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ABSTRACT OF THE THESIS

Infrastructure, Finance & the Law in an Era of Catastrophic Fire

by

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Professor Shaina S. Potts, Chair

Recent catastrophic wildfire events in California have turned electrical infrastructure within the state into a source of risk. The purpose of this thesis is to critically examine how this infrastructural risk is legally, financially, and technically negotiated – and to whose benefit. I first demonstrate how the American public utility system, and the malleable definitions of "public" and "private" it has constructed, offers a peculiar vocabulary through which wildfire-related risks can be distributed. I focus on the statutory authority of investor-owned utility companies to pre-emptively deenergize on days of high fire risk (the so-called "public safety power shutoff"), along with the legal efforts of these same utilities to reform California's liability regime, as examples of what I call "liability technologies": legal and technical efforts to socialize the costs associated with infrastructure. The second half of this thesis considers infrastructure not

as a potential liability, but as a potential asset. Through close attention to the complex and contested bankruptcy of Pacific Gas & Electric (2019-2020), I show how catastrophic wildfires created a "special situation" that artificially depressed the value of financial assets associated with the distressed firm. PG&E's bankruptcy became a legal-financial occasion in which profit could be won for sufficiently powerful financial firms. I develop the concepts of "social leverage" and "legal arbitrage" to explain the mechanics of this process. These concepts demonstrate how financial power rests on the ability of certain entities to dictate future outcomes and minimize the risks to which they are exposed, and how the law is enrolled into and aids this process. In focusing on the specificities of legal and financial practice within the public utility system in an era of catastrophic fire, I broaden what counts as "infrastructure" in the field of infrastructure studies – and what therefore counts as an object of politics.

The thesis of John Locke Schmidt is approved.

William Clarence Boyd

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AUM	assets under management
Cal Fire	California Department of Fire and Forestry Protection
CPUC	California Public Utilities Commission
DWR	California Department of Water Resources
HFTD	high fire threat district
IPP	independent power producer
IOU	investor-owned utility
NEA	National Energy Act (1978)
PG&E	Pacific Gas & Electric
PIMCO	Pacific Investment Management Company
PSPS	public safety power shutoff
PUC	Public Utilities Code
PURPA	Public Utilities Regulatory Policy Act
SCE	Southern California Edison
SDG&E	San Diego Gas & Electric
TCC	Tort Claimants Committee
WUI	wildland-urban interface

Introduction

INFRASTRUCTURE AND WILDFIRE

In California, there are fires everywhere.

Eighteen of the state's twenty largest recorded wildfires have occurred in the twenty-first century, at the very dawn of the new millennium, and the majority of these in the last five years. As of this writing, four of these fires – the Dixie, Monument, Caldor, and River Complex – are still smoldering. In 2020, more than four million acres burned in California. Such a figure may have been a routine occurrence prior to the colonization of North America and across the telescopic distances of the Holocene. But is unprecedented in the modern era and highly disruptive to the patterns of human settlement across the western United States that this era has (violently) created.

The mood is apocalyptic. Along the "wildland-urban interface," evacuation or the possibility of evacuation has become an annual concern. Gavin Newsom, the governor of California, shares videos of himself surveying the wreckage of these catastrophic events, grimly enjoining his audience to acknowledge that "just straight-up…these are climate-induced fires."[1] Federal, state, and municipal firefighters, meanwhile, battle the flames with elaborate, militarized chains of command, heavy machinery, and air support (Neel 2018). When the fires do reach the cities and their collection of flammable human structures, their behavior can suddenly and unpredictably change – as fire ecologists have demonstrated, for example, in the case of the 2017 Tubbs Fire in Santa Rosa (Keeley and Syphard 2019). Or else the smoke simply meanders from the big fires on the slopes of the Sierra Nevada and other parts of the Western Range, casting a deathly pall over urban agglomerations near and far. It can blanket these cities in a gray haze of

[1] The video in question is available here.

particulate matter, particularly dangerous for those without N95 masks, HEPA filters, or homes to keep the air out. This is how smoke from the Camp Fire made the air quality in the San Francisco Bay Area the worst of anywhere in the world for a brief period in 2018. Or it can settle further up in the atmosphere, producing an eerie, science-fictional orange glow, as smoke from the various fires consuming the West did to the Bay Area only two short years later.

Wildfires perform a crucial service in promoting plant succession in many ecosystems across the West, which are often adapted to periodic burns of varying levels of intensity and frequency. These fires, ecologists remind us, are, at base, a function of fuel availability, aridity, and ignition. But the interaction of these factors is a thoroughly "socionatural" phenomenon, to borrow Erik Swyngedouw's felicitous term – a process that is "simultaneously human, natural, material, cultural, mechanical, and organic" (1999: 445). Ignition can be caused by dry lightning, or it can be caused by human factors – infrastructure, arson, or accident. Decades of fire suppression and tree death caused by invasive beetles have increased fuel availability on California's public lands, and a multi-decadal warming trend, predicted by models of anthropogenic climate change, has dried these fuels out. Fires in arid forests with lots of dead fuels tend to spread quickly. In the fall, on the eve of the first annual rains, they can be carried along by hot, dry Santa Ana or Diablo winds. At the same time, both the tenor and scope of these fire events – their transformation into *risks* of increasing frequency and magnitude for those on the state's wild edges, or else portents of an imminent apocalypse for those in the cities beyond their immediate reach – are also a consequence of historical patterns of urbanization running up against the state's combustible fire ecologies.

The fires all around us, in short, have social and natural meanings, causes and effects. This thesis attempts to understand the political and economic dimensions of wildfire as a

socionatural process that unevenly distributes different kinds of risk across California's landscapes. It does so through an analysis of the legal, financial, and material relationships between fire and electrical infrastructure. This infrastructure – the powerlines, transmission towers, and generating stations crisscrossing the state – has historically powered processes of American modernization and urbanization. It is also a major and increasing source of wildfire and its attendant risks and liabilities, which extend beyond the state's charred physical landscapes and into the arenas of finance and the law.

In the remainder of this introduction, I situate this analysis with a brief (and by no means exhaustive) review of several relevant empirical and conceptual threads drawn from an interdisciplinary literature on infrastructure, temporality, risk, and the Anthropocene, before outlining the chapters to follow.

Review of the literature: fire, risk, and the Anthropocene

The "Anthropocene" initially emerged as a geological concept meant to designate a new epoch in which human activity has come to play an increasingly significant role in shaping many distinct earth system processes (Crutzen and Stoermer 2000). Within geology, attention has focused on determining a stratigraphically measurable and meaningful start date for this new epoch (Lewis and Maslin 2015). But the Anthropocene has also migrated into the humanities and social sciences. The concept has perhaps lost some of its scientific and definitional precision in the process, but it has also proven to be a productive framework for thinking through questions of risk (Cutter 2021), time (Elliott 2021; Folkers 2021; Whyte 2020), urbanization (Otter 2017), history (Chakrabarty 2009), and human-environment relationships among many other topics.

Fire is a prominent image and major concern in much of this Anthropocene literature. Perhaps most poetically, the environmental historian Stephen Pyne (2018) has linked

increasingly spectacular landscape fires to the "lithic" fires of fossil-fueled combustion to suggest that the Anthropocene may with equal accuracy be described as a coming "Pyrocene." In any case, fires have been a significant human intervention on many landscapes across the world – including California – for somewhere between 4,000 and 8,000 years (Neale et al. 2019). More recently, catastrophic wildfires in California and elsewhere across the western United States have become an irresistible symbol in the popular media especially for the new dangers associated with the Anthropocene in general and with climate change in particular. There are, of course, good reasons for this. The annual acreage burned in California grew by a factor of five between 1972 and 2018, mostly because of the increased areal extent of summer forest fires along the state's North Coast and in the Sierra Nevada during this period. Climate scientists associate these summer forest fires with increased aridity, itself attributable to a centennial warming trend that conforms to models of anthropogenic climate change (Williams et al. 2019).

At the same time, Simons (2018) argues that a singular emphasis on western wildfires as a symptom of runaway climate change can produce a peculiarly "de-politicizing" effect – insofar as it fails to account for the "institutions, policies, and billions of (US) dollars' worth of financial incentives that help produce human settlements and immense social risks on [fire-prone] landscapes" (154). To adequately explain wildfire as a socionatural phenomenon in the western United States, then, the Anthropocene as a concept needs to encompass not only the global effects of humans on climate, but also the specific patterns of human settlement that turn fires into "risks" for people – and the social, political, and economic systems that enable those settlement patterns. In California, this means also recognizing the social and financial forces that have encouraged suburban and exurban expansion into the so-called "wildland-urban interface"

(WUI), where humans live in low-density residential environments among flammable vegetation and where fire risk is often most extreme.

As of the 2010 census, an estimated 11.2 million people in California live on the WUI, more than any other state in the country (Martinuzzi et al. 2015). The interface is a demographically diverse category, containing both people seeking refuge from cities in well-heeled exurban enclaves and people pushed out of cities by skyrocketing urban rents and home prices. This diversity is well acknowledged in studies that engage with the interface. Palaiologou et al. (2019), for example, have estimated that communities that they designate as "high social vulnerability areas" based on various demographic characteristics in three study sites across California, Oregon and New Mexico are disproportionately exposed to wildfire risk emanating from the WUI. Conversely, Eriksen and Simon (2017) and Davis (1999) have documented the ways more affluent WUI communities in places like the Oakland Hills and Malibu have successfully and rapidly rebuilt after catastrophic fire events. Work like this evokes an uneven geography of fire and its impacts across the state.

Indeed, inequality in exposure to disaster is one of three emergent trends that Cutter (2021) usefully identifies in a recent article on the changing nature of risk in the Anthropocene, along with the increasing effects of statistically non-extreme ("everyday") events and the growing threat of "cascading" or "compound" hazards that "[precipitate] failures in critical infrastructure or [accelerate] preexisting conditions of vulnerability" (823). For Cutter, wildfires in California fit all three of these Anthropocene risk trends: they are starting to look like a "new normal of larger loss events occurring with greater frequency" (2021: 819); they are unevenly felt across a stratified social landscape; and they can trigger cascading socionatural impacts – for example, mudslides on denuded post-burn landscapes or disruptive power outages that both

follow major wildfire events and, increasingly, anticipate them as well. This thesis explores the specificities of how these Anthropocene risk characteristics are legally, financially, and materially negotiated. In other words, it considers in detail the technical mechanisms through which the risks of increasingly "everyday" catastrophic fire events with cascading impacts are unevenly distributed across different social groups.

Review of the literature: infrastructure, politics, and time

The intersection of wildfires and powerlines as a possible set of cascading hazards brings us into the interdisciplinary field of "infrastructure studies," which has emerged within anthropology, geography, and related disciplines in recent years. This body of scholarship treats infrastructure not as an invisible background to social life, but rather as an important object of analysis with its own distinctive political and temporal characteristics.

In his intellectual genealogy of the word, Carse (2017) explains that "infrastructure" was initially used by French civil engineers to describe construction work on railroad projects that took place prior to the physical laying of track. Over the course of the twentieth century, the word moved from this specialized context first into the military bureaucracy and then into the realm of international development economics, where it came to refer not just to large, capital-intensive projects but also to the intangible "human capital" necessary for economic growth. In each of these discourses, and as indicated by its prefix, infrastructure "suggests relationships of depth or hierarchy" (Carse 2017: 27). Infrastructure is beneath, between, behind, or before the economic, social, and physical structures built on top of it. It is not surprising then that when functioning properly it tends to recede from collective view. A major objective of infrastructure studies has therefore been to prevent or demystify the "black boxing of infrastructural systems" that are underground, overhead, and floating imperceptibly all around us (Graham 2010: 8).

Because the "normally invisible quality of working infrastructure becomes visible when it breaks" (Star 1999: 382), there has been a tendency within this literature to focus on moments of infrastructural disruption, disorder and decay – when infrastructures stop working in the way that they should (e.g. Gupta 2015; Luke 2010; McFarlane 2015). In these moments, infrastructure is revealed to be a thoroughly political object, signaling both the priorities and failures of states, and becoming an arena through which demands can be made by their subjects. Anand et al. (2018: 3) suggest that in both the Global South and, increasingly, the advanced economies of the Global North, "infrastructural breakdown saturates a particular politics of the present." For Fortun (2012), this is symptomatic of "late industrialism," a time in which many infrastructures, and the twentieth century industrial aspirations that orient them, are becoming increasingly "exhausted" (449).

Insofar as this thesis is concerned with electrical infrastructure as a source of wildfire in California, it operates in this mode. But to focus merely on infrastructural breakdown or exhaustion would be to miss much of the picture. Equally important are the ways infrastructure *works*. Importantly, this means attending to infrastructure's own *legal* and *financial* infrastructures – what Furlong (2020) calls infrastructure's "plumbing." This is the world of legal contracts, risk models, rate cases, regulatory petitions, balance and term sheets, payment architectures and so on through which infrastructure is financed, constructed, and operated. It is also the arena where much of the politics of the American electrical grid unfold in practice.

Finally, all infrastructures, working and nonworking, possess important temporal characteristics. They "signal the desires, hopes, and aspirations of a society" and, once constructed, help to bring certain futures into being (Anand et al. 2018: 19). And they also have an *anticipatory* quality: they orient present activity in the shadow of an imagined future (Gupta

2018: 63). In other words, infrastructures mediate a two-way temporal relationship between the past, the present, and the future. As vehicles for development and modernity, they engineer imagined futures; as artifacts fixed in space, they signal how those imagined futures have shaped and continue to shape past and present human behavior and action. A major theme of the first part of this thesis is the way that the public utility model has historically incentivized private investors to participate in the creation of twentieth century American modernity and with what unintended effects – and how this "utility consensus" (Hirsh 1999) may be shifting in the wake of catastrophic fires.

Outline and method of the present work

I argue that infrastructure is a primary site in which the risks, costs, liabilities, and – surprisingly – opportunities associated with wildfires are increasingly allocated. The systems of law and finance that govern infrastructure are necessarily enrolled into this process. It is at the intersection of these two systems that infrastructure becomes an asset class. At the same time, both finance and the law offer established vocabularies for powerful and well-situated actors to minimize or redistribute the risks created by infrastructure. Wildfire enters this picture as a newly potent infrastructural risk to be managed with familiar legal and financial tools, and one which cannot be fully understood apart from these tools.

In California, infrastructure is a productive subject for studying the political economy of wildfire, just as wildfire is a productive subject for studying the political economy of infrastructure. There are several reasons for this. First, infrastructure is a significant source of ignition for disproportionately large and destructive fire events within the state. So, for instance, at least eight of the twenty most destructive wildfires in California's history have been caused by

electrical powerlines, with another two under investigation (Cal Fire 2021). Second, infrastructure is the material substratum that enables broader patterns of urbanization across the state: there would not be suburban expansion into fire-prone WUI environments without the electrical infrastructure to power those suburbs. Third, infrastructure is a domain that brings together many different and often competing constituencies – including utility ratepayers, company shareholders, the state, and the "public" it governs – among which wildfire risk is ultimately distributed.

The current legal and regulatory system governing the electricity industry in the United States was designed with a modernizing imperative in mind, marshalling private capital to invest in infrastructure's construction and maintenance through the creation and regulation of monopoly business franchises that still deliver most of California's – and the country's – electricity. The rents associated with the monopoly power to provide infrastructure remain attractive to finance capital – perhaps increasingly so. But wildfires and the costs associated with them threaten this model. This is especially true in California, where fire risk is extreme and utility companies have historically been held strictly liable for the property damage caused by the wildfires that their powerlines ignite.

In an era of catastrophic fire, then, infrastructure is both a potential asset and a potential liability. As I will show in this thesis, both the firms that own this infrastructure and the financiers that invest in these firms deploy intertwined legal and financial strategies to capitalize on the former and minimize the latter. These efforts to simultaneously extract value from infrastructure as an asset class and to minimize or transfer elsewhere its risks and liabilities broadly occur within the institutional context of the American "public utility" model. I argue that this model creates ambiguous boundaries between public use and private interest and transforms

courtrooms into strategic sites of financial accumulation. For the lawmakers, lawyers, financial firms, shareholders, and utility managers that populate this social universe, California's fires represent either a legal and technical risk to be mitigated or a special situation through which windfall profits can be made.

The primary material grounding this argument comes from textual analysis of court documents and judicial decisions, legislative and shareholder reports, public utilities commission orders, congressional investigations, and wildfire mitigation plans. For context, informal, semi-structured interviews were conducted with financial journalists, legal scholars, and climate scientists. These interviews provided useful background information for approaching the legal, policy, and financial documents that constitute the empirical backbone of this thesis.

How should these artifacts be approached in a social scientific investigation? Several methodological and conceptual points are worth spelling out here. First, law, finance, and policy are each obviously instrumental discourses. The documents that practitioners in these fields produce are meant to satisfy particular requirements for corporate disclosure or else effect particular legal, political or economic outcomes in courtrooms, legislatures, and elsewhere. However, they can each also be approached as "an *object* of ethnographic study" (Riles 2004: 777, emphasis mine; see also Appel 2019) that reveals something of the character of legal or financial knowledge and practice. Second, law and finance are mutually constitutive; but this does not mean that law is simply subordinate to broader economic and capitalist logics. Rather, capitalism and the market are "constituted in and through…legal practices, which have their own complex, competing and sometimes contradictory dynamics" (Potts forthcoming: 15).

Taken together, these two points call for both *intensive* and *extensive* engagement with legal and financial texts – with an eye toward not only the political, juridical, and financial

objectives these texts are designed to produce, but also the vocabularies employed for these purposes in unfolding legal contexts. This means tracing the chains of legal precedent that condition particular courtroom outcomes in the manner of more conventional legal histories, as I do in chapter one; it also means zeroing in on the legal and political arguments made by lawyers and lawmakers before a judicial decision is made or a piece of legislation is passed.

These arguments may be successful in convincing a judge or legislature to take some kind of action, or they may not. But they demonstrate in any case the legal logics that propel cases forward and govern firm behavior within courtrooms, revealing the mechanics of certain accumulation strategies enabled by law. Thus, I dwell at length in chapter one on a petition that the United States Supreme Court ultimately declined to review and in chapter two on the legal maneuvering of financial firms in a bankruptcy proceeding that did not in the end lead to the desired outcome for these litigants. Close attention to the content of complaints, briefs, motions, and objections within such cases as they develop offers insight into the ways law is understood and instrumentalized, and therefore gives a picture of the legal terrain of finance and the economy, just as it illuminates the financial prerogatives that underpin law and politics.

