REVIEW ARTICLE

Carbon Reduction Standards Emissions in New York City's Buildings: Climate Cultures in Sociological Research

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Abstract

On April 18, 2019, the City Council passed Local Law 97, which aimed to reduce greenhouse gas (GHG) emissions in New York City buildings 40% by 2030 and 80% by 2050. This was based on the realization by government officials that two-thirds of New York City's GHG emissions were from buildings. Local Law 97 intended to give landlords time to evaluate their properties and write new leasing agreements; but it became clear that the economic costs involved in changing building types and structures would be astronomically high. Anticipating pushback from the real estate community, Mayor Bill de Blasio put together a team of architects, engineers, policy advisors, data scientists, and city planners to facilitate multi-layered collaboration, especially among building investors, regulatory agencies, local communities, tenants, and employees. Still, he faced enormous resistance from NYC's real estate community partly because he treated private places as if they were public spaces: That is, the city government supported clean air as a public good while the real estate community focused on promoting the rights of private citizens – to let landlords decide how and when they would cut GHG emissions.

From a sociological perspective, it is important to determine the extent to which different actors (including architects, engineers, policy advisors, data scientists, city officials, investors, regulatory agencies, local communities, tenants, and employees) converse with each other about the ramifications of GHG emissions; and the extent to which their admittedly diverse agendas and cultural affiliations support the reduction of GHG reductions. This paper seeks to answer the question of whether these actors converge, in terms of acknowledging the business decisions required to adapt to the effects of climate change and, at the same time, work towards reducing GHG to meet the necessity of mitigation (For further information on these two elements, see [1] Indeed, the current sociological literature juxtaposes adaptation and mitigation as intersecting axes, which enables one to identify distinct climate cultures. This work enables this researcher to identify NYC's climate culture and make the point that, even within the defined climate culture, actors cluster in opposing quadrants.

Before delving into the above theoretical foundations, it is important to note that, while Local Law 97 is complex and, over time (especially with changes in political administrations), may be revised or rescinded, this paper focuses on whether Local Law 97 has enabled landlords and tenants to work together to design solutions that are cost effective and environmentally sound. In this paper, I discuss the ways greater public awareness has led to understanding the negative effects of climate change that, in turn, led to the passage of Local Law 97. Within this context and using a distance/similarity matrix proposed by [2], this paper illustrates relational cultural spaces that influence the landlord/tenant relationship. It shows that, on the one hand, landlords (including property owners) want to bring their buildings "up to code;" and, on the other hand, they want the freedom to decide which materials to use. Here, I illustrate that landlords/property owners have the potential to develop closer relationships with tenants to address energy efficiency and cost effectiveness. At the same time, I point out the complexities involved in changing social practices, climate cultures, and local perceptions.

This paper first examines the sociological literature on culture, climate change, spatial formations, and identity. Then, it describes the socio-ecological context that, over time, has established the identity of NYC's real estate community. Third, it evaluates a range of professional and general publications over the past 50 years to illustrate that, while there has been a substantial increase in public awareness about climate change and sustainability, the continuum of NYC's climate adaptation culture as a relational space falls somewhere in the middle. As will be discussed below, according to the model proposed by [3], the two extreme end points in climate cultures –

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universalistic and minimalist –are not part of NYC's climate culture, which negates the potential for embracing the greater good of environmental justice (i.e., universalistic culture). Fourth, in analyzing the information provided in personal interviews, taking place between July 2019 and February 2020, with seven practitioners in the field of building ownership and energy management, this paper identifies the different, and often conflicting, interests of property owners and tenants who are affected by the behavior of the municipal government and real estate investors. Finally, I offer insights into how various actors might share the risks and vulnerabilities brought about by GHG emissions in NYC based upon with [3] "Proposed Explanatory Framework of Climate Adaptation Cultures."

Review of the Literature

The discourse around NYC's carbon reduction standards emissions centers on sociological understandings of subjective meanings and social structures within which "culture" and "climate change" emerge. For this present study, this discourse encompasses global spheres of influence, which systematically compresses economic, political, technological, social and cultural conditions [4]. These conditions promote spatial formations and exchanges of shared knowledge; and enables sociologists to place NYC's culture, climate change, spatial formations, and identity in a larger, global context.

Culture

[5] analyze the causal relations between local climactic conditions as cultural patterns of behavior. They define culture as a specific knowledge construction – such as values and beliefs – that explain local differences in perceptions or preferred measures [2]. However, they also recognize that it is not easy to precisely define culture as knowledge oriented. They note that [6] and Geertz study subjective meanings of culture whereas Levy-Strauss, Bourdieu, and Foucault focus on structural configurations (16-18). Following this, [7] combines subjective and structural approaches; and proposes a definition of culture that incorporates aspects of socially shared knowledge and possibilities for cultural adaptation and mitigation. According to [2], it is then possible to identify multiple simultaneous cultural affiliations (28), which seems to be operative in the case of NYC's building emissions.

Climate Change

Studies emanating from German-speaking regions examine specific case studies with the "hope" that the case studies will have broader implications for climate change in the "life world contexts." From this vantage point, sociologists recognized the need for quantitative analyses in order to advance the discourse. [2] As will be discussed, NYC's building emissions standards fit within the context of quantifiable measurements provided by GRESB (Global Real Estate Sustainability Benchmarks) – to define global standards for sustainability performance by providing standardized and validated environmental, social, and governance (ESG) data.

Earlier studies addressed connections between the natural and social sciences vis-à-vis climate change in which sociologists considered climate cultures as collectively shared vulnerability with resilience constructions. Within this framework, it has become possible to examine both vulnerability and resilience as determined by age, gender, income, and exposure within a specific space [8]. An additional contribution, by [9] considers the ways humans – in different groups – attribute meaning to physical objects (in the present study, buildings), which in turn implies different courses of action [2].

Spatial Formations

Within the context of climate change, vulnerabilities within various sectors of society such as coastal protection and spatial development, is the overarching concern in NYC and relates to how buildings are maintained, which fits in with Heimann's proposition that change occurs over time and socio spatially (17). Global changes, such as an increase in GHG emissions, might very well lead to new spatial formations of shared knowledge (21) because of the way economics, politics, technology, social and cultural conditions compress and intermesh across the globe. Along with this, Heimann asserts that discussing climate change, cultural groupings, and spatial formations assumes multiple affiliations.

Identity

According to [10], groups offer different degrees of acceptance – even in terms of defining the "problem." In addition, these researchers maintain that local climate adaptation depends upon specific identity constructions. In the present case of NYC buildings, the identity constructions are between the spheres of mitigation, (which reduces the emission rate of greenhouse gases to the atmosphere and, in some cases, even removes them) and adaptation (which alters 'business as usual' decisions to account for current and modelled changes). In order to identify these constructions, it is necessary to understand the historical context within which socio-ecological spatial formations occur.

Socio-Ecological Context

Although the modern environmental movement began in the 1960s and 1970s, NYC did not attempt to regulate carbon emissions until 2005 when Mayor Michael Bloomberg started go promote and use the term, "sustainability." Even after he created of the Office of Sustainability – Buildings and Energy Efficiency in 2009, he noted that businesses were not motivated to make their buildings more energy efficient. It was not until Hurricane Sandy, in 2012, when the economic losses in New York City were estimated to be roughly $19 billion, that businesses began to take seriously the effects of climate change and address carbon emissions in their buildings. By

that time, international pension funds and academics from Maastricht University already had set up GRESB (Global Real Estate Sustainability Benchmarks) – to define global standards for sustainability performance by providing standardized and validated environmental, social, and governance (ESG) data to more than 75 institutional investors, representing over USD 18 trillion in institutional capital. Because NYC historically has been at the forefront of most new initiatives, the fact that it was slow to address environmental sustainability indicates that the United States was (and is) behind many countries in the world.

