

Green Devaluation: Disruption, Divestment, and Decommodification for a Green Economy

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Abstract

This paper argues that taking up questions of value can help political ecologists and economists develop a more powerful analysis of the green economy, as it introduces new urban, industrial, and technological dimensions into a self-identified green capitalism. More specifically, I maintain that processes of green devaluation, decommodification, and techno-industrial replacement are as important in understanding green economic development as new value enclosure and green growth. Twenty-first-century green economic politics have been marked by Schumpeterian ambitions and zero-sum intra-capitalist struggles, alongside a more general hardening of anti-fossil fuel industry politics from both grassroots climate justice activists and, increasingly, mainstream investors. I explore three interrelated initiatives—disruptive innovation in Silicon Valley cleantech, the US fossil fuel divestment movement, and the global financial industry’s stranded assets organizing—as windows into these struggles. Themes of devaluation, obsolescence (both technological and “moral”), and (more or less absolute) decommodification carry through this discussion as activists struggle to translate quantitative advances against fossil fuels into a more profound qualitative break. Understanding these fights is essential to developing more effective engaged scholarship on climate change and a just energy transition.

Keywords: green devaluation; fossil fuel divestment; green economy; decommodification; obsolescence

The economic crisis of the late 2000s provoked a major shift within neoliberal capitalism and, centrally, neoliberal *environmentalism*. Alongside its unleashing of global finance and attacks on Keynesian and Developmentalist welfare states, neoliberalism had pioneered new forms of accumulation by dispossession at the periphery; notably, “green” value enclosures and land/resource grabs. Nevertheless, the 2008 collapse demonstrated to many the neoliberal turn’s failure to secure capitalism. As more radical voices called for breaks from a system in crisis, heterodox economists fought back from the margins to gain the ear of powerful governments. The American Recovery and Reinvestment Act and other national

recovery programs adopted neo-Keynesian rhetoric, advocating technological rejuvenation, the creation of quality manufacturing jobs, and a return to “real” economic development. Critically, many looked to a “green economy” as the driver of this economic transformation (Block 2011; UNEP 2011; Bailey and Caprotti 2014). Green economic development programs reframed neoliberalism’s environmental project as industrial and innovation policy—the dream of ecological modernization (Mol and Spaargaaren 2000) prioritized and funded to an unprecedented degree in countries like the United States and China. Programs pledged support for rising “cleantech” industries, particularly ones developing renewable and alternative energy. At the same time, by moving to wean their economies off fossil fuels, they sought to mitigate the longer-term crisis of climate change.

Critical environmental scholarship has confronted so-called green capitalism in many forms, but it has only begun to take on the green economy. In this paper, I argue that one of the green economy’s most important effects has been to move creative destruction (Schumpeter [1934] 2011, [1942] 2008), and a more aggressive, zero-sum conception of green growth, to the center of green capitalist politics. In the United States, Green Keynesianism has been disappointed in many ways by neoliberalism’s enduring power—ongoing financial short-termism, pressure to offshore manufacturing, and working/middle-class economic precarity have so far checked many green jobs hopes. However, green *Schumpeterianism* is alive and well. Prominent neo-Schumpeterian economists and innovation theorists (Mazzucato 2013; Perez 2013) continue to interpret the green economy for academic and popular audiences, for example through notions of socio-technical/energy transition and transformation. Critically, narratives of “disruptive innovation,” zero-sum technological and industrial competition, pervade green capitalism’s new high-tech spaces. Alternative energy enterprises aim to disrupt the existing energy industry, overturning established technologies, organizational forms, and companies (and production regions and geographies of capital). More recently climate justice activism tacitly enlisted itself behind this intra-capitalist struggle, as entities such as 350.org wage a major campaign to pressure endowments, pension funds, and other institutional investors to financially divest from fossil fuel companies, with or without reinvestment in their green competitors. Fossil fuel companies have proven a difficult target for Silicon Valley’s would-be disruptors. However, financial players are increasingly compelling the energy industry to prepare against enforced technological replacement, as they quantify and publicize the epochal financial risks of “stranded assets”—a multi-trillion dollar devaluation of fossil resource reserves, and a global geography of property rendered unusable.

