SEATTLE CITY COUNCIL
CENTRAL STAFF

September 3, 2019

M E M O R A N D U M

To: Sustainability and Transportation Committee
From: Yolanda Ho, Analyst
Subject: Natural gas piping systems prohibition (CB 119640)

On September 10, 2019, the Sustainability and Transportation Committee (Committee) will discuss Council Bill (CB) 119640, amending the Seattle's Building and Construction Codes (Seattle Municipal Code Title 22) to prohibit natural gas piping systems in all new buildings.

This memorandum (1) provides background and context on the City's efforts to reduce greenhouse gas emissions and risks associated with natural gas; (2) describes CB 119640; and (3) discusses potential impacts of the legislation.

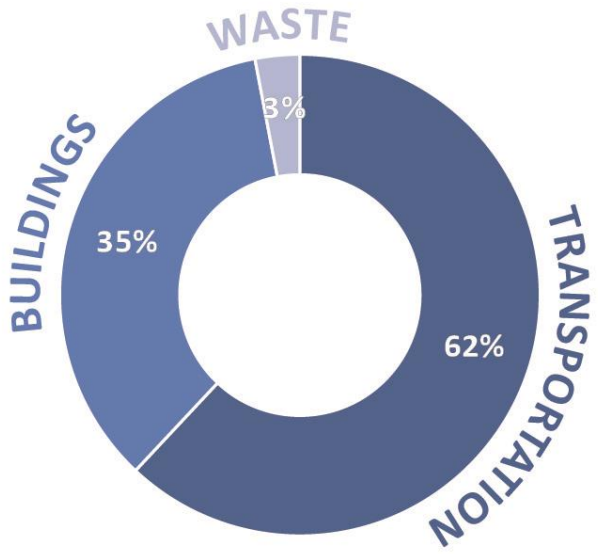
Background

Seattle's greenhouse gas emissions and reduction goals

Greenhouse gas emissions (GHGs) trap heat in the atmosphere, causing a rise in global temperatures that, in turn, produces climate change. Since the Council adopted Resolution 28546 in June 1992, recognizing the crisis of global warming, the City has taken multiple steps to reduce its GHG emissions, including establishing the nation's first municipal building green building policy in 2000, and requiring that all new City-funded projects and renovations over 5,000 square feet of occupied space achieve a Leadership in Energy and Environmental Design Silver certification.

In 2011, the Council adopted Resolution 31312, establishing a goal for Seattle to reach zero net GHG emissions by 2050, setting intermediate reductions targets, and committing to prepare for the likely impacts of climate change. To achieve these targets and the ultimate goal, the Council adopted the 2013 Seattle Climate Action Plan (CAP) through Resolution 31447 in 2012. This plan recommended implementation of a variety of short- and long-term coordinated strategies to reduce GHG emissions and foster climate resiliency, with strategies particularly focused on emission reduction related to transportation and buildings, which comprise the vast majority of Seattle's GHG emissions (Exhibit 1).

Exhibit 1. Share of Seattle's greenhouse gas emissions by source in 2016



Source: 2016 Seattle Community Greenhouse Gas inventory

The CAP set a 2030 goal for reducing emissions from residential buildings by 32 percent and from commercial buildings by 45 percent from 2008 levels. Resolution 30316, adopted in 2001, directed OSE to create an inventory of Seattle's GHG emissions to track progress towards these goals. The most recent analysis (2016 Seattle Community Greenhouse Gas Emissions Inventory) found that of the 35 percent of citywide GHG emissions attributed to buildings, over 71 percent of building emissions were produced by the direct combustion of natural gas in residential and commercial buildings. Natural gas accounted for a quarter of Seattle's total GHG emissions in 2016. Further, the report determined that the City was not on track to meet its climate goals at its current rate of GHG reduction. To reach zero net GHG emissions by 2050, the pace of Seattle's emissions reductions will need to increase by sevenfold.

Spurred by the national movement to implement a federal Green New Deal, the Council adopted Resolution 31895 this year, establishing goals for a Green New Deal for Seattle and identifying necessary initiatives to meet these goals, including supporting the transition from the use of natural gas to non-polluting electricity. The resolution also recognized that the City needs to take more urgent action in order to reduce its GHG emissions based on the recent United Nations Intergovernmental Panel on Climate Change's report[1] emphasizing the need for immediate reductions in GHG emissions to limit the impacts of climate change.