In his first year as mayor, Bill de Blasio sought to align NYC's interests with international initiatives, particularly in the United Nations Framework Convention on Climate Change (UNFCCC) and the United Nations Environment Program. In addition, he urged businesses to voluntarily reduce their energy usage and emissions and, when that didn't work, in 2019, he signed into law the Climate Mobilization Act (CMA) and Local Law 97, which required property owners (both business and residential) to cut building emissions by 40% by 2030 and 80% by 2050 or face severe penalties for non-compliance. Property owners looked at the huge capital investments they would have to make in order to bring their buildings "up to code" and, in confronting the reality that they were not willing to incur severe financial losses to meet the legal requirements, began to develop strategies for stalling – to extend the timeline for compliance.

Against this backdrop, a number of long-standing organizations helped redefine NYC's climate culture. This includes the Real Estate Board of New York, which is the oldest New York institution (est. in 1896), as well as a range of governmental, non-governmental, and international organizations that were established around the same time that the environmental movement began in the 1960s and 1970s. One interesting example is Vornado Realty Trust (est.1962), which is one of the largest commercial real estate investment trusts (REITs) in the country. Within the past couple of years, Vornado has developed a strategy for sustainability in NYC. According to its Senior Vice President for Energy and Sustainability, Daniel Egan:

About 25-27 million square feet of our real estate is now in Manhattan. We actually started out as a retail company and owner of malls and strip centers in suburban locations mostly in New Jersey but, over the years, we have sort of redefined our core business to be commercial offices and retail in urban centers. We're not very geographically diverse, which actually presents a lot of opportunities for us. We have a relatively short list of utility authorities that we have to deal with, and the state government, so it's a little bit easier.

Professional associations also are part of NYC's climate culture. For example, the Building Owners and Managers Association (BOMA), which has represented commercial real estate professionals in the five boroughs since 1967, currently sponsors a series of educational workshops and seminars to help building managers understand the nuts and bolts of Local Law 97. In addition to BOMA, the US Department of Energy's Office of Efficiency and Renewable Energy and the NYC's Department of Environmental Protection, both of which were established in 1973, provide information resources to the real estate community.

It wasn't until the 1990s that the needle moved forward, as several entities began to promote energy efficient buildings. While NYC's Environmental Justice Alliance (est. 1991) provided an outlet for social activism and labor concerns – "on the ground and at the table" – it turned out that its activities were peripheral to the interests of the entrenched real estate community. On the other hand, the community did accept the non-profit U.S. Green Building Council (est. 1993), which created a set of rating systems for the design, construction, operation, and maintenance of green buildings, homes, and neighborhoods to enable building owners and operators to use resources efficiently: Its Leadership in Energy and Environmental Design (LEED) green building certification program is now widely used in NYC and worldwide.

Recognizing the need for a leading scientific institute to track climate change and interact with policymakers, Columbia University established the Center for Climate Systems Research in 1994. While the Center does not influence the real estate community, the Global Reporting Initiative (GRI), established in 1997, does. GRI helps businesses align with worldwide sustainability measures. Interestingly, while NYC's real estate community wants to compare the energy efficiency of its buildings to other buildings around the world, it struggles to quantify the GRI's core values of connecting climate change to human rights, governance and social well-being. While keeping abreast of developments within GRI, NYC's real estate community focuses instead on meeting the US Environmental Protection Agency's standards through its Energy Star Portfolio Manager (est.1999).

Finally, to further define NYC's climate culture, at the beginning of the 21st century, several different types of organizations raised the visibility and the quality of measurement of energy usage. To varying degrees, these organizations connect with NYC-based real estate concerns, introduce green legislation, and even publish results from scientific research. Table One provides a few prominent examples and lists some of their contributions.

With socio-ecological data gathered from extensive interviews with key stakeholders and information from company websites, this researcher assigned numeric values for each of the 13 organizations discussed (not including other organizations from Table One). In so doing, this paper attempts to use [2] relational cultural spaces to sketch out (or, illustrate) a

Table 1. Examples of NYC's Networking Organizations

Organization	Type
Energy Watch (est. 2000)	One of the first energy and sustainability data analytics companies
Urban Green (est. 2002)	Non-profit advocacy group, providing models for the built environment in New York City with models replicated worldwide.
World Green Building Council (est. 2002)	The World Green Building Council (World GBC), a global network to create green buildings in around 70 countries; and transform the building and construction industry towards a net zero carbon and sustainable built environment.
New York Energy Consumers Council (est. 2004)	Non-profit, commercial energy-rate payers advocacy group; and an integral part of the public rate making process.
NYC Mayor's Office of Sustainability – Buildings and Energy Efficiency (est. 2005)	Government entity responsible for range of programs to improve the energy efficiency of buildings throughout NYC: establishing public buildings as models of sustainability; strengthening requirements for new construction and renovation; and ensuring that benefits are equally shared throughout New York City.
NYC Panel on Climate Change (NPCC) (est. 2008)	An independent organization convened by Mayor Michael Bloomberg in August 2008 where many leading earth scientists and researchers from Goddard Institute for Space Studies (GISS) were part of the panel; and legal, insurance, and risk management experts are part of the NPCC.
GRESB (est. 2009)	A private limited company with large pension funds based in the Netherlands. Seeking comparable and reliable data on the performance of their investments, they became the leading environmental, social and governance (esg) benchmark for real estate and infrastructure investments across the world.
Building Energy Exchange, (est. 2013)	Non-profit organization that connects New York City's real estate and design communities to energy and lighting efficiency solutions through education, exhibitions, technology demonstrations, and research.
Science for Climate Action Network (est. 2017)	Advocacy group that has a global network of over 1,300 environmental non-governmental organizations in over 130 countries working to promote government and individual action to limit human-induced climate change to ecologically sustainable levels.

visualization of NYC's climate culture. While it is certainly not complete, Figure Two shows how each of the organizations exist, in relation to each other, along x and y coordinates – with the x axis representing the necessity of mitigation in reducing GHG emissions; and the y axis representing the necessity of adaptation in prioritizing business decisions. The major "findings" from this visualization are as follows:

- Apart from organizations that focus specifically on climate change and environmental protection – i.e., G, H, and K – there is a great deal of variation within Culture B's relational space – even for those organizations that value both adaptation and mitigation.

  o For example, the Real Estate Board of NY (D) focuses much more on business decisions than the Mayor's Office of Sustainability (A).

  o On the other hand, through its Energy Star Portfolio Manager, the EPA (M) is relatively unconcerned with how realtors make business decisions; but does focus on the cost effectiveness of energy savings.

  o Furthermore, Vornado Realty Trust (E) understands that, to meet the interests of its investors, it must report on and even advocate for a reduction in GHG emissions in its buildings.

- At this point in time, all organizations recognize the necessity of mitigation in reducing GHG in NYC, which is why CULTURE A and CULTURE D are completely empty.

- Two organizations – one domestic (I) and one international (C) – fall into CULTURE D because they

are not concerned with prioritizing business decisions, which means that they have very little influence in terms of the way tenants and landlords relate to one another.

In sum, this rough visualization demonstrates the ways that researchers may use the data they gather; and may even expand their information base by using questionnaires to ask key actors to rate their organizations' mitigation and adaptation strategies. This would allow for a comparison of geographical regions and further define global climate cultures (Figure One).

Slow Shifts in Public Awareness

In the present day, the use of words such as "sustainability," "built environment," and "environmental, social, and governance" are part of the rhetoric in NYC's initiatives to reduce carbon emissions. In fact, every sustainability officer uses these terms both to educate employees within their companies and to satisfy investors' interests in funding green buildings. While this rhetoric represents the impulse to normalize change, the extent to which these words are used over time both by professionals and the public shows a shift in values, attitudes, and priorities in New York and globally.

