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“Breakthroughs” for a green economy? Financialization and clean energy transition

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ABSTRACT

Reimagining energy infrastructures for the 21st century increasingly means choosing between competing economic futures, a dilemma that is now provoking conflicts across many places and realms. In the United States, one critical clash is unfolding among tech sector advocates for a clean energy transition, as U.S. cleantech has worked to regroup from Silicon Valley's failed clean energy manufacturing push of the late 2000s and to navigate an ongoing solar trade war with China: about what that transition might look like, how it might be achieved, and, critically, what economic sectors and rents might emerge from it. One set of entrepreneurs and venture capitalists argues that “breakthrough” clean energy technologies are needed to produce an energy transition and to bolster U.S. economic power into the 21st century. Meanwhile, a competing set prioritizes deploying existing technologies and infrastructures at scale. The latter argues that new *kinds* of innovation can accomplish this task, and in the process defend embattled U.S. hegemony: notably, so-called *financial* innovation, and new articulations between finance and high tech. This debate has major implications for the nature and global politics of a green economy.

1. Introduction

As political factions in the United States clash over the prospect of a clean energy transition, it has become increasingly clear that reimagining the country's energy infrastructures for the 21st century means choosing between competing national economic futures. In the U.S. context, worsening conflicts with embattled fossil fuel industries and regions dominate much of this discussion, with new populism around the demise of U.S. coal only the latest, most confused – and recently most significant, in the wake of the 2016 Presidential election. However, fossil fuel industries' rhetorical and institutional assaults on renewables, and clean energy supporters' own recent organizing successes against fossil fuels [1], are far from the only face of this struggle. In this paper, I will engage a debate that I argue has profound significance for the future of clean energy in the United States, the nature of the green economy that energy development might produce, and the shape of U.S. power within 21st century capitalism. In the late 2000s and early 2010s, U.S. clean energy advocates experienced a profoundly confusing phenomenon, one that is still reverberating through the industry: Silicon Valley led a would-be boom in “cleantech” innovation and manufacturing that lapsed into an embarrassing failure, one that still tarnishes the sector in the minds of many. Almost simultaneously, renewables recorded a wave of staggering successes: the country saw a surge of solar and wind energy deployment, and a radical cheapening of

these technologies. Through this ongoing wave of infrastructure development, renewables have achieved cost-competitiveness with fossil electricity sources in an increasing number of markets across the country. This highly disparate experience has provoked contrasting – and competing – visions for the future of U.S. clean energy, and a clean energy economy.

On the one hand, as I will discuss in the first section of this paper, entrepreneurs and venture capitalists that had backed Silicon Valley's failed cleantech boom were profoundly frustrated in its wake. With new self-appointed spokespersons like Bill Gates, in the mid-2010s they set out in search for an explanation of what had gone so wrong – and how it might be remedied to advance the sector moving forward. They expressed a keen sense of opportunity lost for U.S. companies to develop “breakthrough” renewable energy technologies to transform the sector and the U.S. economy into the 21st century. Moreover, as I will explore in the second section, they sought governmental protection against a competitor their past experience equipped them poorly to fight, as China rose to become a global clean energy manufacturing leader not on the strength of new research breakthroughs but on the mass production and deployment of long-mature technologies – ones that the United States had played an important role in developing, but had chronically neglected in deployment.

On the other hand, as I will argue in the third section, a competing set of entrepreneurs and financiers saw in the U.S. wave of renewable

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energy infrastructure deployment in the 2010s – and the cheap imports that helped enable that boom – a major new opportunity. They maintain that the United States has not lost its chance for genuine clean energy breakthroughs, nor for the international comparative advantage and monopoly rents, private and public, these innovations might bring. Rather, U.S. public and private actors should reimagine (more accurately, *continue* to reimagine) what “counts” as innovation, within cleantech and full stop. They have proposed ways by which Silicon Valley entrepreneurs might remake cleantech in information technology’s image, a “Cleantech 2.0”. Crucially, within this broader rethinking they have framed *financial* innovation, and a rising “fintech” sector, as a legitimate and necessary source of breakthroughs in renewable energy deployment – arguments made before the late 2000s financial crisis for financial productivity, financial engineering, and U.S. financial hegemony returned in a green, high-tech form.

With this paper, I take up a debate that has become central to the politics of energy transition and its articulation with green economic development in and beyond the United States, but that has been surprisingly neglected in critical scholarship. In the United States, questions of the *sufficiency* of energy, its basic affordability and security, have receded in domestic energy politics – not the case when modern clean energy technologies were developed in the 1970s. Instead, proponents frame renewable energy development and broader clean energy interventions¹ as a vehicle for novel forms of innovation, economic development, and political economic power – would-be qualitative transformations and secular expansions within a global capitalist economy. This narrative has built on preexisting discourses of high-tech “disruption” [1] and rejuvenated U.S. hegemony, including decades-old arguments for a “service economy” and “New Economy” to be led from innovative urban-regional economies like Silicon Valley. As I will argue, it has simultaneously inherited, and stands to further, a longstanding “financialization” of these performative visions of U.S. innovativeness and sustained power [2,3].