To draw my argument out, I turn in chapter one to the ways in which wildfire has transformed infrastructure into a liability, and for whom. This means exploring how utilities and legislators have managed the risks and costs associated with infrastructure in an era of catastrophic fire. Importantly, these efforts are articulated through the institutional and statutory design of the "public utility" model, and the system of rights and obligations it assigns. This chapter therefore contains an abridged history of the American public utility concept and the peculiar legal environment it has created. I then focus on two mechanisms by which infrastructural wildfire liability has been negotiated: first, a 2019 petition brought by California's

investor-owned utilities to the United States Supreme Court, which attempted to fundamentally transform the state's legal landscape; and second, the increasing use of preemptive power shutoffs by these same utilities on days of acute fire risk. Each of these things, I suggest, must be understood as a "liability technology": a legal and technical effort on the part of lawmakers, electric utilities, and their shareholders to socialize the costs associated with infrastructure. It is through such technologies, I argue, that the politics of infrastructure and fire increasingly play out in incendiary California.

Who will be made to bear infrastructure's risks also crucially determines the value of infrastructure as an asset. To explore infrastructure as an asset class, I turn in chapter two to the 2019-2020 bankruptcy of Pacific Gas & Electric, California's largest investor-owned power utility. PG&E entered a complex and contested restructuring process after a series of powerline-ignited wildfires across its service area in 2017 and 2018 left it with upwards of $30 billion in unexpected liabilities. It was the largest corporate bankruptcy since the 2008 financial crisis, and a parade of hedge funds and activist investors became involved in various capacities in the unfolding legal drama.

For these financial firms, I will argue, wildfires – and the financial distress they ignited – became an occasion for "legal arbitrage," which here means taking advantage of the different values of an asset in courtroom and market contexts. Interpreting the widespread involvement of financial firms in PG&E's bankruptcy through this (perhaps idiosyncratic) definition of legal arbitrage helps us to understand both how law structures the value of financial assets and how it offers avenues through which financial risks can be minimized for actors with sufficient power. Following Konings (2018), and borrowing from the language of finance itself, I call this power "leverage." Together, the concepts of arbitrage and leverage show us how financial firms seek

out the rents channeled through infrastructure through proactive and novel legal strategies – strategies enabled, in PG&E's case, by catastrophic wildfires.

Chapter 1

INFRASTRUCTURE AS LIABILITY

In an era of catastrophic fire, electrical infrastructure in California looks increasingly like a massive, unprecedented liability. How are the firms that own and operate this infrastructure, and those who invest in and govern them, managing this liability? To answer these questions, it is necessary to examine in detail the evolving regulatory environment in which California's electric utilities operate – and the legal, technical, and financial vocabularies such an environment offers them, their shareholders, and the state's lawmakers to negotiate the risks associated with infrastructure.

Before laying out this chapter's primary arguments, it is important to give a sense of the potential breadth of this liability.[1] Following a series of powerline-caused southern California wildfires in 2007, the California Public Utilities Commission (CPUC), a regulatory body overseeing the state's investor-owned utilities (IOUs), initiated a series of proceedings meant to address the wildfire risk posed by the state's electrical infrastructure. One outcome of these proceedings was the creation in 2018 of a map that identifies "high fire threat districts" (HFTDs) within the utilities' service areas. Based on this map, each of the state's IOUs are required to submit annual "wildfire mitigation plans" to the CPUC that contain extensive information about their level of risk exposure. The picture painted by these mitigation plans is striking (see Table 1). Southern California Edison (SCE), which operates in a large swath of southern and central California, identifies approximately 5.14 million customers and 51,185 circuit miles of

[1] The information in the following paragraphs and table is calculated from data provided by each of the state's three largest investor-owned utilities in their 2021 Wildfire Mitigation Plans (table 8: state of service territory and utility equipment). The "high fire threat districts" include areas with "elevated" (Tier 2) and "extreme" (Tier 3) fire risk, as well as areas with a high number of dead or dying trees (Zone 1). Zone 1 data comes from the US Forest Service and may partially overlap with the California Public Utilities Commission tiers.

transmission and distribution assets; as of 2020, 14.4% of these customers (741,898) and 26.8% of these powerlines (13,700 miles) reside in HFTDs. Moreover, 20.3% of the company's powerlines and 22% of its customers exist on the wildland-urban interface (WUI), where human habitation and flammable vegetation commingle. San Diego Gas and Electric (SDG&E), whose service area spans the southwest corner of the state, tallies approximately 1.31 million customers and 17,584 circuit miles of overhead infrastructure; 35.5% of its powerlines (6,237 circuit miles) and 14% of its customers (183,557) are in HFTDs. Finally, as the largest of California's IOUs, and with a license stretching across the fire-prone Sierra Nevada mountain range in the northern half of the state, PG&E's risk profile is perhaps most severe: 31.1% (30,750) of its 98,751 circuit miles and 9.4% (530,994) of its 5.6 million customers are in HFTDs, while 23.9% of those powerlines and 27.5% of those customers are in the WUI.

In short, California's three largest utilities face massive wildfire risk. When their electrical infrastructures ignite large and costly fires – as they did in 2007, 2015, 2017, and 2018 – that risk transforms into financial liability for the people and companies that own it. The purpose of this chapter is to identify why this system of liability operates in the way that it does, and with what material and spatial effects.

Table 1: Wildfire Risk Profiles of California's Major Investor-Owned Utilities

Utility	Total customers	Customers (HFTD)	Customers (WUI)	Total circuit miles	Circuit miles (HFTD)	Circuit miles (WUI)
Pacific Gas & Electric (PG&E)	5,631,215	530,994 (9%)	2,130,744 (27%)	98,751	30,750 (31%)	31,059 (24%)
Southern California Edison (SCE)	5,137,729	741,898 (14%)	1,451,279 (22%)	51,185	13,700 (27%)	13,013 (20%)
San Diego Gas & Electric (SDG&E)	1,308,921	183,557 (14%)	9,431 (1%)	17,584	6,237 (35%)	296 (2%)

The argument is composed of the following parts. *First*, wildfire events from 2007 onward have inaugurated a new regime of infrastructural liability in California. This liability is not merely unprecedented in dollar terms. It has also opened a qualitatively new dimension to electrical infrastructure, epitomized by the adoption among the state's IOUs of the so-called "public safety power shutoff" (PSPS), in which electricity is preemptively cut to parts of the grid on days of acute fire risk. In addition to being technical solutions to the problem of powerline-caused fires, these shutoffs should be read as a way of allocating risks and costs across the social universe brought together by the system of the "public utility." In this way, PSPS events represent a radical departure from the vision of modernity conjured by the twentieth century public utility model, which was imagined as a way of combining public regulation and private enterprise to electrify the country.

Second, these PSPS de-energization events are only the most visible and potentially disruptive changes to the legal, financial, and regulatory systems by which infrastructure is governed. The prospect of catastrophic wildfire liability costs which are not allowed to be recovered by raising utility rates has set in motion efforts by the IOUs and sympathetic lawmakers to dramatically reconfigure these systems, with varying levels of success. Many of these efforts orbit around the question of the "public" or "private" nature of the state's IOUs for the purposes of conferring liability and socializing its costs. This is especially true regarding efforts made by utilities and lawmakers to reform California's unique interpretation of "inverse condemnation," which stipulates strict liability for the taking or damage of property for "public use," and which historically includes IOUs in its ambit as providers of electricity as a public good.

Of course, adjudicating the public/private divide and its attendant rights and obligations has long been a central preoccupation for legal "reasoning by dichotomy" (Potts 2020b). But as I will repeatedly show, the very history and structure of regulated IOUs – as well as the effectively sovereign power of market actors to set in motion transformations of energy law in California – confounds any meaningful public/private distinction. The purpose here is not, however, simply to observe that the divide between public and private is "ambiguous" or "murky" in actual practice. Rather, this ambiguity is legally and financially useful for utilities, their shareholders, their regulators, and the state – and it constitutes the conceptual terrain on which much of our contemporary infrastructural politics play out.

Third, the California wildfire situation therefore reveals to us that "infrastructure" describes not just physical systems of social provision, but also the risks and liabilities necessarily attached to these systems – and the *legal logics* by which these risks and liabilities will be distributed across different social groups.

To contextualize the changes that have taken place in California, this chapter begins with an account of the "public safety power shutoff" as a technology for managing liability as well as fire. It then proceeds to an abridged history of the "public utility" concept, its legal underpinnings, and the way both have transformed over the course of the twentieth century. After outlining some of the relevant legal precedent, the chapter concludes with a recent (and ultimately failed) petition to the United States Supreme Court – spearheaded by SDG&E but with the support of all of California's major IOUs – challenging the constitutionality of inverse condemnation, as well as roughly contemporaneous changes made to CPUC regulatory standards by the California state legislature.

Public safety power shutoff as a liability technology

In addition to forming the basis for legal challenges and legislative changes to California's public utility liability regime, catastrophic fires from 2007 onward have had dramatic material effects on the provision of electricity in the state. These effects are most apparent in the introduction and regulatory codification of the "public safety power shutoff," a tool deployed by IOUs to reduce the risk of powerline-ignited wildfires by preemptively de-energizing parts of the grid on days of high fire danger. This chapter begins with a consideration of the PSPS as a technology for managing infrastructural liability – one which will complicate the twentieth century notion of "public utility" as a modernizing legal and sociotechnical project.

Before even turning to questions of liability and cost, the relationship between electrical infrastructure and wildfire poses an intractable engineering problem. Though they represent only a small percentage of all ignitions in California, powerline-caused fires are disproportionately likely to be large and destructive. This is because the conditions that tend to cause infrastructure failure – namely, high speed winds that typically occur in autumn after the summer drying season – are conducive to rapid wildfire spread, and because infrastructure exists where people live (*Final Report of the Commission on Catastrophic Wildfire Cost and Recovery* 2019).

Following massive wildfires in its service area in 2007, San Diego Gas & Electric sought permission from the CPUC to shut off power when the Santa Ana winds exceeded a certain speed threshold to prevent powerline ignitions. While the commission denied the utility's request under the conditions specified in its application, it nevertheless concluded that SDG&E had statutory authority to preemptively shut off power in emergency situations (CPUC Decision 09-09-030). This decision, elaborated and formalized in 2012 (CPUC Decision 12-04-024), laid the ground for the discretionary use of preemptive de-energization by each of the state's large IOUs.

It was not until 2019, however, that the PSPS was truly thrust into popular consciousness. After the unprecedented destruction of the 2017 and 2018 wildfire seasons, the state's IOUs executed 13 PSPS events in October and November of that year, cumulatively affecting 2,153,906 customers (*Public Report on the Late 2019 Public Safety Power Shutoff Events* 2020: 3). These outages were most severe in PG&E's service area. In late 2019 the utility shut off power five times, disrupting electricity service to 1,942,549 customers – including a single October 26 PSPS event that lasted three days and affected nearly a million customers, many in the densely populated San Francisco Bay Area.

There is evidence to suggest that PG&E's decision to de-energize to such an extent was shaped by its unfolding legal situation at the time. In the middle of its bankruptcy proceedings and consequently not yet eligible to participate in the recently passed AB 1054's Wildfire Fund (which will be explained in more detail in the next chapter), PG&E was perhaps especially cautious. Its 2019 shutoffs resulted in approximately 12 million "person-days" of outages. That level of exposure is 50% higher than what Abatzoglou et al. (2020) have modeled was necessary after the fact based on PG&E's public-facing PSPS emergency criteria and available meteorological data. It has likewise been estimated that the outages initiated by PG&E cost the state $10 billion in lost economic productivity (*Full Committee Hearing to Examine the Impacts of Wildfire on Electric Grid Reliability* 2019) – 0.3% of the gross state product that year.

That amount is also roughly 120% of the $8.4 billion PG&E was offering as a settlement to the wildfire victims in its bankruptcy case at the time. While comparing the costs faced by a single private firm in bankruptcy court with the costs its decision to de-energize had on the overall economic condition of the state in which it operates invokes vastly different scales and contexts, these two figures are not incommensurate. In fact, they are linked by a system that

relies on investor-owned companies to provide electricity as a public good. Within this public utility system, these power shutoffs function *inter alia* as a mechanism for converting one kind of liability (the costs a utility may incur if its infrastructure is determined to be the cause of a wildfire) into another. This second kind of "liability" is not legally determined, but it can be thought of as a kind of collective vulnerability or exposure. It may be measured in monetary terms, as the costs of lost economic productivity associated with interruptions to electricity service; or it can be measured in terms of the individual risks to life and health these interruptions produce.

The massive reach and disruptive effects of PG&E's 2019 PSPS events led to widespread public outrage, prompting a full US Senate hearing and an extensive CPUC report on the outages. That report found that California's utilities in general and PG&E in particular failed to effectively coordinate with other entities during the outages, did not adequately consider the effects of the shutoffs on high-need populations, and did not provide sufficient explanation of how the benefits of de-energization outweighed the potential public safety risks (*Public Report on the Late 2019 Public Safety Power Shutoff Events* 2020). It also established a protocol for post-PSPS event reporting, now required after each individual shutoff and folded into the IOUs' annual "wildfire mitigation plans."

For its part, PG&E suggests that it is continually striving to make its PSPS events "smaller, smarter, and shorter," and that its 2020 shutoffs used "improved scoping techniques and mitigation strategies…[to reduce] the number of customers impacted by approximately 55 percent on average" while shortening the average time to power restoration from 17 hours to 10 (*PG&E 2021 Wildfire Mitigation Plan Report*: 847, 854). At the same time, the company warns that future mitigation efforts will not be able to yield the "large, step-function improvement in

PSPS footprints [i.e. the scope and impact of shutoffs] as was achieved in 2020" (ibid.: 852), and predicts no change or even an increase over the next ten years in the overall frequency of PSPS events in its service area as fire conditions continue to worsen. The result may well be an increasingly uneven geography of electricity service in the state, with tangible reductions in PSPS impacts in certain urban areas existing alongside WUI communities clustered in the Sierra foothills that are hyper-exposed to both wildfire and de-energization efforts designed to prevent it.

It is possible (or even likely) that PG&E has made substantial progress improving its shutoff protocols in compliance with California's regulatory requirements, just as it is possible that the shutoffs are themselves capable of functioning as highly effective public safety measures. But such considerations are beyond the scope of this chapter. The purpose here is not to suggest that PSPS events are unnecessary in every instance, or to argue that in some alternate universe in which California's electricity is not provided by investor-owned companies such PSPS events would cease to exist altogether. Though there is ample evidence collected in the wake of catastrophic fires indicating that each of the state's IOUs have systematically neglected their electrical infrastructure and habitually violated state safety rules (see Complaint for Declaratory and Injunctive Relief, *Cannara v. Nemeth* 2019: 9-10),[2] California's landscape – and especially PG&E's service area – is itself ultimately too fire-prone for such arguments to hold.

Rather, what I want to emphasize is that the PSPS must be understood as both a technical problem and – in relation to the legal dimensions of infrastructure outlined in the forthcoming

[2] PG&E's neglect of its infrastructure is particularly egregious in this regard. Following the 2018 Camp Fire, investigative journalists discovered that on average PG&E's transmission towers were 68 years old, while the life expectancy of such assets was 65 years. The transmission line that ignited the Camp Fire had been in operation for over a century. The same report finds that PG&E continually delayed making needed upgrades to its infrastructure, even as historic drought dramatically increased fire risk. See Blunt and Gold 2019.

sections – a liability problem. Seen in this light, power shutoffs are a way of displacing risk *ex ante* just as the efforts of IOUs to reform inverse condemnation described below reflect an effort to socialize liability *ex post*.

Utilities and their shareholders have a deep financial interest in using each of these tools, insofar as they distribute the costs associated with electrical infrastructure outward to a "benefited public" of power consumers. When approaching the public utility system as a field of potential liabilities mediated through the law, the PSPS and other efforts to reform California's liability standards exist among a suite of possible actions to be taken by an IOU. The sociospatial and geophysical dimensions of the PSPS cannot be easily separated from the legal efforts of the IOUs to transform the state's liability regime. Each is a sort of *liability technology*, by which I mean a mechanism for managing or redistributing the costs and liabilities of infrastructure.

"Public utility" and modernity

To appreciate recent transformations of the legal landscape governing electricity in California and the importance of the PSPS as a symbol of the shifting meaning of infrastructure, it is necessary to understand the historical genesis and evolution of the concept of the "public utility" over the course of the last century. In this section, I trace this history to demonstrate the pivotal role the public utility system played in the constitution of twentieth century American modernity. To invite the capital needed for its construction and continued operation, this system has been legally and institutionally designed as a compromise between public authority and private enterprise. It is the tensions that attend such a compromise that have enabled legal and economic restructuring of the industry in moments of crisis. The wildfires in California represent one such moment of crisis, but certainly not the first.

In the United States, the term "public utility" does not refer specifically to public ownership, but rather to a Progressive-era regulatory apparatus broadly aimed at the "social control of business" (Boyd 2014). Buoyed by an 1877 Supreme Court decision that permitted regulation of property "clothed with a public interest when used in a manner to make it of public consequence" (*Munn v. Illinois*: 126), states from 1907 onward began implementing statutes to govern the terms by which non-state enterprises could profit from the sale of electricity in exchange for guaranteed service. Developed first by institutional economists and legal practitioners in New York and Wisconsin and quickly adopted across the country, these statutes were enshrined in state Public Utility Codes and administered by newly created public utilities commissions, which were designed to balance the interests of providers of the new legal category of "public goods" and their users.

During this period, the widespread adoption of alternating current increased the distance electricity could travel, while aspiring monopolists like Samuel Insull, president of Chicago Edison, sought to reap benefits from economies of scale by dramatically expanding the customer base and generation capacity of the utilities under their control. The result was that the electric industry, initially a chaotic, competitive and decentralized realm of power generation and distribution, substantially consolidated over the first half of the twentieth century into the public utility model, in which tightly regulated and vertically integrated private businesses were granted a monopoly franchise to deliver power within a particular spatially-defined service area (Bakke 2016; Granovetter and McGuire 1998).

The creation of the public utility constituted a radically successful sociotechnical project on its own terms. In 1898, roughly 5% of households in the United States had access to electricity; by mid-twentieth century, electric power was ubiquitous. Meanwhile, large utility

companies became the dominant purveyors of that electricity.[3] Today, power in the United States is delivered by a collection of federally and municipally owned utilities, local cooperatives, and IOUs; but it is the latter that supply nearly all the major markets, with the result that 72% of customers nationwide get their electricity from investor-owned utilities (EIA 2019).

This speaks to the business success of regulation, in which IOUs were assigned some of the obligations of a public entity – namely, nondiscriminatory electricity provision to a predefined service area – in exchange for "rate of return" calculated in consultation with regulators and based on the value of their fixed assets that provided electricity. This was achieved by determining the value of the electrical infrastructure used by an IOU to produce and deliver power and negotiating with the appropriate public utilities commission to determine the rates that could be charged to customers to secure a specified return on top of this base. Regulation, in other words, did not simply constrain the power of monopoly utilities; rather, it created the very market conditions in which the electricity industry was meant to operate.

