Southern Oregon Climate Action Now

SOCAN

Confronting Climate Change

https://socan.eco

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Chair Sohl, Ashland Climate & Environment Policy Advisory Committee

Summary Statement

The evidence seems clear and unequivocal that for individuals and communities wishing to protect their personal health or the health of the planet, methane (natural) gas is not a reasonable 21st century choice for providing buildings with energy. The dire suicidal trajectory we are currently following can be averted, but only with concerted individual and collective action. We have choices when considering our personal health and addressing the existential threat posed by the climate crisis. Among these choices, promoting the ongoing inclusion of methane gas in new residential construction seems strongly contra-indicated. For the reasons argued here, Southern Oregon Climate Action Now supports Ashland Youth in their effort to promote actualization of the Ashland Climate and Energy Action Plan Buildings and Energy Strategy BE-1-2. Promote switching to low and non-carbon fuels. and BE-2-1. Expand participation in energy efficiency programs & promote climate-friendly building/construction (CEAP undated).

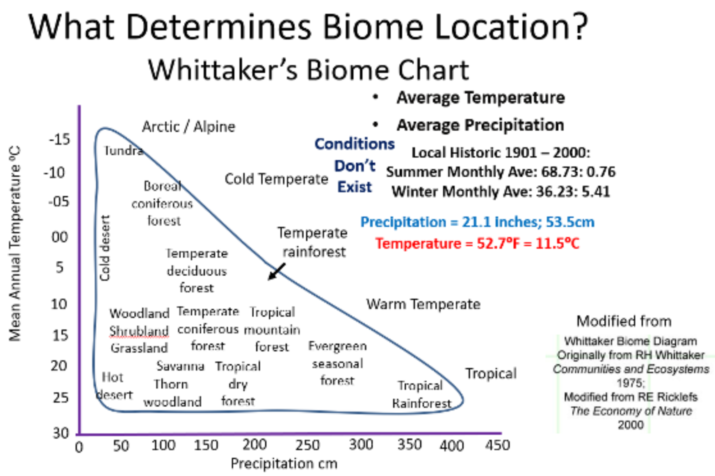
What is the Justification for the Summary Statement

Southern Oregon Climate Action Now (SOCAN – https://socan.eco) was established in 2012 as the first grassroots climate activist organization in Southern Oregon. Since then, we have been joined by several other climate organizations each promoting climate action in their own way. We applaud the Youth team from Rogue Climate for their effort to establish methane (natural) gas-free homes in the city of Ashland and stress the urgency of doing this immediately.

I write from a dual perspective: partly as a retired Faculty member in Biology at Southeast Missouri State University and more substantially as cofacilitator of SOCAN, an organization now of over 2,000 rural Southern Oregonians (many of whom live in Ashland) who are concerned about the climate crisis and urge national, statewide and local action to address it. The mission of SOCAN is to promote awareness and understanding of the science of global warming and its climate change consequences and stimulate individual and collective action to address it. Since rural Oregonians occupy the frontlines in experiencing the impact of the drought, shrinking snowpack, wildfires, and extreme weather that the climate crisis imposes, we are strongly committed to effective action at all levels. Our support for these efforts stems both from the interest of our Ashland activists in seeing the city move forward on implementing its Climate and Energy Action Plan but also from the interest of regional residents in seeing a model that they could pursue in other communities.

Is there urgency to address the climate crisis?

Figure 1. Climatic factors determining the distribution of natural ecosystems (biomes). Modified from Whittaker 1975).



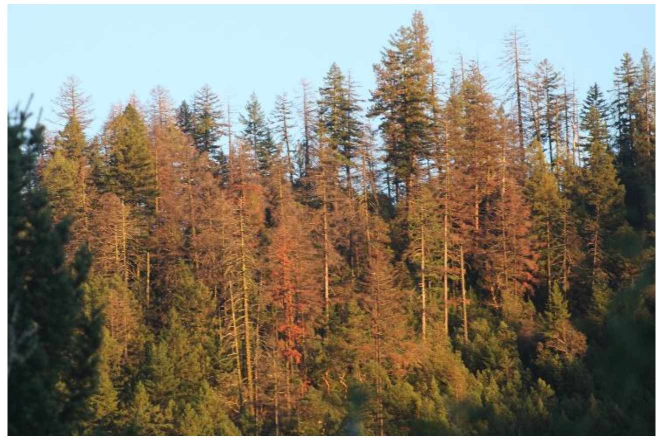
Before addressing the specific proposal under discussion, I would like to explain how I became engaged in the climate movement and why I judge there is urgency. Before relocating to Southern Oregon, I taught Biology for many years at Southeast Missouri State University. It was teaching the community ecology section of an upper division General Ecology course that ignited my climate concern. Teaching community ecology involves introducing students to a graph developed many years ago by Robert Whittaker (Figure 1 presents my modification of this chart) that depicts how temperature and precipitation serve as the primary variables determining where natural ecosystems (biomes) occur across the planet. As can be seen, the climatic conditions for each of these biomes occupy a relatively narrow intersection of mean annual temperature and mean annual precipitation (serving as a surrogate for water availability). If the climate that currently supports one of these biomes shifts outside the tolerance range of species in that community, the biome will become compromised and ultimately be locally eliminated. While the species that occupy a biome have the capacity to exhibit range shift and move from their current geographic location to follow the shifting climate, this capacity is limited. To illustrate this limitation, imagine a pine tree and where the pinecones fall (Figure 2). Only a small number fall far outside the canopy of the tree indicating that

Figure 2. Ponderosa pine tree depicting pinecone distribution. Photo credit Alan Journet

rapid range shift is unlikely. ***Regrettably, the climate is changing at such a rapid rate that it will prohibit the range shift of many species.*** This will place them in extreme peril.

While teaching this component of the course several decades ago, it occurred to me that the climate shifts being proposed by climate models of the time would so dramatically adjust the climate across much of the globe within a few decades that many of these biomes would be severely challenged. Folks living in the Rogue Valley and watching the death of Douglas firs (Figure 3) are probably witnessing just this outcome. This trend explains the threat of mass extinctions currently being experienced by our global native biodiversity, a phenomenon about which we frequently hear reports (e.g., Ceballos & Ehrlich 2023).