Theoretically and methodologically, this discussion advances new political and cultural economic scholarship on green economic development (and clean energy transition as a central project of that development), financialization, and, crucially, the deepening articulations between these contemporary processes [4–10,1]. I argue that the tech and infrastructure debates explored here present a distinct and significant face of broader financial sector interest in the green economy. I foreground both the narratives through which competing interests are making their case today, and the longer-term structural conditions and discourses that have helped shape these arguments. Particularly, I focus on a specific instantiation of today’s debate provoked by Bill Gates’ formation of a so-called Breakthrough Energy Coalition in the lead-up to the 2015 Paris climate talks – a move that prompted critics to articulate competing versions of cleantech’s future. In contextualizing this contemporary debate within broader political economic transformations, I build upon work by geographical political and cultural economists [11–15,1], economic sociologists and innovation theorists [16,2,17] and science and technology (STS) scholars, particularly those working within the emerging cultural political economy of research and innovation (CPERI) [18,19].

2. A Breakthrough Energy Coalition? U.S. “Breakthrough” Debates in the 2010s

In the lead-up to the Paris COP21 climate meeting in 2015, Bill Gates and two dozen other tech and finance billionaires announced a bold investment commitment for climate change mitigation: they would collectively dedicate billions of their private funds to the development of “breakthrough” clean energy technologies, profoundly

novel innovations to transform (and “disrupt”, e.g. [1]) energy production and use in the 21st century. Gates, who spearheaded the formation of this Breakthrough Energy Coalition, took a lead role in representing its mission (e.g., [20–23]). The Coalition demonstrated a faith in the power of the private sector and so-called angel investment long familiar from narratives of Silicon Valley’s success, as both private and public actors promoted its “open” model as the heart of the U.S. innovation system. Unusually, however, the Coalition also appealed to *governments’* role in technology development – a role that venture capitalists, entrepreneurs and policymakers have ignored and undermined for decades, as the rise of neoliberal economic thought since the 1970s and its successful attack on the Keynesian developmental state made overt U.S. industrial policy increasingly politically intractable (even as “hidden” industrial policy in diverse forms continued and even intensified) [24,16,17,19].² Gates and others billed the Coalition as the private sector counterpart to Mission Innovation (which Gates also helped coordinate), a twenty-country commitment to double national clean energy research and development (R&D) between 2015 and 2020. Even as the 2016 Presidential election raised significant questions about the U.S. government’s willingness to honor its pledge, Gates and company moved ahead with their private investment vision, shortly thereafter announcing a \$1 billion fund called Breakthrough Energy Ventures [25]. With these initiatives, Gates furthered a particular vision of clean energy transition, one that he had advanced in various forms through the 2010s:

We need an energy miracle...a massive amount of research into thousands of new ideas—even ones that might sound a little crazy—if we want to get to zero emissions by the end of this century...Within the next 15 years...I expect the world will discover a clean energy breakthrough that will save our planet and power our world [22].

Although many in the U.S. business press lauded the Breakthrough Energy Coalition’s blend of billionaire philanthropy and enlightened investor self-interest, it has received a critical reception from a number of leading clean energy policy experts, entrepreneurs, and financiers (e.g., [26–30]). Many, like Romm, are established critics of Gates’ energy ‘miracle’ argument, similar claims advanced by entities like the Breakthrough Institute (and see [19]), and the basic philosophy of energy transition that underpins these narratives.³ In focusing on basic R&D and blue-sky energy breakthroughs, Gates and the Coalition downplay the significance of existing renewable energy generation technologies – especially wind power and solar photovoltaic (PV) infrastructures now being deployed at scale in the United States and globally. Critics argue that this preoccupation with *new* breakthroughs erroneously dismisses existing clean energy technologies, their ongoing improvement, and the dramatic progress now being made in their mass production and deployment. In other words, it misses a breakthrough that has already *happened*, as key renewable energy technologies developed in the 20th century finally come into their own. For example, the well-known cleantech entrepreneur Jigar Shah argues, “we already have the technology to solve climate change”. He elaborates:

The challenge with Gates’s announcement is that while he and others are filling a real need, it is not the most pressing need...solar and wind are winning around the world not because of fundamental technological breakthroughs, but instead because after 30 years the banking sector is finally comfortable scaling up their use...we can always use more and achieve better. But for once we have to stop satiating the public with

² A trend that has shaped energy-industrial discourses and policies across many contexts; see e.g., Tarasova [62].

³ Gates’ long-term support for nuclear energy and embrace of the climate skeptic Bjørn Lomborg have also drawn particular fire from Romm, Shah, and others. Indeed, Mulvaney [13] excavates a historical renewable energy breakthrough versus deployment debate between Lomborg and Carl Pope, former Chairman of the U.S. Sierra Club, that anticipates many of the tech sector arguments explored here.

¹ For example, around energy efficiency, green building and retrofitting, and other interventions not treated in depth here (but see [8]).

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