The Legal Fight for HVAC Sustainability

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction:

An HVAC (Heating, Ventilation, and Air Conditioning) system is a system that is designed to provide indoor comfort by controlling the temperature, humidity, and air quality of a building. HVAC systems incorporate a collection of components, including heating and cooling equipment, air ducts, fans, filters, etc., to regulate the indoor environment. HVAC is in nearly every modern building in the U.S.

When HVAC was first invented, mechanical engineers did not know how to modulate HVAC power sources to minimize energy expenditure—the power sources ran all the time, never shutting down, which ensured stable operation but led to excessive energy use. In addition, mechanical engineers did not understand the environmentally hazardous effects of many refrigerants, and proper containment strategies were not in place (Environmental Protection Agency, 2017). Both excessive energy use and refrigerant leaks make up HVAC's environmental toll. Nowadays, HVAC systems are much better understood, and newer, more sound designs and implementations have surfaced. However, the poor HVAC systems and blueprints of yesterday remain prevalent in buildings and mechanical engineering departments throughout the U.S.

Estimates suggest that HVAC systems, on average, account for a walloping 35% of a building's energy consumption (the most, by far, out of any constituent energy system in a building) (Bonacorda, 2017). According to the International Energy Agency (IEA), buildings are responsible for approximately 28% of global carbon dioxide emissions (International Energy Agency, 2019). This is due, in large part, to the fact that many buildings' HVAC systems use the antiquated, environmentally harmful technology referenced before. As irrevocable damage to our environment draws closer, it is in the best interest of engineers, legislators, and the public to tease out and correct unsustainable facilities-engineering practices—with HVAC as a focus.

Over the last few years, a syndicate of mechanical engineers, energy advocates, environmental engineers, and others have offered several environmentally friendly innovations and retrofits to HVAC design. These new technologies have shown great promise in ensuring a more sustainable world. However, implementing these technologies has yet to keep pace with their creation. In this paper, I will show that a lack of federal statute is to blame for this phenomenon. I argue, based on my investigation, that Congress can do much more than what it is currently doing, and that the grip of powerful interest groups is the cause of the fallow legislation. Altogether, this research will answer the following question: why has there not been a commensurate legal movement for sustainable HVAC implementation despite notable HVAC engineering advancement?

To show that government actions have stalled the progress of the sustainable HVAC systems movement, I will point to several instances in which federal HVAC sustainability legislation has been introduced but rejected—and that while rebuffed at the federal level, similar laws have found success at the state level. The HVAC sustainability laws of the more environmentally conscious states provide legal precedent for future laws governing the implementation of sustainable HVAC technology; they refute the idea that regulations on sustainable HVAC technology are impractical or cannot be realized.

Big corporations, for instance, have vested interests in stopping the sustainability movement. I will track where their money is going, how they speak about sustainability, and to what extent they seek government recourse and protection. This research will shed light on what societal attitudes and structures insulate and empower them. In my research, I will frame the future of HVAC sustainability in our nation—analyzing the regnant social structures and views that have led to government inaction and shaped our current climate situation. Most importantly,

this research will underscore a connection between certain societal actors (corporations, politicians, government, etc.) and the current sustainable HVAC engineering reality.

Literature review:

Past research primarily imputes the lack of sustainable HVAC implementation to a lack of education on the issue (Bonney & Eichholtz, 2020). The research states that a national sustainability conversation must happen before progress occurs. People must understand and value sustainability before anything else.

Because of little to no social commentary on sustainability, the public throughout much of the U.S. is unaware of the impact HVAC systems have on the environment and the potential benefits of sustainable HVAC systems. This lack of awareness leads to using old, inefficient HVAC systems that consume significant energy and emit harmful gasses into the atmosphere (Environmental Protection Agency, 2019). A theme in the research is that the costs of sustainability technology can be prohibitive and that tax credits, grants, and other financial incentives can be powerful motivators for businesses to adopt new technologies and practices (Burman & Korkmaz, 2020). However, as states each have their views on sustainability and its urgency, as well as their unique circumstances, the availability and effectiveness of these incentives vary widely across different regions of the country. Research has looked into how much the federal government should devolve the responsibility of sustainability to the states, finding that a federal approach generally works best for all (Hymel & Berrens, 2015).