Figure 3. Douglas firs dying on Anderson Butte in the Applegate Valley. Photo credit Alan Journet



It's worth pointing out that the same two variables are also instrumental in determining where we can maintain our agriculture, forestry, and fisheries. Figure 4, for example, depicts the optimum growing season temperature requirements of grape varietals indicating how climate change can affect agriculture. No doubt researchers studying other crops could produce a similar graph of temperature optima for their varieties.

Figure 4. The optimal growing season for grape varietals illustrated climate impact on agricultural success. (Jones 2015)

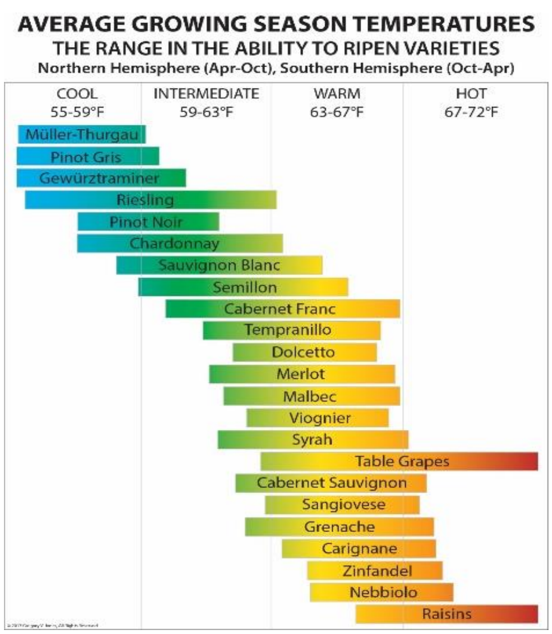
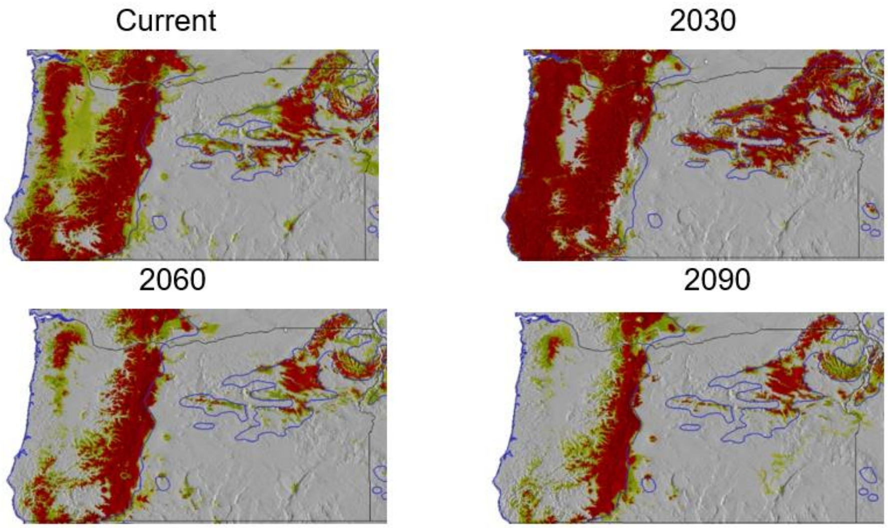


Figure 5 provides an example of the likely impact of future climatic conditions on Douglas fir in Oregon. Climate envelope projections were developed by Rehfeldt and Crookston (Rehfeldt et al. 2012) for many western tree species. The basic principle behind these projections is to identify the climate where tree species have recently existed and project where those climatic conditions will exist according to projection scenarios. Projections are available at Crookston and Radke 2023) for many western trees. In these projections, red represents the optimum climate, green and yellow sub-optimal climates, and grey conditions that are inappropriate. According to these analyses, following the 'business as usual' scenario, the climatic optimum

Figure 5. Douglas fir, Psuedotsuga menzeisii appropriate climate now and in the future (Crookston and Radtke 2023).



for Douglas fir is likely to be substantially reduced by the end of the century. These projections also suggest that by 2100 the Oregon climate will be outside the range for Sitka spruce, Engelmann spruce, Lodgepole pine, Jeffrey pine, Subalpine fir, and Western juniper while along with Douglas fir, Ponderosa pine, White fir, and Pacific madrone will likely find appropriate conditions substantially reduced and the location of conditions appropriate for California black oak and Oregon white oak will likely be substantially adjusted.

I now look at the climate trends that data indicate we have experienced and climate models projecting what we are likely to experience through the century. The Global temperature history from 1850-2022 is depicted in Figure 6. Figure 7 then displays the 1895-2019 trend for the contiguous United States while Figure 8 offers the same for Oregon. The Jackson County historic trend is presented in Figure 9.

In contrast to the global temperature increase of 0.06^{o}F (0.033^{o}C) per decade (Figure 6), warming in the contiguous U.S. from 1896 to 2019 (Figure 7) was a little higher at the rate of 0.15^{o}F (0.09^{o}C) per decade. The increase for Oregon (Figure 8) was even higher, at 0.2^{o}F (0.11^{o}C) per decade while Jackson County (Figure 9) equaled Oregon.

Figure 6. Global historic temperature rise from 1851 to 2023; baseline is the 1901-2000 mean. NOAA 2023

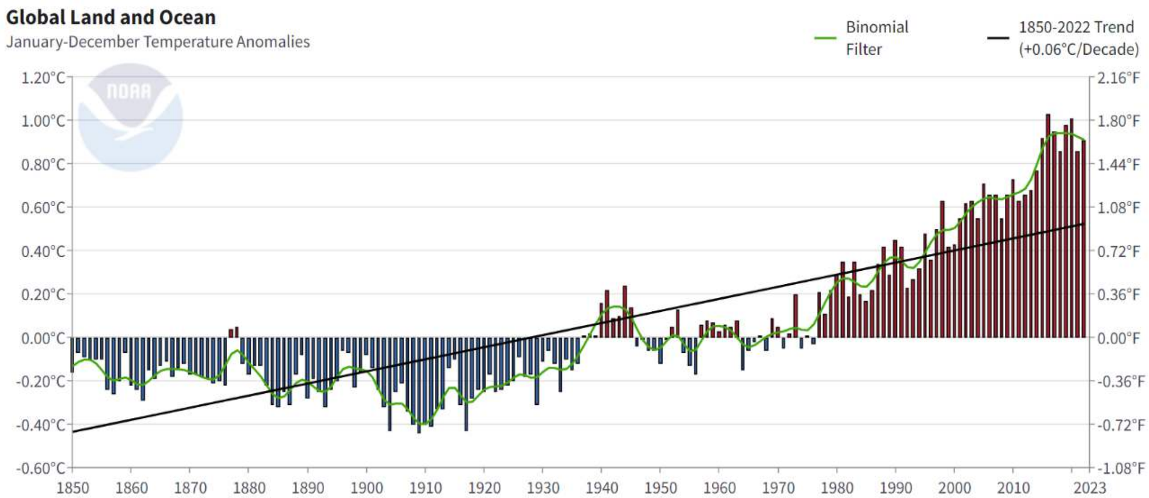


Figure 7. Historic temperature rise from 1896 to 2019 for the contiguous 48 U.S. states; baseline is the 1901-2000 mean. NOAA https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/

