

## **Energy Decarbonization and Electrification of Energy in Buildings Sources and Citations**

**A low-carbon lifestyle and economy will mean broader, deeper changes than merely switching one type of power for another, while keeping lifestyles and the economy the same. As a society, we have the ability to rethink and change our way of living. Using less. Extracting less. Reusing more. Relocalizing resources.**

**Below you'll find sources with scientific support for the transition off fossil fuels, including natural gas. These back up 350 Eugene's advertisement in the Register Guard on August 9, 2020.**

**All residents, regardless of income or where they live, have a right to safe, reliable and affordable clean energy.** Both rural and urban communities must be part of energy planning. Our community can provide financial supports and access to improvements for everyone.

1. Polluting industries, like fracking wells and factory farms, are located where lower-income households and people of color are most likely to suffer the health risks.

*How Pipelines Fuel Climate Injustice*, Climate Reality Project

<https://climaterealityproject.org/blog/how-pipelines-fuel-climate-injustice>

2. Families with lower income emit less carbon but experience greater impacts from climate disruption, while those with higher income contribute more emissions but often are less impacted.

*Wealthier people produce more carbon pollution – even the “green” ones*

David Roberts, Vox December 2017

<https://www.vox.com/energy-and-environment/2017/12/1/16718844/green-consumers-climate-change>

**Transitioning to a sustainable life style means decarbonizing all energy systems.**

3. International experts say emissions must be slashed by 45% from 2010 levels by 2030, reaching net zero by 2050, to keep warming below 1.5C.

*Special Report on Global Warming of 1.5C*, IPCC 2018.

<https://www.ipcc.ch/sr15/>

4. Oregon's goal is to reduce greenhouse gas emissions in Oregon by at least 80% below 1990 levels by the year 2050. *Addressing Climate Change* webpage, OR.gov

<https://www.oregon.gov/energy/energy-oregon/Pages/Climate-Change.aspx>

5. Eugene's own *Climate Recovery Ordinance* requires an 80% reduction in emissions from local energy use by 2030.

<https://www.eugene-or.gov/3210/Climate-Recovery-Ordinance>

This means a reduction of 790,000 MT CO<sub>2</sub>e is needed from the forecasted total 2030 emissions (1,010,000 MT CO<sub>2</sub>e).

Eugene Climate Action Plan, 2020, Figure 12

[https://www.eugene-or.gov/DocumentCenter/View/55835/CAP-20\\_Summer\\_2020\\_FINAL-w-appendices-compressed](https://www.eugene-or.gov/DocumentCenter/View/55835/CAP-20_Summer_2020_FINAL-w-appendices-compressed)

**Natural gas is a big part of the problem because of the carbon emissions it produces.** Natural gas is methane, which adds carbon to the atmosphere when it is burned and when it leaks from production and transport systems.

6. *More natural gas isn't a "middle ground" – it's a climate disaster*, David Roberts, Vox 5/30/2019. <https://www.vox.com/energy-and-environment/2019/5/30/18643819/climate-change-natural-gas-middle-ground>

7. Most natural gas is extracted from the ground by conventional drilling and fracking – it's a fossil fuel. *Is Your Natural Gas Actually Fracked?* Tarika Powell, Sightline.org, October 2017

<https://www.sightline.org/2017/10/30/is-your-natural-gas-actually-fracked/>

8. As it moves along thousands of miles of pipe, 1-2 % leaks into the air. Methane is much a more potent greenhouse gas than carbon dioxide, so even this small amount is very harmful. *Assessment of Methane Emissions from the U.S. Oil and Gas Supply Chain*, Science, July 2018

<https://science.sciencemag.org/content/361/6398/186>

9. In Eugene, gas use in buildings accounts for 27% of all local carbon emissions. *Eugene 2017 Community Greenhouse Gas Inventory*, Figure 8

<https://www.eugene-or.gov/DocumentCenter/View/45062/2017-Eugene-Community-GHG-Report>

10. The gas industry claims it can engineer a carbon-neutral supply. This would be done primarily by adding renewable natural gas and hydrogen to the supply, carbon offsetting, conserving, and using efficient equipment. Northwest Natural, Less We Can <http://lesswecan.com>

**What is RNG?** Methane escapes from organic waste at landfills, livestock operations, farms, and sewage treatment facilities. It can be captured, processed and used as energy in a product called renewable natural gas (RNG). Depending on the source and circumstances, RNG can be low or even zero-carbon. It can be used efficiently at the site of production, for heavy vehicle fuel, and to produce electricity at times of peak demand. It is less clear how much carbon savings would result from RNG as part of the direct gas supply for energy in buildings. Hydrogen energy is low-carbon, but commercial capacity for using hydrogen faces serious safety and technical challenges.