With other papers in this collection, I emphasize value theory’s ongoing power to shed light on the workings of capitalism, and green capitalism specifically. Here, I focus on the aforementioned strategic *devaluations* being waged in the name of a green economy. I explore what I call “green devaluation” via projects of disruptive innovation, divestment, and

asset stranding, framing them as an interrelated set of politics. Methodologically, I analyze cleantech discourses developing among venture capitalists and tech industry analysts, organizing visions articulated by the divestment movement, and stranded asset assessments released by investors and organizations such as the Carbon Tracker Initiative and Oxford's Stranded Assets Research Network. Interpreting these interconnected discourses and practices, I argue that the green economy's devaluations encompass far more than simple competition for customers, with seesawing revaluations as opposing companies and energy sources gain and lose market share. Instead, they suggest a more absolute, structural devaluation of fossil fuel assets and fossil fuel companies as we know them—one perhaps best expressed in terms of technological and “moral” obsolescence, and, ultimately, decommodification. This decommodification is an understudied but increasingly significant corollary of more familiar processes of green enclosure.

Theorizing Green Value and Devaluation

Critical environmental scholars are increasingly taking up questions of value in their examinations of the formation and failings of new environmental markets. These markets, and their commodities and value forms, are based on previously non-marketed “ecosystem services,” pollution (or, rather, pollution-prevented/mitigated), and other environmental “externalities” and pro-environmental actions traditionally ignored by economics and business practice. Critiques have analyzed emerging mainstream processes of green commodification theoretically and historically, from utilitarian framings of biophysical processes (the creation of novel use values) to formal assignment of exchange values, their appropriation, and market creation (e.g. Foster 2002; Castree 2003; Heynen et al. 2007; Mansfield 2009; Prudham 2009; Gómez-Baggethun et al. 2010). However, investigations of green markets have engaged more extensively with particular valuation attempts and their failings/failures (often following Polanyi [1944] 2001) than with the broader systemic role that green enclosure might play in the expanded reproduction of capital and capitalism; for example, questions of *surplus* value production and appropriation. Existing research most often discusses surplus value as stolen from various “outsides” in processes of accumulation by dispossession (e.g. Harvey 2003; Moore 2015). However, the green economy's move into urban and industrial geographies prompts us to consider more expansive analyses of value, surplus value, and the reproduction of (green) capitalism.

Emerging attempts to theorize the green economy are beginning to engage familiar processes in geographical political economy (e.g. Harvey 1982; Storper and Walker 1989; Sheppard 2011): high-tech struggles; industrial formation, competition, and decline; urban-regional investment and disinvestment. In value terms, the green economy's move into urban and industrial geographies suggests additional sources of surplus value, including labor exploitation in the classic Marxian sense (Marx [1867] 1990) and urban and rural land

rents (Knuth 2016; Smith 2007). Of particular interest here, “technological” (or “Schumpeterian”) rents are often framed as a more virtuous form of surplus. The concept describes the more or less transient monopoly (and monopoly rents) that innovators can command before a technological breakthrough is generalized (Storper and Walker 1989). Technological rents are particularly applicable where, as with the green economy, innovators aim at a major intensive expansion and secular transformation within capitalism, not simply extension of the existing system at its peripheries. In this type of would-be industrial revolution, enterprises *produce* novel value frontiers in addition to merely enclosing them, creating dramatically new kinds of technologies, products, and use values (see Walker forthcoming 2016). Although the green economy’s “green growth” vision demands critique, including but not limited to new environmental externalities created by renewable energy production (e.g. D’Alisa et al. 2014; Mulvaney 2014), we must seriously consider alternative energies’ more limited, strategic proposition: to grow themselves at the expense of fossil fuels, a uniquely damaging industry in an era of climate change. In this sense, green economic development suggests destruction and zero-sum *replacement* as much as net expansion (although it ultimately aims at both).

Theoretically, both Marxian political economy and Schumpeterian disequilibrium economics emphasize technological development under capitalism as a destructive process, one that indeed produces *devaluation* as much as new value, industrial development, and technological surplus. Marx’s theorization of value as socially necessary labor time explicitly defines the concept relationally and technologically, a contingent reflection of the state of competition in an industry and the general forces of production in a given time and place. From this starting point, he derives major insights into how capitalist producers are compelled to constantly innovate or be outcompeted; enlisting organizational revolutions, new technologies, and non-human forces such as fossil energy to maintain competitive labor productivity— all only postponing and socializing eventual crisis. In Marxian value terms, capitalism’s permanent technological revolution manifests in part as “moral depreciation,” when industrial fixed capital is devalued by technological competition before the end of its useful material life. In contrast, Schumpeter draws on Marx but is far more sanguine about technological innovation’s destabilizing tendencies. He famously lionizes “the perennial gale of creative destruction” (Schumpeter [1942] 2008, 84) as necessary to advancing an inventive capitalism. Schumpeter expands upon Marx’s discussion of productivity-enhancing technologies within existing industries in an important way, drawing on Kondratieff’s theory of economic long waves: he thinks more centrally about technologies creating *new* industries, and industrial revolutions (see Storper and Walker 1989; Walker forthcoming 2016). This is precisely the kind of epochal transformation neo-Schumpeterians now envision for the green economy and its energy transition (Perez 2013).