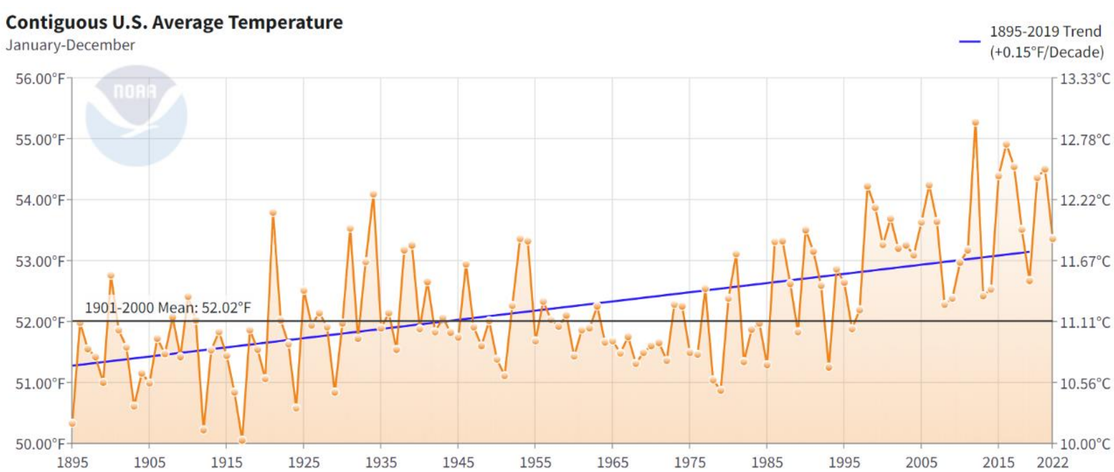


Figure 8. Historic temperature rise from 1896 to 2019 for Oregon; baseline is the 1901-2000 mean. NOAA 2023

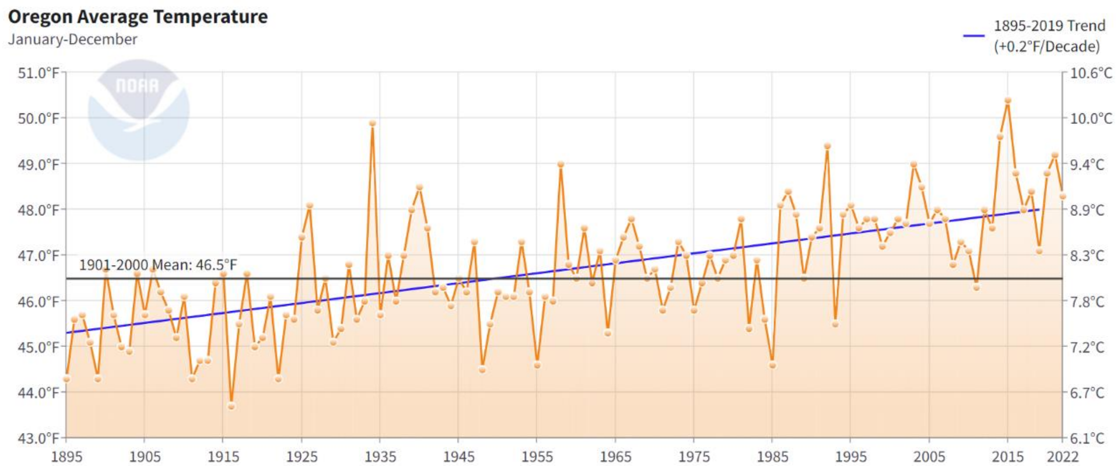
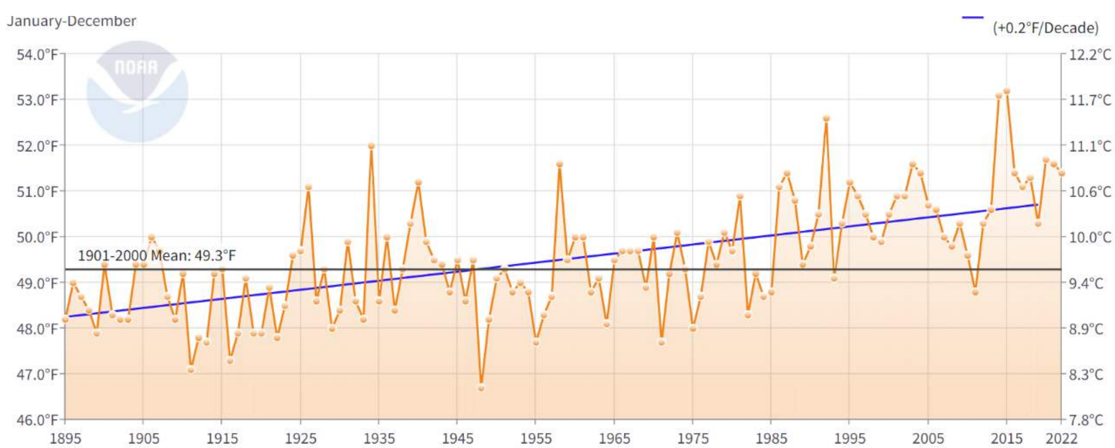


Figure 9. Historic temperature rise from 1895 to 2022 for Jackson County baseline is the 1901-2000 mean. NOAA 2023



I will now present example projections into the future. Figure 10 presents the projected change in temperature (compared to the 1981-2010 average) for Oregon to 2100 under two future scenarios: RCP (Representative Concentration Pathway) 8.5 which was initially developed as the 'worst case scenario' assuming no effort to reduce the trajectory of accelerating fossil fuel use and greenhouse gas emissions. Unfortunately, the evidence suggests we are on, or close to, the RCP 8.5 trajectory. As a result, it has also been dubbed the 'Business as Usual' scenario. RCP 4.5, meanwhile, depicts a scenario in which we still continue increasing but substantially lower the accelerating trajectory. Figure 11 presents parallel projections for Jackson County.