[1] United Nations Intergovernmental Panel on Climate Change. (2018). Global warming of 1.5 °C, https://www.ipcc.ch/sr15/.

Seattle's electrical power supply has been carbon neutral since 2005, making it the first in the nation to achieve this goal. Earlier this year, the Washington State Legislature passed and the Governor signed the Clean Energy Transformation Act (E2SSB 5116) requiring that all electric utilities serving retail customers in Washington supply electricity completely free of GHG emissions by 2045.

Risks associated with climate change

While the City continues to pursue and implement strategies to reduce GHG emissions, it also acknowledges the need to prepare for the possible impacts of climate change. In August 2017, OSE released the Preparing for Climate Change report, detailing sector-specific actions for implementation and highlighting the need to lead with equity to ensure that those most vulnerable are not left behind during these preparations.

Both this report and Seattle Public Utilities' 2019 Risk and Resiliency Assessment and Framework identified a variety of challenges related to climate change specific to Seattle including, but not limited to, the following:

- Greater risk of drought, potentially impacting the City's water supply reservoirs;
- More extreme rain events that could create capacity and water quality challenges for the City's drainage and wastewater system;
- Higher risk of landslides due to increased winter precipitation;
- Rising sea levels that will increase the extent and frequency of coastal flooding, especially for low-lying areas such as the Duwamish, Interbay, and Alki;
- More frequent and intense wildfires;
- More hot summer days; and
- Degradation of air quality, particularly during the summer.

Climate impacts associated with the natural gas supply chain

In addition to the emissions produced as a result of natural gas combustion to heat homes and fuel appliances, the drilling, extraction, and transportation of natural gas generates large amounts of GHG emissions. Raw natural gas is comprised mostly of methane and typically contains some amount of other gases, including ethane, propane and butane. Methane is a particularly problematic GHG. Though it persists in the atmosphere for a much shorter time than carbon dioxide (i.e. up to 20 years versus centuries), it traps more heat in the atmosphere and is estimated to warm the planet over 80 times more than an equivalent amount of carbon dioxide over a 20-year period.[2]

[2] As measured by Global Warming Potential, a system developed by the United Nations Intergovernmental Panel on Climate Change, https://www.ipcc.ch/site/assets/uploads/2018/02/SYR_AR5_FINAL_full.pdf.

As raw natural gas is extracted and processed for use, large amounts of GHGs are emitted both intentionally and inadvertently. Standard industry practices of venting, which involves deliberately releasing natural gas into the atmosphere, and flaring, a strategy for disposing of unusable gas by burning, contribute to increases of both methane and carbon dioxide in the atmosphere. The processing and transmission of natural gas also involves the use of natural gas. Throughout all these stages to distribution, malfunctioning or aging equipment leak methane (also known as "fugitive emissions").[3]

While natural gas has been promoted as a less polluting alternative to coal because it produces fewer GHG emissions, a 2018 study[4] found that previous assessments of the natural gas supply chain have underestimated methane emissions, possibly by as much as 60 percent. When more accurate estimates of methane emissions are taken into account over a 20-year period, the relative climate benefits of natural gas diminish substantially. Additionally, after years of being relatively stable, methane has been increasing in the atmosphere since 2007, and this increase accelerated between 2014 and 2017.[5] While the reasons for the increase in methane remain unclear, one study[6] has linked it to global shale-gas production, which jumped from 31 billion cubic meters per year in 2005 to 435 billion cubic meters per year in 2015, with production in the United States accounting for 89 percent of total global production.

Risks associated with the use of natural gas in buildings

The use of natural gas in buildings poses several safety risks to Seattle residents. Seattle is situated in an earthquake-prone area, with the Seattle Fault running east-west through south Seattle, and natural gas infrastructure is a potentially significant source of fire and explosion during earthquakes and other fire events. The city has no natural gas transmission lines within its boundaries, and most of the original iron distribution pipes have been replaced by more flexible plastic in recent years.[7]

While these pipes are expected to perform well in response to shaking from an earthquake, they will not be able to withstand the shearing force of landslides or ground failure due to soil

[3] James Bradbury, Zachary Clement, and Adrian Down, Greenhouse gas emissions and fuel use within the natural gas supply chain – Sankey diagram methodology, U.S. Department of Energy, 2015, https://www.energy.gov/sites/prod/files/2015/07/f24/QER%20Analysis%20-%20Fuel%20Use%20and%20GHG%20Emissions%20from%20the%20Natural%20Gas%20System%2C%20Sankey%20Diagram%20Methodology_0.pdf

[4] https://science.sciencemag.org/content/361/6398/186.