Hirsh (1999) has described this model as a "utility consensus" between regulators and utility managers. For regulators, this consensus was envisioned as a way of protecting consumers of electricity from monopoly pricing. But such an arrangement also insulated utility companies from both state takeover and market competition. The spatial barriers it erected in the market and the profits it guaranteed through consultation with the public utility commissions kept interest rates low for electricity firms by reducing the risks of doing business. This was especially important in a capital-intensive industry that has historically relied on debt financing for expansion (Boyd 2014: 1643). As Harrison (2020: 4) summarizes:

[3] In 1902, nonutility power capacity, derived mostly from cogeneration by industrial power consumers, accounted for over 60% of total electrical capacity in the United States. By 1978, that number had fallen to a little over 3% of total capacity (Hirsh 1999: 82).

> Much of the early history of electricity was coming up with ways to match the long-term investment required to build electricity infrastructure with an industry financial model less vulnerable to capital flight...The state has historically performed this task through the regulation of monopoly electric utilities. Crucially, regulation was not only devised to protect customers from paying monopoly rents. Rather, regulation provided utilities with a captive customer base whose consumption could be cultivated, as well as a requirement that utilities earn fair returns on their investment.

Over time, the public utility model helped to produce a nationwide electric grid, the ur-infrastructure of American modernity. For much of the twentieth century, "modernity" meant the increasing availability and use of electric power in both homes and industry as part of a broader imagination of social progress. The utility consensus reached its zenith in the postwar "golden age," an era of sustained economic growth built on increasing consumption of power by both industry and households and buttressed by low energy costs. This era was characterized by the CPUC in retrospect as the "glory days" of the American electricity industry (Dasovich et al. 1993). Regulated monopolies attracted capital with their promise of safe and predictable returns, while real advantages in thermal efficiency (the amount of energy that is converted from fuel sources into electricity) produced by economies of scale continued for decades until plateauing in the sixties, encouraging the construction by utilities of ever-larger power plants whose costs could then be folded into their "rate base" in collaboration with regulators.[4]

"During the post-World War II economic boom," Boyd suggests, "there seemed to be little reason to consider a future that might turn out differently than the past" (2014: 1685-1686). Indeed, the entire utility consensus was in this period premised on a vision of the future extrapolated from the felicitous conditions of the present: low costs for fuel inputs, increasing technical efficiencies, and expanding power production to meet steadily increasing demand.

[4] From 1948 to 1965, crude oil prices stayed roughly level at around two dollars per barrel and oil and natural gas became a major source of power generation. The US GNP grew on average 2.8% per year in the same period. National electricity sales increased at an average rate of 9.37% per year and the cost of electricity stayed below two cents per kilowatt-hour, while capital spending by utilities was consistently high. See Dasovich et al. 1993: 17-26.

From 1920 to 1973, electricity consumption grew at an average rate of 7% per year, while costs declined in roughly the same period from 62 to 9 cents per kilowatt-hour (Hirsh 1999: 47). The electrification of American life was actively promoted by the regulated utilities, who encouraged the widespread adoption of electrical appliances that we have come to associate with twentieth century modernity and who also helped to provide the industrial capacity necessary to produce them.[5] Undergirding the expansionary strategy of investor-owned utilities was an "ideology of growth" widely shared by power producers, consumers, and regulators:

> Generally trained as engineers, power company executives believed…that they possessed legitimate technological approaches for solving social problems and for enhancing material well-being. Their belief was bolstered by the generally accepted notion…that electrification had revolutionized life at home, on the farm, and in industry…Increasing use of power…helped generate the economic engine that maintained the American way of life. And because they kept that engine purring, utility managers considered themselves stewards of technological and social progress – not just businessmen trying to make money. (Hirsh 1999: 50)

But beginning in the seventies, the circumstances that made this future imaginable began to undergo a series of tectonic shifts. In the United States, the technical efficiencies in power generation afforded by the utilities' scale economies hit a ceiling at the same time that geopolitical conflicts in the Middle East drove up the price of fuel inputs. The "energy crisis" provided the background to the 1978 National Energy Act, an effort spearheaded by Jimmy Carter to encourage energy self-sufficiency in the form of the increased use of domestic coal and renewables and various incentives for conservation and industrial cogeneration, a process through which large energy consumers generate their own electricity and use the waste heat for some productive purpose. In response to these transformations, the growth in demand for electricity that had been so meticulously cultivated by IOUs slowed down, and by the eighties

[5] Insofar as this configuration of people and power comes to bear on the "conduct" and "wealth" of a population, we may think of it as a biopolitical arrangement. Boyer (2019), expanding this Foucauldian premise and seeking to account for the ways political power is entangled with electrical infrastructure, proposes the term "energopolitics."

many utilities that had expanded continually in the heyday of the utility consensus faced large capacity excesses and cost overruns (Harrison 2020).

It is with the passage of the National Energy Act that we see the first stirrings of crisis-provoked reorganization of the legal, financial, and regulatory frameworks governing the public utility consensus. A minor clause in the Public Utilities Regulatory Policy Act (or PURPA, one of the components of Carter's NEA), enabling qualifying "independent power producers" (IPPs) to sell wholesale electricity to utilities, paved the way for eventual restructuring of the electricity industry. Without the regulatory expectations and large infrastructural footprints of the utilities, these independent producers could competitively generate power that PURPA required the utilities to purchase at their "avoided cost" – that is, how much it would cost them to produce the power themselves. The CPUC was at the vanguard of this effort, working throughout the eighties to bring a large amount of IPP generation capacity online and then declaring that the industry was ripe for further reform "in light of the fact that [California] has seen the utility's monopoly position erode substantially during the past two decades" (Dasovich et al. 1993: 14). One year later, in 1994, the CPUC laid out its vision for the future. "We foresee a California," they wrote, "in which…California's consumers gradually enjoy *direct* access to generation suppliers, marketers, brokers and other service providers in the competitive marketplace for energy services" (emphasis in original, CPUC OII 94-04-031; CPUC OIR 94-04-032). California legislators moved to adopt the Commission's suggestions, and by 1998, the state became one of the first in the nation to initiate a fully "deregulated" energy market in which consumers could freely choose their power producer.[6]

[6] The quotation marks are necessary because the new energy markets required (and continue to require) substantial regulatory oversight in order to function as simulacra of perfect markets. See Boyd 2020.

The now-infamous 2000-2001 California electricity crisis that followed – which saw the forced divestiture by utilities of many of their power plants, coordinated efforts on the part of energy traders to withhold supply in an effort to bid up its price on the new market, rolling blackouts across the state, skyrocketing electricity costs, and the first bankruptcy of PG&E (Solomon and Heinan 2001; Whittington 2002) – largely put further deregulatory efforts on pause across the country. It also left us with the patchwork of regulatory systems that currently govern the American electricity industry, with some states running fully competitive energy markets, some keeping in place the traditional regulated public utilities, and others like California adopting a "hybrid model" of competitive wholesale power generation and monopoly utility franchises for retail electricity service (see Harrison 2020 for a more detailed description). In any case, the twilight and (partial) transformation of the twentieth-century utility model signaled the end of a century-long national consensus that the careful regulation of business could be harnessed for modernization and social progress – signaled here by the ever-expanding electrification of the country – and the patchwork replacement of such a belief with a faith in "the market" to achieve some of these same ends. This turn severed the ideological link between "public utility" and modernity.

Legal dimensions of the public utility

The onset of industry restructuring and "deregulation," then, may have indicated an ideological shift we are still living through. It also further hybridized an industry model that by and large *already* operated on the borderlands between public interest and private property. In this section, I consider how these terms have been enrolled into public utility regulation and litigation and the kinds of legal reasoning they make possible. The notion of "public utility" provides IOUs with both the obligation to deliver electricity as a public good and the right to profit from their

ownership of the private property that generates and distributes that electricity. Just how "public" a utility is, then, is a matter of open dispute. It is this question that has historically anchored the (legal) infrastructure of (physical) infrastructure in the United States. How a utility is defined and redefined in particular legal contexts determines in turn who will bear the risks associated with infrastructure: the utilities and their shareholders, who own and profit from the infrastructural enterprise, or the community of ratepayers that benefit from the "public goods" which those utilities create and administer.

What Hirsh calls the "utility consensus" is more commonly referred to by actors within the electricity industry as the "regulatory compact" – a phrase that suggests a public/private compromise in relation to the assignation of rights and responsibilities. This "compact" encompasses the monopoly franchise and its guaranteed rate of return on fixed capital investments, and grants IOUs the power of eminent domain – the ability to condemn property necessary for construction and operation of its infrastructure – in exchange for the universal provision of electricity at "just and reasonable" rates within a service area.[7] In other words, it endows IOUs with a public purpose and public powers, while also leaving room for utilities to maintain that their electrical infrastructure is the private property of the company, itself subject to Fifth and Fourteenth Amendment protections against public taking without due process of the law and just compensation.

This tension was well understood by architects of the public utility system and has animated many disputes in energy case law and regulatory rate proceedings in the intervening period. Robert Lee Hale, a legal scholar, institutional economist, and proponent of the regulatory system that had been built up in the first decades of the twentieth century, argued as early as

[7] In the California Public Utilities Code, the relevant sections are §451 (just and reasonable rates) and §612 (utilities' power of eminent domain).

1922 that the concept of public utility represented "a legal curb on the power of property owners" – here the utilities, their shareholders and the infrastructure in their possession – that "may very well serve as a model, wherever applicable, for the revision of other property rights" (213). In his account, the economic rights of businesses to profit from their ownership of private property put to public use – becoming in the process "clothed with a public interest," in the words of the *Munn v. Illinois* decision – are substantively transformed by regulatory practice, with potentially far-reaching implications for property rights in general.

Hale thus implores those engaged in nascent regulatory efforts to be more forthcoming about the radically new "body of law" that may emerge from the public utility model and its full implications (1922: 216). But other contemporary commentators were less confident about the power of public utility to upend settled common law expectations around the rights accorded to property owners. Writing in 1940, a few years after nearly every state in the country had adopted some form of public utility regulation, and witnessing a rash of businesses in every sector, from farming to real estate, lobbying for "public utility" status and its attendant monopoly privileges, the economist Horace Gray paints a starkly different picture:

> [Public utility] originated as a system of social restraint designed primarily, or at least ostensibly, to protect consumers from the aggressions of monopolists; it has ended as a device to protect the property, i.e., the capitalized expectancy, of these monopolists from the just demands of society, and to obstruct the development of socially superior institutions…Just as in the days of the Empire all roads led to Rome so in a capitalistic society all forms of social control lead ultimately to state protection of the dominant interest, i.e., property. The public utility concept has thus merely gone the way of all flesh. (15)

A major theme in public utility regulation has indeed been the "capitalized expectancy" of utilities to "fair" rates of return from their property. In *Bluefield Water Works & Improvement Company v. Public Service Commission of the State of West Virginia* (1923), for example, the Supreme Court ruled in favor of a West Virginia water utility that claimed state regulators had

undervalued its assets during the rate-setting process. "Rates which are not sufficient to yield a reasonable return on the value of the property…being used to render the service," Justice Pierce Butler wrote at the time, "are unjust, unreasonable, and confiscatory, and their enforcement deprives the public utility company of its property in violation of the Fourteenth Amendment" (*Bluefield Co. v. Pub. Serv. Comm* 1923: 690). Here, the "just and reasonable" language present in the public utility codes is deployed not in relation to the service rendered for the public, but rather in relation to the property expectations of the utility – and the possibility of a ratemaking decision that sets rates so low that they constitute an uncompensated, "confiscatory" legislative taking of that property.

The Court's opinion in *Bluefield* suggests that rate regulation is a mechanism for harmonizing private expectation and public purpose. Foreshadowing arguments that would be made nearly a century later by California's IOUs and state lawmakers (about which more below), Butler concludes that "return should be reasonably sufficient to assure confidence in the financial soundness of the utility and should be adequate…to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties" (*Bluefield Co. v. Pub. Serv. Comm* 1923: 693). By the Court's reasoning, "proper discharge" of a utility's public purpose depends on its access to private capital – and that capital will only arrive with the guarantee of adequate profit produced by the electrical infrastructure in its possession.

But as the legal challenge that led to the *Bluefield* decision makes clear, in courts the private property rights afforded to the utility and its investors are also used to challenge rates set by regulators as unconstitutional government "takings" of utility property. In other words, the public utility model doesn't merely harmonize between public and private interest; it also routinely produces conflicts between them.

The last major Supreme Court decision about takings in a rate-setting context came in 1989 with *Duquesne Light Co. et al. v. Barasch et al.*, as the utility consensus was continuing to unravel. In that case, an electric utility in Pennsylvania (Duquesne Light Company) began construction on seven nuclear generating facilities in the waning hours of the industry's "glory days," only to witness subsequent geopolitical events in the seventies dampen the demand for nuclear power in the United States. The project was cancelled, and when Pennsylvania's Supreme Court upheld the state's utilities commission decision to disallow passing along the cost of the (incomplete) facilities to ratepayers, Duquesne appealed at the federal level. Duquesne argued that this regulatory disallowance constituted a taking of the company's private property without just compensation, violating its Fifth Amendment rights. In the end, the Court demurred, concluding that the disallowance of rate recovery for costs that are not "used and useful" is not a taking (*Duquesne Light Co. et al. v. Barasch et al.* 1989: 302) – while still upholding in principle the *Bluefield* precedent about the possibility of rates that are "confiscatory" of the utility's property.

Whether we view the public utility concept as a system that has subordinated property rights to public purpose along the lines proposed by Hale – or as a system that has been subordinated by property rights from more or less the very start, as Gray suggests – is less important for the purposes of this chapter than pointing out that the public use/private property framework and its attendant tensions represents the legal vocabulary through which utilities are regulated and their rates adjudicated. As Potts (forthcoming, emphasis in original) contends in a different context, "The point is…not that the courts have gotten it 'wrong,' or to suggest a more 'accurate' definition of the public/private divide. The point, rather, is to examine *how* these terms were redefined, and with what effects."

The "publicness" of public utilities is a matter of ongoing and context-specific legal negotiation, enabled by the unique regulatory apparatus that has emerged within the United States over the last century. In cases like *Duquesne*, that apparatus is the terrain on which battles over rights, obligations and liabilities are fought. It has provided both the contemporary understanding of "public use" *and* the utilities' arguments about regulatory "takings" of private property. The outcomes of the legal disputes over these terms have direct effects on the financial position of utilities, and these court cases therefore form an important location for what Harrison (2020: 13) describes as "accumulation by regulation." Harrison is referring here specifically to the rate cases brought before public utilities commissions and the "rate of return" those cases allow for utilities. But when those rate cases do not deliver the desired outcome for utilities, they have recourse to a broader legal universe through which they can plead their case on statutory or constitutional grounds, variously defining themselves as more or less "public" or "private" along the way. In the cases of *Bluefield* and *Duquesne*, utilities presented themselves as private businesses unjustly harmed by onerous or "confiscatory" regulatory decisions; in the wildfire-related cases I describe in the next section, California's utilities likewise present themselves as merely private actors for the purposes of avoiding "inverse condemnation" liabilities when they start fires – or else they demand from regulators the public power to socialize these liabilities through rate increases.

Insofar as these challenges have financial effects, enabling utilities to pass along their liabilities in rates, they are accumulation strategies expressed in the language of the law. "Infrastructure," then, encompasses not merely the physical assets that deliver things like water, power, and commodities, but also the legal vocabulary that attaches itself to and governs these assets – what we might call infrastructure's legal infrastructure.

Liability in an age of catastrophic fire

The public use/private property dichotomy is at the heart of California's wildfire liability regime. Much maligned by legal and financial observers, this regime has recently been subjected to concerted legal attacks by California's utilities in the aftermath of catastrophic wildfire events. This section surveys these efforts and the legal rationales underpinning them – extending the argument presented above that infrastructure is a legal system of apportioning risk just as much as it is a physical system of providing services, and further developing the idea that the concepts of "public" and "private" do not have rigid boundaries within the law or substantial purchase in actual legal, legislative or financial practice. Within the legal and regulatory systems that govern public utilities as shared *social enterprises*, these categories are central but contentious; "beyond" that system, in the markets that govern public utilities as *investments*, public authority devolves to a substantial degree into the hands of private actors.

Importantly, the massive scope of recent wildfire events has begun to confound the conventional methods available to utilities for mitigating liability costs through insurance. In 2007, the Witch, Guejito, and Rice Fires tore through San Diego Gas & Electric's service area, destroying 1,347 structures, killing two, and injuring 40 more. The fires were caused by SDG&E's powerlines, and the costs incurred over the months and years that followed exceeded a utility's liability insurance for the first time in the state's history (*Final Report of the Commission on Catastrophic Wildfire Cost and Recovery* 2019: 32). Since then, wildfire liabilities have begun to routinely outstrip insurance for California utilities, while premiums have risen to as high as 40 cents for every dollar of available commercial coverage (Graves et al. 2018: 25). The $30 billion in liabilities stemming from the 2017 Northern California Fires and the 2018 Camp Fire estimated by PG&E at the outset of its bankruptcy proceedings exceeded its

$1.4 billion in wildfire insurance coverage by a factor of twenty, while the $4.7 billion incurred by SCE from the 2017 Woolsey and Thomas Fires was nearly five times its $1 billion dollar policy (Brief for Edison Electric Institute as *Amicus Curiae* Supporting Petitioner, *SDG&E v. CPUC* 2019: 12-13).

Insurance is a contractual technology for managing risk and covering liability. As the protections it offers become exhausted by catastrophic fires, California's utilities have attempted to socialize their costs in other venues. The 2007 fires and the unrecovered costs they ignited provided a legal vehicle for SDG&E and California's other major IOUs to attempt to transform the state's wildfire liability regime through the intervention of the United States Supreme Court. Though the Supreme Court ultimately declined to review SDG&E's petition, the company's concerns – and the concerns of the shareholders of each of the state's utilities – nevertheless found their way into AB 1054, a California state legislature bill that transformed the state's liability environment.

As numerous commentators have emphasized (normally alongside the recommendation that these standards be transformed; see, e.g., Kousky et al. 2018; Nagano 2020; Obeid 2021), California has a uniquely exacting set of regulatory standards and legal precedent governing utility liabilities. These begin with §19 of the state constitution, which stipulates that "Private property may be taken *or damaged* for a public use and only when just compensation, ascertained by a jury unless waived, has first been paid to, or into court for, the owner" (emphasis mine). The language present here expands upon the Takings Clause in the Fifth Amendment, mandating just compensation not only in the event of a public taking, but also if property is damaged by public use.