To assess likely temperature change between 1900 and 2100, to these projection estimates we should add the warming that occurred before 1981.

Figure 10. Projected change in temperature in Oregon to 2100 under two scenarios. USGS 2021

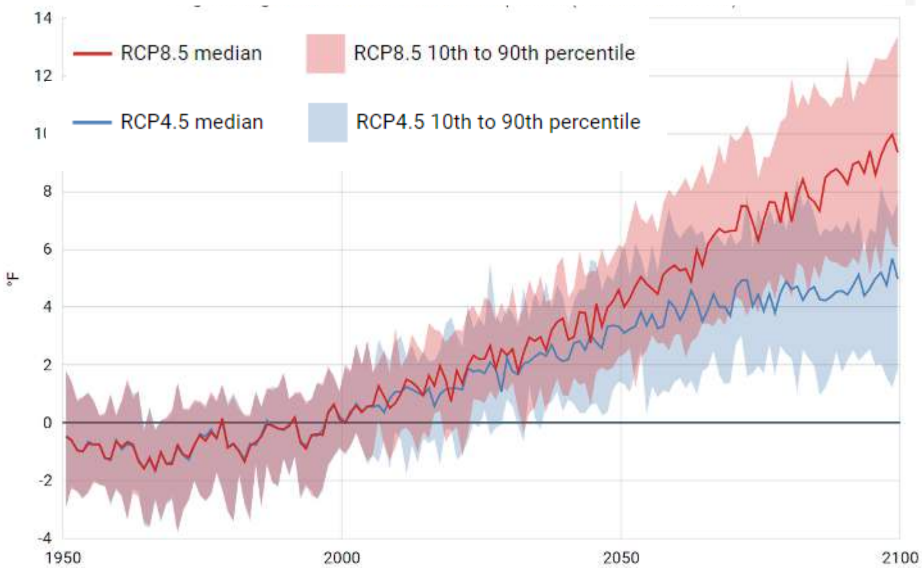
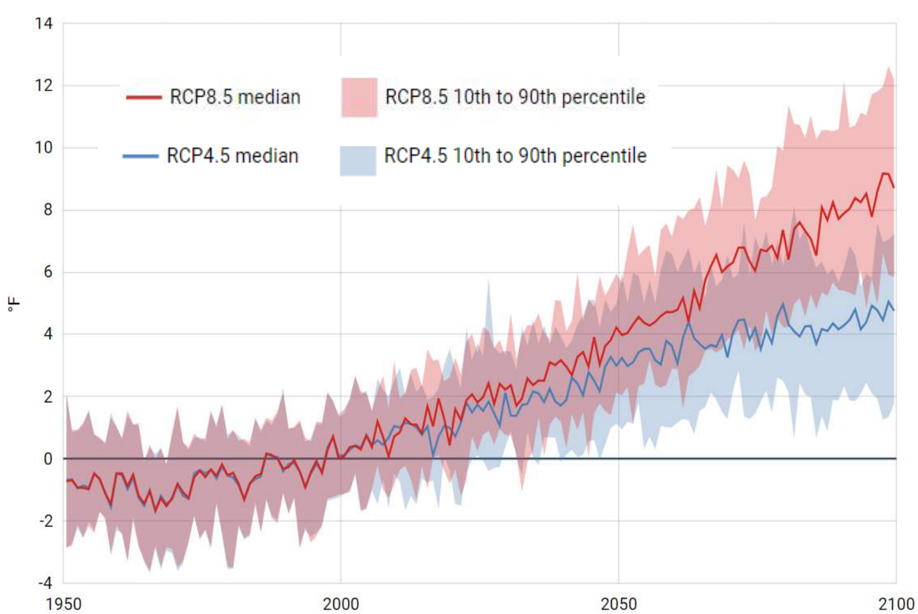


Figure 11. Projected change in temperature for Jackson County to 2100 under two scenarios. USGS 2021



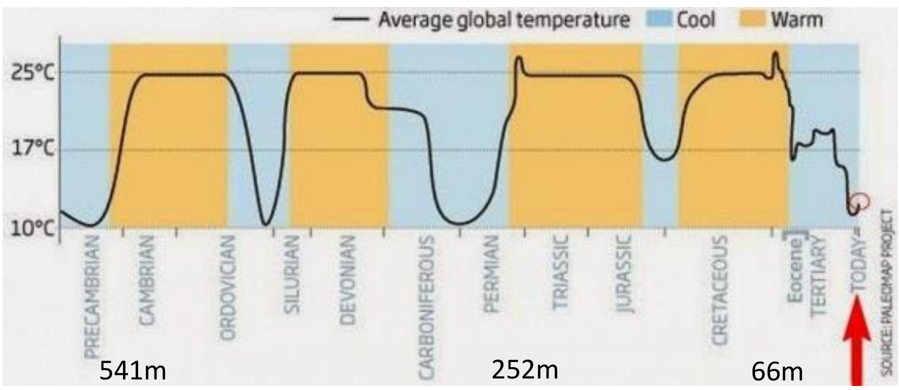
I now combine the historic trends and the projected trends to assess temperature patterns in relation to the limited tolerance for temperature change that our natural ecosystems exhibit (Figure 1 again). This allows us to anticipate what may happen to our biomes by the end of the century.

The historic trend for Oregon and Jackson County, for example, from 1900 up to the 1981-2010 baseline employed by the USGS was 0.11°C per decade suggesting a warming over those 80 years of about 0.88°C. This is consistent with the Fourth U.S. Climate Assessment Report (NCAR 2018) which suggested that global warming from 1900 – 2016 amounted to 1.8°F (1°C). To estimate what the warming impact will be for Oregon and Jackson County by the end of the century, we then add the 20th century warming depicted by the USGS RCP8.5 scenario. For Oregon and Jackson County alike, this amounts to 0.88°C plus about 9°F (5°C), for a total of nearly 6°C. This estimate is also echoed by the Fourth National climate Assessment report (NCAR 2018)

Consulting Figure 1, we find that warming of such dimensions could easily be sufficient to compromise natural ecosystems in our region and across the nation and planet. We must recall, also, that our agriculture, forestry and fisheries will be similarly threatened.