Geographical political economy has long investigated how capitalism's technological-economic upheavals necessarily express themselves as transformations in and of space; however, the field is only beginning to take on specifically green devaluation. For example, Storper and Walker's (1989) theory of geographical industrialization draws on both Marx and Schumpeter to theorize how cities and regions rise on surplus from leading industries and technologies. It also interprets how industrial and technological competition plays out as a struggle between places. Creative destruction signifies the fall as well as the rise of industrial regions, the devaluation of their fixed capital and socioecological landscapes. Green economic development is already demonstrating this geographic unevenness. Cleantech centers like Silicon Valley compete with other cleantech clusters in the United States and abroad (e.g. Davies 2013). More pointedly, they confront legacy fossil fuel production regions and new unconventional extraction frontiers—a conflict that is fueling bitter inter-regional battles over US energy and climate policy. Furthermore, Harvey's (1982, 2003) theory of spatial/spatio-temporal fixation theorizes investment (and disinvestment) in fixed capital and infrastructure as a mechanism for effecting geographic (de)valuation. As both critical environmental scholars and political economists take the green economy more seriously, they have begun to adapt the spatio-temporal fix to theorize green investment and fixed capital formation (Castree and Christophers 2014; Ekers and Prudham 2015; McCarthy 2015).

Finally, scholars have begun to consider green economic development and its energy transition as forces for large-scale devaluation (Castree and Christophers 2015; McCarthy 2015), building on treatments that focused more on devaluations imposed by climate change itself (Sayre 2010). I argue that just as critical researchers are undertaking close analyses of green value enclosure, we must examine in greater depth the specific discourses and practices beginning to effect green *devaluation*. I suggest that campaigns around cleantech disruption, fossil fuel divestment, and asset stranding—the trope of “leaving fossil fuels in the ground”—represent an interrelated devaluation effort. These developing market storylines, visualization exercises, and political strategies will be critical in realizing the kind of structural political economic transformation outlined above. Alongside devaluation, another notion that weaves through their discussions is obsolescence and, ultimately, decommodification (e.g. Bakker 2005; Prudham 2009; Green and Baird 2016; see also Kopytoff 1988). Tech industry practitioners preparing against disruptive innovation treat obsolescence in increasingly codified form. Today, the concept is being adapted by climate activists deploying a new language of morality, and by scientists and financiers reappraising the future of fossil fuels.

Green Devaluation: Disruption, Divestment, Decommodification

Disruptive Innovation and Technological Obsolescence

Since cleantech began to emerge as a self-conscious sector in the early 2000s, its advocates presented it in Schumpeterian terms. Caprotti (2012), unpacking cleantech's developing cultural economy during this period, argues that industry players drew a line between their activity and earlier alternative energy development in the United States and Europe—from the late 1960s/early 1970s on, in generative centers like the San Francisco Bay Area (Hirsh 1999). As cleantech, renewable and alternative energy businesses especially were meant to have come of age as a mainstream industry. Caprotti calls out in this self-definition process a trope of cleantech as a “sixth technological revolution,” put forward especially by Milunovitch and Rasco (2008), a white paper released by Merrill Lynch. These arguments drew heavily on the work of the neo-Schumpeterian scholar Carlota Perez, especially her adaptation of Schumpeter's thought on industrial revolutions to interpret the New Economy/dot-com boom of the late 1990s (Perez 2003). Similar framings of cleantech and the green economy as an industrial revolution have since been advanced academically by Matthews (2013), and, recently, Perez herself (2013).

Echoing Davies (2013), I maintain that deeper engagement with the high-tech regions (and organized and branded “clusters”) most actively producing and circulating cleantech discourses suggests further insights into the sector. Particularly, I argue that cleantech's narratives and experience have been powerfully influenced by its origins in Silicon Valley and the San Francisco Bay Area. Bay Area cleantech promoters in the 2000s often called back to the region's longstanding leadership in solar, wind, and energy efficiency development. However, industry insiders point to the 2000-2001 dot-com collapse and its aftermath as the key generative moment for cleantech in its current form (e.g. *GigaOm*, November 28, 2011, Luce and Steel 2015)—that Silicon Valley venture capitalists and regional economic development agencies were casting around for possibilities to replace the momentum and returns lost by information and communications technology (ICT). A survey of tech industry literature and more specialized reporting on cleantech (e.g. in *Wired*, *TechCrunch*, *GigaOm*, *GreenTech Media*, *Grist*, and so on) over the last decade suggests that US cleantech has continued to narrate its experience strongly in terms of Silicon Valley's rising – and for years now, falling—interest; for example, a widely cited 2007 TED talk by John Doerr, of the famous Silicon Valley venture capital firm Kleiner Perkins Caufield & Byers (*Wired*, January 20, 2012; *Reuters*, January 16, 2013). Another touchstone is the trajectory of cleantech-specific reporting from Silicon Valley-dominated outlets such as the PricewaterhouseCoopers/National Venture Capital Association *MoneyTree™ Report*.