In general, a property owner in the United States subject to a public taking without "just compensation" can sue for recovery under the auspices of "inverse condemnation" – so named because it is the party subject to taking that is suing for compensation, rather than the entity condemning it for public use (thus inverting the normal legal order of a public taking). What is particular about the application of this doctrine in California is its scope and the kind of liability it confers. State courts have interpreted §19 of the California constitution and the Takings Clause of the Fifth Amendment as implying strict liability for damages caused by public use, even when that damage is caused "neither intentionally nor negligently" and "whether foreseeable or not" (*Albers v. County of Los Angeles* 1965: 263, 264). In *Barham v. Southern California Edison Co.* (1999), an appellate court extended this strict liability standard to California's IOUs, determining that SCE's private ownership was irrelevant when considering whether the utility could be held liable under inverse condemnation. This was not only because "a public utility is in many ways more akin to a governmental entity than to a purely private employer" (430), but also and more importantly because the utility's electrical infrastructure was being deployed for a "public use" when it sparked a 1993 fire that damaged the plaintiff's property in the case. The legal logic underpinning the *Barham* decision was reconfirmed in *Pacific Bell v. Southern California Edison Co.* (2012), when the same appellate court rejected SCE's arguments that as a privately owned company it was not subject to inverse condemnation, additionally citing its "monopolistic or quasi-monopolistic authority deriving directly from its exclusive franchise provided by the state" as a crucial factor determining its liability (1406).

In both *Barham* and *Pacific Bell*, the courts assigned California's investor-owned utilities the same expansive obligations a public entity would have in the state. As with most cases that deal with public takings, the moral calculus behind these decisions centered on the principle of

widely socializing costs. “Individual property owners,” in other words, “should not have to contribute disproportionately to the risks from public improvements made to benefit the community as a whole” (*Pacific Bell v. SCE* 2012: 1407; see also *Barham v. SCE* 1999: 430). A government can spread costs through taxation, the courts reasoned, while an IOU can likewise pass along costs through rate increases. But as I indicated in the previous section, public utility regulation is not an automatic process. Rather, it is a terrain of contestation, and a capacious legal vocabulary for apportioning liability. Within this process, the public or private nature of the utilities undergoes constant revision, while the regulatory commissions ultimately make their own decisions about the costs companies can pass on in rates.

In the case of the 2007 fires caused by SDG&E, the CPUC determined that the utility had acted imprudently in managing its infrastructure and prevented it from recovering $379 million in liability costs from its ratepayers. In so doing, the commission was applying its own “prudent manager” standard for determining whether rate increases were “just and reasonable.” The $379 million figure represented only 15% of SDG&E’s approximately $2.4 billion in liabilities resulting from the fires, with the remaining 85% paid for by the utility’s liability insurance (Brief in Opposition of Real Party in Interest and Respondent Ruth Henricks, *SDG&E v. CPUC* 2019: 12).

But the disjuncture that opened up between the costs incurred by the utility under California’s interpretation of inverse condemnation and its ability to pass those costs on to ratepayers under CPUC’s prudency standard was deeply alarming to SDG&E. It portended a possible future in which the costs of catastrophic infrastructure-caused wildfires, exceeding insurance coverage and not guaranteed to be recovered through rate increases, presented utilities with potentially unbounded liabilities, to be borne by the company and its shareholders. After the

CPUC rate decision was upheld by California's appellate courts and denied review by California's highest court, SDG&E, in concert with the state's other two major IOUs and their shareholders, attempted to challenge this situation with a 2019 petition for a writ of certiorari to the Supreme Court. The fundamental question calling for review, SDG&E and its allies suggested, was:

> Whether it is an uncompensated taking for public use in violation of the Fifth and Fourteenth Amendments for a State to impose strict liability for inverse condemnation on a privately owned utility without ensuring that the cost of that liability is spread to the benefitted ratepayers. (Petition for a Writ of Certiorari, *SDG&E v. CPUC* 2019: i)

Harkening back to the private property rights against "confiscatory" regulation enshrined in *Bluefield* – and largely sidestepping the Supreme Court's *Duquesne* precedent on regulatory takings[8] – SDG&E's Supreme Court petition flipped the logic of inverse condemnation as it has been codified in California on its head. So long as they are unable to socialize liability through rate increases, the petition suggests, it is the *IOUs* – and not the owners of property damaged by powerline-caused wildfires – that are victims of an "uncompensated taking for public use." California's liability regime has in this telling created a "takings whipsaw in which the State transfers the cost of damage from public improvements from one private party (the damaged homeowners and businesses) to another private party (SDG&E and other privately owned utilities)" (ibid.: 2).

In so doing, the California system "exposes investor-owned utilities to unbounded liability that is confiscatory" (Brief of *Amici Curiae* Shareholders in California Investor-Owned

[8] SDG&E argued that the Court's ruling in *Duquesne*, which determined that disallowance of rate recovery for unused power facility costs wasn't a confiscatory regulatory taking, did not resolve the matter hand, since it was the interaction of California's inverse condemnation strict liability standard and the CPUC's disallowance of rate recovery under the prudent manager standard that facilitated the taking. Besides, SDG&E suggested, the *Duquesne* opinion never indicated "an overall reasonable rate of return would insulate a State from any and all takings challenges in a utilities context" (Petition for a Writ of Certiorari, *SDG&E v. CPUC* 2019: 18).

Utilities in Support of Petitioner, *SDG&E v. CPUC* 2019: 4) and "eviscerates" the regulatory compact (Brief for Edison Electric Institute as *Amicus Curiae* Supporting Petitioner, *SDG&E v. CPUC* 2019: 3). These arguments by California's IOUs and their allies rely on the flexibility of the concepts of "public" and "private" in public utility regulation. It is the tax-like rate authority bestowed upon or taken from the utility by regulators – not its electrical infrastructure being enrolled into public use — that SDG&E argues is the most important determinant of its status as a public entity. Preventing it from exercising this authority, California forces "a privately owned company to act as the Government for the purposes of paying inverse condemnation claims to others, but then treats that company differently from the Government in disallowing those costs to be spread" (Petitioner's Reply Brief, *SDG&E v. CPUC* 2019: 2). In other words, strictly liable but disallowed rate recovery from a "benefited public" of ratepayers by the CPUC, SDG&E presents itself as transformed by California's legal environment into a merely private actor whose property has been taken without compensation.

Here, to be a public entity (or a "Government") means to possess the ability to unilaterally socialize risk (and liability) across a broad base of rate-or-taxpayers. As already mentioned, private firms can selectively and contractually transfer risk to a willing counterparty through the mechanism of insurance when denied that ability. SDG&E's Supreme Court petition not only begins at the moment this insurance mechanism runs up against its actuarial limits in the face of catastrophic fires, but also argues that in fact California's legal regime turns the utility into an ersatz *insurer* at the same time that it turns it into an ersatz government.

In a report prepared by financial consultants for PG&E a year before SDG&E's petition, the wildfire exposure faced by California's utilities was described as an "asymmetric risk" – one with no upside if a fire does not occur but potentially "unbounded" costs. "These asymmetric

exposures are basically like insurance risks and not ordinary business risks," the report's authors gravely conclude (Graves et al. 2018: 20). But unlike insurance firms, utilities are not paid a premium for taking on such risk – nor, the authors suggest, do the rates set in consultation with regulators take it into account. This reasoning was taken up by the shareholders of California utilities in SDG&E's writ petition, who additionally cite the credit rating agency S&P to challenge the state's wildfire liability regime: "the legal doctrine of inverse condemnation *effectively makes California's electric utilities the state's reinsurer*, which creates new risks that were never envisioned when investor-owned utilities were established" (emphasis mine, in Brief of *Amici Curiae* Shareholders in California Investor-Owned Utilities in Support of Petitioner, *SDG&E v. CPUC* 2019: 8). The repeated invocation of the utility as a (re)insurer indicates that we are squarely in the domain of risk management. In this domain, the question of whether a company or constellation of companies are more or less "public" determines who can be made responsible for this risk.

S&P's description of the California IOUs' (unwanted) "insurance" obligations came in the context of a credit rating downgrade announcement for SDG&E – one moment in a wave of such downgrades directed at the state's utilities, beginning around the time of the 2017 Northern California fires and the concurrent CPUC decision to deny rate recovery for SDG&E's 2007 liabilities. The effect of potential future fire liabilities on the utilities' credit ratings – and consequently on the utilities' cost of capital – was a recurrent theme in SDG&E's writ petition and the amicus briefs filed on its behalf. California's unique liability environment and its potential financial consequences is also a known "risk factor" that the IOUs have felt legally compelled to disclose to their investors (see, e.g., *PG&E 2020 Joint Annual Report to*

Shareholders: 43; *Sempra Energy 2020 Annual Report*: 45). It was precisely this risk factor that SDG&E attempted to ameliorate through its Supreme Court petition.

Ultimately, SDG&E's effort failed to gain traction. The Supreme Court denied its petition for a writ of certiorari on October 7, 2019 without written explanation. But the financial wellbeing of California's utilities, as assessed by private credit rating agencies – along with the concerns of their shareholders – was still enough to trigger transformations of the state's energy law in other ways I will now explain.

Just as the public utility system offers a legal language through which electricity companies, regulators, and jurists may continually redraw the boundaries of public and private and the rights and obligations afforded to each, governance within this system likewise confuses any attempt to clearly delineate between public and private authority. Agnew (2012) has described the immense power wielded by the credit rating agencies over sovereign creditworthiness as the "privatization" of public authority – instruments of a "low geopolitics" that engender an "inability to demarcate where the public ends and the private begins" (9). In the case of California energy governance, the utilities' credit downgrades – announced by S&P, Moody's and Fitch after catastrophic fires brought the full extent of the IOUs' wildfire exposure to the surface – provided the empirical grist not only for SDG&E's writ petition, but for a series of reports commissioned by the Office of the Governor as well (see *Wildfires and Climate Change: California's Energy Future* 2019; *Final Report of the Commission on Catastrophic Wildfire Cost and Recovery* 2019). The findings of these reports were the basis of subsequent legislative decisions that, while stopping short of reforming California's approach to inverse condemnation outright, nevertheless substantially transformed the state's liability standards to the benefit of its utilities.

SB 901 (2018) codified the CPUC prudent manager standard and directed the CPUC to specifically consider an electrical corporation's "financial status" when determining whether it could pass along costs to ratepayers (SB 901 §26, amending PUC §451). But this failed to stem the utilities' credit rating tailspin, so the California legislature quickly passed AB 1054 (2019), which drew directly on the reports produced by the governor's office. In addition to establishing a statewide "Wildfire Fund" to cover liabilities beyond what was available to the utilities in insurance markets, AB 1054 shifted the burden of proof regarding utility prudency for the purposes of more easily socializing wildfire liability. The bill stipulates that so long as a utility has received a "valid safety certification" covering the period when it is potentially liable for a catastrophic fire by submitting an annual wildfire mitigation plan, it is no longer required to affirmatively demonstrate "prudent management" of its infrastructure when appealing to the CPUC to recover costs through rate increases. Rather, the utility's ratepayers (or another interested party) now bear the responsibility of bringing forth evidence which "creates a serious doubt as to the reasonableness of the electrical corporation's conduct" in future rate cases related to wildfire liability (AB 1054 §6, amending PUC §451). If they submit annual wildfire mitigation plans to state regulators, the new liability standards enshrined by AB 1054 restore the IOUs' public(-like) power to spread costs among their ratepayers to the benefit of their shareholders, resolving – at least in part and for the time being – the disjuncture identified in SDG&E's writ petition.

Both the change in prudency standard and the creation of the Wildfire Fund were among the suite of policy recommendations initially contained in the reports commissioned by the governor, which in turn anxiously invoked the credit rating risks identified by the private market analysts at S&P and elsewhere as one of their primary raisons d'être. Moreover, the basic

structure of the Wildfire Fund (explained further in the next chapter) was proposed by SDG&E as early as 2009 in the aftermath of the Witch, Guejito and Rice Fires, and the public Department of Water Resource (DWR) bonds that partially capitalized it are backed by extending a "nonbypassable charge" on IOU ratepayers initially implemented during the 2000-01 Energy Crisis. These charges were first levied on ratepayers to pay off costs incurred by the DWR during that earlier moment, when it began procuring electricity for the IOUs on an emergency basis in the face of skyrocketing costs (Complaint for Declaratory and Injunctive Relief, *Cannara v. Nemeth* 2019: 28; 31). What this demonstrates is simultaneously the pliability of public power and the substantial reach of private authority from one crisis to another, emanating from transnational credit rating agencies through California utilities and their private shareholders to the state's "public" and the laws that govern it.

Conclusion

In the United States, the public utility system was designed to attract private capital to invest in infrastructure to advance a broadly shared vision of social progress. It is in this way that "public utility" has historically functioned as a vehicle of American modernity. By stipulating that electric power is a public good and delegating responsibility for the bulk of its provision to private businesses, whose profits are determined in consultation with regulators, the public utility model has succeeded in producing a vast and complex electrical grid infrastructure.

This model has also produced the "public" and the "private" as evolving legal artifacts. The scope and meaning of these concepts are continually negotiated in rate cases, regulatory commission decisions, appellate and Supreme Court petitions, and legislatures. How the boundaries between public and private get drawn in these contexts determines how infrastructure's risks, costs, and liabilities will be distributed, and to whose benefit.

In short: who will bear the costs of infrastructure? It is precisely this question that is continuously worked out whenever utilities petition regulators for rate increases, or contest perceived regulatory "takings," or preemptively shut off power to their service area to avoid future liabilities. As I have endeavored to show, it has also been a subtext within public utility regulation from its very beginnings. But for much of the twentieth century, these liability questions have been accompanied and perhaps overshadowed by the success of the public utility model to marshal private capital in the service of a dramatic modernizing project. In California, one unintended consequence of this modernizing project – and its interactions with historical patterns of urbanization, wildland fire management, and liability regimes in the state – has been the creation of an electrical grid infrastructure that is beset by wildfire risk. The public safety power shutoff described at the beginning of this chapter is both a symptom of this risk and a liability technology among others for managing its legal consequences.

In other words, the scale and destructiveness of California's recent infrastructure-ignited fires has added a new layer of urgency to longstanding liability questions created by the public utility system. So long as the state continues to experience wildfire events like it has in the last five years, it is likely that the legal and financial liabilities produced by infrastructure will become even more salient and contentious, especially as California's utilities are made to embark on capital-intensive projects designed to reduce wildfire risk.

But there is also, of course, an even broader arena in which the question of how infrastructural liability is distributed is certain to be a central concern. The net asset value of the United States' electrical grid exceeds $1 trillion (Boyd 2014). This includes hundreds of billions of dollars' worth of investments in generating stations and transmission infrastructures that may not have reached the end of their useful life, but which must either be left "stranded" or upgraded

at no small cost in any coming green transition. Decarbonization will create new liabilities of potentially unprecedented scope within the electricity industry. Tracing why and how these liabilities are socialized is therefore a politically and analytically necessary task.

Chapter 2

INFRASTRUCTURE AS ASSET

In the fall of 2017, a series of 21 major wildfires and over 200 smaller fires tore through Northern California. Sixteen of these were determined by the California Department of Fire and Forestry Protection (Cal Fire) to be related to electrical infrastructure owned and operated by the power utility Pacific Gas & Electric (PG&E). A little more than a year later, on November 8, 2018, a century-old transmission line in PG&E's service area ignited the Camp Fire in Paradise, California – the deadliest and most destructive wildfire in the state's history to that point. Facing liabilities potentially exceeding $30 billion associated with these and other wildfire events, PG&E filed for Chapter 11 bankruptcy on January 29, 2019 (*In re PG&E Corporation* #263).

This was the largest corporate bankruptcy since the dramatic flameouts of Lehman Brothers and General Motors during the 2008 financial crisis. It therefore represented an attractive opportunity for hedge funds and other financial firms with experience in distressed asset investment and corporate legal restructuring – one version of what is known in finance as a "special situation," in which assets are purchased at a steep discount caused by a particular event with the expectation that their value will rise over time.

The attention given to PG&E by these financial firms during its Chapter 11 bankruptcy proceedings takes place in a moment of broader interest in infrastructure that has accelerated within finance since the 2008 crisis. In recent years, an extensive critical geographic literature has emerged to take stock of the evolution of urban infrastructures into a full-fledged alternative "asset class" for investors seeking predictable returns from a captive customer base, backed by the apparent solidity of "real" infrastructural assets. Much of this literature has focused on processes of what might be called *enticement* and *enclosure*. *Enticement* here refers to both the

public policy choices and private financial arrangements that are designed to attract finance capital to invest in infrastructure – for example, the issuance of tax-exempt municipal bonds, state project financing backstops and guarantees, or inventive debt-and-equity arrangements brokered by financial managers and marketed to institutional investors (see, e.g., Ashton et al. 2012; O'Neill 2019; Pryke & Allen 2019). *Enclosure* describes the numerous acts of privatization that have occurred in both the Global South and Global North over the last forty years, whereby formerly public assets with monopoly characteristics are released into private, rent-seeking hands (see, e.g., Christophers 2020; Purcell et al. 2020). Together, these dimensions of enticement and enclosure represent important components of what has commonly been described as the "financialization" of infrastructure.

The PG&E bankruptcy appears to fit uneasily in this burgeoning literature on the relationship between infrastructure and finance. Financial firms certainly flocked to the utility in the lead-up to and during its bankruptcy, taking equity, debt and even more esoteric insurance subrogation positions in the distressed company. But this is, first of all, precisely *not* an "enclosure" story. As I showed in Chapter 1, publicly traded investor-owned utilities – of which PG&E is the nation's largest by both revenue and customer base – have been a uniquely dominant force in America's electrical sector since the Progressive era (Boyd 2014; Hirsh 1999). While privatization has been a watchword vis-à-vis other infrastructures and in other parts of the world, the primary mode of electricity provision in the United States has in other words always been mediated by private finance. Secondly, the most immediate "enticements" for the hedge funds and activist investors that staked out financial positions in PG&E's restructuring process had less to do with infrastructure as an asset class – though this must certainly have been an important consideration – and more to do with the opportunities presented by the massive

liabilities associated with a particular (incendiary) infrastructure situated in a particular (fire-prone) place. It was PG&E's distress, as much as its infrastructure, that made it an attractive financial object.

These factors each contribute to the novelty of the PG&E case. Nevertheless, I will suggest here that an analysis of the "special situation" that unfolded during PG&E's bankruptcy can contribute to a better understanding of the relationship between infrastructure and the law, and the way the latter preserves the value of the former in specific ways for financial actors even in situations of acute distress. The primary argument of this chapter is that the law represents an important site for financial accumulation – as both a convenient vehicle for the acquisition of infrastructures that generate rents, and as a set of conceptual and institutional practices that enable novel forms of leverage and arbitrage.

In short, infrastructure remains a system of both tangible and financial assets with attractive monopoly characteristics for investors, even when the firms that own and operate it may be legally liable for the damages it causes. As we will see in the PG&E case, bankruptcy courts – which simultaneously police the boundaries between law and markets and enable privileged firms to continually transgress those boundaries – can in fact create arbitrage opportunities for those seeking exposure to this asset class. Inside the courtroom, I will show, success depends on an entity's ability to leverage its position of social centrality in relation to an unfolding legal event. This form of leverage is also the exercise of financial and legal power.