**For RNG projects to produce the most carbon-savings, several aspects of production and use must be taken into account.**

11. The feedstock matters. Converting livestock manure = very high carbon-savings ; burning wood pulp = not much savings, if any.

Location of use matters: Onsite use contributes to low-carbon intensity, because it obviates infrastructure for transport for off-site use and leakage along the way.

End-use matters: Most current production of RNG is used for vehicle fuel: 100% displacement of fossil fuel in a vehicle or fleet. RNG can be used to produce electricity, helping with the “peaking” problem. For direct use as energy in buildings: only a fraction of total direct pipeline supply would be displaced.

[https://www.anl.gov/sites/www/files/2020-07/RNG\\_database\\_2019\\_update\\_0720.xlsx](https://www.anl.gov/sites/www/files/2020-07/RNG_database_2019_update_0720.xlsx) Argonne Nat’l Labs, Renewable Natural Gas Database.

12. California Air Resources Board, Carbon intensities of various fuels, Table 1 <https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities>

**But the potential for RNG and hydrogen is insufficient.** Multiple studies confirm that, in the final analysis, even if all the potential organic sources were put to use, only a small fraction of current gas supply could be replaced.

13. *The False Promise of “Renewable Natural Gas”*. Vox 2/20/2020 Good general article – the place to start! <https://www.vox.com/energy-and-environment/2020/2/14/21131109/california-natural-gas-renewable-socialgas>

14. ODOE found that Oregon sources could replace about 17% of Oregon’s current gas demand. *Biogas and Renewable Natural Gas Inventory SB 334 (2017)*, ODOE <https://www.oregon.gov/energy/Data-and-Reports/Documents/2018-RNG-Inventory-Report.pdf>

15. The American Gas Foundation found that all national sources could replace between 8-20% of national use. *Renewable Sources of Natural Gas: Supply and Emissions Reduction Assessment*, American Gas Foundation <https://www.gasfoundation.org/wp-content/uploads/2019/12/AGF-2019-RNG-Study-Full-Report-FINAL-12-18-19.pdf>

**NOTE:** American Gas Foundation’s 2011 assessment found that “The results of this study indicate a likely resource market penetration on the order of 4-10% of the natural gas currently (2010) used in this country...”. (<https://www.eesi.org/files/agf-renewable-gas-assessment-report-110901.pdf>, page 4). The 2019 Assessment found that “The reported RNG resource potential estimates reported here are 90% and 180% increases from the comparable resource potential scenarios from 2011 AGF Study.” (pg 62), which were 4-10% - hence the 8-20% estimates used in 350 Eugene’s August 9, 2020 ad.

**Should factory farms and landfills be regarded as “renewable”?** Decreasing methane at the source is better accomplished by decreasing the trash and manure in the first place. Zero-waste programs have been very successful. Small dairies and ranches produce almost no methane – it’s factory farms that are the problem.

16. *The False Promise of “Renewable Natural Gas”*. Vox 2/20/2020 <https://www.vox.com/energy-and->

[environment/2020/2/14/21131109/california-natural-gas-renewable-socialgas](https://www.vox.com/energy-and-environment/2020/2/14/21131109/california-natural-gas-renewable-socialgas)

**Gas use entails serious health concerns.** Multiple studies find that cooking with gas raises health risks for asthma and other respiratory problems, especially in children.

17. *The False Promise of Renewable Natural Gas*, David Roberts, Vox February 2020 <https://www.vox.com/energy-and-environment/2020/2/14/21131109/california-natural-gas-renewable-socialgas>
18. *After a decade of research, here's what scientists know about the health impacts of fracking*. Environmental Health News, April 2019 <https://www.ehn.org/health-impacts-of-fracking-2634432607.html>

**Gas is not more reliability than electricity.** The gas industry tries to cast doubt on the reliability of a renewable electricity supply. Where will power come from “when the wind doesn’t blow and the sun doesn’t shine”? Multiple studies, including EWEB’s 2020 assessment, have shown clean electrification is possible. New generation capacity is being planned and built. This can be community solar projects and rooftop arrays as well as utility electric. A more flexible and resilient grid is being developed, and local “mini-grids” are an option. Energy storage in myriad forms are coming on-line.

