to the SEC that would require an electrical receptacle, circuit, and electrical capacity for each installed gas appliance in dwelling units. This "electric ready" requirement is an important first step, but the City of Seattle should go further and require all-electric equipment in all occupancy groups described in Chapter 3 of the Seattle Building Code. The code update as written would require only dwelling units in R-2 occupancy to be "electric ready", which make up only 36% of the square footage of the affected buildings.[9] While the optimal approach would be for the code to require all-electric construction for all occupancy groups, it should at the very least require all occupancy groups to be "electric ready".

Additionally, the proposed code would allow for developers to continue to install gas cooking appliances in homes, even though these devices are known to be a major source of indoor nitrogen dioxide (NO_2). A recent report by RMI, Physicians for Social Responsibility, Sierra Club and Mothers Out Front found that gas stoves, particularly when unvented, can be a major source of indoor air pollution.[10] The EPA found that homes with gas stoves have

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[6] EIA Residential Energy Consumption Survey (2015), https://www.eia.gov/consumption/residential/reports/2015/overview/

[7] Rocky Mountain Institute, The Impact of Fossil Fuels in Buildings: A Fact Base at 6 (2019), https://rmi.org/insight/the-impact-of-fossil-fuels-in-buildings/

[8] Pacific Northwest National Laboratory, Energy and Carbon Enhancements to the City of Seattle Code Requirements at 19 (2015), https://pilotscholars.up.edu/cgi/viewcontent.cgi?article=1043&context=egr_facpubs

[9] Seattle Energy Benchmarking Analysis Report (2016) at 14, http://www.seattle.gov/Documents/Departments/OSE/Seattle%20Energy%20Benchmarking%20Analysis%20201 6%20for%20web.pdf

[10] Brady Anne Seals & Andee Krasner, Rocky Mountain Institute et al., Health Effects from Gas Stove Pollution (2020), available at https://rmi.org/insight/gas-stoves-pollution-health/.

50 – 400% higher concentrations of NO_2 than homes with electric stoves.[11] A 2013 study of children with asthma in suburban and urban homes measuring month-long averages of indoor NO_2 found that as NO_2 levels increased, so did the severity of asthma.[12] For every 5-ppb increase in NO_2 above a threshold of 6 ppb, the risk of wheeze and the need for medication increased. The study concluded that asthmatic children are at higher risk for more severe asthma symptoms at low levels of NO_2 and the risk rises as NO_2 rises.[13] These health consequences could be avoided by requiring the installation of electric or induction stoves.

While requiring the elimination of fossil fuel-fired water heating equipment in occupancy groups R-1 and R-2 is a step in the right direction, the City should expand this requirement to all occupancies described in Chapter 3 of the Seattle Building Code. While R-1 and R-2 are important occupancy groups that need to be electrified, they consist of only 40% of the square footage of all buildings that would be affected by this code.[14] Water heating makes up 19% of the direct emissions from buildings nationally and by not electrifying this end use, the City of Seattle is missing a key opportunity to eliminate direct building emissions from water heaters as the grid becomes decarbonized.

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.[15,16] This analysis has been reinforced by research done by the California Energy Commission (CEC) on the affordability of all-electric construction which found substantial capital savings in all climate zones modeled. The CEC analysis found that a mixed-fuel medium size 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.[17] The CEC also found that a mixed-fuel mid-rise residential building in California costs about $14,400 more than an all-electric version,[18] and a mixed-fuel hotel

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[11] Integrated Science Assessment (ISA) For Oxides of Nitrogen – Health Criteria (Final Report, 2016). US Environmental Protection Agency, Washington DC, EPA/600/R-15/068, p. 2-38, 2016. https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=310879.

[12] Kathleen Belanger et al, "Household levels of nitrogen dioxide and pediatric asthma severity", Epidemiology 24(2), March 2013, 320-330, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3686297/

[13] Ibid.

[14] Seattle Energy Benchmarking Analysis Report (2016) at 14, http://www.seattle.gov/Documents/Departments/OSE/Seattle%20Energy%20Benchmarking%20Analysis%20201 6%20for%20web.pdf

[15] Heat pumps for Hot Water (2020) at 6, https://rmi.org/insight/heat-pump-hot-water-cost/

[16] Rocky Mountain Institute, Economics of Electrifying Buildings at 29 (2018), https://rmi.org/insight/the-economics-of-electrifying-buildings/

[17] 2019 Nonresidential New Construction Reach Code Cost Effectiveness Study at 11 (2020), https://efiling.energy.ca.gov/GetDocument.aspx?tn=233812-5&DocumentContentId=66459

[18] 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

costs between $1,277,845 to $1,284,121 more than an all-electric version.[19] Given the high cost of construction in Seattle, code measures that can both reduce carbon emissions and upfront construction costs should be embraced.

The buildings built today in Seattle will exist for decades or centuries to come and should take advantage of the inherent carbon reduction, cost and climate resilience benefits of all-electric construction. The proposed updates to the SEC will partially achieve these benefits and is a positive step, but in order to fully achieve the benefits of these technologies, SDCI should require fully all-electric new construction in the proposed 2018 Seattle Commercial Energy Code.

Respectfully submitted,

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[19] 2019 Nonresidential New Construction Reach Code Cost Effectiveness Study at 13 (2020), https://efiling.energy.ca.gov/GetDocument.aspx?tn=233812-5&DocumentContentId=66459