This study used six research databases – *Case Access Project (Harvard Law School)*, *EBSCO e books*, *Environment Complete*, *Green FILE*, *Nexis Uni*, and *Web of Science* -- to track the usage of seven terms: climate change, environmental justice, environmental risk(s), environmental sustainability, greenhouse gas emissions, sustainable design, and urban ecosystems. Table Two describes the six databases; Table Three summarizes the frequency of usage in two prominent environmental databases; and Appendix A provides a complete listing of word usage.
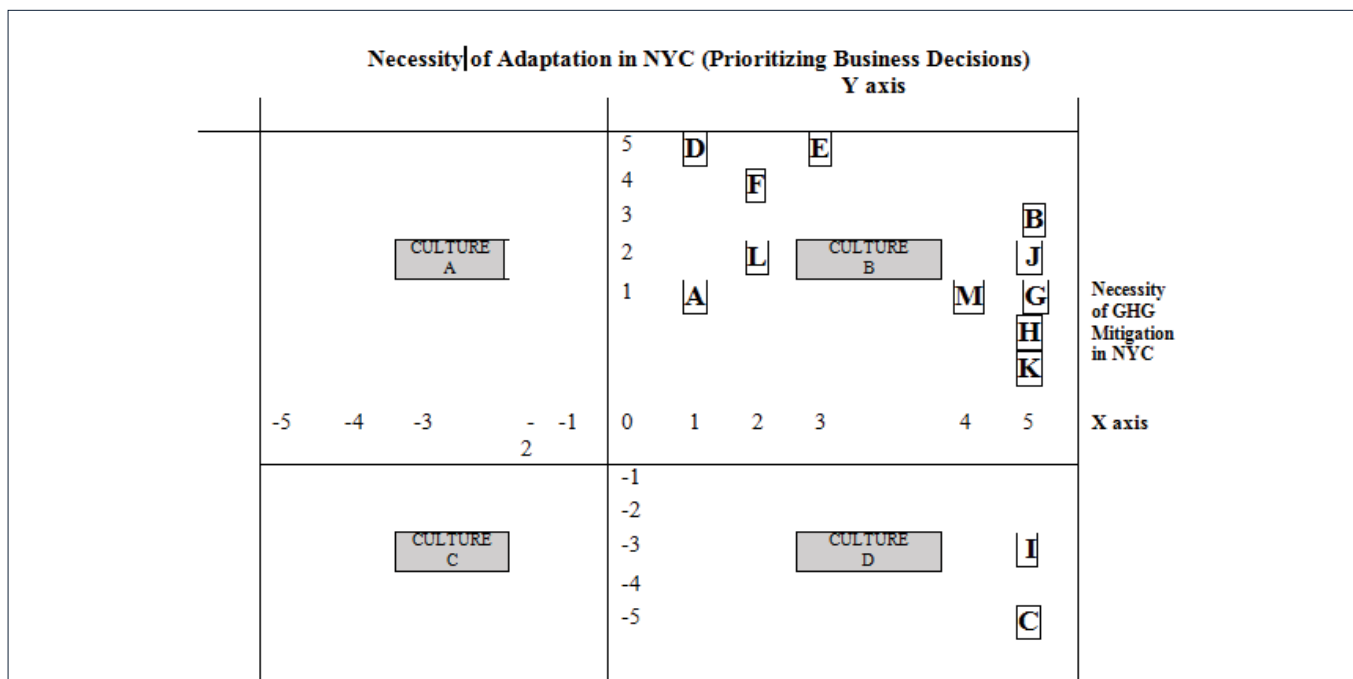
Figure1. Visualization of Relational Cultural Spaces

Key Organizations:

A. Office of Sustainability – Buildings and Energy Efficiency (2009)

B. GRESB (Global Real Estate Sustainability Benchmarks) (2009)

C. United Nations Framework Convention on Climate Change (UNFCCC) and the United Nations Environment Program (2014)

D. Real Estate Board of New York (1896)

E. Vornado Realty Trust (1962)

F. Building Owners and Managers Association (BOMA) (1967)

G. US Department of Energy's Office of Efficiency and Renewable Energy (1973)

H. NYC's Department of Environmental Protection (1973)

I. Environmental Justice Alliance (1991)

J. U.S. Green Building Council – Leadership in Energy and Environmental Design (LEED) (1993)

K. Center for Climate Systems Research (1994)

L. Global Reporting Initiative (GRI) (1997)

M. US Environmental Protection Agency's standards through its Energy Star Portfolio Manager (est.1999)

Table2.

Database	Description
Case Access Project (CAP) –Harvard Law School	Includes all official, book-published United States case law — every volume designated as an official report of decisions by a court within the United States.
EBSCO e books	Multidisciplinary collection includes thousands of e-books covering a large selection of academic subjects and features e-books from leading publishes and university presses.
Environment Complete	Contains more than 2.4 million records from more than 2,200 domestic and international titles going back to 1888 (including over 1,350 active core titles) as well as more than 190 monographs. The database also contains full text for more than 920 journals.
Green FILE	Covers all aspects of human impact to the environment. Its collection of scholarly, government and general-interest titles includes content on global warming, green building, pollution, sustainable agriculture, renewable energy, recycling, and more. 1970s - present. Mostly abstracts; some full text.
Nexis Uni	Occurrence in *New York Times*, *New York Post*, and *Financial Times*. News coverage includes deep backfiles and up-to-the-minute stories in national and regional newspapers, wire services, broadcast transcripts, international news, and non-English language sources.
Web of Science	Includes Science Citation Index Expanded (1900 - present), Social Sciences Citation Index Expanded (1956 - present), and Arts & Humanities Citation Index (1975 - present). All subjects are covered. Indexes articles from almost 10,000 journals as well as the citations in the articles indexed. Recent years include abstracts.

Table3. Usage of Key Terms in the *Environment Complete* & *Green file* databases between 1970 and 2019 (includes the number of times in titles, abstracts, and subject terms, full text within magazines, reviews, books, and academic journals indexed within these 2 environmental science databases)

	Climate Change	Environmental Justice	Environmental Risk(s)	Environmental Sustainability	Greenhouse Gas Emissions	Sustainable design	Urban Ecosystem(s)	TOTAL
1970-1979	118	-0-	11	3	-0-	-0-	46	178
1980-1989	692	6	106	69	3	-0-	139	1,015
1990-1999	8,185	493	818	2,527	641	18	198	12,880
2000-2004	10,852	743	1,514	2,794	1,260	212	377	17,752
2005-2009	39,464	1,482	4,044	7,776	5,633	1,815	1,189	61,403
2010-2014	64,919	1,296	5,570	13,260	5,813	945	1,590	93,393
2015-2019	87,257	1,329	8,321	18,648	6,669	714	1,714	124,652
TOTAL	211,487	5,349	20,384	45,077	20,019	3,704	5,253	311,273

In tracking the usage of these key words across the research databases, several important trends in publications aimed at general scientific and scholarly communities, environmentalists, journalists, and legal scholars emerge:

- "Climate change" was the most widely used of the seven terms. Its peak years were in 2008 and 2018. Interestingly, the first marker coincides with the establishment of NYC Panel on Climate Change (NPCC) and the second occurs just before the enactment of Local Law 97.

- The usage of "Environmental Sustainability" jumps in late 2005, coinciding with Hurricane Katrina, and has steadily climbed since 2009, including a spike in case laws, which indicates an increased interest in how the environment affects people's living conditions.

- "Greenhouse Gas Emissions" and "Environmental Risks" had about half the number of citations as "Environmental Sustainability;" however, the case laws for "Greenhouse Gas Emissions" peaked in 2015 – a few years after the Building and Exchange Commission began to hold educational seminars on energy and efficiency solutions in buildings.

- Journalists appear to have steadily reported on "environmental risks," beginning in 1989, with a dramatic increase after 2019. Compared to "climate change," the numbers are relatively small; but the dramatic increase may be in response to the publicity around the impending climate change legislation.

- The relatively small amount of interest in "environmental justice" until 2017, when it rose slightly, and "urban ecosystems" until 2019, shows that the public's awareness of the need to change have

not appreciably changed. In essence, "justice" implies a sense of morality whereas "risk" does not, which is probably why it showed up less.

- Finally, there were few citations for "sustainable design," which also may indicate little change in public attitudes toward the built environment.