[5] E. G. Nisbet, M. R. Manning, E. J. Dlugokencky, R. E. Fisher, D. Lowry, S. E. Michel, et al., Very strong atmospheric methane growth in the 4 years 2014–2017: Implications for the Paris Agreement. Global Biogeochemical Cycles, 33, 318–342, 2019, https://doi.org/10.1029/2018GB006009.

[6] R.W. Howarth. Ideas and perspectives: is shale gas a major driver of recent increase in global atmospheric methane?, Biogeosciences, 16, 3033–3046, 2019, https://doi.org/10.5194/bg-16-3033-2019.

[7] Seattle Office of Emergency Management (OEM), Seattle Hazard Identification and Vulnerability Analysis (SHIVA), (Seattle, 2019), https://www.seattle.gov/Documents/Departments/Emergency/PlansOEM/SHIVA/SHIVAv7.0.pdf.

liquefaction,[8] which could occur in about 15 percent of the city's total area. The areas most vulnerable to ground failure are the Duwamish Valley, Interbay, and the Rainier Valley. A magnitude 7.0 earthquake along the Seattle Fault could trigger thousands of landslides. The failure of natural gas distribution pipes would exacerbate the risk of fire in the aftermath of an earthquake. Historically, fire has resulted in more loss of life than collapsing buildings following earthquakes.[9]

Absent a natural disaster, natural gas pipes can catastrophically fail. In 2016, an abandoned, but still active, natural gas pipe in the Greenwood neighborhood exploded. The explosion completely destroyed three businesses and damaged nearly three dozen others, costing an estimated $3 million in damages. Nine firefighters, who were on site to investigate reports of a gas leak, were also injured as a result of the explosion.[10] A natural gas pipeline explosion in British Columbia in 2018 cut off the flow of natural gas from Canada into Washington, putting Washington residents at risk of power outages in areas where natural gas is used to produce electricity. This disruption temporarily impacted garbage, recycling, and compost pickup for residents of King County, as the trucks used for these purposes are powered by natural gas.

Natural gas cooking appliances emit nitrogen dioxide, carbon monoxide, and formaldehyde, which compromise indoor air quality if not ventilated properly and can adversely impact the respiratory health of certain populations, particularly children, the elderly, and those with existing health conditions.[11] Airborne irritants produced by cooking with natural gas can trigger asthma attacks, which is more likely to impact Black/African-American households and low-income households due to the prevalence of asthma in these groups.[12] Research has found that an estimated 55 percent to 70 percent of homes with gas stoves exceed the level of nitrogen dioxide that meets the U.S. Environmental Protection Agency's definition of clean air.[13]

All-electric buildings in Seattle

Seattle already has numerous all-electric buildings. Most of these are residential developments, either detached single-family homes, townhomes, or apartment buildings. Attachment 1 provides examples of all-electric buildings in the Seattle area.

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[8] Glenn Farley, "PSE replacing gas mains with quake resistant pipe," King 5 News, July 25, 2017, https://www.king5.com/article/news/local/disaster/pse-replacing-gas-mains-with-quake-resistant-pipe/459526019

[9] OEM, op cit.

[10] Evan Bush and Christine Clarridge, "Seattle explosion leaves heart of Greenwood neighborhood a gigantic mess," Seattle Times, March 9, 2016, https://www.seattletimes.com/seattle-news/greenwood-explosion-destroys-buildings-injures-9-firefighters/.

[11] Nicole, Wendee, Cooking Up Indoor Air Pollution: Emissions from Natural Gas Stoves, Environmental Health Perspectives 122:1, (2014), https://ehp.niehs.nih.gov/doi/full/10.1289/ehp.122-a27.