One of the most influential discourses that cleantech inherited from Silicon Valley tech culture in the 1990s has been the trope of disruption and a related set of value conversations around obsolescence. First, disruptive innovation, a term coined by Harvard Business School's Clayton Christensen (1997) during the dot-com bubble, is a reworking of

Schumpeter's notion of creative destruction that quickly became a central imaginary in Silicon Valley (e.g. *The New Yorker*, June 23, 2014; *Forbes*, July 3, 2014; see also e.g. *The New York Times*, June 10, 2000). Broadly speaking, disruption talk among tech entrepreneurs and speculative venture capitalists champions innovation-driven destabilization as a positive force. More specifically, disruption is seen as necessary to the outside returns on supposedly radically experimental, high-risk start-ups that both groups eternally seek. It portrays older industries as staid, outdated, and ripe for enforced irrelevance by bold young technological challengers. Moreover, it recasts an ongoing high failure rate among enterprises as a regional strength—evidence of an ambitious, restless, and flexible start-up culture. These discourses have helped produce their own reality, structuring practices and expectations for incoming generations of entrepreneurs and funders.

Second, in value terms, more rapid rates of disruption have translated into accelerated technological/technical obsolescence, particularly in ICT products and production chains. Sandborn (2007) estimated that in 2007 three percent of the total global pool of electronic parts then went obsolete every *month*. Consistent with Marx's moral depreciation, these technologies have often been devalued well before the end of their materially functional life—socially rather than materially “manufactured” or “planned” obsolescence (although often both) (Slade 2009). They have typically been devalued in an absolute and “incurable” sense, one that has more to do with qualitative techno-social paradigm shifts than quantitative advances in productivity. They are stripped of use value when replaced or made archaic, of exchange value when removed from markets, of fresh infusions of value (as socially necessary labor time) once removed from active production.¹ American economists, accountants, and business theorists had discussed innovation and the issue of technological obsolescence for decades before the New Economy boom (e.g. Eisner 1956; Green and Sorter 1959), after the concept was widely popularized in the 1910s-1920s by the automobile industry's technological and design revolutions, especially its introduction of annual model changes (Slade 2009). However, intensifying threat of obsolescence in today's era of self-conscious disruption produced an increasingly codified set of practices for appraising “obsolescence risk”—for retail products, intermediate goods, manufacturing technologies, and whole production chains (Barreca 1998; Sandborn 2007). As we will see, these risk assessment tools are now being translated into instruments for climate change analysis and organizing.

As per the new usual, disruption thinking guided the way Silicon Valley took on cleantech in the mid-2000s. In 2006 the region's disruption culture already demonstrated problems that have only become clearer since. Internal and external critics have slammed

¹ My interpretation of obsolescence here diverges from Weber (2002), who examines economic obsolescence classification in real estate and argues that obsolescence works more in the realm of exchange values than use values, especially in contrast to blight classifications.

Silicon Valley's "cult" of disruption as increasingly destructive and amoral (*PandoDaily*, October 24, 2012), and venture capital's speculative rent-seeking as shortsighted and exploitive of prior state investment (Mazzucato 2013)—both at odds with the socially beneficial role the region attempted to claim with cleantech. Moreover, disruption's acceleration of obsolescence has generated mountains of electronic (e-)waste (Slade 2009; Knapp 2016), a major contradiction in Silicon Valley's green claims. Nonetheless, entrepreneurs and venture capitalists relied heavily on the model to guide their visions of a cleantech revolution (Nordan 2011; Hargadon and Kenney 2012; Luce and Steel 2015). In cleantech's case, would-be disruptors typically targeted the existing energy industry, aiming to seize market share from investor-owned utilities and fossil fuel companies. Inherited ICT-based models of disruption suggested that relatively small, minimally capitalized start-ups could use innovative technologies to seize a large market share and command outside technological rents:

VC investors who had experience with software and semiconductors, the traditional lifeblood of Silicon Valley, viewed cleantech investing as an extension of these areas... Looking at a global energy market, which is measured in trillions of dollars, the premise for cleantech investing became: "If we can disrupt just a small portion of that market, then we'll make an enormous company." (Luce and Steel 2015, 191)