In sum, the new knowledge could provide a framework for public officials and private citizens to understand climate change as an immediate concern and define relational cultural spaces that influence the landlord/tenant relationship. As it turns out, between 2007 and 2019, only five scholarly/ interdisciplinary publications addressed carbon reduction emissions in NYC buildings. Of these, none recognized the interplay among investors, property owners, tenants, and the municipal government; nor did they identify how new knowledge about how to reduce carbon emissions might fit into NYC's local narrative about climate change [11]. As will be discussed below, the interdisciplinary studies did not reference interactions between property owners and tenants, which has made it difficult for companies to meet the new carbon emissions standards. Only people working on the ground would know about these interactions, which is why there is a major disconnect Thus, it appears that there is no structure to normalize the connection between GHG emissions and business decisions and shift public awareness.

First, [12] provides a quantitative analysis of program design models based upon the NYC Mayor's 2030 plan. He makes the important point that heightened public awareness of climate change and inattention by national policymakers actually led NYC to focus on reducing GHG under the International Council of Local Environmental Initiatives' guidelines. In addition, he details methods for integrating enhanced building operations (EBOs) into sustainability programming, pointing

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out: "Program concepts are new; and the engineering detail is not well understood." In addition, he describes the LEED certification program and compares investments with energy-cash flow. In terms of who is responsible for making the changes, Bobker states:

Third-party property managers are technology brokers and gatekeepers; but property managers do not bear responsibility for energy costs passed on to tenants … they don't have enough pull in the market place…Municipal programs offer a long-term market for services that can build up industries… The programs have to address weaknesses in existing building commissions and operator training. (2007:6-7)

Bobker provides recommendations for NYC's municipal program that includes: 1) developing contract provisions; 2) building specific types of retrofits; 3) deepening training for consultants, property managers, service mechanics, operating engineers, and technical students; 4) encouraging team building among engineers and property management firms; 5) developing audits to avoid double counting; 6) encouraging operating engineer participation; and 7) instituting reporting requirements with financial incentives. In essence, Bobker identifies the context of the relationship between the municipal government and property owners; however, he does not take into account the pressures investors place upon property owners, nor does he acknowledge the role of tenants in reducing carbon emissions.

Second, [13] looked at the interactions between policy makers and those responsible for developing measurement tools and inventories of carbon emissions on an international level, including the IPCC, the United Nations Framework Convention on Climate Change (UNFCCC), United Nations Environment Program, the World Bank, and the World Resources Institute, among others. Their study describes how the municipal data for NYC increases the knowledge base in terms of assessing the way urban environments produce and consume the majority of the world's GHG emissions. It identifies city mayors, urban leaders, businesses, and civil society as the key actors in reducing the impact of climate change. While this study does mention the 2010 inventory initiatives through the Mayor's Office of Long-Term Planning and Sustainability, its main focus is the international context and does not shed light on how investors, property owners, tenants, and the municipal government in NYC could interact (and negotiate) to bring about change.

Third, [14], who is affiliated with the Human Rights and Public Policy programs and is the director of CUNY's Institute for Sustainable Cities at Hunter College, discusses the ways in which NYC has become a national and international leader in responding to climate risks by protecting critical infrastructure systems and residents' livelihoods. Similar to the above-mentioned research, he discussed Mayor Bloomberg's

initiatives and reflected upon the importance of future administrations in using risk-based metrics. In his analysis, he acknowledges the complexity of changing the status quo. For example, he notes that the numerous private sector firms who generate electricity for ConEdison are less likely to engage with the Mayor's office in planning.

Fourth, [15], and Ibrahim edited and published several case studies to illustrate the global breadth of the urban climate change research network, which included several prominent cities and countries. It is important to note that the NYC case studies referenced approximately 25 different municipal, national, and international organizations that had projects; and addressed multiple concerns, including urban flooding, building infrastructure and resiliency, public health, wastewater treatment plants, youth activism and science-informed policy, computer modeling of temperature changes, and interfaces between science and society. In sum, this compendium offered examples to demonstrate the multiple and diverse ways NYC is affected by climate change.

Finally, [16] acknowledged that many overlapping disciplines and competing interests are involved in planning, architecture, engineering, and real estate. In addition, this study identified the hard-to-change building characteristics that influence total energy use and carbon emissions especially for office buildings. They note:

Good building orientation, as deemed by LEED, also was not significant for office buildings: this result reflects ongoing debates about the actual energy impacts of the LEED certification process (Scofield 2009; Newsham, Mancini, and Birt 2009)… Few studies have observed the effect of characteristics throughout the life of buildings on energy consumption, taking together fundamental building characteristics, occupancy and use, and surrounding urban form … We believe that this indicates that planners and other professionals should focus their attention on where the actual energy is, or at least where and when the key decisions are made that will affect the energy use of the actual building throughout its lifetime. (2019:325-327)

From the standpoint of analyzing interactions and communication networks among investors, property owners, tenants, and municipal government, Hsu et al did allude to the possibility that tenants may actually become involved in the decision making.

Slow Increases in Tenant Awareness

While tenants might say that they are willing to invest in upgrades to the buildings they occupy, for a number of reasons, they are not aware of the increased costs that go along with expanding operations and coordinating the activities of multiple operating entities, which include assessments by licensed engineers and certified energy managers, as well as

property managers and construction teams. They may not even know that NYC's municipal government requires that property owners to report their complete building energy emissions profiles, which includes the age and type of building, weather conditions, and the increase of water levels along the coastline. In addition, for the most part, tenants do not review the hundreds of pages of leasing agreements that they sign, which includes numerous stipulations and requirements that are managed, behind the scenes, by property owners.

Complications arise when a business's sustainability team is charged with implementing the terms of leases – such as cost per square foot, escalations, and taxes— that the real estate brokers negotiated. Jay Raphaelson [24], president of Energy Watch, one of the first energy management firms to address energy reporting, explains the problem:

Although escalated in the discussion, many brokers aren't as well versed on sustainability issues; and their sustainability teams really don't have input in the lease negotiations. After the deal is completed, sustainability teams are often tasked with implementing terms that have been negotiated in the lease by the brokers; and very often [these extra expenses] come out of the tenants' pocket without the landlords' contribution because the brokers do not have the skill sets to negotiate sustainability projects.

Several experts interviewed for this paper concur that, within the past two years, nearly every business has hired a "sustainability officer" to network inside their companies to educate employees about new energy efficient standards and to tap into outside information sources to learn how to satisfy standards for compliance. However, tenants remain unaware of these initiatives and the demands that real estate investors (REITs) place on property owners to provide detailed sustainability reports. In fact, between 2014-2019, the number and types of businesses that sought comprehensive energy reports increased dramatically. Raphaelson notes:

In the past, only large businesses wanted data and analytics on energy usage; but now, even smaller businesses need it. And, while it used to be that the primary recipients of the energy data were accounting managers and building engineers, many stakeholders are now involved – including vice presidents of operations.

Two theoretical perspectives offer an explanation as to how NYC's "climate culture" might evolve – one, by [17], poses questions about the ways existing values define the limits of climate change; and the second, by [11], alerts researchers to the problems associated with introducing "new knowledge" that may not fit into a local narrative. For example, proponents of Local Law 97 hope that sustainability reporting requirements and government regulations will provide an incentive for tenants and landlords to communicate better and

share knowledge about how they can meet the GHG reduction standards in buildings. However, in the present context, the way knowledge is disseminated [6, 18] – specifically, not seeking input from tenants – presents significant challenges. That is, property owners construct information for investors and the municipal government but do not communicate with their buildings' tenants. As a result, since tenants are unaware of how property owners work with investors, they act only on what they perceive to be vulnerabilities or risks.

Interviews with Stakeholders

Those who invest in buildings – through pension funds or REITs – have the most power to advocate for a greener, built environment. Between July 2019 and February 2020, to better understand the interplay of investors, property owners, and tenants, and the municipal government, I conducted interviews with seven stakeholders, all of whom agreed to use their names and titles. I asked the following questions:

- When did sustainability reporting become important to building owners?