It seems reasonable to argue that the potential disruption of the natural ecosystems that provide our life support services (clean water and clean air) along with our agriculture, forestry and fisheries should point to extreme urgency associated with addressing the global climate chaos. An urgent response commensurate with this discussion has yet to be demonstrated. We encourage Ashland to take the lead regionally and statewide in recognizing this urgency by reducing emissions from fossil fuel use resulting from future residential construction. The proposed reduction may be small, but urgency demands that every possible step be taken.

Figure 12. Millions of years of global temperature fluctuation (Lasbury 2013).



One oft-heard response to the global temperature trend is that it is a natural phenomenon. Certainly, global temperature has changed over the hundreds of millions of years of Earth's history. Indeed, we have evidence suggesting a historic fluctuation (Figure 12) between a hot-house condition (averaging 25°C) and an ice-house condition (frequently averaging 10°C). It's interesting to note that the entire history of *Homo sapiens* and the recent cycle of glacial and interglacial fluctuations has occurred within the current ice-house phase. This means that this is the climate to which life on the planet as we know it is adapted. Steffen et al. 2018 warned that the current trend and feedback loops could push Earth's temperature over a tipping point threshold and return us to the hot-house phase, an outcome that would undoubtedly be completely inhospitable to our current natural ecosystems, agriculture, forestry and fisheries and all life as we know it. That historic climate fluctuated before the arrival of *Homo sapiens* does not, of course, preclude *Homo sapiens* from being responsible for the current trend since the causes are different. The historic shifts resulted from factors such as the adjustment of continents via tectonic plate movement and atmospheric greenhouse gas composition changes resulting from the evolution of methanogenic and then photosynthetic bacteria and plants.

What causes global warming and climate change?

Global warming is driven by a process that is well understood, though often misrepresented or misunderstood by some individuals.

Very simply, the process is as follows:

Figure 13. Depiction of the historic greenhouse gas / thermal blanket effect

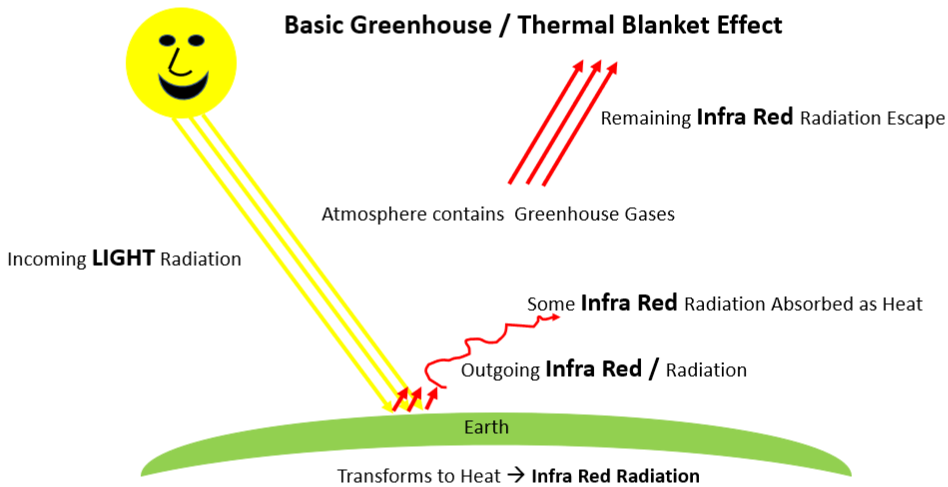
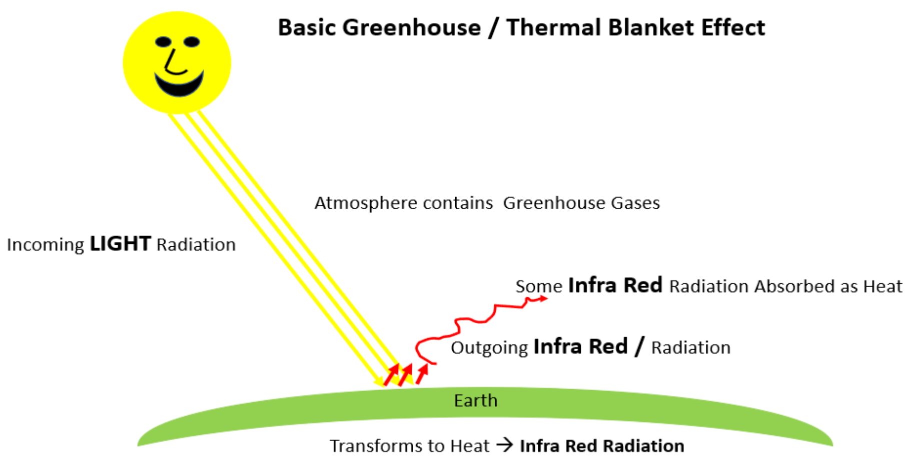


Figure 14. Depiction of the accentuated greenhouse gas effect resulting from human activity