[12] Centers for Disease Control and Prevention, Asthma Prevalence and Health Care Resource Utilization Estimates United States, 2001-2017, https://www.cdc.gov/asthma/asthmadata.htm.

[13] Peter A. Smith, "The Kitchen as a Pollution Hazard," New York Times, July 22, 2013, https://well.blogs.nytimes.com/2013/07/22/the-kitchen-as-a-pollution-hazard/.

CB 119640

Under the direction of Councilmember O'Brien, legislation was drafted to prohibit the installation of natural gas piping systems in all new buildings. This legislation would amend Seattle's Building and Construction Codes (Seattle Municipal Code Title 22) to prohibit the installation of natural gas piping systems in new buildings described in a complete building permit application that is submitted to the Seattle Department of Construction and Inspections (SDCI) on or after July 1, 2020. This prohibition would also apply to new detached accessory dwelling units.

The prohibition would exclude portable propane appliances for outdoor cooking and heating. SDCI would have authority to promulgate rules exempting natural gas piping systems necessary to power certain natural gas-powered equipment and appliances, such as commercial cooking appliances, on an annual basis where suitable alternative electric appliances are unavailable. SDCI would also be given authority to support enforcement of the prohibition.

The legislation also includes a request that SDCI recommend amendments to technical codes and the Seattle Municipal Code by July 1, 2020, to limit the installation or expansion of natural gas piping systems in:

- Additions to existing buildings;
- Substantial renovations where the existing mechanical systems are proposed to removed and replaced; and
- Extensions to existing natural gas piping systems in existing buildings.

Impacts of CB 119640

Fiscal Impacts

Public Health – Seattle & King County (PHSKC) is responsible for administering Seattle's Fuel Gas Code, including permitting the installation of natural gas piping systems and enforcement. The proposed legislation could result in reductions to PHSKC's staff due to diminished natural gas piping permit revenues from projects in Seattle, which totaled $550,000 in 2018. Service connections to natural gas comprise about 50 percent of the Seattle Department of Transportation's utility permits. On average, between 2013 and 2018, these permits accounted for about 9 percent of all Street Use permits, representing $2.9 million in permit fee revenues. Street Use is projected to collect $44.2 million in revenues in 2019.

Prior to the effective date of July 1, 2020, the City should conduct outreach to developers, property owners, contractors, and other stakeholders to ensure that they are aware of the prohibition on natural gas piping systems in new buildings. Similarly, SDCI staff will need to be trained to ensure that all permit applicants understand the regulations. The Council may want to consider appropriating additional resources for outreach and training during the 2020 budget deliberations if this legislation is adopted.

The legislation gives SDCI the authority to enforce the new regulations. Depending on the frequency of reported violations, SDCI may need additional staff, funded by the General Fund, to support enforcement.

Executive Commitment

Successful implementing of this legislation will require a shared commitment by the Mayor and City departments. SDCI will be responsible for updating technical codes to ensure consistency with the intent of this legislation. SDCI is currently updating the Seattle Building Code and expects to submit these amendments to Council at the end of the second quarter/beginning of the third quarter of 2020. SDCI is also requested to explore other means of limiting installation or expansion of natural gas piping systems, as described previously.

Development Costs

A study[14] of costs associated with electrification of homes in various cities found substantial cost savings associated with electric heat pumps as compared to natural gas systems in new homes over the lifetime of appliances (i.e. 15 years). Another study from California determined that new all-electric residential construction provided upfront capital savings, partially due to cost savings from not installing gas piping.[15] At least one developer in Seattle has been building all-electric single-family homes since 2009 and has stated that there is no difference in development costs between all-electric homes and those that use natural gas. This may not be the case for commercial development, however.

Employment

While this legislation could increase employment opportunities for electricians and related trades, it is likely to adversely impact those who supply natural gas and install natural gas piping systems. The City and its partner organizations may want to provide workforce development support (e.g., job training, apprenticeship programs, etc.) for those who are likely to experience a loss of income as a result of this legislation.

Electricity Generation Capacity

Currently, Seattle City Light produces excess electricity, and exports the surplus on the wholesale market, so in the short term, it is likely able to accommodate increased demand. Understanding its long-term capacity constraints will require further analysis.