- Was there a significant event that motivated their interest? How has the culture (awareness of sustainability) changed?

- What are some of the risks that building owners watch for regarding energy supply? Do they adopt different strategies? If so, what are the strategies?

- What does Corporate Social Responsibility entail? When did this become important to businesses and/or the public?

- Will Local Law 97 succeed?

- What are your primary networks – in terms of sharing knowledge and information about trends in energy reporting?

- Is there a network of businesses that work together to deal with potential disasters?

Within the context of these interviews, I learned that investors want to make sure that their money is being used responsibly; and they expect property owners to implement sweeping changes. In essence, investors don't spend much time learning about sustainability; but they expect "green" results.

In contrast to REITs and other investors, landlords and property owners are positioned to keep up with the latest technology and understand how their operations could be affected by Local Law 97. Because sustainability is relatively new, property owners hire consultants to evaluate their energy usage status and suggest strategies for compliance. In one interview, Chris Cayten [19], Partner and Senior Director of Strategic Growth in the consulting firm, Code Green, notes that the Local Law 97 motivates landlords and property owners to "care" more about

the environment. To reduce carbon emissions, companies will have to do more on-site investing in renewable sources. To demonstrate their commitment, landlords and property owners develop statements about "corporate responsibility" to show what they are doing and, hopefully, to engage their employees in working towards a safe and healthy environment. According to John Forester, LEED Senior Director of Energy and Sustainability for RMR, property owners offer training programs to their employees on how to conserve energy in hopes that these values will extend beyond the workplace. Forester says: "You have to have a code of conduct and employee whistleblowing."

Outside consultants often are successful in helping property owners keep abreast of new policies and technologies and offering cost-effective solutions to reduce energy consumption. According to Emily Christoff [20], a sustainability professional: "Standards provide a framework that can help companies work towards enhanced building efficiency. However, LEED certification can be expensive, resource intensive, and therefore not attainable for all."

Another strategy businesses use is diversifying the talent pool within their companies so as not to rely on outside consultants. According to Forester, "As an organization, we have to keep in touch with technologies and things that benefit our portfolios: We need in-house expertise rather than consultants." Christoff [20] agrees: "Companies need to innovate from within. And diversity and inclusion are crucial."

While often left out of the equation, according to my interviewees, individual tenants who live or work in the buildings also need to be environmentally conscious. On the one hand, tenants became increasingly vocal about the coastline and cleaning up the environment after Hurricane Sandy; on the other hand, they are slow to evaluate their own energy usage. Nevertheless, building owners worry that if their building is "dirty," tenants might move to another place that is more environmentally conscious. Or, tenants with allergies may voice concerns about air quality within the buildings. As a sign of the times, all of my interviewees agreed that businesses have become increasingly interested in buildings that bring "happiness" to their employees, including natural sunlight and other things that promote wellness. Raphaelson observes the shift as follows:

Corporate Social Responsibility is much more than energy. It includes developing a conscience with respect to recycling, wellness, community support, and employee (and gender) equity. It really started with recruiting millennials and gen Xers in law firms. Job applicants started asking about social issues. To get people engaged and promote cohesion, employers started sponsoring, for example, "a day of giving" in which employees would help build a house for Habitat for Humanity. Opportunities for advancement include supporting causes,

and younger employees in particular want to feel that they are heard. They want to feel like they are part of something.

In NYC and globally, grass-roots climate movements are gaining momentum, especially among millennials and gen Xers. One group in particular, Extinction Rebellion (XR), is a UK based activist group that gained significant traction in NYC over the past two years. The group largely consists of young working professionals and activists who demand radical social change. They are organized, willing to risk arrest to raise public awareness, and demand urgency for climate action.

While NYC's Panel on Climate Change (NPCC) has a detailed sustainability agenda that includes incentives to convince property owners to invest their own money in capital improvements and apply for government relief grants, according to the Deputy Director for Buildings and Energy Efficiency in the Mayor's Office of Sustainability, John Lee, this is a difficult sell: "Real estate owners willingly spend tons of money on Carrara marble but they are extremely resistant to the government telling them what to do to make their buildings more energy efficient." Furthermore, according to Dan Egan [21] of Vornado, the current energy infrastructure will have trouble meeting the goals for the future. The municipal government ultimately places the burden on property owners to get to NetZero. The following figure represents the breakdown in communication (Figure Two).

While investors, property owners, tenants, and the municipal government have different operating principals –that is, investors want to know how their money is spent; property owners want to operate energy efficient buildings; tenants want healthy environments; and the municipal government wants to eliminate carbon emissions – at the same time, these four actors are trying to come to a consensus on what "sustainability" means. John Forester [22] of RMR explains:

We didn't even have a sustainability website (or a core person) until a few years ago…The skillset to me is really around the awareness aspect – if we are successful in educating our employees and our tenants around awareness. Awareness needs to stay with employees and tenants -- as they go home and they're talking with their kids or their family … The point now is to demystify what sustainability means and tie that into the roles that individuals play in their organizations.

Sociologists recognize that this new knowledge framework, and the accompanying networks have the potential to effectively implement any form of social change. For example, the law needs to be adjusted in order to provide solutions for different types of buildings. Understandable, says Chris Cayten [19] of Code Green, who has an educational background as an architect and used to work in the Mayor's Office: "There's always something new to learn so that we can help our clients [who are property owners]. There are nuances that we need to learn."
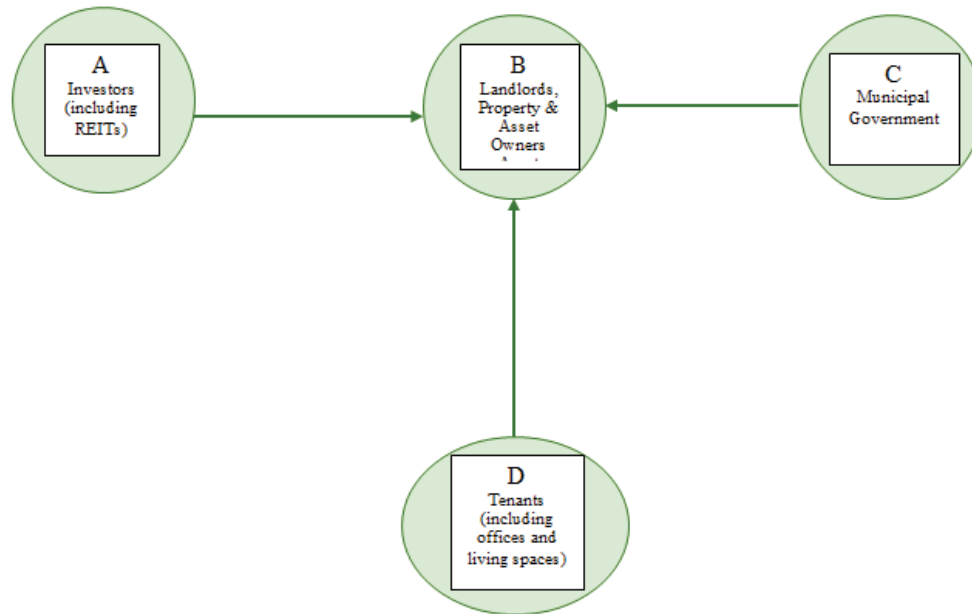
Figure2. NYC's Climate Culture Regarding the Implementation of Carbon Reduction Standards

A, C, and D exert pressure on B to reduce carbon emissions but otherwise do not become involved in B's operations. A wants greener buildings and regular reports to know how B spends A's money; C places carbon penalties on B and, as yet, does not make allowances for the different types of buildings involved; and D wants B to provide greener buildings but does not understand the costs involved.

However, the learning curve extends beyond "nuances" because the concept of sustainability is not well defined. For example, while the idea of NetZero was initially exciting to many people, the actual implementation still is unclear. First are problems with measurement tools and reporting. There isn't a great benchmarking tool for collecting building consumption data in, for example, scientific research laboratories. Second, there are concerns about the communities surrounding the buildings: While businesses look for ways to purchase energy from renewable resources, they also have to consider the impact in the community where the buildings are located.