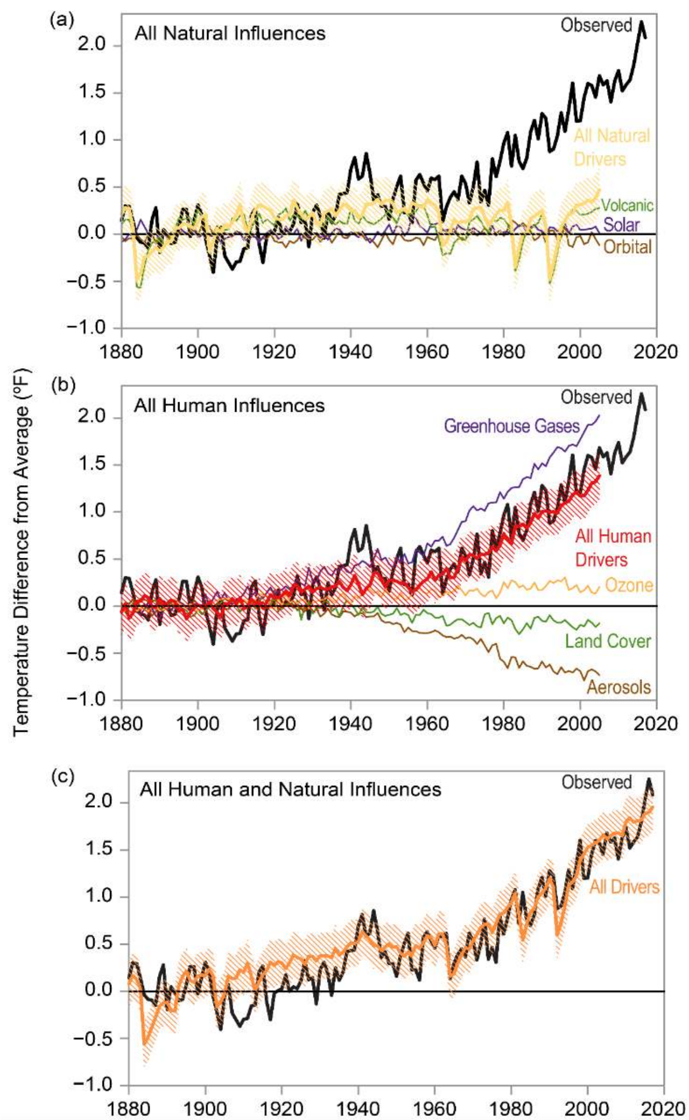


Incoming radiation (mainly visible light) passes through the atmosphere and reaches the land surface. Once here it is transformed into longer wave radiation (heat / infra-red radiation). This radiates back outwards. A proportion of this heat is trapped by gases in our atmosphere resulting in the planet being warmer than it would be without these gases (Figure 13). This is the historical reality that results in a warm planet. Indeed, absent these gases and the thermal blanket they provide, our annual global temperature would likely be 20^{0}C to 30^{0}C (35^{0}F – 55^{0}F) cooler, probably too cold to support life – certainly life as we know it.

Driven by human activity, particularly our extraction, processing and combustion of fossil fuels, the concentration of the greenhouse gases in the atmosphere is increasing. As a result, we arrive at the condition depicted in Figure 14 where more heat is retained and warming occurs.

Despite the frequent erroneous presentations of the process as involving the trapping of incoming solar heat radiation by these greenhouse gases, the process actually involves trapping outwardly radiating infra-red radiation (heat).

Figure 15 Impacts of human and non-human activities on the historical climate.USGCRP 2018



Modeling has differentiated between natural (non-anthropogenic) and human-imposed (anthropogenic) impacts on the climate historical trends of the last few decades. The results are depicted in Figure 15. Here, graph (a) illustrates what trend natural (non-human) factors would have imposed on the global temperature. The black line represents the observed trend while the colored lines represent what the impacts of natural factors would have been. Clearly these natural factors do not correlate with observed data. Graph (b) then indicates the correlation between human influences and the observed data. This clearly offers a better correlation. Finally, (c) depicts the combination of human and natural impacts and produces a far superior correlation to the above options.

The message is that those natural factors that contribute to global temperature are inadequate to explain the trends we have seen while natural factors plus human-imposed factors correlate well with the trends we have experienced. In fact, the natural factors alone combine to suggest the planet should be cooling (Hayhoe 2023).

What does this mean for fossil fuel use?

The human activities that contribute to the increasing concentration of these greenhouse gases are well understood. For example, a University of California, Berkeley report (UCB 2023) states : “The burning of fossil fuels is the primary cause of current climate change, altering the Earth’s ecosystems and causing human and environmental health problems.” Meanwhile, National Geographic (2015-2023) states: “When fossil fuels are burned, they release carbon dioxide and other greenhouse gases, which in turn trap heat in our atmosphere, making them the primary contributors to global warming and climate change.” Meanwhile, recognizing the role of other factors, the European Commission (undated) states “Burning fossil fuels, cutting down forests and farming livestock are increasingly influencing the climate and the earth's temperature. This adds enormous amounts of greenhouse gases to those naturally occurring in the atmosphere, increasing the greenhouse effect and global warming."

Even sources misrepresenting the process (UN undated) can correctly identify the source of the problem: "Fossil fuels – coal, oil and gas – are by far the largest contributor to global climate change, accounting for over 75 per cent of global greenhouse gas emissions and nearly 90 per cent of all carbon dioxide emissions."

It is also recognized that fossil fuels result in greenhouse gas emissions from more than just their combustion, but also from their extraction, processing, and transmission/transportation (IEA undated):" The production, transport and processing of oil and gas resulted in 5.1 billion tonnes (Gt) CO_2 equivalent in 2022 – just under 15% of global energy sector GHG emissions. About half of these emissions came from flaring and methane released during oil and gas operations". The point made here is that we must consider more than just the combustion emissions from these fossil fuels. The U.S. Environmental Protection Agency (EPA 2023) also acknowledges the role of other activities, besides fossil fuels, in generating greenhouse gas emission.

It's worth noting here that one of the greatest problems faced in SW Oregon is forest fire (whether local or distant) and the smoke it produces. A recent publication by Dahl et al. (2023) has convincingly reported that greenhouse gas emissions traced to fossil fuel carbon producers contributed to nearly 50% of the rise in Vapor Pressure Deficit (a prime stimulator of wildfire spread) between 1901 and 2021. In other words, the continued use of fossil fuels such as methane gas is elevating our wildfire risk.

Where does so-called fossil (natural) gas fit into this picture?

The International Energy Agency (IEA 2023a) reported that 75% of global greenhouse gas emissions result from the energy sector. The same source states: "Fossil fuels continued to represent 80% of the total energy supply … globally, with oil comprising nearly 30%, followed by coal (27%) and natural gas (24%)."

Client Earth (2022) reported that coal is the dirtiest fossil fuel, being responsible for between 0.3 and 1.0^{o}C of global warming while oil is responsible for about a third of global total emissions. Meanwhile, this source notes that despite its being touted as a cleaner energy source, natural gas still "accounts for a fifth of the world's total carbon emissions."

For the Unites States, the Environmental and Energy Study Institute (EESI 2021) reported that "Natural gas … now supplies one-third of the country's energy consumption." This report also concluded: "Through leakage and direct emissions from combustion, natural gas was responsible for 36% of greenhouse gas emissions in the United States in 2020."

The conclusion that methane (natural) gas is a leading contributor to our national climate pollution output should be clear. Additionally, we must acknowledge that this is not just through combustion of the fuel.

What are the climate change consequences of fossil (natural) gas use?

