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**Authors**
Sims, Christo
Sivakumar, Akshita

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# Making Sustainability Concrete
## Designs for Green Architecture in Silicon Valley

CHRISTO SIMS and AKSHITA SIVAKUMAR

"Sustainable" urban development projects are realized not despite but rather through the institutionalized organization of differences. There are so many different actors involved, so many entrenched interests, so many different genres of expertise and perspectives about what sustainability is or should be, of what should or should not be built and how, that it is a rather curious political accomplishment when a new urban form gets built, promoted, and recognized by many as admirably "green." Understanding how these differences are mobilized and coordinated in practice is thus key to understanding how the politics of sustainability is made concrete in particular ways and not others.[1]

In this essay, we take a pragmatic approach to the question of how sustainability in the built form gets established materially. Rather than starting with science, the state, or another presumed ultimate arbiter of whether a project is *actually* green, we examine the construction of sustainability in the messy middle of the design process. The design process, we maintain, is a key site where the politics of sustainability play out, where different perspectives on sustainability are revealed, developed, struggled over, and settled pragmatically. By interrogating how designers mobilize and manage these differences, we aim to shed light on sustainability in the making, that is, as a process of doing politics by other means.[2]

1. While this article focuses on a sustainability project in California, we take much inspiration from critical assessments of sustainability discourse in international development regimes. As Bernstein (2001) notes, the notion of "sustainable development" that became hegemonic during the 1980s and 1990s differed significantly from the environmental protectionist approach to environmental governance that became increasingly popular in the 1970s. In particular, earlier framings tended to position industrial activity and environmental protection at odds with each other, whereas "sustainable development" allowed industry groups to insinuate themselves as necessary and powerful partners in environmental governance. Escobar (1995) draws a similar conclusion while also diagnosing the colonial underpinnings of an emergent eco-managerialism during the 1980s. Greenberg (2015) makes a similar observation in the realm of urban politics.

2. In treating design as a key site of pragmatic politics, we are indebted to feminist STS scholars, such as Suchman (2006, 2011) and Irani (2019).

To do so, we focus on the design of one of Google's new corporate campuses in Mountain View, California, called Charleston East. The building has been extensively promoted and fairly widely recognized by journalists and local political officials as an innovative and admirable case of green corporate architecture. As we show, there are good reasons to be skeptical of these claims. Indeed, we agree with scholars who point out that calls for "sustainable development" and "sustainable growth" are in many ways paradoxical (cf. Escobar 1995; Greenberg 2013; Hickel 2019) and that much contemporary corporate green architecture articulates a particularly incoherent eco-imaginary of capital (Spencer 2020). But our aim in this essay is not to debunk the sustainability claims that Google, its architects, journalists, and elected officials have made. Rather, we hope to cast light on how a particular building came to be designed in ways that allowed it to be recognized by many as a green success story. To tell an important part of this story, we focus on how different forms of expertise were mobilized and coordinated in the design process to produce Charleston East as "green."

Our exploration yields three main insights. First, we argue that the construction and stabilization of Charleston East as "green" depended not only on technoscientific expertise but also, and more so, on aesthetic expertise. As we show, the experts who participated in the design of Charleston East rendered sustainability quite differently, and they used distinct techniques to claim authority. To provide a quick gloss: aesthetic experts tended to render sustainability *narratively*: they told uplifting stories, produced awe-inspiring images, and enacted charismatic performances of what they claimed would be desirable, innovative, and sustainable futures. By contrast, sustainability experts, who tend to be trained in engineering and adjacent fields, attempted to establish sustainability by rendering it *technically*: they deployed quantified modes of measurement, representation, prediction, and comparison (Willis et al. 2017; Barber 2020), and they worked to make the proposed design compliant with standards specified by the state and other governmental agencies, such as the US Green Buildings Council (USGBC). Second, we argue that the design process, as currently institutionalized for large corporate development projects in the United States, facilitated coordination and compelled compromises among experts despite their different renderings of sustainability. Specifically, we argue that the temporal structure of the design process, a corresponding division of expert labor, and the use of shared artifacts, namely computer models, worked to circumscribe the technical work of sustainability experts, directing it narrowly toward compliance with state building codes and the collection of green building certificates. Finally, given the centrality of aesthetic expertise in the design process, we conclude with a brief reflection on why dismissing aestheticized renderings of sustainability as mere greenwashing may underestimate their political efficacy.