Flaws in Silicon Valley's model of green economic development and energy transition bear major responsibility for failures in US cleantech since the late 2000s boom. Cleantech's troubles have included a raft of prominent corporate failures, especially of capital-intensive manufacturing start-ups like Solyndra; significant investment losses; and plummeting new early-stage investment and venture capital interest. These problems have had multiple, well-known causes; for example, a surge in Chinese renewable energy manufacturing and cheap exports to the United States, and the lure of far quicker and easier profits from a fresh ICT boom around social media and the "sharing" economy. However, industry insiders broadly acknowledge that their ICT-informed model of disruption and its financing simply worked poorly against an entrenched fossil fuel industry, especially amid a boom in unconventional extraction that dramatically lowered commodity energy prices (e.g. Nordan 2011; Hargadon and Kenney 2012). Entrepreneurs and venture capitalists began to understand that "one can't just 'disrupt a small portion of [the energy market]'... successful companies have to scale up in the face of longstanding distribution networks, legacy systems, and deeply rooted relationships. Even with better technology, a small player won't succeed if it can't take its technology to market" (Luce and Steel 2015, 191). Despite would-be disruptors' rhetorical aggression, they were not powerful enough (yet) to confront a massive, deeply rooted fossil industry head-on.

Fossil Fuel Divestment and “Moral” Obsolescence

While a wave of cleantech start-ups battered against powerful fossil fuel interests, climate activists were similarly moving toward a more directly confrontational stance. Notably, high-profile disappointments such as the 2009 United Nations climate meeting in Copenhagen and the 2010 failure of the Waxman-Markey Bill, initially seen as a probable prospect for binding US national greenhouse gas limitation and a critical aid to energy alternatives, provoked widespread soul-searching within climate advocacy. Commissioned by the Rockefeller Family Fund, an analysis of Waxman-Markey’s failure from the prominent sociologist Theda Skocpol (2013) blamed the environmental establishment for taking an overly conciliatory position vis-à-vis fossil fuel companies, including their portrayal of natural gas as a “transition fuel”. Skocpol argued that neoliberal mainstreaming might have gained major environmental groups an insider seat at the table with industry players and policymakers, but at the cost of their actual efficacy – that by abandoning grassroots activism, they had sacrificed the force that a more radical, energized base could bring to bear against fossil industry power. Skocpol’s report provoked considerable debate within the environmental movement (*Grist*, March 15, 2013) but reflected a growing mood in US climate advocacy. Activists increasingly saw a direct assault on fossil fuel companies as necessary to forcing transformations needed for climate justice—like Schumpeterian talk of disruption, a far cry from the “win-win” anemia of neoliberal ecological modernism. Organizations such as 350.org have prominently taken up this call (*Grist*, January 14, 2013), helping enlist US college campuses and urban organizers behind an international movement for climate justice, one that prominently features direct action against the fossil fuel industry and its infrastructure (e.g. Bond 2011).

A central platform of this increasingly combative climate organizing in the United States has been fossil fuel divestment. The call for divestment was most visibly sparked by a highly influential 2012 article written by Bill McKibben in *Rolling Stone* (July 19, 2012). Other important framing came from Naomi Klein (2014). Loosely unified by 350.org since 2012 via its Go Fossil Free campaign but run on the ground by hundreds of organizations on college campuses, in cities, and in other institutional spaces, the movement called for institutional investors and corporations to publically divest their fossil fuel holdings (*Rolling Stone*, February 22, 2013, *East Bay Express*, May 8, 2013). As defined by 350.org (2016), “full” divestment requires an institution or corporation to make a binding commitment to shed all coal, oil, and natural gas investments—direct stocks, corporate bonds, and shares in mutual funds containing fossil fuel assets. Utilizing proprietary analysis conducted by Fossil Free Indexes, a private financial research company, 350.org especially encourages divestors to target the world’s “top 200” fossil fuel companies, ranked by the carbon content of their reserves. “Partial” divestors pledge to withdraw their investment in particularly carbon-intensive fuels: coal and/or tar sands. According to 350.org, as of August 2016, 550

institutions worldwide had made full or partial divestment pledges, including (ordered by number of pledgees rather than valuation) faith-based groups, foundations, governments, universities and other educational institutions, pension funds, NGOs, for-profit corporations, and healthcare organizations.