Reports on greenhouse gas emissions and their contribution to global warming and the climate crisis often focus on carbon and combustion emissions. Unfortunately, this overlooks two important realities:

(i) Not all greenhouse gases contain carbon (nitrous oxide, for example) while among greenhouse gases, whether they contain carbon or not, all gases are not equal. The Intergovernmental Panel on Climate Change Assessment Report 6 (IPCC 2021) indicates the carbon dioxide equivalent (CO_2e) value for other gases. This measures their potential to induce warming in comparison to carbon dioxide (set at 1) and reveals the other greenhouse gases are many times more potent than carbon dioxide. Because methane is relatively short-lived in the atmosphere, it is assigned both a 20-year and a 100-year value. Thus, on a 20-year basis, fossil origin methane is 82.5 times more potent on a pound-for-pound basis than carbon dioxide while non-fossil methane is 79.7 times more potent and nitrous oxide is 273 times more potent. Meanwhile, on a 100-year basis, fossil origin methane is 29.8 times more potent than carbon dioxide while non-fossil methane is 27.0 times more potent and nitrous oxide is 273 times more potent. Human -produced Chlorofluorocarbon (CFCs), Hydrofluorocarbon (HFCs), and Perfluorochemicals (PFCs) are much more problematic even than these gases, ranging up to the thousands of times more potent.

(ii) Meanwhile, though the combustion of fossil fuels may be an important component of the problem, greenhouse gases also leak during the extraction, processing and transmission of fossil fuels, especially methane (natural) gas.

The gas utilities and their organizations long ago and for many years claimed that natural gas is the ‘clean fossil fuel.’ When it was clear that the public was beginning to understand the impact of methane leakage, this campaign underwent a subtle adjustment to argue that natural gas is the ‘cleanest <u>burning</u> fossil fuel.’ For example (Avista 2021a) states: “Even though <u>natural gas is a clean fuel</u>, we believe we can make it greener, and we felt it was time to be clear about our path forward.” (underline emphasis mine). Presumably, this marketing ploy was based on the expectation that most readers / listeners / viewers would not notice or understand the significance of this subtle change. Thus, these utilities continued, and still continue, to claim their product is cleaner than other fossil fuels, a claim worth evaluation.

The U.S. Energy Information agency (USEIA 2023) publishes data on the relative carbon dioxide efficiency of combusting various fuels in term of the number of pounds emitted per million British Thermal Units (BTU) of energy generated. The key values are listed in Table 1

Table 1. Carbon dioxide emissions in pounds per million BTU of energy generated		
Fuel	**Carbon dioxide lbs per million BTY**	**Other comment**
Coal (all types)	211.47	Range 205.57 – 250.59
Tire-derived fuel	189.94	
Diesel and home Heating Fuel	163.45	
Waste oil	163.14	
Propane	138.63	
Motor gasoline	138.57	
Natural gas	115.65	

While these data assuredly confirm the claim that methane gas is the cleanest burning fossil fuel, they ignore the reality that assessment of the climate impact of fuels must incorporate a full lifecycle (cradle to grave) analysis. This means we must assess all greenhouse gas emissions (not just carbon dioxide) measured in terms of their global warming potential (i.e., carbon dioxide equivalent) resulting from the extraction, processing and transmission of the fuel in addition to those resulting from its final combustion.

Our understanding of the impact of gas leakage has been growing for years (e.g., Howarth 2014, 2015, Alvarez et al. 2018), A recent peer-reviewed paper by Gordon et al. (2023) illustrates the problem by offering the following important conclusions:

1- In terms of methane emissions, "gas with a 0.2% leakage rate is on par with coal at all analyzed levels of CMM [Coal Mine Methane] leakage."
2- "Based on existing studies, coal has a median life-cycle Greenhouse gas [emissions rate] of 980 kg CO_2e [carbon dioxide equivalent] per kWh (with an absolute minimum of 675 and maximum of 1689) and gas has a median life cycle GHG of 501 CO2e/kWh (with a minimum of 290 and maximum of 988)."
3- "…global gas systems that leak over 4.7% of their methane (when considering a 20-year timeframe) or 7.6% (when considering a 100-year timeframe) are on par with life-cycle coal emissions from methane leaking coal mines."
4- "methane leakage from gas production systems [ranges] from <1% to >66%.

Note that while the median value (# 2) for global warming emissions from gas usage is half that of coal, the range for gas emissions overlaps that for coal. This implies that gas is, in some situations, worse than coal. Since leakage rates increase with age (e.g., Weller *et al.* 2020), it seems inevitable that emissions will increase as infrastructure ages.

In identifying methane as responsible for 30% of the global warming since the Industrial Revolution, the International Energy Agency (IEA 2023b) makes clear the need to reduce methane emissions if we are to limit warming to 1.5°C above the pre-industrial revolution level.

To its credit, Avista (2023a), for example, claims a commitment to reducing greenhouse gas emissions and "Avista has always been on the forefront of clean energy and innovation."

However, this apparent commitment to reducing greenhouse gas emissions is somewhat optimistic. The Avista plan to reduce emissions (2021b, p. 5) comprises a commitment to:

"• Diversify and transition from conventional, fossil fuel natural gas to renewable natural gas (RNG), hydrogen, and other renewable biofuels.

"• Reduce consumption via conservation, energy efficiency, and new technologies.

"• Purchase carbon offsets as necessary."

What the plan fails to note is that all these approaches require that the basic business model of continuing and expanding the supply of methane to customers is retained.

These three options deserve analysis:

The first option is flawed. The so-called Renewable Natural Gas (Biomethane) option is constrained by an incontrovertible problem: there is only a limited amount of RNG available. Cyrs *et al.* (2020) for example, reported that as of that date, the organic waste stream was only capable of providing 7% of contemporary national methane usage. Additionally, the availability of RNG in Oregon is severely limited (ODOE 2018). This assessment concluded that anaerobic digestion could only provide 4.6% of the state's annual methane usage, while even with employment of energy intensive thermal gasification technology, the total could only reach 17.5% of Oregon's usage. In addition, this option ignores completely the serious question about the full life cycle assessment of RNG in terms of total greenhouse gas emissions from the production and transmission of this fuel. Clearly, once the RNG is in the pipeline, it will leak, in the same way that shale-fracked methane leaks. A final concern is worth noting. Since there is a limited amount of RNG, and some industrial processes will be very difficult to electrify, it seems much more reasonable to confine RNG usage to processes that really need a combustible fossil fuel energy source. Pumping this valuable RNG commodity into pipelines for general use represents a complete misuse and waste of that resource.