After outlining the PG&E case in broad strokes – identifying the major players involved and charting the company's path out of bankruptcy – I will arrive at this conclusion in the following order. First, I consider what it means to think of infrastructure as an asset class, and identify some of the reasons it has perhaps become attractive to finance capital in the current

political and economic conjuncture: its "safety," ability to backstop a variety of financial securities, and tendency to be passed on from the public to private investors at preferential rates. I then show how these qualities are either present or inverted in important ways in the case of PG&E's bankruptcy. Next, I turn to a prominent theme in the critical literature on finance and infrastructure – rent – and consider the extent to which financial involvement in PG&E's bankruptcy should be construed as a form of financial rent-seeking. Rent, I will suggest, offers a partial answer to the question of *why* PG&E was attractive to financial actors, but it does not help us to understand *how* these actors sought to extract value from the distressed firm. To address this latter question, I conclude by offering an alternative presentation of distressed asset investment, using (and expanding) concepts that are immanent to financial practice: leverage and arbitrage. In my analysis, distressed financial assets – stocks and bonds that plummet in value when the firm that issues them heads toward bankruptcy – are vehicles for leveraging particular outcomes in the social and economic space of the courtroom. The spread (or difference) between the value of these assets on the open market and the value of these assets as a way of actively directing a debt restructuring process suggests that bankruptcy courts are spaces of legal arbitrage. By deploying the concepts of leverage and arbitrage against themselves, I hope to foreground questions of risk and power as they emerge at the intersection of finance and the law.

The bankruptcy of Pacific Gas & Electric

PG&E's bankruptcy was a major financial and legal event. At least twelve of the fifty largest hedge funds by assets under management became involved in the company's restructuring process (Figure 1). These funds and others entered the courtroom as shareholders (owners of PG&E stock), bondholders (owners of PG&E debt), or subrogation claims holders (owners of insurance claims against PG&E).

Claims trading – in which major investors acquire financial assets in a restructuring corporate or sovereign entity on secondary markets with the expectation of earning a return – is a routine accompaniment to major bankruptcies within the United States. The claims trading market is estimated to be worth more than $300 billion annually (Velchik and Zhang 2019). Within a sample of 474 Chapter 11 cases that took place between 1996 and 2007, Jiang et al. (2012) found that hedge funds were publicly involved nearly 90% of the time. This is a product of legal design. The legal rights of creditors, shareholders, and other parties of interest to bankruptcy proceedings are freely alienable, and it is common for large financial firms to amass these assets to actively intervene in a restructuring event.

There were five major parties to PG&E's restructuring process not including the company itself: the bondholder funds, the shareholder funds, the wildfire victims, the subrogation claimants, and the State of California, which oversaw the entire process through periodic filings by the Office of the Governor. These parties are represented in Figure 2, which indicates both the financial claims these parties held against PG&E (in solid arrows) and other linkages between the various constituencies (in dashed arrows). The most important hedge funds involved in the case are individually identified. PG&E, the debtor in the case, was steered through the bankruptcy by a group of shareholder funds (Abrams Capital/Knighthead Capital/Redwood Capital) who had acquired massive amounts of PG&E stock in the lead-up to the bankruptcy in the hope of successfully restructuring the company without letting its existing equity get wiped out (as is a common outcome in bankruptcy proceedings). Together with PG&E, these funds worked to craft a "Plan of Reorganization" that would restructure the company's debts in a way that would keep it solvent – and prevent the shares they owned from becoming worthless.

These shareholder firms were joined by The Baupost Group, which straddled the equity and "subrogation" positions. Subrogation is a legal mechanism written into insurance contracts that allows insurers to seek reimbursement from liable third parties for payouts that they have made to their policyholders. It is explained legally as a way of preventing an insured party from collecting twice on the same loss (Parker 2005); it is justified *economically* as a way of lowering insurance premiums by allowing insurers to recoup some of their costs against the party responsible for damages in court. In the PG&E case, subrogation meant that many insurance firms held claims against PG&E for insured losses to their policyholders resulting from the fires sparked by the utility's powerlines. But like shares and bonds, these claims are themselves alienable, which is how a hedge fund, The Baupost Group, simultaneously came to hold 4.6% of PG&E's common stock and 23% of the wildfire subrogation claims against PG&E (*In re PG&E Corporation* #3020-1; #3940: 12). The remainder of these subrogation claims were mostly held by insurance firms.

Third, a group of bondholders, led by Elliott Management Corporation and Pacific Investment Management Company (PIMCO), separately pursued their own alternative "Plan of Reorganization" in the early months of the bankruptcy. This alternative plan would have transformed the company's capital structure to leave them as majority shareholders of the company upon its emergence from bankruptcy. The bondholder group formed an "Ad Hoc Committee of Unsecured Noteholders" to advance their courtroom agenda, and enlisted the fourth party in the diagram below, the wildfire victims (represented by lawyers for the "Tort Claimants Committee"), to whom they promised greater remuneration for damages than what was initially proposed by PG&E. In the early phase of the bankruptcy, the debtor (PG&E), shareholder, and subrogation groups were allied together against the Ad Hoc Noteholder and

Tort Claimant Committees, who strategically joined forces to promote a mutually advantageous competing Plan of Reorganization. These "alliances" are indicated in Figure 2 with colored ellipses.

A fifth and final interested party in the case was the state of California, as represented by the Office of Governor Gavin Newsom, which routinely intervened in the bankruptcy on behalf of the wildfire victims in particular and the state's ratepaying "public" in general. These interventions by the state mediated between the interests of PG&E and its shareholders, the bondholders who had acquired PG&E's distressed debt on secondary markets in order to impose their own will in the case, and the Tort Claimants Committee, to whom the company was liable for wildfire damages. They involved both the stick of a threatened public takeover of the company and the carrot of recently passed state legislation creating a wildfire insurance fund in which PG&E would only be eligible to participate upon a successful and timely exit from bankruptcy. More details on these state interventions will be given below.

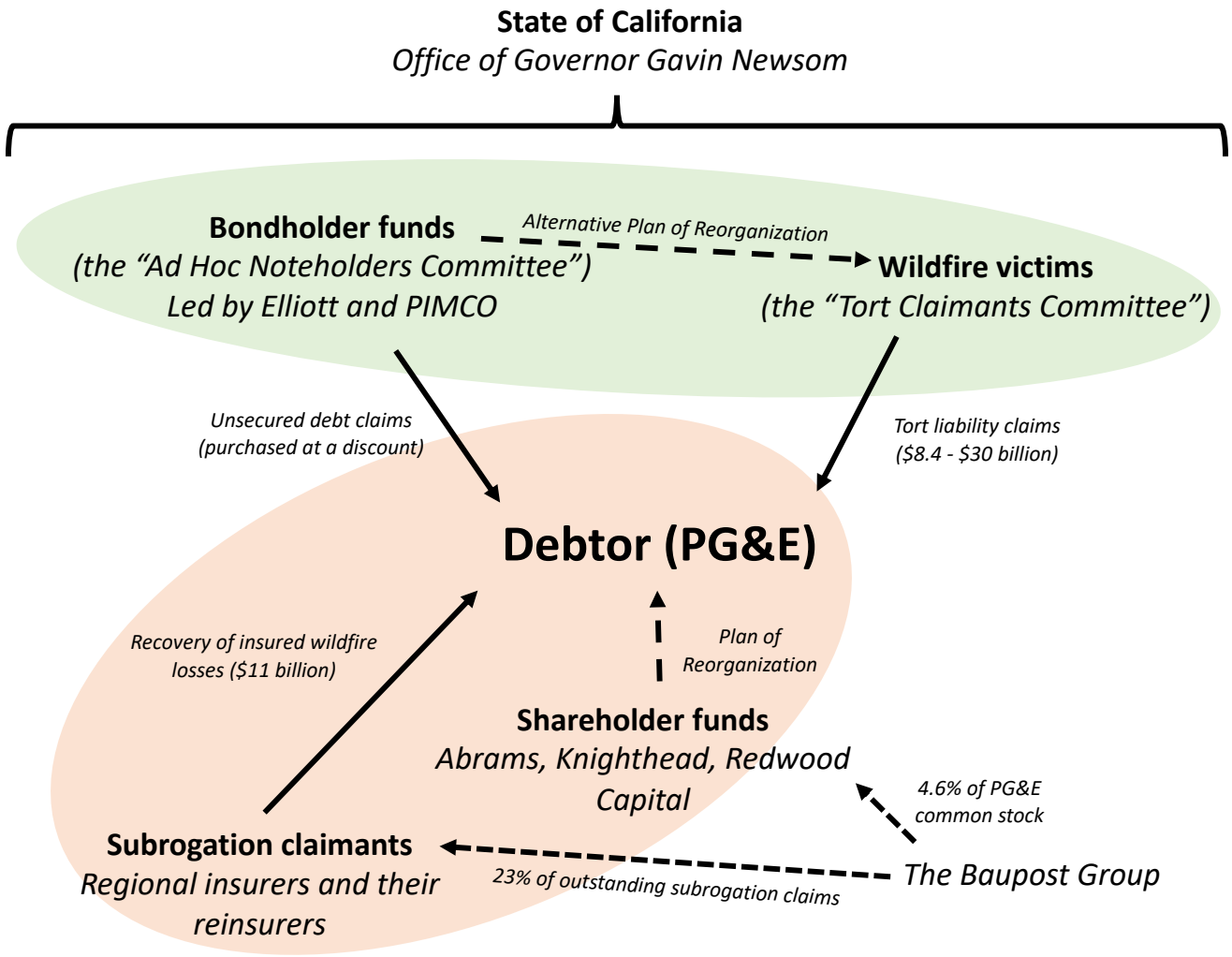
PG&E's path out of bankruptcy involved a series of separate agreements, first with the subrogation group in September 2019 (*In re PG&E Corporation* #3992); then with the Tort Claimants Committee in December, when it matched the amount promised to wildfire claimants by the alternative plan (*In re PG&E Corporation* #5038); then with the bondholders in January 2020, who finally agreed to withdraw their alternative plan from court in exchange for the lucrative opportunity to participate in a planned equity "backstop financing" round (*In re PG&E Corporation* #5519); and finally with Gavin Newsom, who announced his support of the debtors' Plan of Reorganization in March (*In re PG&E Corporation* #6402). The plan was confirmed by an order of the judge on June 20, 2020 (*In re PG&E Corporation* #8053).

Figure 1: Top 50 Hedge Funds by AUM Involved in Pacific Gas & Electric's Bankruptcy[1]

Rank	Manager	Assets (millions)
1	Bridgewater Associates	$132,050
2	Renaissance Technologies	$68,000
3	Man Group	$62,000
4	AQR Capital Mgmt.	$60,840
5	Two Sigma Investments/Advisers[1]	$42,900
6	Millennium Mgmt.	$38,776
7	Elliott Management[2]	$37,769
8	BlackRock	$32,909
9	Citadel[1]	$32,243
10	Davidson Kempner Capital Mgmt.	$30,880
11	Viking Global Investors[2]	$30,000
12	Baupost Group	$28,900
13	D.E. Shaw Group	$28,676
14	Farallon Capital Mgmt.	$27,600
15	Marshall Wace	$27,100
16	TCI Fund Management	$25,000
17	Wellington Alt. Investments[3]	$22,000
18	Winton Group	$21,846
19	Capula Investment Mgmt.	$19,800
20	York Capital Mgmt.	$18,500
21	Element Capital Mgmt.	$18,000
22	King Street Capital Mgmt.	$17,900
23	Canyon Capital[2]	$17,800
24	PIMCO	$17,387
25	Sculptor Capital Mgmt.[4]	$15,250
26	Anchorage Capital Group	$15,000
27	Third Point	$14,761
28	Cevian Capital	$14,500
29	Point72 Asset Mgmt.	$14,000
30	Graham Capital Mgmt.	$13,701
31	GoldenTree Asset Mgmt.	$13,634
32	Angelo, Gordon	$13,500
33	Appaloosa Mgmt.	$13,000
34	Magnetar Capital	$12,656
35	Nephila Capital	$10,659
36	Pharo Management[2]	$10,000
37	Mariner Investment Group	$9,482
38	Lone Pine Capital	$8,818
39	ExodusPoint Capital Mgmt.	$8,600
40	Pershing Square[2]	$8,000
41	Tudor Investment	$7,812
42	Taconic Capital Advisors	$7,680
43	Steadfast Capital Mgmt.	$7,500
44	BlueMountain Capital Mgmt.	$7,400
45	Senator Investment Group	$7,400
46	CQS	$7,300
47	Varde Partners	$7,293
48	Carlson Capital	$7,277
49	Cheyne Capital	$7,194
50	Aspect Capital	$7,071

[1] Funds ranked by assets under management as of June 30, 2019 (*Pensions & Investments* 2019). Those involved in PG&E's bankruptcy shaded in green (as indicated in Exhibit A, *In re PG&E Corporation* #4369 and *In re PG&E Corporation* #3020-1).

Figure 2: Structure of the 2019-2020 Pacific Gas & Electric Bankruptcy



Infrastructure as asset class

In this section, I step back from the PG&E case to outline some of the factors that have contributed to infrastructure's rise as an investment vehicle – in particular, its safety and solidity, and the related processes of privatization and securitization. I then demonstrate the ways in which these categories are present in or meaningfully reconfigured in PG&E's bankruptcy. With massive and growing exposure to wildfire risk, PG&E is not a "safe" investment in the conventional sense, and it has always been an investor-owned firm. Looming over its bankruptcy was not the possibility of privatization, then, but public takeover. However, the state of California has also taken dramatic steps – most notably the creation of a specialized wildfire insurance fund, partially financed by securitized rate payments – to entice private capital to invest in its utilities.

As O'Neill (2017: 178) explains, infrastructures tend to possess numerous intrinsic qualities that appeal to investors. They are often organized as "natural" monopolies, and subject to "inelastic demand," providing essential subsistence services like water, power, and sewage that people will pay for even as prices fluctuate or economic crises arise. They are spatially and technologically stable enough in general to function as long-term investment instruments. And they have built-in systems of measurement – water and power meters, road tolls, and so on – that relay relatively straightforward and constant information about real activity in urban space.

Much critical attention has been given to the mechanisms of securitization concocted by finance on top of the revenue streams marshalled by infrastructure (see, e.g., Bryan and Rafferty 2018; Christophers 2020; Purcell et al. 2020). Indeed, this "liquefaction of infrastructure assets," through which stable monthly rate payments (or, in a related and more infamous case, mortgage payments) are tranched together and used to back securities capable of being rated and passed on

to financial markets, "overcame a crucial barrier to [infrastructure] being seen as an asset class" in the first part of the 21st century (O'Neill 2019: 1306). Prior to the 2008 financial crisis, securitization seduced finance capital into valuing infrastructure for its financial attributes – its function as a base of revenue flows out of which new securities could be built, marketed, and sold. After the crisis, which spectacularly laid bare the fragility of many of these securitization schemes, infrastructure was rebranded within the financial universe as a "real" asset, with a solidity that distinguishes it from the more vaporous and dematerialized realm of pure finance (O'Neill 2019).

Financial interest in infrastructure after the crisis has coincided with what has alternately been called a new land "rush" or land "grab" that has seen massive and ongoing waves of investment in agriculture across the Global South and even parts of the Global North (see, e.g., Li 2014; Li 2018; Sommerville 2018). As Li (2014) has observed, this "land grab" was driven by the combination of rising food prices and market collapse in 2007-08, which led food-importing countries "to consider ways to by-pass global food markets by engaging directly in food production," while simultaneously driving "hedge funds and other large institutional investors to look for 'safe' places to put their money" (592). The marriage of social need and the apparent safety of the underlying asset likewise describes some of the appeal of infrastructure *qua* investment. Infrastructure, like productive agricultural land, fulfills a socially necessary role in the provision of subsistence goods. Like Sommerville (2018) suggests of agriculture, it can therefore function as an arena of "socially responsible" finance that simultaneously benefits from a "more tangible, solid, and intrinsic source of value than alternative, more 'financial' assets" (651).

Two macroeconomic and policy explanations jump out as explanations for the rise of infrastructure as an asset class. First, in many of the advanced capitalist economies of the Global North, perceptions of financial asset safety are perhaps being reconfigured. As Bryan and Rafferty suggest, in an environment of semi-permanent quantitative easing and negative real yields on Treasury bonds, "securities backed by household contractual payments, in combination with state policies of household financial risk management, are starting to look like 'safe' assets" by comparison (2018: 126). Infrastructure, which arranges and extracts contractual payments from a base of real assets, looks particularly appealing in this regard. Second, as Brett Christophers has meticulously documented in the particular case of the United Kingdom (2019; 2020), finance capital has benefited from decades of privatization, in which a multitude of public infrastructures – telecommunication networks, water and power systems, port and airport operations, and so on – have been transferred over from states to private investors.

As an asset class, then, infrastructure is multifaceted. It is a set of real assets, a system of social provision, and an organized flow of captive payments. It is "safe," or appears to be so, and regularly given over to private financiers on a preferential basis. It can be securitized or otherwise engineered to meet the needs of finance. In fact, securitization is not the only mechanism through which finance extracts value out of infrastructure. Pryke and Allen (2017), for instance, have documented the ways in which "well-positioned intermediaries are capable of financially structuring an asset to generate value above and beyond that apparent from predictable cash flows" by brokering debt and equity arrangements with institutional investors to finance the construction of a water desalination plant in California (1338). Infrastructure in this sense offers a vehicle for financial assets to be created and fees to be generated even in the absence of securitization of its underlying revenue streams. In cases like this, infrastructure can

be broadly thought of as an *occasion* for forms of financial engineering that generate a multitude of profit opportunities for the firms marshalling the large-scale capital investment it requires.

This speaks to a broader division that has emerged in the relationship between finance and infrastructure. "A key difference under financialization," Furlong (2020) observes, "is the disconnect between the returns from the infrastructure and those to investors…or between 'market value' and 'investment value'" (577). In other words, financial actors are often able to concoct investment opportunities over and above the market value associated with a particular infrastructural asset that even extend beyond schemes to securitize the predictable rate payments that the infrastructure commands.

For Ashton et al. (2012), who introduced the distinction, "market value" refers to the revenue streams a particular infrastructure commands, while "investment value" refers to the forms of financial engineering – interest rate swaps, lowered cost of capital due to improved credit ratings, and boosted equity payouts – that private firms can build on top of this base. The PG&E bankruptcy can be thought of as a particular legal (and socionatural) event occasioning this kind of financial engineering. In the company's restructuring process, the "market" and "investment" value of its underlying infrastructure sharply diverged. Facing potentially catastrophic infrastructural liability, the competing Plans of Reorganization advanced by both the bondholder and shareholder investors during bankruptcy were each about manufacturing "investment value" in a situation of rapidly declining "market value."