In its divestment advocacy, the framing language adopted by 350.org is explicitly one of morality rather than economics. The organization defines divestment as shedding investments that are “unethical or morally ambiguous,” arguing:

Fossil fuel divestment takes the fossil fuel industry to task for its culpability in the climate crisis. By naming this industry’s singularly destructive influence—and by highlighting the moral dimensions of climate change—we hope that the fossil fuel divestment movement can help break the hold that the fossil fuel industry has on our economy and our governments. (350.org 2016)

Particularly, 350.org targets fossil fuel companies’ “veneer of legitimacy,” arguing that institutional investors’ public distancing can remove this “social license to operate” (350.org 2016). Both 350.org and popular commentators have located fossil fuel divestment within a longer tradition, identifying it with past ethically justified divestment campaigns—against Sudan in the late 2000s, pressuring the government to end the conflict in Darfur; and especially the influential 1980s campaign to divest from Apartheid South African holdings. Prominent ongoing efforts to divest from big tobacco have also been cited as an influence (*Rolling Stone* July 19, 2012, February 22, 2013; *East Bay Express*, May 8, 2013; *Huffington Post*, November 2, 2013). Other moral-political divestment campaigns on college campuses today protest Israeli policy on Palestine and the US private prison industry. Not surprisingly, divestment activists have particularly targeted institutions and investors with a public mandate, social purpose, and/or reputation to protect. For some, like universities, divestment is the latest tool in a long effort to exert moral leadership on climate change (e.g. Knuth et al. 2007)—if a particularly contentious one. In recent years, students have frequently battled university administrations over divestment, with Harvard University students going far as to sue the university over its failure to divest.

One reason that the fossil fuel divestment movement has adopted a rhetorical strategy of moral shaming is an effort to leverage its influence, and its particular *type* of influence, against a far more economically powerful opponent. Proponents have had to be open about these tactics almost from the movement’s beginnings (*Rolling Stone*, February 22, 2013), given the small dollar value of investments initially withdrawn relative to the total capitalization of fossil fuel companies, and these companies’ propensity to self-fund from profits rather than turning to stock markets—a subject of early critiques from Christian Parenti and others (*The Huffington Post*, November 29, 2012; *The New York Times*, January

27, 2013; *East Bay Express*, May 8, 2013). In emerging critical scholarship on the movement, Rowe et al. (2016) defend its strategy in Gramscian terms, emphasizing its work to destabilize consent for the existing order. They argue that despite divestment's seeming congruence with anti-statist neoliberal environmental movements like sustainable consumption and shareholder activism, its goals are political: to weaken forces working to block state intervention, using tools uniquely available to activists. This analysis seems consistent with post-Waxman-Markey discussions in the US context and with 350.org's own framing.

I argue that the divestment movement's appeals to the moral-political realm also further a deeper aim. Precisely by largely avoiding overt talk of the economic, divestment activists advance a case for the more absolute devaluation of the fossil fuel industry and its assets. We might describe their goal as "moral" obsolescence.² Cleantech's language of disruption and obsolescence is ethically neutral, reflecting Silicon Valley's libertarianism and futurism (Turner 2006). Products and sectors are rendered technologically/techno-socially obsolete because they have become out-of-date, unfashionable, or archaic. By contrast, divestment's logic implicitly invokes notions of social and moral progress: products and sectors forced into obsolescence because right-thinking society has come to deem them unethical. This logic applies to tainted but only as-yet devalued "vice" commodities like tobacco (*The Huffington Post*, November 2, 2013) and, especially, "commodities" turned back into non-commodities, as with the abolition of slavery (Kopytoff 1988). This argument adds major weight to conflicts with the fossil fuel industry, particularly a "leave it in the ground" campaign against burning existing fossil fuel reserves—it is well worth underlining parallels with slavers' protests against abolition as the mass devaluation of property and regions economically dependent upon it (Davidson 2008). In this vein, divestment's logic seems to suggest a categorical decommodification of fossil fuels—ironically, considering that the thrust of green capitalism has been to argue away ethical resistance to putting a price on (more of) human and non-human nature, although certainly not without precedent (Bakker 2005, Prudham 2009; Green and Baird 2016).

Although Rowe et al. (2016), among other interpreters, find fossil fuel divestment consistent with a broader anti-capitalist agenda, I argue that the movement more immediately serves the intra-capitalist struggle outlined here. Divestment in fossil fuels diverges in important, under-analyzed ways from other divestment campaigns. First, it aims to remove a product from the market rather than change political practice—the anti-tobacco industry campaign is its closest analog, and more recently private prison

² I draw on Marx's (1990) "moral depreciation" here but in an inexact way; his *moralische* translates more nearly to "human" or "social."

divestment. Second, uniquely, that targeted product demands a licit market replacement.³ Although divestment activists might certainly advocate energy conservation and broader social and economic reorganization over the longer term, in the immediate moment high-energy societies are far more likely to turn to renewable energy and other cleantech industries to replace a staple commodity. In other words, divestment may be as powerful an aid to would-be disruptive innovators as it is to climate regulators or degrowth activists (D’Alisa et al. 2014). It stands to weaken or remove obstacles that have blocked their economic success, especially if it succeeds in also clearing the way for more powerful climate change regulation and green economic/industrial policy.