## Designing Green Corporate Architecture

When companies like Google hire celebrity architects, they initiate a design process that is quite standardized. In North America and Western Europe, the design of most large-scale commercial development projects is contractually organized into distinct sequential stages. While decisions made by experts in a previous stage can be altered in later stages, there are strong path dependencies in the decision-making process. Often, clients must sign off on design proposals in one stage before the architects will move to the next stage, and there can be stiff financial penalties if clients later decide to change a design direction to which they agreed in an earlier stage.

This sequentialization of decision-making helps reduce the risk of costly overruns and legal disputes for both architects and their clients. However, as we show, sequentialization also works to compel coordination and compromises among experts who have quite different understandings of what sustainability in the built form is and should be. In early stages, architects and other aesthetic experts typically take the lead. In subsequent stages, the design team enlarges to incorporate additional experts, many of whom have engineering training and specialize in specific aspects of building design and development. It is typically during these later stages that sustainability experts get involved. As we show, this sequentialization of the division of expertise has the effect of significantly restricting the design possibilities available to sustainability experts and other technical specialists. As such, experts who get involved later in the design process are often compelled to make compromises in their understandings of what makes for good green design (Rademacher 2018). Because many design decisions have already been fixed, sustainability experts tend to look for creative ways to make these earlier decisions compliant with state building codes and with the scoring criteria of green certification agencies, such as USGBC.

This mapping of a division of expert labor onto different temporal stages of the design process requires mechanisms for coordinating the work of the heterogenous experts. As with other complex production processes, coordination among experts within and across the stages of the design process is facilitated to a large degree by the use of shared artifacts. In the case of architecture, the most important of these shared artifacts are architectural models (Yaneva 2009). Throughout the design process, architects and engineers use computer software to produce models of their proposed design. As designers and their clients move between the stages, different experts use modeling software to render sustainability in disparate ways. As a project moves through the design stages, the models that experts produce transform from abstract, formal, and aestheticized renderings to increasingly technical renderings that specify how the proposed facility is anticipated to perform as well as how it should be assembled. For example, the models that sustainability experts produce attempt to predict how the proposed facility will perform against various metrics, such as energy efficiency, daylighting, and temperature regulation (Willis et al. 2017).

In keeping with Star and Griesemer's (1989) classic theorization of "boundary objects," these computer models are pliant enough to allow experts from distinct communities of practice to collaborate on a collective undertaking despite having different forms of expertise and, in many cases, divergent ideas about what makes for good green design. Since the computer models allow for interpretive flexibility, experts from different communities of practice can coordinate their activity without having to fully understand or agree with each other. When combined with the temporal division of expert labor, the shared models allow a green design project to keep moving toward materialization without the need to reach consensus among experts and other stakeholders.

To illustrate these dynamics at Charleston East, we focus on how a variety of experts rendered sustainability differently in the first three phases of the design process—*predesign*, *schematic design*, and *design development*. We also draw attention to an additional phase, which we call the *promotion phase*. During this phase, which is not an official part of the design process, clients and architects often do considerable work to present their new building favorably to outsiders, especially journalists, media influencers, and government officials. Throughout, we analyze how the design process works to compel coordination and compromises among experts despite their differences.

## Predesign and Schematic Design

One of the first things that architecture studios do once they acquire—or seek to acquire—a new commission is to develop a concept for the project. At this stage, the lead architect(s) will typically play a prominent role within the design team and in presenting ideas to clients and publics. Typically, sustainability experts and other engineers are not centrally involved at this stage. During this predesign phase, the primary model of the proposed building that the design team produces is called a *parti diagram*, or *parti* for short. Architects use parti diagrams to propose, deliberate, and establish consensus about higher-level decisions for the building's form and organization. Partis are intentionally abstract and diagrammatic. They depict the general structure, geometric proportions, exposure to the elements, sightlines, and adjacencies, without being specific about the quantitative measures of the building. They also often gesture toward influential formal ideas in architectural history. For celebrity architects, such as the ones hired by Google for Charleston East, parti diagrams also visualize the distinctive aesthetic style of the architect. In many cases, clients hire the firm of a celebrity architect over a more conventional firm because they want their building to bear the celebrity architect's distinctive aesthetic signature. Here, for example, is how a designer who worked on Google's new campuses responded when we asked them why they thought Google hired celebrity firms:

> Because they're artists more than architects. I mean, this isn't Gensler [a large commercial architecture firm], right? I mean, Gensler has a name. [But] this isn't about doing architecture for a client. It's not like, let me build you whatever. It's more like, you want a sculpture from me: you want a Bjarke Ingels, you want a Foster, you want a Heatherwick. You get a very specific style out of it.