As I will show in more detail below, the ultimate success of PG&E's restructuring plan – developed in tandem with its hedge fund shareholders, who had purchased distressed stocks in the company when the full scope of its liabilities was coming into view – depended on its ability to compel the financial firms arrayed on the debt side to withdraw their own competing plan.

Crucially, this meant offering the debt investors on the other side of the table a privileged opportunity to participate in the company's new equity fundraising round: conjuring and allocating "investment value" within the courtroom for legal advantage.

It is worth emphasizing that neither the advantages of safety nor the windfalls of privatization explain the particular appeal of PG&E. In many ways, the story is inverted here. With upwards of $30 billion dollars in wildfire liabilities, evaporating market capitalization, and an uncertain and perhaps dangerous relationship to what appears to be an increasingly fire-prone service area, the company was hardly a "safe" investment. And while the financialization of infrastructure has in other contexts depended on the decision of governments to privatize their assets, non-state investor-owned utilities like PG&E have historically played an outsized role in electricity provision in the United States, as I already explained in detail in the first chapter. PG&E's bankruptcy, meanwhile, was superintended by the State of California, which used both the threat (sincere or not) of a public takeover of the utility and the enticement of AB 1054, a legislative bill authorizing the creation of a specialized wildfire insurance fund developed in tandem with the state's investor-owned utilities, to push the Chapter 11 process along in a way that was politically palatable. Throughout the bankruptcy, the Office of the Governor routinely filed statements and objections that referred to the necessary role played by AB 1054 and the Wildfire Fund in PG&E's restructuring plans (e.g. *In re PG&E Corporation* #5138). Moreover, it did not voice its full support for PG&E's reorganization plan until the firm had agreed to a "Case Resolution Contingency Process" by which the state itself could enter bids to take over the company should it fail to exit bankruptcy in a timely process (*In re PG&E Corporation* #6398: 16).

Exiting bankruptcy quickly allowed PG&E to avoid the possibility of a bidding process that may have ended in a public takeover. It also enabled the utility to participate in an entity known as the California Wildfire Fund – a new legal and political apparatus that functions as a specialized form of insurance for very large wildfire events. The Fund, created by AB 1054, socializes wildfire risk between utilities and their ratepayers, creating a pool of money to pay out future wildfire claims ignited by electrical infrastructure. As of 2020, it has the capacity to pay $21 billion worth of future claims.[1]

One of the stated purposes of the Fund is to stabilize the investor-owned utilities' credit ratings (CEA 2020: 3) – to create, in other words, a favorable environment for infrastructure finance. That is, by concocting an insurance mechanism that exposes the state and the ratepaying public to the financial risks of future infrastructure-caused wildfires, it aims to remake California's utilities into attractive, stable investments. The Fund was initially capitalized by a $2 billion loan from the state and individual contributions from the state's three large investor-owned utilities: San Diego Gas & Electric ($322.5 million), Southern California Edison ($2.362 billion), and Pacific Gas & Electric ($4.815 billion). PG&E gained the right to participate by confirming its Plan of Reorganization in bankruptcy court before a June 30, 2020 deadline. This base of utility and state-provided money is supplemented by "nonbypassable charges" levied on the utilities' collective 11.5 million ratepayers, which can be used by the Fund to issue additional debt as needed (CEA 2020).

The Wildfire Fund is financed through a combination of state subsidy, pooled corporate self-insurance, and the securitization of a special charge passed on to the state's utility

[1] The Wildfire Fund itself represents another vehicle for finance and insurance capital, insofar as it reserves the right to transfer wildfire-related risk to reinsurers – seeking, in effect, insurance for itself. As of this writing, it has yet to seek any reinsurance coverage, perhaps because the rates expected by reinsurers are too high.

ratepayers. This scheme resembles in some ways the "Storm Reserve Accounts" established in Florida after Hurricane Andrew, through which utilities in that state have been able to securitize public utilities commission-approved rate charges to pay for damages to their infrastructure caused by extreme weather events (cf. Kousky et al. 2019). There are, however, several important distinctions. First, the scope of the Wildfire Fund is much larger – both in terms of the amount and sources of the money pooled together, which comes from both the state and all three of its major utilities and their respective ratepayers – as is the potential scope of the damages it is meant to cover. Second, the reserve accounts in Florida are meant to protect against "natural" disasters that are extrinsic to the utilities' infrastructure – for example, flooding – whereas the Wildfire Fund is specifically designed to pay for damages associated with utility-*caused* wildfires. Here, in other words, the logic of securitization is deployed along with other insurance mechanisms to hedge infrastructure as a potential liability, rather than monetize it as an asset.

Infrastructure, finance, rent

Many critical scholars writing about infrastructure privatization have interpreted this phenomenon through the category of rent. In this section, I will apply this frame to PG&E's bankruptcy to try to ascertain what it can and cannot show us about the legal and financial strategies at play. "Rent," I believe, helps to explain certain overarching financial *motives* at the risk of glossing over the specificities of financial *practice*.

For Purcell et al. (2020), the concentration of ownership over land and other assets – including infrastructures and their associated payment streams – in the hands of finance capital signals the "rise of a growing band of global rentiers" in the aftermath of the 2008 financial crisis, with one important marker of financialization therefore becoming the increasing "penetration of rent-extraction mechanisms into new spheres of social reproduction and everyday

life" (446; see also Andreucci et al. 2017). One major implication of this Marxian strand of thinking is that ownership of infrastructural assets is a financial practice that captures value produced "elsewhere" in the economy – that it is, in other words, a process whereby value is "deducted from society as a whole in the form of rents" (Purcell et al. 2020: 445).

"Rent" here describes a contentious but structurally necessary mechanism through which value is distributed in capitalist societies. It is structurally necessary because without the legal foundation of property rights from which rentiers secure their profits, capitalism would not be able to function. But it is contentious insofar as it represents a terrain of struggle between the land (or asset) owning classes, industrial capitalists, and workers. Just as landowners may appropriate parts of the total surplus by virtue of their property claims on the sites where production happens or the homes and apartments where workers live, infrastructural rentiers extract household payments through exclusive possession of those systems of subsistence provision (water, sewage, electricity, and so on) upon which workers rely. Thus the turn toward infrastructure as an asset class is in this telling part of a larger process of "financial expropriation," through which finance establishes relationships of rent, credit, and debt to manage workers' consumption needs, enabling it to "profit without producing" (Lapavitsas 2013). State retrenchment and waves of privatization provide a particularly felicitous environment for this kind of rent-seeking, systematically empowering a new rentier class of landholders, asset owners and financial firms (groups that of course substantially overlap in practice).

Such ruminations on the relationship between value and infrastructure finance as a form of rent-seeking are no doubt useful and thought-provoking interventions. But arms-length theorizing about the true source of value being appropriated by financial and infrastructural rents

ultimately tell us little about the internal logics of valuation according to which finance operates. Nor does it specify the precise nature of many of the revenue streams that finance has concocted from the control of infrastructural assets, or the empirical and conjunctural particularities that make certain infrastructures and not others attractive as objects of investment. Moreover, approaching infrastructure finance as a pure domain of rent extraction retreads old debates about what counts as "productive" labor what counts as "unproductive" labor. As Sheppard (2020) has argued, capitalist production relies on spatial accessibility and a vast network of infrastructural systems to function, which may be provisioned by the state or itself packaged as a commodity produced by infrastructural firms, making this an empirically and geographically tenuous distinction. Finally, a singular focus on financial rents as the appropriation of value produced elsewhere in the economy ignores the conceptual core of contemporary financial practice, and one which must be central when thinking about utilities and wildfire – namely, *risk* (on which more below; cf. Christophers 2018).

It may be possible to sidestep some of these issues and still deploy the concept of rent in an empirically illuminating way. In his recent work on "rentier capitalism," Christophers (2020) offers a way forward, elaborating a theory of rent that takes some inspiration from Marxian thinking on the topic, without accepting all its conceptual baggage. Defining rent as "income derived from the ownership, possession, or control of scarce assets under conditions of limited or no competition" and using the United Kingdom as a case study (2019: 2), he offers a broad picture of the various ways in which economies in the Global North have become "rentierized" over the last forty years. Finance is for Christophers only the "leading edge" of a larger secular turn toward rent in the neoliberal era, which has become the predominant form of corporate

activity across almost all sectors of the economy.[2] Other types of assets that offer opportunities to collect rent include land, government contracts, digital platforms, intellectual property, natural resources, and, of course, infrastructure. High barriers to entry and the potential for monopoly control make all these sectors lucrative arenas for corporate rent-seeking, which has in turn been catalyzed by government policies that have dramatically expanded the number of assets available to rentiers at the same time that it has inflated their prices and lowered the tax burdens associated with them.

Christophers' work suggests that rent-generating assets are attractive foremost because of their monopoly attributes. "Conditions of limited or no competition" perfectly describes the state of electricity provision in California, where transmission and retail distribution still operate on a regional monopoly franchise model, even if power generation has been partially opened up to wholesale competition between traditional utilities and so-called independent power producers. Indeed, the "safety" of infrastructure as an asset class is often as much about the settled and restricted state of the market in which it operates as it is about the physical solidity of the underlying asset and the captive revenue streams it commands. The deputy chief investment officer at PIMCO, one of the financial firms that made a major debt investment in PG&E during its bankruptcy, makes this clear when he describes the firm's investment strategy:

> …high barriers to entry are an important characteristic for the sustainability of attractive economic profits. If an industry's structure discourages new entrants, it passes an important screen in our investment process and therefore warrants further assessment. While an industry with high barriers to entry does not automatically generate excess profit, it does offer competitive shelter – and the higher the barrier to entry, the greater the prospect for above-average returns. (quoted in Christophers 2020: 292)

More than almost any other industry, infrastructure is protected from economic competition by its "high barriers to entry." These include both the capital intensiveness of infrastructural

[2] Christophers therefore prefers the term "rentierization" to the more common refrain of "financialization."

projects, and, in the United States, the sanctioned monopoly franchises created by the public utility model.

It is precisely these barriers that entice investors, who rely in turn on the lawyers who Katherina Pistor (2019) has called the "masters" of the "code of capital." Nowhere is this truer than in the rarefied world of "special situations," where financial and legal strategy directly coincide. Put simply, when distressed asset investors intervene in bankruptcy court, lawyers are not merely handmaidens to financial accumulation. Instead, accumulation strategies *are* legal strategies: the future value of a financial asset depends on a firm's ability to successfully carry forth its agenda in the bankruptcy process. This is a task that lawyers must carry out. It is thus no surprise that there is a highly symbiotic relationship between legal and financial professionals in the realm of activist investing, and substantial overlap at the top end of many of these specialized funds.[3]

Provisionally, then, we may say that the appeal of PG&E as an infrastructural investment is in the final analysis the opportunity it offers to collect on monopoly rents. These rents are enabled by the specific competitive and spatial barriers that have been erected within the American electricity market and the historical concentration of both political and market power in the hands of electric utilities (Hirsh 1999; Granovetter and McGuire 1998). Meanwhile, the hybrid public and private nature of IOUs, along with the social necessity of the "public good" they provide, further bolsters their reputation as a sound investment – even in a situation as precarious as PG&E's. The extraordinary steps taken by the state of California to stabilize its utilities in the aftermath of catastrophic wildfires, described above, confirms this, and further

[3] A famous example of this legal/financial symbiosis is Elliott Management – the driving force among PG&E's distressed debt investors. It was founded by Paul Singer, who began his career as a real estate attorney before creating the hedge fund.

distinguishes PG&E's Chapter 11 from other corporate bankruptcies that do not share these characteristics.

The strategies that the hedge funds and activist investors took into the courtroom entailed the use of law as a tool to gain access to these rents (or else the capital gains and interest payments that rely on them) at a discount. This was attempted either through becoming a major shareholder during a moment of looming crisis and asset devaluation and using that equity stake to steer the Chapter 11 reorganization process; through the so-called "loan-to-own" strategy of converting a (likewise distressed) debt position into a controlling equity stake (Jiang et al. 2012); or through the privileged access afforded to all participants in the bankruptcy to further stock issued by PG&E at below-market rates.

Rent-seeking, in other words, may well be the ultimate motive. But what of the legal-financial strategies just described? Does the concept of "rent" help us to parse the particular logic of the corporate bankruptcy and special situation? A first attempt at an answer to this question may be made by way of analogy to Neil Smith's now-classic theory of the "rent gap" (1979).[4] For Smith, gentrification occurs when cycles of urban disinvestment and property depreciation create the conditions for potentially profitable reinvestment. Seeing a "gap" between "capitalized" and "potential" ground rent – that is, between the rent that *could be* appropriated from ownership of a land parcel being put to its "highest and best use" and the rent that is *actually* being appropriated from the land given its present use – capital floods back in. "Gentrification" is a function of this recapitalization process.

Distressed investment in financial assets associated with infrastructure seems to follow a similar pattern. In this case, "rent" accrues not to landowners, but to owners of financial assets

[4] I am grateful to Eric Sheppard for suggesting this point.

(stocks and bonds) – in the shape of both rate payments on the underlying infrastructure and the entitlements to interest, dividends and capital gains that ultimately depend on those payments. Insofar as wildfire liabilities have artificially depressed the market value of PG&E's shares and outstanding debt, there is likewise a "gap" that has opened up between the "actual" and the "potential," just as processes of urban depreciation lay the ground for capital's return to the inner city. In both cases, then, we may be witnessing "capital *revaluation*" as a "rational market response" (Smith 1979: 545, emphasis in original).

Leverage and arbitrage

Interpreting special situations by way of analogy to the rent gap alerts us to the market conditions that might make nominally "high risk" investments – like those in a company entering bankruptcy with unknown and potentially unprecedented wildfire liabilities – appealing or even coolly "rational." The invocation of "rent" more broadly also foregrounds a certain undeniably important dimension of infrastructure as an asset class: its monopoly characteristics, those "high barriers to entry" which so frequently shelter its owners from competitive pressures. But when we set aside the question of *where* value comes from and instead turn our attention to the empirical particularities of *how* distressed asset investment secures profits for the hedge funds that are positioned to take part in it, both "rent" and the "rent gap" are insufficient or at least only partial as forms of explanation. By themselves, they do not fully capture the intertwined legal and financial logics at play when finance capital seeks to take advantage of a special situation in bankruptcy courts. In the final section of this chapter, then, I follow the lead of several recent theorists of finance (among many others, Konings [2018]; Hardin and Richard Rottinghaus [2020]; Miyazaki [2013]) in appropriating and expanding two interrelated *financial* concepts –

leverage and arbitrage – to supplement a more narrowly rent-oriented view of the PG&E case and the activist investment strategies it engendered.

Within conventional financial theory, both words have specific, technical meanings. *Leverage* refers to the act of borrowing money to multiply exposure to and by extension the potential returns from a particular financial position. *Arbitrage* is the process of exploiting price discrepancies across markets.[5] In actual financial practice, both leverage and arbitrage are central conceptual and practical categories. But I believe these categories can be mobilized in a slightly more capacious way to illustrate how bankruptcy courts and the law more generally enable the exercise of a specific form of financial power (leverage) – and how access to this form of power in turn enables financial firms to systematically avoid taking on unnecessary risk (arbitrage). In what follows, I will take each concept in turn and consider what it illuminates about PG&E's bankruptcy proceedings.

Leverage

Without leverage, finance is unthinkable. All banks and financial firms are highly leveraged at all times, and the magnitude of financial profits is a function of the ability of these entities to leverage their positions through continual and preferential borrowing. But, as Martijn Konings has recently pointed out, "leverage" also has broader connotations. In common language, "leverage" describes the power an actor possesses to actively determine the outcome of a particular situation – to bring into being a particular and advantageous future outcome for oneself. In other words, "leverage does not simply quantitatively amplify a speculative position

[5] If the same asset or commodity is circulating with different price in two markets simultaneously – the theory goes – it is possible for arbitrageurs to buy low in one market and sell high in another, pocketing a risk-free profit until the forces of supply and demand cause that price gap to disappear. Arbitrage will thus gradually cause prices to converge across markets (this is the principle behind the so-called "law of one price.")

but does something to shape the configuration of reality itself" (Konings 2018: 15). This kind of leverage is a function of the density of an actor's connections within a particular system: how exposed others are *to you*. To successfully leverage your position in this second sense, you need to achieve a certain kind of social centrality, such that the other social forces around you also have a stake in your ongoing success.

Konings is writing here about the financial institutions that have made themselves "too big to fail" – those (financially leveraged) banks that have been deemed systemically important enough to get bailed out when crises arise (thus achieving a kind of social leverage). The PG&E bankruptcy gives us an example of how the mechanics of leverage operate on a more local scale. PG&E itself, which supplies power to millions of people in California, is obviously a highly socially "leveraged" entity, with many people and institutions, including the state itself, deeply invested in its ongoing operation. But bankruptcy courts, and the swirl of claims trading that occurs around them, offer other ways for various actors to seek out and exploit leverage in relation to a single unfolding legal process.

The law and its emphasis on the rights afforded by the contract are essential in this regard. Insofar as the hedge funds participating in PG&E's bankruptcy are doing so with borrowed money, they are leveraged in the narrow, technical sense. But insofar as their acquisition of equity and debt on secondary markets grants them a position in PG&E's Chapter 11 process as relevant and interested parties, they are empowered to exercise leverage in the expanded sense – not on a grand, system-wide scale, but in a specific legal context.

This is captured in financial rhetoric, which often describes the best places to exert leverage in bankruptcy court as "fulcrum" positions in a distressed firm's capital structure (Jiang et al. 2012; Lichtenstein and Carney 2007). Typically, these "fulcrum" positions will be located

in unsecured (i.e. noncollateralized) debt, written down in secondary markets and unlikely to be paid in full, giving debt investors considerable influence over the bankruptcy process. Other forms of activist and alternative investing, like private equity, could likewise be described as ways of seeking "leverage." But the courtroom accumulation strategies here are distinguished by their reliance on explicitly crossing over into legal space to secure this position. Finance and law are "co-constituted" in this process (cf. Potts 2020a): the capital markets offer leveraged firms a seat at the table in bankruptcy court as controlling shareholders and affected bondholders, depending on the position one chooses to take, and legal practice determines the value of the financial assets these firms acquire.

Of course, leveraging through litigation did not simply begin with the bankruptcy of PG&E. Each of the hedge funds that became involved in the reorganization process did so because of their confidence in being able to manufacture a particular future outcome in the courtroom. This confidence came from their corporate background. Many of the investors, like Elliott Management Corporation and The Baupost Group, had years or decades of prior experience in sovereign and corporate debt litigation (on the former of which see Potts 2018). What *is* unique about the PG&E case is the particular constituencies that the bankruptcy brought together in the courtroom, and the opportunities the case offered for these constituencies to leverage their own and one another's positions in order to direct the process in particular ways.