The research shows that by way of government inaction, building codes and regulations have not been updated to incentivize or compel sustainable HVAC systems. Many building codes only require minimum energy efficiency standards, which are not nearly stringent enough

to promote sustainable HVAC systems. This makes it difficult for sustainable HVAC systems to compete with traditional HVAC systems, which tend to be slightly cheaper. Public ignorance traces back to the government and corporate stewardship of the sustainable energy conversation (American Council for an Energy-Efficient Economy). Another bugbear is the lack of federal funding for research in developing new technologies and approaches to HVAC sustainability (American Council for an Energy-Efficient Economy). Despite this, engineers have made great strides on this front (Bellos, Gyalistras, & Kolokotsa, 2020). There seems to be a federal government interest in the energy status quo: fossil fuels and unsustainable energy (American Council for an Energy-Efficient Economy).

A reasonable refutation of sustainable HVAC systems is their associated installation costs, which substantially exceed those of traditional HVAC systems. Many might ask why we should federally overhaul our current system and replace it with a more expensive one. To answer this, it should be noted that sustainable HVAC systems are easier to maintain, repair, and retrofit. Most importantly, they save energy and utilize more environmentally friendly energy sources without sacrificing performance (U.S. Department of Energy, 2021). Many contractors unthinkingly opt for older models to save money up-front, prioritizing short-term savings, not realizing that newer, more sustainable designs would be a more financially and environmentally sound choice in the long run.

For this paper, I decided to examine the legal fight for HVAC sustainability through the lens of the Social Construction of Technology (SCOT) view. "Advocates of SCOT—that is, social constructivists—argue that technology does not determine human action, but rather, human action shapes technology" (Klett, 2018, pg. 1). SCOT advocates claim that technology cannot be truly understood without understanding the social context in which it is immersed.

SCOT seeks to understand what social forces led a technological artifact to arise in the first place. The invocation of SCOT will allow us to answer why sustainable HVAC systems are not as prevalent as they could be. SCOT seeks to find syncretism between different social actors' philosophies and values on technological artifacts. In accounting for the role of different social groups in shaping technology, we can determine how HVAC sustainability practices can find their place in American society and, retrospectively, why they have not done so yet.

Methods:

Understanding the roadblocks to HVAC sustainability through the framework of SCOT will entail a discourse analysis. A discourse analysis couples well with SCOT because it allows one to examine how language, communication, and discourse—all social constructs—shape social reality. It seeks to understand how the social construction of knowledge, meaning, and power relates to a particular topic or issue.

Discourse analysis will help to discern the origin of the arguments for and against HVAC sustainability. I will examine relevant government documents and other public records and review the assumptions, values, and beliefs that undergird these discourses. I will identify how other social groups frame the issue of sustainability in HVAC design and how, in turn, this precipitates certain government policies or lack thereof.

I compiled a range of publicly available interlocutions in the form of government reports, media articles, and studies. To provide a current perspective, the data collection period covered the past ten years, from 2013 to 2023. This discourse analysis of the lack of government laws on HVAC sustainability revealed a complex and contentious issue that requires cooperation and action from various stakeholders. There is no one-size fits all solution. The sources cited suggest

that the federal government has not promoted sustainable energy design due to a number of factors, including political ideology, industry influence, and public opinion.

Analysis:

The last decade has been a period of dynamism for the HVAC industry. As Bellos, Gyalistras, and Kolokotsa (2020) highlight, significant progress has been made in the development of HVAC technologies, particularly those with clean energy applications (Bellos, Gyalistras, & Kolokotsa, 2020). These advancements have the potential to significantly reduce energy consumption in buildings and contribute to the fight against climate change.

These technologies are exciting, and the report leaves the door open for contractors, stakeholders, and other social actors to take notice of these technologies and envision them in their buildings. It touches on the fact that these new technologies will help in the fight against climate change and admonishes others to use them over existing, less sustainable technologies. Most importantly, it closes by saying that the federal government is a necessary step in reversing climate change.

The mechanical engineers have said that their technology can help, but HVAC is a massive national infrastructure, and many want to ensure its overhaul makes sense. A 2018 report by the U.S. Department of Energy does just this by contextualizing the presence of HVAC technology in the climate change conversation, saying, "The building sector is a significant contributor to global energy use and greenhouse gas (GHG) emissions. In 2014, buildings accounted for approximately 40% of total U.S. energy consumption and 38% of U.S. CO2 emissions" (pg. 1).

The U.S. Department of Energy's report, parroting that of Bellos, Gyalistras, and

Kolokotsa (2020), suggests that government action is critical in promoting energy efficiency and reducing energy consumption in buildings. The report goes on to state that public incentives for sustainable HVAC design have shown enormous success. The report insinuates that without government policies and programs to incentivize and regulate energy efficiency, progress in HVAC sustainability will likely be slower and less comprehensive than it could be.