This designer's comment begins to show how the combination of particular forms of expertise and distinctive ways of rendering architectural models work in concert to encourage acquiescence from other participants in the design of a sustainability project. At this stage, expert authority is closely tied to the reputation and charisma of lead architects, especially when they are celebrities. These narrativized performances tend to combine striking aesthetic renderings of the parti diagram—fleshed-out versions that architects call *conceptual renderings* or "money shots"—accompanied by compelling narrations by the celebrity architects and their top lieutenants. From the perspective of the architecture firm, one of the main goals of these performances is to get the client, city officials, journalists, and other stakeholders excited about their proposed design. As one consultant who has worked on dozens of large-scale development projects put it to us, "You certainly want to excite people. . . . That's what architects do: they sell ideas, they sell concepts. . . . Nobody can sell a building better than an architect."

The first conceptual renderings for what would become Charleston East were publicly revealed by Google in a 2015 video and blog post (Radcliffe 2015). The video featured Google's vice president for real estate and workplace services, David Radcliffe, and the project's two European celebrity architects, Bjarke Ingels and Thomas Heatherwick. Alongside promises to do "more with the local community" and to "lead to a better way of working," the publicity materials extensively emphasized the project's green merits, which, the spokesmen maintained, would amplify the area's existing natural wonders. "It's interesting to try and look at how you can really augment or turn the dial up more on that nature," Heatherwick remarks in the video as he pantomimes rotating an invisible nob with his hand. The new buildings, the architects maintained, would be in a harmonious relationship with the natural environment. The idea was to use long-span glass canopies supported by slender columns to envelope workplaces that could be flexibly rearranged in accordance with Google's unknown future needs. Plus, the glass canopies would allow for abundant natural light, and hence greenery, inside the structures. "These are greenhouses that enclose and protect pieces of nature," Heatherwick elucidated.

As a way to garner support for the project, these narrativized and aestheticized renderings of sustainability were quite successful. Google's blog post generated much media fanfare, both locally and internationally, and journalists and elected officials appeared impressed by the project's aesthetically striking conceptual renderings and the accompanying charismatic performances by the celebrity architects. Here, for example, is how the journalist Daniel DeBolt (2015) characterized Google's proposal in the local Mountain View newspaper:

> Google has unveiled plans for an office campus that will undoubtedly be called extraordinary. . . . Google hired European architects Bjarke Ingels and Thomas Heatherwick to develop the architecture and the result is an astounding proposal for a largely car-free campus that blurs the boundary between nature and offices. . . . Designs show a lightweight, translucent canopy draped over an open, multi-story office area, with meandering walking paths, parking hidden under picturesque green landscapes, and publicly accessible retail stores and cafes open to the public. The buildings would be LEED platinum.

While the Mountain View City Council did not approve this initial conceptual rendering, which would have required the city to grant Google the right to develop an additional 2.5 million square feet of office space in the area, city officials did eventually approve a smaller proposal that maintained the concept of long-span glass canopies. With city officials and the local news media now largely enrolled in support of Charleston East, the design team moved to the next phase in the design process.

## Design Development

As is often the case with green architecture projects, the technical work of trying to make Google's new campuses sustainable came after the presentation of conceptual renderings and after Google, city officials, and journalists had committed themselves, in different ways, to the aesthetic direction specified in the parti diagrams and conceptual renderings. Sustainability experts typically get involved during this later phase, which architects refer to as *design development*.[3] As these other experts get involved, both the genre of the models and the basis of expert authority changes. Expert authority shifts from highly aestheticized performances by charismatic architects to technical, and often quantitative, renderings rooted in the authority of numbers (Porter 1995). Similarly, the models become less aesthetically striking and more focused on visualizing quantitative information.[4]

However, once the design process has entered the design development stage, many design decisions that may have been preferable from the perspective of sustainability experts are no longer on the table. Once approved, the parti becomes an artifactual anchor, much like the plans famously analyzed by Suchman (2007: 69–84), that orients action by other experts in later stages of the design process. As an orientation device, the parti works to narrow the design possibilities available to sustainability experts. Here, for example, is how one of the experts who worked on Charleston East put it to us: "The problem with . . . bringing in consultants at a later stage" is that "it's like a Band-Aid. You're trying to fix problems when you could have avoided them if the design was different."