And although the gas industry claims otherwise, gas furnaces and stoves are not reliable during an outage because they usually have electric igniters, and cannot be ignited manually.

19. EWEB finds that capacity for electrification over the next 5 years is possible.  
Electricity Supply Planning and Electrification Impact Study, 2020 <http://www.eweb.org/about-us/electricity-supply-planning>
20. *Heating Electrification: The next opportunity for coordinated climate action*. CLASP.ngo, April 2020 <https://clasp.ngo/updates/2020/heating-electrification-the-next-opportunity-for-coordinated-climate-action>
21. *Electrification Futures Study: End-Use Electric Technology Cost and Performance Projections through 2050*. National Renewable Energy Labs, 2017. <https://www.nrel.gov/docs/fy18osti/70485.pdf>

**Is it a better investment to phase out gas use, or to decarbonize the gas supply?** Multiple studies find the economics of electrification to be better. Because of both financial and carbon cost, electrification provides the best way forward.

22. “All-electric new homes are less expensive in every region of the US, compared to new homes with both electricity and gas. (RMI) Transitioning current gas homes to electricity without unfair costs to consumers will require financial supports from utilities, local governments and non-profits.” (Quote from Vox article; see the report referenced here). *The Economics of Electrifying Buildings*, RMI 6/2018.  
[https://rmi.org/wp-content/uploads/2018/06/RMI Economics of Electrifying Buildings 2018.pdf](https://rmi.org/wp-content/uploads/2018/06/RMI_Economics_of_Electrifying_Buildings_2018.pdf)
23. “To summarize: decarbonizing buildings with electrification saves homeowners and developers money, with savings rising over time; decarbonizing buildings with RNG costs ratepayers money, with costs rising over time.”  
*Unplugged: How the Gas Industry is Fighting Efforts to Electrify Buildings*. DeSmogBlog 7/28/2020  
<https://www.desmogblog.com/2020/07/22/unplugged-how-gas-industry-fighting-efforts-electrify-buildings>
24. “Rapid emissions reductions can be achieved in this sector through electrifying building processes (such as air heating/cooling, water heating, cooking, and ventilation), while concurrently transitioning to a power sector supplied by renewable energy sources (Leibowicz et al. 2018). High-income countries have an opportunity to lead this transition in the near term, with middle- and low-income regions following as constraints on emissions become stricter (Wang et al. 2018). It should be emphasized that electrification is only one approach to reducing emissions from buildings: building design and energy efficiency are absolutely paramount to decarbonizing this sector, but are not the primary focus of this piece.” *Building Electrification: Research Perspectives on Technologies, Policies, and Mitigation Strategies*. Energy Innovation, Oct 2019  
<https://energyinnovation.org/2019/10/04/building-electrification-research-perspectives-on-technologies-policies-and-mitigation-strategies/>

**Offsetting isn't a long-term solution.** A trading scheme of market-based payments that allows one organization to pay for carbon reductions at a separate location so as to compensate for their own emissions is known as "offsetting". For example, an offset might be made by a company in Oregon manufacturing canned foods to help develop a electric plant in Iowa that would use wind turbines instead of coal. Offsets function as a short-term stop-gap measure, but they are not a true solution.

*Can you really negate your carbon emissions? Carbon offsets, explained.* Umair Ifran, Vox.com, Feb 2020. <https://www.vox.com/2020/2/27/20994118/carbon-offset-climate-change-net-zero-neutral-emissions>

**"Energy choice" is a concocted argument intended to deceive.** Once upon a time, lighting was provided by gas. Gas lighting was supplanted almost everywhere by electric lights in the early 20<sup>th</sup> century. Before gas, whale blubber provided oil for lighting, until whales were hunted nearly to extinction. Do we wish we still had the choice for gas or whale oil or electric lights? No, electricity serves the purpose better, and no one complains.

25. More Americans use electric stoves than gas for cooking already. *No more fire in the kitchen: Cities are banning natural gas in homes to save the planet.* Elizabeth Weiss, USA Today, Nov 2019. <https://www.usatoday.com/story/news/2019/11/10/climate-change-solutions-more-cities-banning-natural-gas-homes/4008346002/>