The Hydrogen option might look promising so long as the Hydrogen employed is extracted from water using electrolysis through the energy intensive process driven only by renewable energy sources. Of course, there is a real question as to whether renewable energy should be used to produce Hydrogen and maintain the methane industry. More reasonable might be a plan to commit renewably generated energy directly to end uses. Unfortunately, if alternative processes are employed for producing Hydrogen, the technology confronts another problem. Howarth and Jacobson (2021), for example, report that using Hydrogen generated from methane (so-called blue hydrogen) is actually more greenhouse gas emissions intensive than combusting the methane itself. Furthermore, even if the renewable energy were available to produce green Hydrogen, as Erdener *et al.* (2023) point out "existing gas-fired power plants or industrial processes, may not be designed to tolerate hydrogen blending beyond a given limit; for many existing gas-fired power plants, this limit is 5% volume." On a slightly more optimistic note, Esposito (2022) reports a limit of 20%, but notes that even if this Hydrogen is renewably generated, the greenhouse gas emissions reduction amounts to only 6 – 7%. Esposito also adds that this would raise the price of methane by 2 – 4 times. Finally, while biofuel combustion is often designated as net zero in terms of greenhouse gas emissions, this is patently untrue since full lifecycle analysis must assess the emissions from producing, processing and delivering that fuel. As Jeswani *et al.* (2020) report, whether biofuels are genuinely an improvement over fossil fuels requires a close case-by-case analysis of the production sequence of each biofuel process. Whichever approach to reducing emissions is taken under this item, emissions reductions are, at best minimal and Avista remains committed to continuing and expanding its marketing of gas to supply users.

Avista's second option involves increasing energy conservation and energy use efficiency. While this may look promising, a much more reasonable approach than grasping at straws to continue methane gas delivery would be to promote electrification of everything and encourage weaning ourselves completely from methane.

Meanwhile, and clearly, the third option of investing in offsets involves no reduction in emissions whatsoever.

Rather than maintaining the false claim that "…natural gas is a clean fuel" the Avista gas division would be more persuasive if it were to accept the corporate claim (Avista 2023) that they are an energy company not a methane company. Avista would be more convincing if they were to seek alternatives to maintaining their methane business model.

Matthewson (2023) offers a valuable concern: "…while natural gas is an improvement over coal and other fossils fuels, continued reliance on it—not to mention any further development — at the expense of carbon-free alternatives will impede our ability to meet the Paris Agreement climate goals and avoid the worst impacts of global warming." Meanwhile, Kemfert et al. (2022) offer the valuable insight that: "We highlight that natural gas is a fossil fuel with a significantly underestimated climate impact that hinders decarbonization through carbon lock-in and stranded assets."

From the perspective of the climate crisis, a rapidly approaching biological catastrophe is evident. This should indicate to all of us the urgency for action. The message is that we must take every step we can both individually and collectively to reduce our contribution to the problem. This means promoting rules that wean us from fossil fuel use whenever possible.

What are the Health Consequences of Methane Emissions?

In addition to the concern about methane gas promoting global warming and its climate change consequences, there is now abundant evidence that it poses a health hazard to those living in environments served by gas. The toxicity of fossil gas is receiving increasing medical attention. Armand (2022), for example, indicated: "Cooking with gas stoves creates nitrogen dioxide and releases additional tiny airborne particles known as PM2.5, both of which are lung irritants. Nitrogen dioxide has been linked with childhood asthma. During 2019 alone, almost two million cases worldwide of new childhood asthma were estimated to be due to nitrogen dioxide pollution." He also noted: "Children living in households that use gas stoves for cooking are 42% more likely to have asthma…" and "Gas stoves leak even when they are off." Michanowicz et al. (2022) pointed out that gas in homes results in human exposure to methane, ethane and other volatile organic compounds (VOCs).

Several years ago, Gottlieb and Dyrska (2017) releases a report for Physicians for Social Responsibility (PSR) identifying the water and air contamination along with the human health consequences of continued methane gas usage. More recently PSR released a report on the toxic consequences of gas stoves (Seals & Krasner 2020). They concluded that gas stoves emit numerous pollutants, including nitrogen dioxide and carbon monoxide, indoor air pollution can reach levels that are illegal outdoors, risks to respiratory health are well-documented, children are particularly at risk, lower income households are likely at higher risk than others, while ventilation is important, it cannot be relied upon to prevent gas stove pollutant exposure, and, finally, electric equipment is the cleanest household cooking option.

Finally, in reviewing both the climate and health concerns associated with methane gas, O'Rourke et al. (2022) offered several key points:

- "Electrification is the lowest-cost method to decarbonize buildings, increase efficiency, and protect families and communities from the hazards presented by gas.
- "The Northwest's gas supply comes primarily from hydraulic fracturing, or "fracking," a dangerous extraction method that poses immense health and safety risks to communities living near fracking wells, the climate, and drinking water for millions of people.
- "Methane is a potent greenhouse gas, with up to 120 times the global warming potential of carbon dioxide.
- "Biomethane, commonly referred to as "renewable natural gas" (RNG), is still methane and is not a solution to mitigating the climate crisis, nor the health impacts associated with burning gas.
- "Burning methane indoors generates byproducts known to be harmful to human health, including nitrogen oxides, carbon monoxide, and particulate matter. These pollutants have been shown to cause or exacerbate respiratory conditions, including asthma, in children, the elderly, those with underlying health conditions, low-income, and Black, Indigenous, People of Color (BIPOC) communities.

- “The dangerous health and safety impacts of gas—from extraction to compromised indoor air quality from gas stoves—fall disproportionately on low-income and BIPOC communities.
- “Nearly every month in the US there are massive and often fatal accidents involving gas explosions. An October 2016 gas explosion in Northwest Portland injured eight people and caused $17.2 million in property damages.”

Regarding the effects of methane, the International Energy Agency (IEA 2023b) also states: “Taking immediate action to reduce methane emissions would … deliver important health, food security and economic benefits, in addition to helping limit dangerous climate feedback loops.”

Conclusion

Southern Oregon Climate Action Now specifically supports the Building Emissions Concept Ordinance proposed by the Green Energy Institute of Lewis & Clark College. The urgency of our climate crisis demands that cities such as Ashland promote electrification. In this case, that means requiring that new residential construction shall be fossil fuel free. We encourage the Ashland Climate and Environment Policy Advisory Committee and the Ashland City Council respectively to endorse and enact the proposal to achieve this end.

Respectfully Submitted

Alan Journet

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