In my interviews, stakeholders agreed that legislation creates an "opportunity" for change and that Local Law 97, which will assign steep carbon penalties beginning in 2030, will have to be altered to grant exemptions until new energy efficient technologies are created, which may take as long as 20 or 30 years. For example, there is no technology at present to make all-glass office buildings energy efficient. In the current situation, older buildings, with brick structures and small windows, fare better than newer (all glass) buildings, which would collapse under the weight of, for example, double-paned glass – one solution that was considered. Furthermore, scientific research laboratories (which require variable air exchanges) and 24/7 data processing companies will need to invest an inordinate amount of money to find energy efficient solutions. Still, according to John Lee [23], Deputy Director of the Mayor's Office of Sustainability for Buildings and Energy Efficiency, "We have to use the force of law. With a carbon penalty that is priced to be commensurate with the cost of doing the work necessary to reduce energy consumption, we think we can change the conversation."

In essence, the idea is that new conversations will lead to the development of new communication networks within organizations. In illustrating the way this could happen, Dan Egan observes the following changes within his organization:

Because of our local policy landscape on energy and climate change, I am now interacting with very broad and diverse groups of people internally in Vornado. I hadn't interacted this way before; and it means that we've even expanded our decision-making further around sustainability. That is a major development as part of governance at the board level, with a lot of new groups and people that haven't necessarily been part of sustainable decisions before. It's challenging but at the same time good because it means that we're really broadening and deepening our impact here.

In sum, while the four actors have different operating principles, they are in the midst of collectively defining and redefining core concepts in climate change – most notably "sustainability." Local Law 97 poses challenges, as well as long-term opportunities, in terms of gathering and processing new information, and then determining how best to implement those policies.

For many, public awareness of climate change seemed to happen overnight. With this came a heightened interest in legislation and, in order to keep the momentum going, more public institutions had to be created so that knowledge could be shared not only within the real estate community but also at the public level. Chris Cayten [19] explains:

Clearly something like Greta Thunberg is only this year but, in general, climate awareness is on a global scale. Maybe it's just that we're slow to the game in the US but I feel like it really only became a topic, on a global scale, literally in the last two years. For the 10 or 11 years I've been doing this, you used to have to read specific magazines or go to specific websites to hear anything about climate change. Now you see climate change mentioned in the New York Times, New York Post, and Financial Times.

Cayten [19] supports his point by mentioning the newly founded New York Climate Museum, which has an advisory board of experts in business, law, science and architecture, and a mission statement that directly addresses the importance of sharing knowledge at micro and macro levels:

The climate crisis is the defining challenge of our time. We must rise to meet it together. The Climate Museum is creating a culture for action [my italics] on climate, inviting people from all walks of life into the conversation and building community around just solutions.

To date, shared knowledge exists within the context of how businesses can continue to be efficient. As a result, the real estate community is trying to figure out how to measure success and understand the social dynamic within which every citizen may contribute. That is why landlords need metrics to compare their buildings against the same kind of buildings in other cities: the baseline comparisons are paramount. Furthermore, John Lee, in the Mayor's Office, points out that the city has to learn how to measure emissions as part of its accounting procedures. In fact, both private and public REITs are metrics-based. All are looking to quantify in some way – either against their peers or against other available investments. Dan Egan reflects on how change may happen: "Because [our REIT] is such an active contributor in NYC, we hope that our lessons learned here will spread."

In the present day, it is not an exaggeration to say that every company in the world has to take a position vis-à-vis sustainability and the environment. According to Chris Cayten [19] of Code Green, the key is to motivate educated individuals to change cultural norms:

We all talk about buildings as if they are the cause and the issue. The reality is that the buildings don't use energy: people do. If you go to places in Europe, they're used to dealing with being a little hotter in the summer and a little colder in the winter; and putting on a sweater.

If shared knowledge leads to a change of behavior, it is likely that the following three behaviors would help define sustainability: 1) tenants and landlords work together to reduce energy costs; 2) employees demand health and well-being programs; and 3) public and private investors get together on a regular basis to talk about issues and reporting standards. As

will be discussed in the following section, there are, however, substantial economic, social, environmental, and political vulnerabilities and risks that may derail even these best efforts.

Discussion and Conclusion: Sharing the Risks and Vulnerabilities

Because of its location along the coastline, NYC has serious physical risks and significant events. For example, in a worst-case scenario, a black out in certain areas of the city strain local electric grids and, in other cases, may reduce voltage and available power. Through their infrastructures and operations, companies have to plan a response, in case of fires, extreme rainfall, and flooding. In particular, building engineers focus on capital equipment replacements and conduct regular reviews to determine whether the equipment still meets the physical needs of the buildings. In predicting how to protect buildings now and in the future, property owners take into consideration the age of the building, the quality of materials, and the quality of the mechanical structure and operations. In addition to these physical risks, in the realm of climate change, property owners also deal with the risks associated with transitioning into greener buildings. Chris Cayten [19] links the grassroots push to address the environment to how investors make decisions. He notes that everyone is now beginning to move towards a low-carbon economy:

In a city like New York, one of the very stark transitional risks is the carbon cap law. If I have buildings that don't comply with that law, I will pay a fine or I will have a lower valuation. Or, it might be harder or impossible to sell. The value of my product and the long-term value of my business potentially has this transitional risk.

Also, according to [25], Executive Director of the New York Energy Consumers Council (NYECC), a major challenge in NYC is that the electric grid is not carbon free, and there are constraints on clean renewable energy entering New York City. Although this is a challenge, the situation is gradually improving with State legislation such as the Climate Leadership and Community Protection Act and regulatory policy initiatives by the State's Public Service Commission.

While renewable power would reduce buildings' carbon emissions, Local Law 97 was passed to rectify the mispricing of energy and motivate property owners to become more accountable. In accordance with the law, engineers need to assess the buildings and property owners will need to make massive capital investments. John Lee in the Mayor's Office explains:

We see these punitive measures as rectifying…Over time, as the opportunity creates itself, the result will be the useful life of equipment or tenant turnover or repositioning the building. It's not an overnight thing and there is not one solution.

In addition to physical and transitional risks, property owners must manage reputational risks. Leaders of companies address

reputational risks by gaining recognition and receiving awards for building efficiency. For example, a high Energy Star certification rating– if the building energy use intensity is below a certain number – is a key motivator. In other words, the environmental risks – both physical and transitional – must include social and governance aspects, which is why GRESB has comparable and portfolio data for investors and an Environmental, Social and Governance (ESG) benchmark for real estate and infrastructure investments across the world. Emily Christoff [20] adds:

If you don't disclose information on your company's Environmental, Social and Governance (ESG) efforts, investors will ask you about it. They closely monitor and track ESG performance over time to help inform their investment decisions. Within the past couple of years, investors are becoming much more aware of ESG reporting standards such as GRI and GRESB and more and more cities and states are requiring mandatory annual energy benchmarking requirements. We can anticipate that city and state regulations regarding energy efficiency and utility rates and the pricing of carbon will only escalate over time.

In conclusion, bringing all the relevant actors together to address these risks is a formidable challenge that requires involving those who live and work in the buildings. In order to eliminate the negative effects of the air that we all breathe, Americans must learn that what they now consider to be private places are public spaces and, as such, are part of a larger whole that has a tremendous effect on the globe. As mentioned in the introduction, this paper demonstrates that while landlords/property owners have the potential to develop closer relationships with tenants to address energy efficiency and cost effectiveness, the complexities involved in changing social practices, climate cultures, and local perceptions will take years and perhaps decades. By adopting the approach of "culture as relational space," it is possible to examine cultural formations across diverse fields of application from local to the global scales. [3] Propose an explanatory framework of climate adaptation cultures that considers the possible ways private places may evolve into public spaces – as they relate to carbon reduction standards in NYC's buildings. Table 4 identifies the vital connections that have yet to be made. The unwillingness of private citizens to care about the public good is difficult to change. For example, according to Brown University economist, Emily Oster, who researches America's response to the COVID-19 pandemic: "When we have to rely on individuals to make good private decisions for the sake of public health, behavior change is elusive." [26] Furthermore, she notes, this is not a unique feature of American society: Even at the peak of the H.I.V.