Outside of the courtroom, for example, the people who lost their homes in the Camp Fire in Paradise, California in 2018 are the victims of a wildfire, the immediate cause of which was PG&E's electrical infrastructure. *Within* the courtroom, these same people are the primary constituents of the Tort Claimants Committee (TCC), a senior class of "involuntary creditors" whose claims against PG&E were at the center of the proceedings and continuously leveraged by

all parties in the bankruptcy. By the estimation of the presiding judge, these wildfire victims were "the parties most deserving of consideration" (*In re PG&E Corporation* #4167: 2). Or, as the bondholders later averred, "All major constituents in these chapter 11 cases agree that the full, prompt, and fair payment of wildfire victims' claims is paramount" (*In re PG&E Corporation* #5241: 1).

But it would be a mistake to view the wildfire tort claimants in this role as mere pawns whose position of social centrality provided useful leverage for other constituencies. In fact, their early alliance with the "Ad Hoc Committee of Unsecured Noteholders" – the debt investors led by Elliott Management – to advocate for an alternative Plan of Reorganization constituted a kind of "double leveraging." Typically in a bankruptcy the debtor (in this case, PG&E) is granted an "exclusivity period" during which it is the sole party legally able to advance a reorganization plan in court. But others with a financial interest in a restructuring entity may aspire to put forth their own plans for how it should emerge from bankruptcy. This is precisely what happened in the early months of PG&E's restructuring process. The TCC wanted a larger settlement from PG&E, while the Ad Hoc Noteholders' Committee wanted to reorganize the firm's capital structure to maximize return on its investment. The alternative Plan of Reorganization developed between these two parties was a legal vehicle for achieving each of these desired ends.

In their attempt to abrogate PG&E's exclusivity period in September 2019, the TCC and Ad Hoc Noteholders' Committee announced that they had "locked arms on an alternative" and competing plan (*In re PG&E Corporation* #3940: 14), crafted jointly in a separate set of direct negotiations. For the bondholders, the wildfire victims' tort claims against PG&E provided rhetorical and legal justification for judicial acceptance of this alternative plan, which would have provided greater remuneration than the company itself was initially willing to offer. For the

wildfire victims as represented by the TCC, the bondholders likewise offered an opportunity for leverage, amplifying their power to extract concessions from PG&E.

Together, the bondholders and TCC identified themselves as "the two largest stakeholders in [the] case" (*In re PG&E Corporation* #3940: 6). The alternative plan that they created immediately increased the amount of money set aside for wildfire victim claims by $4.1 billion (from $8.4 billion in the original PG&E plan to $13.5 billion) – while by PG&E's estimations also guaranteeing an "unjustifiable economic windfall" of $5.57 billion to the bondholders through a combination of discounted equity, reinstatement of corporate debt without the ability to refinance, and backstop fees (*In re PG&E Corporation* #4119: 7).

In the end, the doubly leveraged gambit of the TCC and bondholders partially succeeded. Over the objections of PG&E and its shareholders, and with a view toward those parties "most deserving of consideration," the wildfire victims, the presiding judge issued an order on October 9, 2019 terminating the utility's exclusivity period and allowing the alternative plan to go forward (*In re PG&E Corporation* #4167: 2). Interestingly, he did so while also acknowledging that PG&E's own plan was progressing apace, and with a note of skepticism:

> While the court has expressed concerns about avoiding any type of litigation that deals with corporate control and sophisticated and rarified bankruptcy issues at the expense of paying the wildfire victims, it will not second-guess the informed decision of two well-counselled groups [i.e. the Ad Hoc Noteholders' Committee and TCC] who are willing to take the attendant risks that go with competing plan disputes. (ibid.: 3)

The judge acknowledges here that allowing the alternative plan to proceed awards the kind of "sophisticated and rarified" legal maneuvering that the bondholders have (obviously) entered the case to pursue. But the social leverage of the TCC and the wildfire victims it represents, which has promoted the alternative plan, is enough to override this concern.

The combined leverage of the TCC and bondholders forced PG&E into defensive posture. The company continued to enter into a series of "restructuring settlement agreements"[6] – first with the TCC, to whom it matched the offer of the alternative plan by guaranteeing $13.5 billion in wildfire claims payment through a combination of cash and shares (*In re PG&E Corporation* #5038), and second with the bondholders, who assented to withdraw their plan only after they had lost the leverage of the wildfire claimants but managed to secure the promise of PG&E to use its "best efforts to provide…an opportunity to participate in up to $2.0 billion of the $12.0 billion equity backstop" (*In re PG&E Corporation* #5519: 8). The resolution of the bankruptcy, in short, depended fundamentally on the questions of leverage: who had it and what demands it allowed them to make in turn.

The competition between the debtor/shareholder and bondholder/TCC Plans of Reorganization is only the most dramatic and immediate manifestation of this leveraging effect. The social necessity of infrastructure itself introduces another novel dimension of leverage into the case, conjuring the category of the "ratepaying public" as a party of central interest in the case – a class of Californians who in the repeated words of the Office of the Governor "must have access to safe, reliable, and affordable service" (*In re PG&E Corporation* #5138-1: 2). These ratepayers were represented by PG&E as burdened by the bondholders' needless insistence on maintaining the company's "high coupon, above market long-term debt" (*In re PG&E Corporation* #4119: 7); conversely, they were cast by bondholders as victims of PG&E's own "financial engineering" in its efforts to issue new ratepayer-backed tax-exempt bonds (*In re PG&E Corporation* #5241-1: 4). In each case, and by competing constituencies, ratepayers were

[6] Before entering into settlements with the Tort Claimants Committee and Ad Hoc Committee of Unsecured Noteholders, PG&E had already by September of 2019 settled with the insurers and hedge funds who held insurance claims against it. See *In re PG&E Corporation* #3992.

leveraged as a long-suffering and potentially put-upon "public," whose interests were being unfairly ignored – by the bondholders (according to PG&E), by the company (according to the bondholders), or by all parties to the bankruptcy (according to the Office of the Governor).

Looking beyond the particularities of the PG&E case, the concept of leverage offers clarity on the legal-financial strategies that take place in bankruptcy court. Bankruptcy is at base a process of rendering judgment on questions of *priority* – adjudicating, in other words, between "competing claims to the same assets" (Pistor 2019: 3). When a firm enters bankruptcy, it is because it no longer considers itself capable of honoring all of the claims others hold against it. Restructuring means determining who gets what and in what order, and whose claims get written down or written off. The United States' bankruptcy code establishes the rules of priority, situating creditors above shareholders – and secured creditors above unsecured creditors (and, further, "senior" unsecured creditors above "junior" unsecured creditors). In this way, it establishes an elaborate social hierarchy in relation to an unfolding legal event. In PG&E's bankruptcy, the firm's wildfire tort, tax, employee compensation, and lien-secured creditor obligations were situated at the top of this hierarchy, while its new bondholders, who had mostly acquired senior notes unsecured by collateral (on secondary markets and at a discount), occupied an intermediate position. The shareholder funds that bought low on PG&E's stock had least priority, but their successful ability to guide the company through the bankruptcy process meant that the value of their equity was nonetheless preserved.

Taking a position in a bankruptcy case by purchasing distressed shares or debt is a way of securing financial exposure to a legal event: a wager that the position you occupy within the priority hierarchy will offer you enough leverage to effect a favorable outcome. Secured creditors with claims on the debtor's collateral have access to one kind of leverage – the legal

power to repossess real assets. Unsecured creditors, whose claims may be "impaired" (i.e. written down) by a restructuring and who are therefore entitled to vote on a firm's Plan of Reorganization, have access to another kind of leverage, which more closely resembles what Konings describes. If a restructuring firm's outstanding debt is sufficiently concentrated in their hands, they form a powerful negotiating bloc. They have, in other words, become central to the drama, and capable of directing its ultimate outcome. It is here that financial firms most often exert power within a "special situation." This is precisely where the Ad Hoc Noteholders' Committee attempted to intervene with their alternative plan in PG&E's bankruptcy. The ultimate failure of this plan was in essence a failure of leverage. Once the TCC agreed to PG&E's revised settlement, the senior bondholders had a less plausible claim to social centrality, and were forced to stage a tactical retreat.

Arbitrage

It is, however, not quite right to say that the financial firms that seek exposure to distressed assets to leverage particular outcomes within the courtroom are making a "wager," as I did in the preceding paragraph. The use of a gambling metaphor foregrounds the speculative quality of investing: taking a risk on an unknown (and ontologically independent[7]) future event. This is certainly how finance is commonly represented by its critics.[8] Shorn of its normative connotations, it is also how finance represents itself – as a professionalized and technically sophisticated arena of calculable risk-taking (de Goede 2004), where financial profits are a natural consequence of this activity. As I have just endeavored to show, however, inserting yourself into a bankruptcy by acquiring distressed bonds or shares is precisely *not* the same thing

[7] Numerous writers who emphasize the "performativity" of finance and economics have convincingly shown this putative independence of markets to be overstated. See, e.g., MacKenzie (2006) and MacKenzie et al. (2007).
[8] It is this stock critique of "out-of-control" speculation that Konings (2018) is primarily responding to and rejecting.

as putting your money on the roulette wheel in a casino. Rather, it is a way of entering into a complex social universe of leveraging and counterleveraging, where particular powerful and well-situated actors actively attempt to manufacture certain future outcomes using the tools of law.

"Risk" in this case, then, is a function of legal power. It may be impossible to eliminate completely, but it can certainly be minimized or shifted onto others by proactive behavior in particular situations. Because in many ways it represents the opposing conceptual pole to "risk" in financial practice, "arbitrage" may help us to see this dynamic in action. As I mentioned above, the definition of arbitrage in financial theory is somewhat specialized: taking advantage of price differences, or "spreads," in two or more markets. When you drill down to its conceptual core, what is central to this definition is the combination of temporal simultaneity and spatial difference that makes an arbitrage opportunity (virtually) "risk-free." If I am able to "buy low" in one place and immediately "sell high" in another, I have effectively short-circuited the entire logic of finance as the reasoned business of "taking calculable risks."

It is hardly surprising that arbitrage is highly alluring as a real or imagined prospect for financial firms – and that its meaning in actual financial practice is substantially more protean than this restricted definition would imply (Miyazaki 2013). As Hardin and Richard Rottinghaus (2020) contend, "arbitrage is not a fleeting, marginal aspect to financial trading, but the central form of financial profit making that firms pay dearly to engage in" (120). Much of the "arbitraging" that takes place in financial markets wouldn't meet the strict criteria of its textbook definition, because it is rare to find an identical asset circulating at different prices in two distinct markets simultaneously. But the ubiquity of what many practitioners informally describe as

"arbitrage" nevertheless signals a certain kind of risk-minimizing behavior that orients many distinct kinds of financial activity.

I think that it is useful to characterize distressed asset investment as the financial use of courtrooms as spaces of legal arbitrage. "Legal arbitrage," like arbitrage more generally, does of course already have a fairly well-defined meaning among both financial practitioners and their various critics. It describes the way finance takes advantage of what might be called "jurisdictional" spreads – for example, the differences in fiscal or regulatory regimes across national boundaries that make certain kinds of "tax planning" and financial innovation possible (Bryan et al. 2016). What distressed asset investment shows us is that finance doesn't merely seek out ways to take advantage of *jurisdictional or spatial* discontinuities of this sort, but *conceptual and procedural* discontinuities between markets and the law. Put differently, legal arbitrage can describe both the strategic use of differentiated legal and regulatory regimes across national (and subnational) spaces *and* the strategic use of the law as a set of institutional and professional practices distinct from those that operate in the market.

This is true even if the boundaries that separate markets from the law are ultimately fictitious. The functioning of the economy always relies on the implicit or explicit enforcement power of the law,[9] but the two are in important ways distinct social systems with their own internal logics. The arbitrage opportunity in a "special situation" is the spread that opens up between the price of financial assets acquired in the market – which begin to plummet when a firm or other entity looks as though it won't be able to make good on its commitments – and the value of those same instruments as vehicles for leverage in a legal-contractual arena. The language of arbitrage here usefully indicates the orientation of the financial firms pursuing this

[9] Even more foundationally, Pistor (2019) suggests that law is required to provide the "legal code" that transforms assets into capital in the first place.

strategy toward risk. Law offers these firms tools to continually minimize the risks (of, for example, default or the erasure of equity value) to which they have taken on exposure. Their success depends on how they can leverage the assets they have acquired to shape the outcome of the restructuring process.

When PG&E declared its bankruptcy in January 2019, the value of its equity fell by 75% nearly overnight, from roughly $24 to $6 per share (Wirz 2019). Its outstanding bonds were likewise discounted. Meanwhile, many insurers that had the right to subrogate against the utility for claim payments that they had made to policyholders in the aftermath of wildfire events (for which PG&E's infrastructure was ultimately legally liable) elected to sell those subrogation rights at a discount in order to avoid a potentially protracted bankruptcy process.

As the prices of all these assets fell, they became concentrated in the hands of financial firms enticed by the arbitrage opportunities offered by bankruptcy litigation. This is how the "Ad Hoc Committee of Unsecured Noteholders" collectively acquired $11.2 billion in PG&E's outstanding bonds, increasing its holdings by more than $1.5 billion after the judge presiding over the case terminated PG&E's exclusivity period (*In re PG&E Corporation* #5267: 12). It is likewise how a single hedge fund, The Baupost Group, came to possess approximately 4.6% of PG&E's outstanding common stock *and* 23% of the outstanding subrogation claims *against* the utility (*In re PG&E Corporation* #3020-1; #3940: 12). It purchased these claims at rates as low as 35 cents on the dollar, ultimately collecting a windfall profit of more than $1 billion when PG&E settled with subrogation claimants in September of 2019 (McDonald and Chediak 2020).

In each of these cases, there is a quantitative and qualitative "spread" between the nominal market value of an asset and what it affords within a courtroom. It is this spread that activist investors seek out as an occasion for legal arbitrage. The ideological function of law as a

boundary-making process[10] is crucial here. The barriers that law continually erects between "legal" and "economic" space works to the concrete advantage of those financial firms that are able to successfully traverse these spheres. Combined with the legal emphasis on sanctity of contract and – in the case of Chapter 11 – jurists' efforts to preserve the entity being restructured as a "going concern," the elements favoring strategies of legal arbitrage become even clearer. It is no surprise, in short, that distressed investing, like infrastructure itself, has "matured into a genuine asset class" (Altman and Benhenni 2019: 22) – one which tends to blossom in the aftermath of economic crisis, when credit dries up and firms begin to face the hard reality of insolvency. Thus what the bankruptcy of PG&E shows us in the final analysis is that even when the safety of infrastructure as a financial asset is radically called into question, situations of distress offer "safety" of an altogether different sort, for those that are powerful enough to exercise leverage on the edges of finance and the law.

Conclusion

Paying attention to the mechanics of PG&E's bankruptcy alerts us to the ways in which law structures both risk and value for powerful financial actors. In a special situation, courtrooms can at once contractually preserve the value of financial assets and minimize the risks associated with them – at least for those powerful enough to negotiate the outcome of an unfolding legal event. Buying into such an event is possible through the markets, which are themselves ideologically quarantined from the courtroom. The legal-financial strategies of activist investors depend upon both the putative independence of legal and economic space and the actual ability of certain financial firms to navigate between them.

[10] There is a growing literature in legal studies that explores this point in substantially more detail. See, among others, Barkan (2011); Potts (2020a); Britton-Purdy et al. (2020); Walzer (1984).

I have employed the concepts of leverage and arbitrage to highlight the ways that exposure to risk in situations like this gets determined by legal and financial power. "Leverage" is a name for this power. It indicates that risk is not somehow external to or ontologically independent of financial practice – because if you have leverage, you have the means to shape the future according to your own designs. Bankruptcy court is simply one such site where this kind of leverage can be sought out. In this sense, a major component of finance is the use of leverage to minimize risk. To foreground this link between law, finance and risk, I used the concept of "legal arbitrage," which indicates the risk-averse nature of many distinct financial accumulation strategies and the ways different social systems like law and finance create not just spatial spreads but conceptual spreads as well.

The bankruptcy of PG&E offers a vivid example of how leverage and arbitrage may determine courtroom outcomes. So too do numerous other corporate and sovereign restructuring proceedings far beyond the electricity industry or California's fire-torn utilities. The PG&E case, then, is both a corporate bankruptcy story and an infrastructure finance story. It joins together two "alternative asset classes" sought out by investors for their ability to diversify portfolios: infrastructure and hedge funds. The legal, political, and monopoly power of those who control the former, along with the stable base of rate payments they command, are enticing to those who control the latter. Money – and especially hedge fund money – poured into PG&E during its bankruptcy not because the firm and its profitability was unimpeachable in the aftermath of catastrophic wildfire events, but because the American public utility system has created highly socially-leveraged firms that remain sound investments even in moments of extreme crisis.

The sanctioned monopoly privileges afforded to investor-owned public utilities generates returns from the opportunity to collect rent. Monopoly is likewise a mechanism for alleviating

(competition) risk. This is one of the attributes that makes infrastructure attractive as an asset class. In California, further incentives were created by the passage of legislation that partially socialized the socionatural and financial costs facing the state's utilities. For the hedge funds and financial firms that participated in PG&E's bankruptcy, the combination of these factors transformed catastrophic wildfire risk into legal and financial opportunity.

Conclusion

INFRASTRUCTURE, RISK AND THE FUTURE

Empirically, my purpose in this thesis has been to explore what happens when wildfire turns infrastructure into a source of risk. As I have shown, the failure of (for example) a powerline or transmission tower can have cascading social effects. When it is determined to be the cause of a destructive wildfire event, such a failure sets in motion legal, technical, and financial processes that determine who will bear responsibility for such risk – long after the last embers have been put out. If one of the new characteristics of risk in the Anthropocene is indeed uneven exposure to increasingly everyday catastrophes (Cutter 2021), tracing how and why these risks are negotiated becomes an urgent matter.

In this thesis, I have also hoped to make a broader theoretical contribution about the relationship between economy, politics, and law. We should not treat legal and political domains as purely subordinate to capitalism and the market. But neither should we, like the legal formalists of old, treat law as somehow purified of politics (Unger 1984), or accept the boundaries legal practitioners themselves have historically erected between the "economic" and the "political" (Britton-Purdy et al. 2020). Instead, the analytical task is trace *how* law offers avenues for fundamentally political and economic processes of contestation and accumulation, and how legal systems interact with or impinge on these processes.

The American public utility system is a productive site for tracing the interconnections and tensions between legal, political, and economic logics. Within this system, regulation creates the legal and economic conditions through which the electricity industry operates. It determines rates of profit or sets the rules of energy markets; it endows investor-owned firms with "public" rights and obligations; and it establishes the legal and statutory vocabulary through which these

firms offload or redistribute the liabilities associated with their ownership of infrastructure. Disputes over these rules, rights, obligations, and liabilities represent a substantial part of the politics of the American electrical grid. Thus studying the public utility model, and the hybrid public-private entities it has produced and continually redefined, offers an especially illustrative and vivid example of the "co-constitution" and ongoing political negotiation of law and economy (cf. Potts 2020a).