In the case of Charleston East, an obvious problem with the concept renderings was the aesthetically striking long-span glass canopies. While these canopies helped generate excitement from the client, city officials, and journalists, they were problematic from the perspective of sustainability experts. "It was designed to look cool," one of the experts who worked on the project told us. "But you can't put a glass box in California. How are you going to keep it cool?" Unlike plants, most humans do not like living and working in greenhouses, so Google would have to consume extensive energy to control climate under the glass (Barber 2020). While the architects eventually compromised and jettisoned the glass, they maintained the idea of long-span canopies that had been central to the original conceptual renderings. Instead of glass, the canopies would now be metal with clerestory windows allowing natural light to enter the interiors.

However, this version of the design still raised concerns from sustainability experts. One of the first tasks of sustainability experts who work on architecture

3. In our interviews with sustainability experts, a few stated that some architecture firms are now trying to incorporate sustainability experts earlier in the design process, but the transformation is still very much unsettled.

4. While there is an emergent aesthetics to the visualization of technical data, these visualizations have yet to acquire the same charismatic authority of parti diagrams and "money shot" conceptual renderings.

projects is to anticipate the energy efficiency of a proposed design. To do so, they use modeling software that produces quantitative measures of the building's anticipated energy use intensity and operation costs. These technical renderings of sustainability are configured to comply with building codes specified by the state and, if the client wishes, with sustainability standards issued by nongovernmental organizations, such as USGBC, that issue green building certificates, like LEED. When rendered technically in this way, the modified models of Charleston East still faced sustainability challenges. While a metal canopy would make the building more efficient to cool than a glass one, metal was also suboptimal from an energy efficiency perspective because it reflects light and conducts heat, thus creating a thermal bridge between the outside and the inside and increasing the energy load on Google's facility. Similarly, the building canopy was designed to be symmetrical for aesthetic reasons, whereas, from an energy efficiency perspective, the optimal configuration of the canopy, its windows, and its shading devices would be tailored to the trajectory of the sun.

Because of these and other decisions that had been committed to in the parti and concept renderings, when sustainability experts first modeled energy use intensity for the version of Charleston East with a metal canopy, the model suggested that the building would exceed both state and city regulatory thresholds for new commercial office buildings.[5] But because the design team committed to a design direction that featured aesthetically striking long-span canopies, the sustainability experts were fairly limited in term of the alterations they could recommend to meet governmental requirements. There are two main recommendations the sustainability experts made to resolve these tensions. First, the sustainability experts proposed several efficiency improvements to the building's mechanical, electrical, and plumbing systems—such as using an efficient fan for the building's HVAC system—as well its lighting scheme that, cumulatively, would allow models of the building's energy use intensity to squeak under regulatory thresholds. Second, the design team proposed covering the entire metal canopy in photovoltaic (PV) shingles.

But here, too, the proposed solutions were not optimal in terms of energy-use efficiency. For one, the symmetrical geometry and orientation of the canopy would prevent the PVs from maximally harvesting available solar energy. For maximum solar energy capture, the PVs would need to face due south at a thirty-degree incli-

5. Energy use intensity is usually calculated as anticipated annual energy use per square foot (or meter) per year. Because Charleston East was being built in California, the designers had to meet or exceed thresholds for energy use intensity that are set by Title 24 of the state's building codes. Additionally, the City of Mountain View requires new commercial office space to exceed Title 24 standards by 10 percent. The design for Charleston East with a metal canopy initially failed to meet either of these regulatory thresholds.

nation, sustainability experts pointed out, but because the canopy was designed to be symmetrical for aesthetic reasons, it aimed many of the PV shingles in directions that would capture little sunlight. Similarly, PV shingles are more expensive and 20–30 percent less efficient than conventional PV panels. Finally, while black PV panels capture the most solar energy, some members of the design team were concerned about the aesthetics of a black canopy. As one member of the design team suggested to us, "If they're black, is it going to look like a little cockroach?" So, the design team compromised and went with silver-colored PVs, which capture less energy than black ones, but which were deemed superior for aesthetic reasons.

Despite these compromises, Charleston East is on path to qualify for a top LEED certificate. While critiqued by many sustainability experts and academics (cf. Navarro 2009; Cidell 2015; Faulconbridge 2015; Knuth 2016), LEED certificates remain the dominant way architects and developers in the United States certify their projects as "green." As such, assumptions about sustainability that are encoded in LEED's scoring system further circumscribe how sustainability experts render sustainability technically. For example, LEED evaluates energy performance based on models of annual *energy costs*, not energy use or efficiency. In measuring energy performance in this way, LEED makes energy efficiency and monetary efficiency commensurate, even though reductions in energy cost can sometimes lead to increases in energy consumption, including consumption that emits more greenhouse gases.[6] As such, a building with high energy use intensity, such as Charleston East, can nevertheless score highly with LEED's scoring criteria because PV arrays allow a company to purchase less energy from the municipal grid, thus lowering its energy costs as measured by LEED. With LEED certificates anticipated, Google and its architects could present their revised models of Charleston East to journalists, government officials, and publics as both innovative and green. They predominantly did so in the final and extended phase of the design process, which we refer to as the *promotion phase*.