Table4. Contextual Factors of Explanation Adapted for NYC's GHG Emissions

Cultural Context (Relational Space/different orders of knowledge; shared knowledge/cognitive normative framings) – **Focused on Hurricane Katrina and Hurricane Sandy**
• Values (ranges from conservation to openness to change) – **Defined as "Corporate Responsibility" to inspire businesses to care more about the environment**
• Beliefs (human relationships with the environment; human exceptionalism)
• Identities (self-definition of individuals and groups/how they act) **Focus of Corporate Responsibility affects property owners, landlords, tenants, and investors**
Socio-ecological context (Reflecting vulnerability and change over time)
• Natural and Built Environment (support for decision making) **Investments in Renewable Resources**
• Social and Economic Resources (includes both places and institutions and who influences decision making and local disparities of power) **Municipal data leads to career opportunities and education (e.g., Energy Watch data analytics)**
Institutional Context (policies and governance)
• Nation, Region, Community **Inattention by policymakers at the national level led to local initiatives**
• Risk Governance Policies (geared to local peculiarities) **Will vary depending on the Mayor's initiatives**
• Legal Framework **How Local Law 97 is written and revised in the future; see section 3 on key words**
INTERACTS WITH ---
Climate Adaptation Cultures (continuum as relational space)
• Universalistic (protection, retreat, accommodation and openness to change) **Not operative in NYC**
• Renaturators (make room for change) **Dependent on negotiations between tenants and landlords**
• Protection (technical protection (security and conservation) values – **As proposed by the municipal government**
• Minimalists (no need to adapt) **Not operative in NYC**
Shared Knowledge of Vulnerability
• Perceptions of problems and opportunities – **to measure, see section 3 on key words – high on "sustainability" but low on "environmental justice"**
Shared Resilience Practices
• Adaptation Practices (differences and similarities in adaptation cultures between communities and individuals) – **relating to Cayten's strategies for compliance**
Time (t=1 …) **The time it takes tenants and landlords to negotiate to reduce GHG emissions**

epidemic, data from countries in sub-Saharan Africa showed limited reductions in risky sexual behavior. Thus, in order to reduce GHG building emissions in NYC, the value of Local Law 97 is not the draconian fines and new regulations: Rather, it is that tenants and landlords/property owners must form long-term connections and negotiate with the municipal government.

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Appendix A: Database Word Searches

| Keyword	Summary of database word searches
Climate Change	• <u>EBSCO database</u>: Jumped from 8 citations to 60 between 1992-1993; and steadily increased to 244 citations in 2019. It has not yet peaked. • <u>Web of Science</u>: Steady increase but has not yet peaked. The total number of citations between 1996 and 2019 is 139,574. • <u>Environment Complete & Green file</u>: The first jump in usage was between 2005-2009. Then there was a steady increase between 2015-2019. • <u>Usage by journalists</u> (from Nexis Uni): The usage was flat until 2008, and then again in 2018.
Environmental Justice	• <u>Web of Science</u>: The first instance of the use of the term appeared in a single abstract in the year 1990, in a paper entitled "The Quest for Environmental Equity -- Mobilizing the African American Community for Social Change," Society & Natural Resources 3(4), pp. 301-311. Since then, usage was flat until about 2005, when it started growing slowly, and has been increasing somewhat steadily since 2012; it appears to still be growing with peak usage in 2019 at 317 uses within Web of Science abstracts. • <u>Environment Complete & Greenfile</u>: The first usage in sources indexed within these environmental science databases was in 1976. Usage grew slowly until a jump in 1993, and then grew steadily ever since with surges in usage between 2005 & 2009, and another surge from 2018 to 2019. This data is very similar to the Web of Science data ---- which gives some consistency to the pattern within scientific discourse. • <u>Usage by journalists (from Nexis Uni)</u> –Occurrence in New York Times, New York Post, and Financial Times. The first jump is in 1994; large increase starts in 2017. • <u>Case law trends</u> (Harvard School of Law's Case law Access Project): Frequency of usage between 1991 and 2017 within digitized documents from U.S. legal cases. Peak usage was in 2014.
Environmental Risk(s)	• <u>Web of Science</u>: 17,334 is the total since 1996. • <u>Environment Complete & Green file</u>: Usage grew slowly until a jump in 1993, and then grew steadily ever since with surges in usage between 2005 & 2009, and another surge from 2018 to 2019. This data is very similar to the Web of Science data ---- which gives some consistency to the pattern within scientific discourse. Total is 20,384. • <u>Usage by journalists (from Nexis Uni</u>) – Occurrence in New York Times, New York Post, and Financial Times: Leaps in 1989, 1995, 2002, 2011 and big jump in 2020. Total # of results: 1,140.
Environmental Sustainability	• <u>Web of Science</u>: The first instance of the term "environmental sustainability" in Web of Science databases was in 1991, in two resources from a conference in Sydney, Australia. • <u>Environment Complete & Green file</u>: Jump between 2005 and 2009; almost doubled in usage between 2010 and 2014; and continued to increase between 2015 and 2019. • <u>Usage by journalists (from Nexis Uni)</u> – Occurrence in New York Times, New York Post, and Financial Times: Jumps in late 2005 (Hurricane Katrina?), late 2007, and late 2008. Steady climb since 2009. Total # of results: 738. • <u>Case law trends</u> through Harvard School of Law's Caselaw Access Project (Frequency of usage between 2002 and 2017 within digitized documents from U.S. legal cases) Peak usage was in 2009.
Greenhouse Gas Emissions	• <u>Web of Science</u>: The first instance of the term "greenhouse gas emissions" appeared in a single abstract in the year 1990, in a paper by JB Smith, entitled "From Global to Regional Climate Change - Relative Knowns and Unknowns About Global Warming," Fisheries 15(6), pp. 2-6. Since then, the use of the term has steadily increased to reach a little over 2,000 citations in 2019. • <u>Environment Complete & Green file</u>: Three citations in 1989; jumping to over 1,000 between 2000-2004 and then again 5,500 between 2005-2009 and reaching a total of 20,019 by 2019. • <u>Usage by journalists</u> (from Nexis Uni) – Occurrence in New York Times, New York Post, and Financial Times: Jumps in 1997, 2005, big jump in 2007, and steady climb since 2010. Total number of results: 8.669. • <u>Case law trends</u> through Harvard School of Law's Case law Access Project: Peak usage was in 2015.
Sustainable Design	• <u>Web of Science</u>: The first instance of the term "sustainable design" was in 1996, which were five resources from a conference in Asheville, NC. • <u>Environment Complete & Green file</u>: Citations jumped from 14 between 1995-1999 to 212 between 2000 and 2004. The peak years were 2005-2009 (1815) and then citations went down. • <u>Usage by journalists (from Nexis Uni)</u> – Occurrence in New York Times, New York Post, and Financial Times. There was a big leap in 2006 and, since then, a steady climb. Total # of results was 206. • <u>Case law trends</u> (Harvard School of Law's Case law Access Project) with a Frequency of usage between 2001 and 2017 within digitized documents from U.S. legal cases. Peak usage was in 2016; and a bump in 2008-2011.