[14] Sherri Billimoria, Mike Henchen, Leia Guccione, and Leah Louis-Prescott. The Economics of Electrifying Buildings: How Electric Space and Water Heating Supports Decarbonization of Residential Buildings. Rocky Mountain Institute, 2018, http://www.rmi.org/insights/reports/economics-electrifying-buildings/.

[15] Asa Hopkins, Kenji Takahashi, Devi Glick, and Melissa Whited, Decarbonization of Heating Energy Use in California Buildings: Technology, Markets, Impacts, and Policy Solutions, 2018, https://www.synapse-energy.com/sites/default/files/Decarbonization-Heating-CA-Buildings-17-092-1.pdf.

Greenhouse Gas Emissions

OSE is analyzing how this legislation would contribute to reducing Seattle's future GHG emissions. The results of this analysis will be included in the Central Staff memorandum for the Committee meeting on September 17.

Next Steps

The Committee will continue discussion of CB 119640, including possible amendments, and may vote on September 17.

Attachments:

Attachment 1 – Examples of all-electric development projects in the Seattle area

cc: Kirstan Arestad, Exec Director
Aly Pennucci, Supervising Analyst

Attachment 1. Examples of all-electric development projects in the Seattle area

Residential Projects	
Byron Wetmore, Seattle 11,362 square feet, Multifamily residential	**Gilman Court,** Seattle 30,854 square feet, Multifamily residential
David Colwell Building, Seattle 71,780 square feet, Transitional housing	**Burke Gilman Gardens,** Seattle 16,916 square feet, Multifamily residential
Seneca, Seattle 21,877 square feet, Multifamily residential	**Miller Park,** Seattle 11,325 square feet, Multifamily residential
First & Vine Apartments, Seattle 46,300 square feet, Multifamily senior housing	**Squire Park Plaza,** Seattle 69,584 square feet, Multifamily residential
Judkins Park, Seattle 17,245 square feet, Multifamily residential	**Unity Village,** Seattle 24,360 square feet, Multifamily residential
Juneau Townhomes, Seattle 10,461 square feet, Multifamily residential	**Elizabeth James House,** Seattle 38,212 square feet, Multifamily residential
Meridian Manor, Seattle 78,967 square feet, Multifamily senior housing	**El Nor,** Seattle 40,448 square feet, Multifamily residential
Pardee Townhomes, Seattle 13,071 square feet, Multifamily residential	**Park Hill,** Seattle 48,856 square feet, Multifamily residential
Security House, Seattle 79,309 square feet, Multifamily senior housing	**Silvian,** Seattle 23,242 square feet, Multifamily residential
The Parker, Seattle 30,810 square feet, Multifamily residential	**Broadway,** Seattle 4,144 square feet, Multifamily residential
Vine Court Apartments, Seattle 44,150 square feet, Multifamily residential	**Joe Black Apartments,** Seattle 20,448 square feet, Multifamily residential
Kingway Apartments, Seattle 152,720 square feet, Multifamily residential	**Holiday,** Seattle 23,200 square feet, Multifamily residential
Mary Ruth Manor, Seattle 20,368 square feet, Multifamily residential	**Centennial,** Seattle 17,089 square feet, Multifamily residential
Hazel Plaza 1, Seattle 12,418 square feet, Multifamily residential	**Ponderosa,** Seattle 15,510 square feet, Multifamily residential
Union James, Seattle 15,000 square feet, Multifamily residential	**White River Apartments,** Seattle 20,340 square feet, Multifamily residential
18th Avenue, Seattle 8,324 square feet, Multifamily residential	**Victorian Place II,** Seattle 18,840 square feet, Multifamily residential
Othello Square, Seattle (under development) 70,805 square feet, Affordable housing	**Maple Lane Estates,** Seattle 17,406 square feet, Multifamily residential
Hobson Place, Seattle (under development) 42,733 square feet, Supportive housing	**Mansard Estates,** Seattle 7,398 square feet, Multifamily residential
Commercial/Institutional	
Blakeley Elementary School, Bainbridge Island 63,800 square feet, School	**Bullitt Center**, Seattle 50,000 square feet, Office building
Bush School Expansion, Seattle (in design) 20,050 square feet, Private K-12 school	**Manson**, Seattle (in design) 34,945 square feet, Office building