The consistency and continuity in messaging between the two actors is telling. By advocating for government policies and incentives to promote energy efficiency, the Department of Energy's report emphasizes the need for a collaborative effort between the public and private sectors to address this global challenge. The discourse also highlights the importance of innovation in the HVAC industry to reduce energy consumption and greenhouse gas emissions, which reinforces, once again, the idea that technological advancements alone are not sufficient to achieve sustainability goals.

These two sources are authoritative and give an unbiased look into the sustainable HVAC reality: the government must promote sustainable HVAC design. The authors' expertise should be valued and serve as a green light to the federal government to begin enacting sustainable HVAC legislation. Yet, Congress continues to impugn the climate change problem and dismisses many HVAC sustainability efforts.

I wanted to know why the federal government was not listening to the advice of respected experts. In his *Vox* article, "Why Hasn't the U.S. Government Done More on Climate Change?" Roberts argues that the influence of the fossil fuel industry and political polarization have been significant obstacles to implementing effective policies to combat climate change. Additionally, the article suggests that the current political climate in the U.S. has meant that national security, inflation, etc., have taken precedence over issues like climate change. Most interestingly, he talks

about how climate change has been flagged as a uniquely left-wing issue, stating, "The fossil fuel industry and its Republican allies have successfully framed climate action as a left-wing cause, rather than a universally important one. That created an atmosphere where many politicians are more concerned with winning elections than combating a global existential threat." Ultimately, he argues that significant action on climate change will require a fundamental shift in political priorities and a willingness to prioritize the planet's long-term health over short-term economic gains.

A politician's views often mirror those of their constituents, though not necessarily. The federal government is mostly divided on this issue. A Gallup poll titled "Poll: Americans Wary of Government Action on Climate Change" (Gallup, 2020) suggests that many Americans are divided just like their representatives. It states that while most Americans believe climate change is occurring, there is a schism on whether the government should take action to address it.

Given the preponderance of evidence on the utility of HVAC sustainability and the government's essential role, the natural question is why some are still skeptical. Further investigation of the research shows that big corporations have had much to do with it. They have the money and resources to proselytize many people into their distorted view of climate change. Big energy corporations have been staunch opponents of the HVAC sustainability movement. Their sharp practice often involves showcasing outdated and inefficient HVAC technologies, lobbying against regulations and incentives for sustainable HVAC systems, and prioritizing short-term profits over long-term environmental sustainability (Burman, Korkmaz, 2020).

The oil and gas industry may have qualms about the truth of climate change and their role in it. A 2015 U.S. Energy Information Administration (EIA) study found that 36% of all energy consumed in U.S. commercial buildings was used for HVAC purposes (as alluded to earlier). Of

that 36%, 55% was used for space heating, typically fueled by natural gas or oil (U.S. Energy Information Administration, 2015). Additionally, many homes in the U.S. still use oil and gas for heating and cooling. However, newer HVAC technologies exist that do not rely on oil and gas at all and have already begun to make their way into the many facilities.

ExxonMobil has historically framed sustainability efforts as meddlesome and intrusive, claiming that regulations and incentives for sustainable HVAC systems interfere with free market principles (Kelly, 2018). In this article, Kelly reports on a series of internal documents from ExxonMobil that were obtained through a lawsuit brought by the company's shareholders. According to Kelly, the documents reveal that ExxonMobil has a history of opposing climate change regulations and promoting climate skepticism. One of the documents reportedly describes regulations aimed at reducing greenhouse gas emissions as a step in the wrong direction—one that could interfere with free market principles. In a 2018 *Guardian* article, an investigative journalist revealed that ExxonMobil had paid millions of dollars to climate change-denying lawmakers, despite promising otherwise. "ExxonMobil gave nearly $2m to members of Congress and a corporate lobbying group that deny climate change and block efforts to fight climate change – eight years after pledging to stop its funding of climate denial, according to a Guardian investigation" (Vaughan, 2018, pg. 2).

This discourse reflects a broader neoliberal ideology prioritizing free markets and deregulation over government intervention. By framing sustainability measures as something that disrupts a more critical social system (the free market), corporations can foil efforts to promote sustainable HVAC technologies and avoid taking responsibility for their environmental impact. As the position of pro-fossil fuels has become increasingly more indefensible, oil and gas companies have had to ramp up their efforts to oppose climate reform. In 2019, Chevron was

among a group of oil and gas companies that lobbied the U.S. Environmental Protection Agency (EPA) to weaken regulations on methane emissions from oil and gas operations (Friedman, 2019). Methane is a potent, noxious greenhouse gas that contributes to climate change, and the EPA's regulations aimed to reduce methane emissions from the oil and gas sector. However, Chevron and other companies emphatically argued that the regulations would impose significant costs on the industry and not provide significant environmental benefits.