Urban Ecosystems	• <u>Web of Science</u>: A significant climb was in 2008-2009 and 2016-2017; the highest is in 2019 with 220. The total since 1996 was 1539. • <u>Environment Complete & Green file</u>: Steep climb between 2005-2009 with a steady increase since then. • <u>Usage by journalists (from Nexis Uni) –</u> Occurrence in New York Times, New York Post, and Financial Times: Steady slow rise until 2015, then steeper rise. But the total number of results was small – only 26.
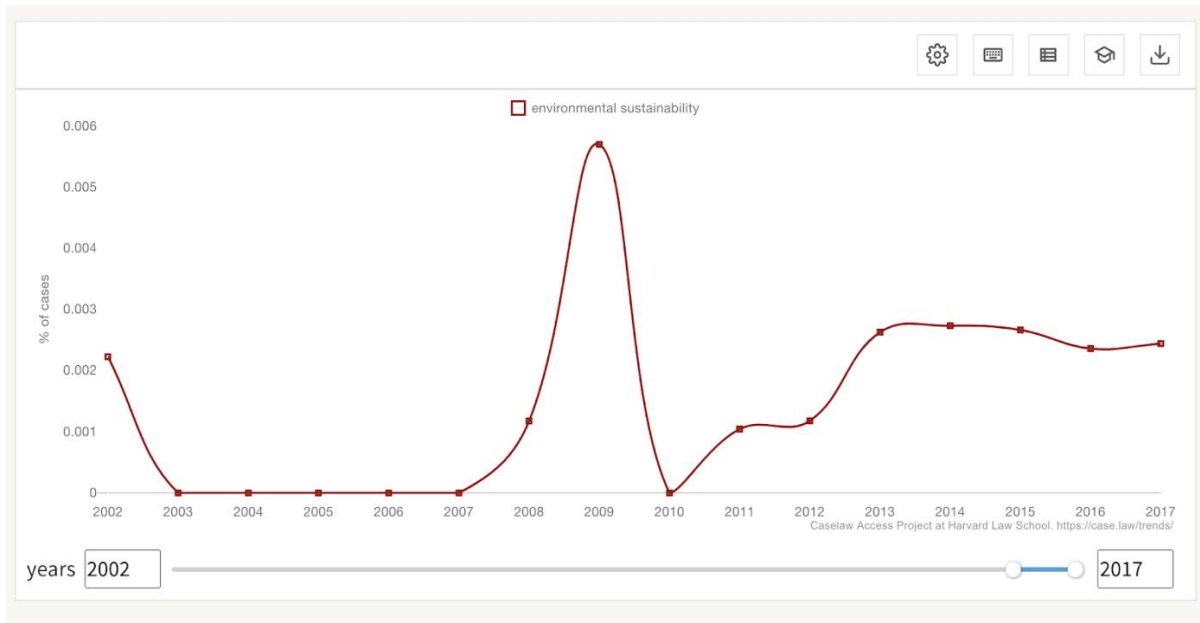
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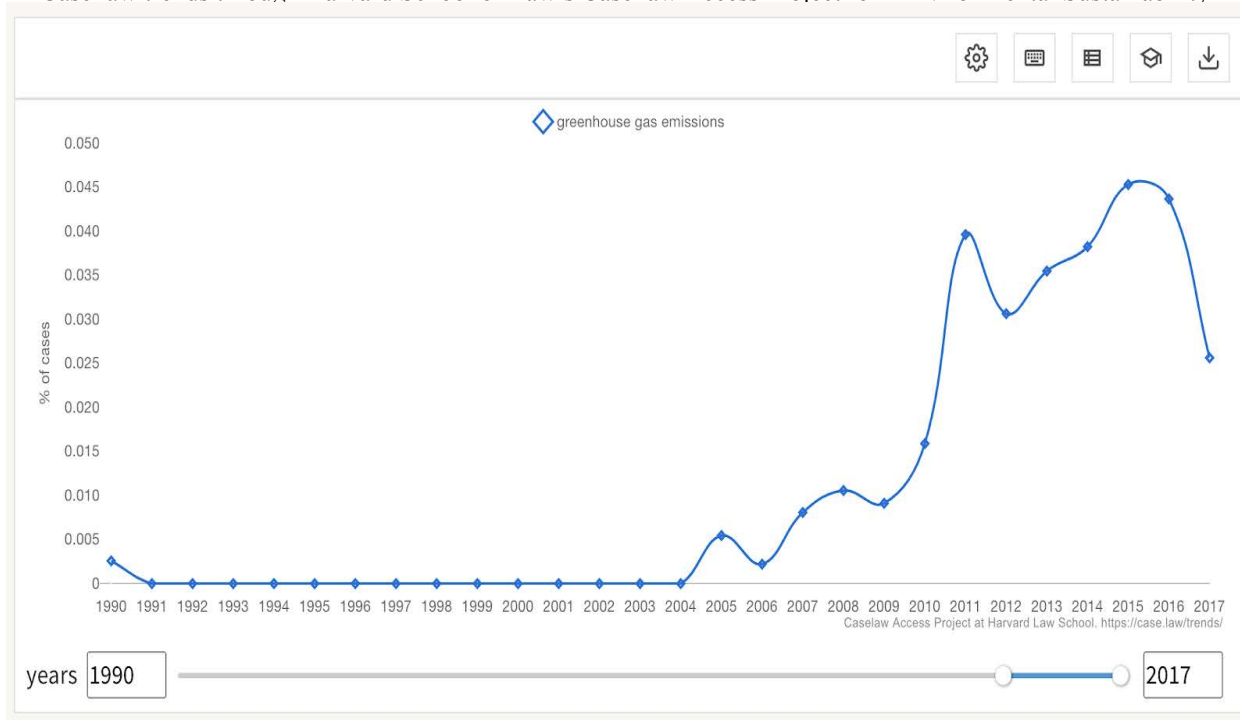
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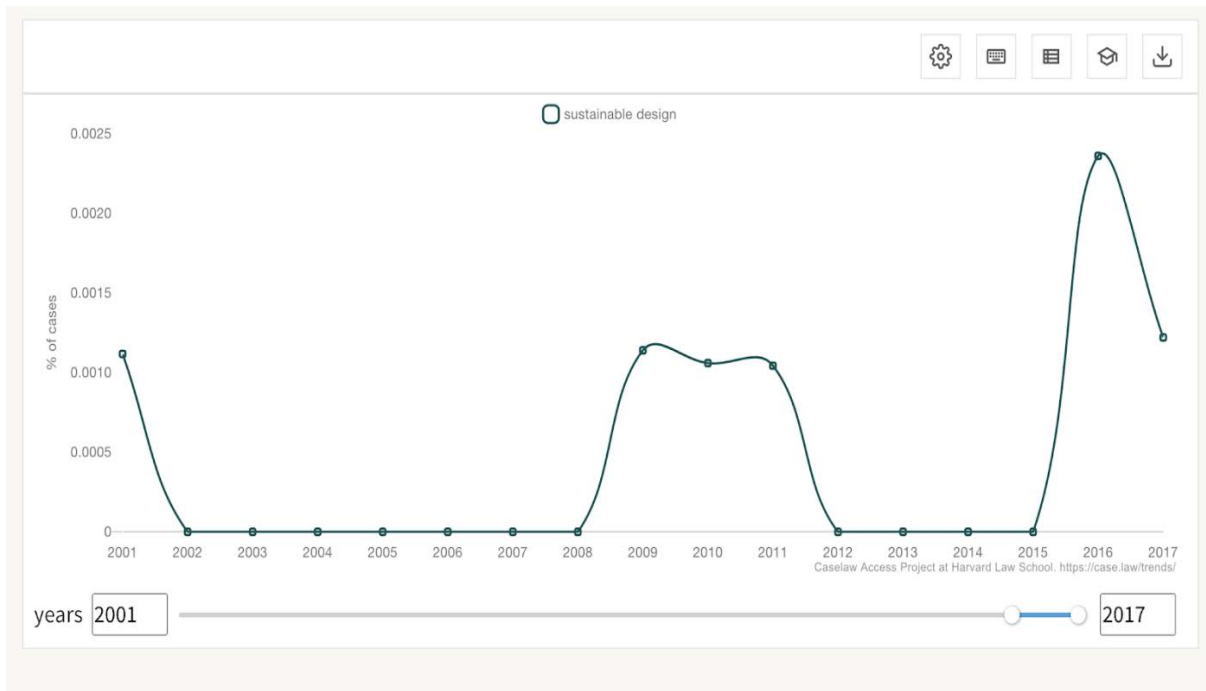
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