## Promotion Phase

During the promotion phase, which typically occurs immediately prior to a building's occupancy, clients and their architects often engage in extensive publicity campaigns that attempt to promote their projects as distinctively innovative and

6. For example, in the United States it is often cheaper to purchase natural gas than electricity, even though consumption of the former emits greenhouse gases whereas the latter can be generated in ways that do not emit greenhouse gases.

ecologically virtuous. During this phase, the division of expert labor and the renderings of sustainability often mimic those that were used in the predesign phase. The authority of, or trust in, numbers is mostly absent, as are the sustainability experts. In their place, clients and their architects often reference the authority of accreditation agencies, but they also rely extensively on the status and charisma of the lead architects as well as highly aestheticized renderings of the buildings themselves.

In the case of Charleston East and its sibling campus, called Bay View, Google released a flurry of highly produced promotional materials announcing the opening of its new campuses. The celebrity architecture firms engaged in a similar, if less well-resourced, publicity blitz. All the promotional materials extensively featured expert-produced visual media that foregrounded the campuses' distinctive aesthetic features: the PV-covered canopies, which Google branded as "dragonscales," and an abundance of greenery. These aestheticized renderings were accompanied by compelling narrations that prominently featured the project's celebrity architects and the buildings' anticipated LEED certifications. At the same time, these publicity materials mostly concealed sustainability experts' technical assessments of the buildings' performance, such as its energy use intensity.

These publicity efforts have largely been successful. "Google Opens Futuristic Mountain View Campus Where Four Thousand Will Work: New Complex Will Be a Green Campus Powered by Thousands of Dragon Scale Solar Panels," stated the headline in the *Mercury News,* the predominant newspaper in Silicon Valley (Avalos 2022). Similarly, Google's press release included supportive statements from the mayor of Mountain View—"We applaud Mountain View's largest employer for its commitment to green building"—and from the local congresswoman, Anna Eshoo. Expert consensus aside, the new buildings were largely received as a green success story.

## Epilogue

Google wanted a cool and futuristic-looking campus that could also be touted as green. In the design process, experts who specialized in rendering sustainability aesthetically took the lead and experts who rendered sustainability technically appended their insights, like a "Band-Aid," to meet regulatory requirements and to collect green building certificates. Nevertheless, Google's new campus has mostly been received as an innovative and compelling case of green corporate architecture. Given this, it can be tempting to interpret Google's new campuses as yet another example of corporate greenwashing. The charge is not so much inaccurate as insufficient. It is accurate insofar as Google's highly visible "green" campus, much like the metaphor of "cloud computing," can obscure the substantial material resources, infrastructures, and e-waste that undergird our digital lives (Ensmenger 2018). Yet aesthetic renderings of sustainability do more than just cloak digital capitalism's material bases. As we have shown, aestheticized renderings of sustainability were integral to, rather than merely draped on, the production process: they helped enroll diverse actors in the project, and they dictated and circumscribed how sustainability experts applied their expertise. As such, aesthetic renderings of sustainability were instrumental in shaping how lofty ideals about sustainability were made concrete in particular ways and not others. Given this, dismissing green corporate architecture as mere branding may miss some of the important political work that is being done by aesthetic renderings of sustainability. Technical renderings of sustainability, however scientific or authoritative, do not in themselves appear to provide sufficient resources for differently positioned people to imagine desirable material futures.[7] In the absence of compelling imaginal alternatives, corporations' efforts to render sustainability in the built form aesthetically can be seductively appealing, reassuring, and even exciting to people who are rightly anxious about the destruction of the planet. If so, then struggles over sustainability cannot be fought with facts and technical expertise alone, nor can they be limited to policy battles, although both are critical sites of environmental contestation. If companies like Google are using design to render their politics of sustainability aesthetic, then environmentalists can respond by not just wielding science or attempting to command the apparatuses of the state but also by politicizing design.

**Christo Sims** is associate professor of communication and affiliate faculty in Science Studies, Urban Studies, and Ethnic Studies at the University of California, San Diego.

**Akshita Sivakumar** is a PhD candidate in communication and science studies at the University of California, San Diego, with a background in architecture and design.

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7. Jacob Foster makes a similar observation, but in relation to the social sciences, in his article for this issue.

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