The wildfires I have described in this thesis have triggered legal, financial, and sociotechnical events and disputes over the new risks associated with infrastructure in the Anthropocene. In chapter one, I showed how these disputes were articulated through the public utility system, which in the United States defines infrastructure's own legal and financial "infrastructures." More specifically, I argued that the malleability of the categories of "public" and "private" within such a system has historically been mobilized to advance a certain shared vision of modernity and social progress, and has more recently presented lawmakers, electric utilities, and their shareholders with the legal vocabulary to redistribute infrastructural risk in an era of catastrophic fire. I described some of these efforts, like the statutory authority of investor-owned utilities to execute public safety power shutoffs, or the petitions they have brought before the United States Supreme Court, or subsequent changes made to California's wildfire liability regime, as "liability technologies": legal and technical devices to socialize risk.

In focusing my attention on the specificities of legal and financial practice within the public utility system, I hope to have broadened what counts as "infrastructure" in infrastructure studies – and what therefore counts as an object of politics. Future research along these lines should continue to explore the legal and financial mechanisms through which infrastructure works, and what those mechanisms afford when it fails. It should also resist facile distinctions

between what counts as "public" and "private" in systems of law and governance, and instead drill into how these concepts are enrolled into and given meaning within specific legal and geographic contexts. As the electricity industry continues its lurch toward decarbonization – and the wave of devaluations that such a transition will necessarily entail (Knuth 2017) – the changing and context-specific relationship between these legal artifacts will determine not just who bears the risks associated with the Anthropocene, but who bears the responsibility of mitigating them.

In chapter two, I pivoted to the bankruptcy of Pacific Gas & Electric to show how wildfires in California have not just produced disputes about how the risks of infrastructure will be managed, but have also produced legal-financial events through which profit can be won. I framed my argument with reference to the attributes of infrastructure that have made it a durable asset class for financial actors in recent decades, as these attributes surely played a role in the broad financial interest in PG&E when it entered Chapter 11. But the bankruptcy of California's largest electric utility was equally a "special situation," in which value could be wrung out from the control of distressed financial assets. In situations like this, both the value and risks associated with these assets is determined by legal and financial practice. Using the concept of social leverage, I showed how "risk" can be a product of the legal-financial power to direct future outcomes, rather than (merely) an ontologically independent variable to be calculated and priced by financial actors. The concept of legal arbitrage was likewise introduced to show how minimizing risk is a common objective orienting many discrete kinds of financial activity, and additionally to demonstrate the ways in which the ideological and conceptual barriers created by law may aid in this objective.

In this chapter, my primary emphasis was on risk as a purely financial category. But as I emphasized in the introduction, wildfire events also become socionatural and geographic risks because of processes of urbanization that produce centrifugal patterns of settlement on the wildland-urban interface. Future research may endeavor to link the social, political, and financial processes that produce these settlement patterns and their attendant wildfire risks to the financial forms of risk and risk-aversion I have here described. Doing so will give a broader spatial picture of how risk is produced, managed, and allocated by finance. The financial forces driving real estate development, suburbanization, and homeownership – either as part of a longer twentieth-century process that shifted finance capital from "primary" to "secondary" circuits (Gotham 2009; Harvey 1978), or as part of a nascent "asset economy" that has redefined class categories in new and important ways (Adkins et al. 2019) – will be central here. Simon (2014; 2018) has begun the work of demonstrating how wildfire risk in the WUI is socially and financially produced. The next step in a future research agenda may be to link this socionatural risk and the processes of urbanization that create it to the ways risk is understood and negotiated in financial practice.

My research also suggests that the legal and financial mechanics of corporate bankruptcy, distressed asset investment, and other "special situations" may be a productive empirical arena for geographers to explore in future studies. Distressed asset investment, like infrastructure itself, is valued by investors for its assumed ability to diversify financial portfolios through exposure to assets that demonstrate low levels of correlation to broader market swings. In this way, distressed corporate assets resemble the insurance-linked and exotic securities – for example, catastrophe bonds and extreme weather derivatives – about which Leigh Johnson has lucidly and extensively written (see among others Johnson 2014; 2015). What non-correlation means is that money tends

to pour into special situations in moments of economic crisis, as opportunities for legal (and other forms of) arbitrage bloom within a broader landscape of corporate distress. Such a dynamic has already dramatically played out amidst the ongoing Covid-19 pandemic, as activist funds pursuing distressed debt plays and special situations raced to raise new investment in an environment of extreme economic turbulence – and subsequently posted above-average returns after governments and central banks took drastic measures to stabilize the economy throughout 2020 and 2021 (Wigglesworth and Indap 2020; Wigglesworth 2021). For finance, leverage – big and small, system-wide and context-specific – turns crisis into opportunity.

The need for massive injections of public and private investment in infrastructure to head off the worst effects of climate change as well as adapt to its impacts is by now widely acknowledged – in political and financial rhetoric if not yet in actual practice. It was, however, the wrong kind of money plowing into infrastructure during PG&E's bankruptcy, chasing the wrong kind of returns. I will close by evoking a theme mentioned at the beginning of this thesis: the relationship between infrastructure and time, which is really the question of the kind of future we are collectively trying to build. The public utility as it was originally envisioned offered one answer to this question, by directing capital toward the infrastructures that would scaffold a certain vision of the future. By comparison, arbitrage inhabits a radically narrowed temporal horizon. It is an event-driven logic that may locate value opportunities across the fire-charred landscape of the present, but it tells us nothing about the shape of what's to come.

Timeline of Important Events

October 22, 2007: SDG&E's powerlines ignites the Rice, Guejito and Witch fires, which burn a combined 207,642 acres, destroy 1,347 structures, and kill 2 people.

December 22, 2008: SDG&E seeks permission from the CPUC to shut off power on days when Santa Ana winds exceed specified speed threshold.

September 9, 2009: CPUC denies SDG&E's request to shut off power under conditions specified in its application, but acknowledges the statutory authority of California IOUs to execute power shutoff events to reduce risk of powerline-caused fires.

April 19, 2012: CPUC modifies its September 9, 2009 decision, formalizing the protocol for "public safety power shutoffs" executed by California IOUs.

September 9, 2015: PG&E powerline ignites the Butte Fire, destroying 965 structures and killing 2 people.

September 25, 2015: SDG&E files application with CPUC to recover $379 million in uninsured costs associated the 2007 wildfires through rate increases.

October 8-October 31, 2017: At least 21 major fires ignite in PG&E's service area. Collectively known as the "2017 Northern California Wildfires," these burn 245,000 acres, destroy 8,900 structures, and kill 44 people. Cal Fire determines the cause of at least 16 of these fires to be PG&E's electrical infrastructure.

December 4, 2017: SCE powerline ignites the Thomas Fire, destroying 1,063 structures and killing 2 people.

December 26, 2017: Concluding that the utility failed to "prudently" manage its infrastructure, CPUC denies SDG&E's application to recover costs related to the 2007 wildfires through rate increases.

June 2018-March 2019: Citing increasing wildfire exposure and an unforgiving liability environment, analysts at Moody's and S&P issue successive downgrades of California IOUs' credit ratings. Upon entering bankruptcy, PG&E's credit rating drops below "investment grade."

September 24, 2018: Jerry Brown signs SB 901 into law. The bill formalizes the CPUC's "prudent manager" standard and directs the CPUC to specifically consider an IOU's "financial status" when determining whether it can pass along costs through rate increases.

November 8, 2018: PG&E transmission line ignites the Camp Fire, which destroys the town of Paradise, California and kills 86 people.

November 8, 2018: SCE powerline ignites the Woolsey Fire, destroying 1,643 structures.

January 29, 2019: PG&E enters bankruptcy due to wildfire liabilities.

April 30, 2019: SDG&E files petition for a writ of certiorari, asking the United States Supreme Court to review California's wildfire liability standards.

July 12, 2019: Gavin Newsom signs AB 1054 into law. The bill creates a Wildfire Insurance Fund for California's utilities and changes wildfire liability standards.

September 19, 2019: Ad Hoc Committee of Unsecured Noteholders and Tort Claimants Committee file motion to terminate PG&E's exclusive right to restructure.

September 24, 2019: PG&E settles with subrogation claimants.

October 5-November 26, 2019: California IOUs execute 13 public safety power shutoffs, cumulatively affecting over two million customers. A single PG&E PSPS from October 26 to October 29 disrupts electricity service to nearly one million customers.

October 9, 2019: Judge grants noteholders' and TCC motion, allowing them to advance an alternative Plan of Reorganization.

December 9, 2019: PG&E increases payment to wildfire victims and settles with TCC.

January 27, 2020: PG&E offers debt investors opportunity to participate in equity backstop financing round and settles with bondholders, who withdraw their competing Plan of Reorganization.

March 3, 2020: State of California endorses PG&E's bankruptcy plan after it submits a "case resolution contingency process" in the event that it does not exit bankruptcy by a June 30 deadline.

June 20, 2020: Judge confirms PG&E's Plan of Reorganization.

Judicial, Legislative and Statutory Authorities

All judicial decisions, legislative bills, and public utilities commission orders cited in the text are listed in alphabetical order below.

A.B. 1054, Public utilities: wildfires and employee protection, 2019-2020 Legis. Sess (Cal. 2019).

Albers v. County of Los Angeles, 62 Cal. 2d 250, 42 Cal. Rptr. 89, 398 P.2d 129 (1965).

Barham v. Southern California Edison Co., 88 Cal. Rptr. 2d 424, 74 Cal. App. 4th 744 (Ct. App. 1999).

Bluefield Co. v. Pub. Serv. Comm., 262 U.S. 679, 43 S. Ct. 675, 67 L. Ed. 1176 (1923).

Cannara v. Nemeth, 467 F. Supp. 3d 877 (N.D. Cal. 2020).

Cal. Const. art. 1 § 19.

Cal. Public Utilities Code art. 1 §451; art. 7 §612.

Cal. Public Utilities Commission D.09-09-030 Denying San Diego Gas & Electric Company's Application to Shut Off Power During Periods of High Fire Danger (2009).

Cal. Public Utilities Commission D.12-04-024 Granting Petition to Modify D. 09-09-030 and Adopting Fire Safety Requirements for SDG&E (2012).

Cal. Public Utilities Commission R.94-04-031 & I.94-04-032 Proposed Policy Statement on Restructuring California's Electric Services Industry and Reforming Regulatory Policy (1994).

Duquesne Light Co. v. Barasch, 488 U.S. 299, 109 S. Ct. 609, 102 L. Ed. 2d 646 (1989).

Munn v. Illinois, 94 U.S. 113, 24 L. Ed. 77, 24 S. Ct. 77 (1877).

Pacific Bell Telephone Co. v. Southern California Edison Co., 208 Cal. App. 4th 1400, 146 Cal. Rptr. 3d 568 (Ct. App. 2012).

S.B. 901, 2017-2018 Legis. Sess (Cal. 2018).

U.S. Const. amend. V; amend. XIV §1.

Additional Case Documents

In addition to the legal decisions referenced above, this paper relies on various court documents associated with the bankruptcy of Pacific Gas & Electric and a petition for a writ of certiorari presented to the United States Supreme Court by San Diego Gas & Electric. These documents, along with a lawsuit filed by Alex Cannara and Gene Nelson against various parties, are listed in chronological order below.

A docket of the PG&E bankruptcy can be found online here:
https://restructuring.primeclerk.com/pge/Home-Index

A docket of the SDG&E petition can be found online here:
https://www.supremecourt.gov/search.aspx?filename=/docket/docketfiles/html/public/18-1368.html

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Pacific Gas & Electric Bankruptcy Proceedings (with docket numbers)[1]

Amended Declaration of Jason P. Wells in support of First Day Motions and Related Relief, *In re PG&E Corporation and Pacific Gas and Electric Company*, No. 19-30088 (Bankr. N.D. Cal. Feb. 1, 2019). [Docket #263]

Third Amended Statement of the Ad Hoc Group of Subrogation Claim Holders Pursuant to Bankruptcy Rule 2019, *In re PG&E Corporation and Pacific Gas and Electric Company*, No. 19-30088 (Bankr. N.D. Cal. Jul. 19, 2019). [Docket #3020]

Joint Motion of the Official Committee of Tort Claimants and Ad Hoc Committee of Senior Unsecured Noteholders to Terminate the Debtors' Exclusive Periods Pursuant to Section 1121(d)(1) of the Bankruptcy Code, *In re PG&E Corporation and Pacific Gas and Electric Company*, No. 19-30088 (Bankr. N.D. Cal. Sept. 19, 2019). [Docket #3940]

Debtors' Motion Pursuant to 11 U.S.C. sections 363(b) and 105(a) and Fed. R. Bankr. P. 6004 and 9019 for Entry of an Order (I) Authorizing the Debtors to Enter into Restructuring Support Agreement with the Consenting Subrogation Claimholders, (II) Approving the Terms of Settlement with Such Consenting Subrogation Claimholders, Including the Allowed Subrogation Amount, and (III) Granting Related Relief, *In re PG&E Corporation and Pacific Gas and Electric Company*, No. 19-30088 (Bankr. N.D. Cal. Sept. 24, 2019). [Docket #3992]

Debtors Objection to Joint Motion of the Official Committee of Tort Claimants and Ad Hoc Committee of Senior Unsecured Noteholders to Terminate the Debtors Exclusive Periods Pursuant to Section 1121(d)(1) of the Bankruptcy Code, *In re PG&E Corporation and Pacific Gas and Electric Company*, No. 19-30088 (Bankr. N.D. Cal. Oct. 4, 2019). [Docket #4119]

[1] For brevity, all of these case documents are cited in the text as *In re PG&E Corporation*, followed by the docket number.

Order Granting Joint Motion of the Official Committee of Tort Claimants and Ad Hoc Committee of Senior Unsecured Noteholders to Terminate the Debtors' Exclusive Periods Pursuant to Section 1121(d)(1) of the Bankruptcy Code, *In re PG&E Corporation and Pacific Gas and Electric Company*, No. 19-30088 (Bankr. N.D. Cal. Oct. 9, 2019). [Docket #4167]

Opposition of Official Committee of Tort Claimants to Debtors' Motion Pursuant to 11 U.S.C. §§ 363(b) and 105(a) and Fed. R. Bankr. P. 6004 and 9019 for Entry of an Order (i) Authorizing the Debtors to Enter into Restructuring Support Agreement with the Consenting Subrogation Claimholders, (ii) Approving the Terms of Settlement with Such Consenting Subrogation Claimholders, Including the Allowed Subrogation Claim Amount, and (iii) Granting Related Relief, *In re PG&E Corporation and Pacific Gas and Electric Company*, No. 19-30088 (Bankr. N.D. Cal. Oct. 16, 2019). [Docket #4232]

Second Amended Verified Statement of the Ad Hoc Committee of Senior Unsecured Noteholders Pursuant to Bankruptcy Rule 2019, *In re PG&E Corporation and Pacific Gas and Electric Company*, No. 19-30088 (Bankr. N.D. Cal. Oct. 21, 2019). [Docket #4369]

Debtors Motion Pursuant to 11 U.S.C. sections 363(b) and 105(a) and Fed. R. Bankr. P. 6004 and 9019 for Entry of an Order (I) Authorizing the Debtors and TCC to Enter Into Restructuring Support Agreement With the TCC, Consenting Fire Claimant Professionals, and Shareholder Proponents and (II) Granting Related Relief Filed by Debtor PG&E Corporation, *In re PG&E Corporation and Pacific Gas and Electric Company*, No. 19-30088 (Bankr. N.D. Cal. Dec. 9, 2019). [Docket #5038]

Statement of Governor Gavin Newsom, *In re PG&E Corporation and Pacific Gas and Electric Company*, No. 19-30088 (Bankr. N.D. Cal. Dec. 16, 2019). [Docket #5138]

Order Pursuant to 11 U.S.C. Section 363(b) and 105(a) and Fed. R. Bankr. P. 6004 and 9019 (I) Authorizing the Debtors and TCC to Enter Into Restructuring Support Agreement With the TCC, Consenting Fire Claimant Professionals, and Shareholder Proponents, and (II) Granting Related Relief, *In re PG&E Corporation and Pacific Gas and Electric Company*, No. 19-30088 (Bankr. N.D. Cal. Dec. 19, 2019). [Docket #5174]

Motion of the Ad Hoc Committee of Senior Unsecured Noteholders for Reconsideration and Relief from Orders Pursuant to Federal Rules of Civil Procedure 59(e) and 60(b), *In re PG&E Corporation and Pacific Gas and Electric Company*, No. 19-30088 (Bankr. N.D. Cal. Dec. 31, 2019). [Docket #5241]

Debtors' Amended Motion for Entry of Orders (I) Approving Terms of, and Debtors' Entry into and Performance Under, Equity Backstop Commitment Letters, (II) Approving Terms of, and Debtors' Entry into and Performance Under, Debt Financing Commitment Letters, and (III) Authorizing Incurrence, Payment, and Allowance of Related Fee and/or Premiums, Indemnities, Costs and Expenses as Administrative Expense Claims, *In re PG&E Corporation and Pacific Gas and Electric Company*, No. 19-30088 (Bankr. N.D. Cal. Jan. 3, 2020). [Docket #5267]

Objection of Governor Gavin Newsom to Debtors' Amended Motion For Entry of Orders, *In re PG&E Corporation and Pacific Gas and Electric Company*, No. 19-30088 (Bankr. N.D. Cal. Jan. 22, 2020). [Docket #5445]

Debtors Motion Pursuant to 11 U.S.C. sections 363(b) and 105(a) and Fed. R. Bankr. P. 6004 and 9019 For Entry of an Order (I) Approving and Authorizing the Debtors To Enter Into Restructuring Support Agreement With Consenting Noteholders and Shareholder Proponents, and (II) Granting Related Relief, *In re PG&E Corporation and Pacific Gas and Electric Company*, No. 19-30088 (Bankr. N.D. Cal. Jan. 27, 2020). [Docket #5519]

Case Resolution Contingency Process Motion, *In re PG&E Corporation and Pacific Gas and Electric Company*, No. 19-30088 (Bankr. N.D. Cal. Mar. 20, 2020). [Docket #6398]

Statement of Governor Gavin Newsom in Support of Debtors' Motion Pursuant to 11 U.S.C. sections 105 and 363 and Fed. R. Bankr. P. 9019 for Entry of an Order (I) Approving Case Resolution Contingency Process and (II) Granting Related Relief, *In re PG&E Corporation and Pacific Gas and Electric Company*, No. 19-30088 (Bankr. N.D. Cal. Mar. 20, 2020). [Docket #6402]

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