Perhaps not incidentally, in 2020, a decision was made by the Trump administration to loosen regulations on methane emissions. The overturned rule required oil and gas companies to monitor and repair methane leaks. The Trump Administration argued that the statute was unnecessary and would impose an undue burden on the energy industry. The entire situation demonstrates how Chevron and other corporations use language and rhetoric to construct particular narratives around sustainability policies and the role of fossil fuels in the economy. By framing these issues in specific ways, these companies can sway public opinion and government policy to cover their guilt and safeguard their profits. The Chevron discourse is a testament to how discourses can significantly impact policy and public perception.

Non-renewable energy corporations like ExxonMobil and Chevron bankroll endless lobbying ventures so that non-renewable energy-friendly laws continue. Lobbying is a practice in which individuals or organizations attempt to influence public policy in their favor. These organizations and individuals work to establish relationships with policymakers so that their concerns are better and more quickly received. Oil and gas companies have lobbied Congress since their inception. Not just this, but they take it a step further and try to instill their message in the public perception. "In many cases, oil and gas companies try to change public perception using the same messages with which they lobby politicians. This includes portraying themselves

to the public as part of a solution to climate change, rather than a cause, and highlighting their investments in clean energy while funneling far more money into dirtier fuels," says Faye Holder, a climate expert at the U.K. think tank Influence Map (Glasgow, 2021, pg. 2). The energy sector's politics embody a specific form of power and authority (Woolgar, 1991).

One might say that, as private corporations, ExxonMobil and Chevron have no responsibility or loyalty to any cause or the public interest, only to their stakeholders. However, both ExxonMobil and Chevron benefit from many generous government subsidies (Glasgow, 2021)—in other words, taxpayer dollars. In this way, the public is indirectly keeping these corporations afloat. ExxonMobil and Chevron must heed public sentiments insofar as they are taking public money.

While we often think of the sustainability movement at the macro level, it is important to recognize that individual accountability and prudence matters, too. The fight against global warming will entail a collective effort. However, many Americans distrust the government and view the movement as pointless. The lack of consequences for poor practice is yet another institutional hurdle. "It is the lack of trust in government that may be one of the foundational barriers to effective environmental action," Kamarck (2022) says. Individual responsibility within a society that does not enforce it can pose a grave challenge. It is just one example that shows why more than just engineering innovation is needed. Feats of engineering innovation are incredible, but lack of individual accountability to sustainable practices spoils what engineering progress is made. The U.S. government must create legislation that incentivizes sustainable practices, and so far, they have only somewhat done so.

The discourse analysis shows that several power relations and ideological assumptions underlie the HVAC sustainability movement. There is often a neoliberal bent in the discourse,

which prioritizes market-based solutions and individual responsibility over collective action and government intervention, reflecting a preference for voluntary efforts and industry-led initiatives rather than mandatory regulations and standards. Clearly, power and influence within the industry shape policy and public opinion while marginalizing the voices of other actors, such as environmental groups and experts.

Conclusion:

The lack of sustainable HVAC energy systems is a blight, enabled, in part, by high government powers and special interest groups. Lack of engineering does not bottleneck sustainability policies; instead, the domination of outside interests makes it hard for these innovations to flourish. This research shows that the federal government and corporations do not exist in a vacuum; they communicate and occasionally make concerted, reciprocal efforts to effect specific policies. People must understand how intimately American corporations and the U.S. government are intertwined. Ultimately, the people empower corporations. Education and scrutiny of corporations make up the people's armament against unjust business practices.

Future research could look further into certain corporations' motivations for derailing the sustainable energy movement. This research could look at how the U.S. could work with these corporations so that sustainable engineering can progress. Something is holding these corporations back and prompting them to invest millions of dollars into anti-sustainability lobbying and marketing. Supplemental research could try to understand the role that company survival plays in corporations’ reluctance. In this way, we may be able to find a solution that marries these corporations' interests with those of the sustainable energy movement.

This research will help to convince others of the severity of government roadblocks on

sustainability issues. It will continue the discussion of sustainability and offer a path ahead that works for all—because a sustainable world is something that we can all get behind.

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