Divestment explicitly attacks fossil fuel industries but only tacitly supports their potential green replacements, a move that separates it from its recent grassroots antecedent, the green collar jobs movement of the late 2000s. This campaign saw community organizers, environmental justice advocates, and labor interests team up to officially champion cleantech and green Keynesianism. In a candid interview in *Antipode*, its well-known advocate Van Jones presented a notably Gramscian vision: alliance with a green capital bloc against a fossil fuel-dominated one as a pragmatic, temporary move in a longer justice fight (Mirpuri et al. 2009). In contrast, although particular local divestment campaigns might indeed choose to undertake both divestment and green *reinvestment*, 350.org’s official framing avoids direct advocacy for alternative energy investments, general or specific: evidently, its moral appeal requires it to stay officially above the fray of intra-capitalist battles. Divestment’s support may be all the more powerful for being indirect, even as this disconnect produces peculiar outcomes on the ground—for example, California’s massive state pension fund CalPERS shedding troubled cleantech investments even as California state law requires it to divest from coal (*GigaOm*, March 12, 2013, *Los Angeles Times*, October 18, 2015).

Asset Stranding and Decommodification

Finally, a key reason that fossil fuel divestment activism has been able to assume the moral high ground in its tactics is that it is now part of a broader, overtly economic movement tackling the issue of stranded assets and climate change. “Leave it in the ground” arguments against fossil fuel reserve consumption are effectively being advanced not only by environmental activists and climate scientists but also by banks and institutional investors, business risk analysts, and other financial interests. In their initial calls for divestment, both Bill McKibben and Naomi Klein were influenced by the work of the Carbon Tracker Initiative, a non-profit financial think tank operating out of the United Kingdom that analyzes “carbon investment risk” (Carbon Tracker 2015a); 350.org’s use of Fossil Free Indexes maintains this

³ Again, with abolition as the closest non-divestment parallel, although the replacement demanded now is more specialized than commodified “free” labor power.

financial connection. A number of similar investor-targeted nonprofits such as the Stranded Assets Research Network (SARN), run out of Oxford’s business school; financial analysts; and major financial institutions (e.g. HSBC 2013; IDB 2015) have begun to formally evaluate and price climate-related risks for fossil fuel companies and their assets – from divestment and other climate policy, technological risk from cleantech energy challengers, climate change itself, and so on (Ansar et al. 2013). Centrally, these efforts refer to the International Energy Agency’s (IEA) recent estimates (e.g. IEA 2013) that a major fraction of existing world fossil fuel reserves must go unburned to limit global warming to 2°C or less. As McGlade and Ekins (2015) similarly calculate in *Nature*, “globally, a third of oil reserves, half of gas reserves and over 80 per cent of current coal reserves should remain unused from 2010 to 2050 in order to meet the target of 2°C” (2015, 187).

This broad financial movement eschews divestment’s moral rhetoric about the numbers above in favor of an ostensibly ethically neutral, self-interested economic warning. It argues that holding fossil fuel assets increasingly threatens companies and investors with epochal devaluation—although, like divestment, its discourses typically do not explicitly promote cleantech and fossil fuels’ industrial challengers. Rhetorically, it takes up the issue of “stranded assets.” Statements by SARN have helped codify a definition of environmental risk-related stranding, where “assets suffer from unanticipated or premature write-offs, downward revaluations or are converted to liabilities” (*Business Green*, October 8, 2013). Premature obsolescence and stranded costs have been a familiar topic of energy industry discussion for decades, in the United States especially after the Federal Energy Regulatory Commission (FERC) formally codified accelerated asset depreciation and cost recovery procedures in the midst of neoliberal electricity deregulation in the 1990s (Hirsh 1999). Industry conversations have borrowed much from general tech industry and ICT framings of obsolescence, normalizing and accounting for “stranding” risk as a cost of technological development. However, the size of the devaluation threatened under climate change has shifted the conversation, as investors warn of epochal write-downs in the valuation of fossil fuel companies and their assets, and similarly scaled losses to investors exposed to them. They are increasingly pressuring fossil fuel companies to track and disclose these risks to shareholders and financiers (CERES 2013). Carbon Tracker (2011) now argues that by holding and planning to acquire trillions of dollars in “unburnable” assets,⁴ fossil fuel companies are inflating a “carbon bubble,” value-at-risk sizeable enough to imperil the global financial system:

Given that only one fifth of the total reserves [of fossil fuels] can be used to stay below 2°C warming... then only 149 of the 745 GtCO₂ listed can be used unmitigated. This is where the carbon asset bubble is located. If applied to the world’s stock markets, this

⁴ Carbon Tracker (2015) estimates a \$2 trillion “danger zone” in unneeded capital expenditures through 2025, planned spending that must be curtailed to avert 156 GtCO₂ of emissions.

could result in a repricing of assets on a scale that would dwarf past profit warnings and revaluation of reserves. This situation persists because no financial regulator is responsible for monitoring, collating or interpreting these risks. (Carbon Tracker 2011, 9)

The kind of decommodification suggested by these financial players is different from the absolute moral obsolescence implied by the divestment movement, but is ultimately no less radical. It is an open question, empirically and politically, if climate change can be averted by the partial decommodification of a quantitatively reduced fossil fuel industry and fossil carbon footprint. The lure of unburned reserves may prove too great without a more qualitative break in energy provision, practices, and cultural norms. Even if fossil fuel reserves are declared unburnable, that does not necessarily decommodify them—for example, as feedstocks for the petrochemical industry (Romero 2016). However, the sheer weight and scope of the numbers involved here—for example, \$2 trillion in stranded capital expenditures by 2025, almost half the industry’s total current valuation (Carbon Tracker 2015b; BNEF 2014); a global geography of fossil fuel reserves devalued, property decommodified, and socioecological relations transformed (IEA 2013; McGlade and Ekins 2015)—suggest quantitative changes that can readily aggregate and transmute into a qualitative shift, in classic dialectical fashion. As with divestment, some of financial activism’s most powerful politics here are tacit. Notably, the stranded assets argument is performative (MacKenzie et al. 2008) and prefigurative in two ways that ally it with both divestment activism and cleantech. First, it is predicated upon effective climate regulation – and may therefore help assume it into being. Second, it invokes a nascent gap and need for replacement, in both material (energy supply) and value terms—a clear opportunity for green entrepreneurs and investors.

Conclusions and Further Research

This broad survey of contemporary green economic politics developing in the United States and beyond strongly suggests that environmental and economic scholars must expand their thinking on value to capture essential features of an emerging twenty-first-century green capitalism. Moving beyond neoliberal environmentalism’s weak “win-win” visions means dealing with contestation, winners, and losers, including *among* capitalists. It is necessary to critique the imaginary of green growth, but green growth is not the only project at play here. Would-be green capitalists and climate activists are becoming increasingly aware of zero-sum stakes and the need for techno-industrial replacement—even if critical scholarship is lagging behind them in this realization. These struggles within capitalist centers and between green and fossil fuel-backed blocs of capital are only likely to heat up, with major ripples through their competing production geographies and resource peripheries. In these fiercely contested spaces, it is impossible to theorize green valuation, commodification, and various

forms of surplus extraction without their corollaries—green devaluation, decommodification, and disinvestment/destruction. These processes demand far more theoretical development, empirical analysis, and public scholarship than they have received to date. In many ways, they are analytically and politically useful. Schumpeterian disruptors and their battles provide frank, if amoral, insights into contemporary capitalist practice—something to which we are likely bound, uncomfortably, for a near-term energy transition. Simultaneously, they highlight its mindlessness and destructiveness.

Finally, critical scholars' role in these developing struggles requires more committed deliberation, vital work that cannot come too soon. Certainly, both green and fossil capitalism are likely to mean exploitation at the periphery (and at "home"); we are bound to take on these fights. However, today's competing capitalist visions are *not* simply identical and interchangeable in their ability to destabilize and compromise the lives of the many, and they leave us with very different material possibilities and socio-technological bases to work from. These divergences require more theoretical and political heavy lifting. Most immediately, the alliances and tactics now being deployed in green economic development demand engaged scholarship and political intervention. For one thing, cleantech may be, or have been, usefully bloodthirsty in its assault on fossil fuels, but with many corresponding flaws, as outlined here. Even if a resurgent cleantech exploits fossil fuel companies' new weakness, its short attention span and inability to tolerate technological stability make it a poor ally for long-term sustainability and just energy transition. Green Keynesianism and industrial policy demand more serious consideration. In addition, even emerging critical scholarship on fossil fuel divestment (Rowe et al. 2016) has not questioned the movement's ready use of and alliance with global finance—ironic, in the ongoing aftermath of the financial collapse. While tactical alliances for a particular fight should not be dismissed, neither should a partner as unreliable—including in its climate change rhetoric (Johnson 2015)—as today's financial industry pass without ongoing scrutiny and active political discussion. As ample experience now demonstrates, unregulated green investment can be not only exploitive but also ineffective.

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