

INEQUITABLE INFRASTRUCTURE: AN EMPIRICAL ASSESSMENT OF FEDERALISM, CLIMATE CHANGE, AND ENVIRONMENTAL RACISM*

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This Article explains a critical, yet unexplored issue: How are some communities like Jackson—the 80% Black capital of Mississippi—often left without water or electricity, while their mostly white neighbors are not? The Article maps uncharted territory by interrogating the underlying causes of this disparity, untangling how three seemingly unrelated factors interplay with the accelerating effects of climate change to perpetuate systemic inequities.

First, and somewhat uniquely, the U.S. federalist construct allocates infrastructure responsibility to the states, which, under the guise of autonomy, subdelegate to often under-resourced local authorities. Second, this capital mismatch requires governmental units to borrow using complex municipal instruments that provide investors vastly underestimated power over critical assets. Finally, these dynamics are compounded by America’s segregationist past, the legacy of which involuntarily concentrated minority groups in areas most exposed to climate change, and as a result increasingly struggling to meet their constituents’ most basic needs.

The Biden administration’s keenly underappreciated legislative package reflects a welcome evolution of the prevailing construct. Yet, the “Infrastructure New Deal’s” financial and structural shortcomings suggest it may disappoint, requiring mitigating strategies which this Article recommends based in part on comparative analysis of successful approaches from other jurisdictions.

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INTRODUCTION

“This is the United States of America, for God’s sake. Everyone in this country should be able to turn on the faucet and drink clean water.”—President Joe Biden¹

“No one ever thought about upgrading [Jackson’s] infrastructure, mainly because there are no white people there.”—Gino Womack, Operation Good (Program Director)²

Imagine two communities, just a few miles apart—one mostly Black, the other largely white. Few would be shocked by striking gaps in wealth, income, or access to opportunity. Yet, surely—in America—both must have water?

In 2022, we were reminded that the answer is “no,” as 150,000 primarily Black residents of Mississippi’s capital, Jackson, spent months without running water following yet another infrastructure crisis.³ In many respects, Jackson encapsulates the state of U.S. infrastructure—a 1950s-vintage system built with inequity in mind, suffering from chronic underinvestment, and increasingly imperiled by climate change.

1. Remarks on the Infrastructure Investment and Jobs Act, 2022 DAILY COMP. PRES. DOC. 1 (Jan. 14, 2022).

2. Areeba Shah, *“There Are No White People There”: Jackson’s Water Crisis, Explained*, SALON (Sept. 2, 2022, 5:45 AM), <https://www.salon.com/2022/09/02/there-are-no-people-there-jacksons-water-crisis-explained/> [<https://perma.cc/9PGK-4R6Q>].

3. See *infra* Section III.B.1.

Infrastructure is critical to our economy and quality of life, yet it remains persistently under-resourced by trillions of dollars.⁴ Far from an academic issue, this broad-based policy failure results in poor families overpaying for critical services of increasingly questionable quality, as climate change pushes aging resources past the breaking point.

Infrastructure policy is conceptualized globally but experienced locally. Our roads, water, and electricity have an extraordinary impact on our lived experience. Yet, for far too many Americans—particularly communities of color—that experience is hardly equitable.

This Article breaks new ground and contributes to the growing literature on environmental racism by connecting infrastructure policy and municipal market dynamics to America’s contemporary resource inequities and disparate climate change impacts. The Article attributes these untenable dynamics to the confluence of three ostensibly distinct but, in reality, deeply intertwined factors.

First, the analysis identifies a distinctive feature of U.S. infrastructure policy: reflecting a federalist construct, the United States delegates responsibility to the states, which subdelegate to local governments. Second, under the guise of autonomy, this “hyperlocal” model pushes key climate-related issues to the least-resourced levels of government, requiring them to borrow heavily through complex debt instruments.⁵ Finally, reflecting America’s legacy of segregation and environmental racism, historically marginalized groups are disproportionately exposed to the perils of climate change. The toxic combination of regressive policy, municipal finance, segregationist history—and now climate change—traps communities in a vicious cycle of excessive bills, never-ending debt, and unacceptable inequity.

The resulting disparities in access to the most basic of human needs reflect a pervasive race- and class-based divide fundamentally incompatible with the nation’s moral responsibility to provide for all citizens.

As a starting point, this Article presents a brief background regarding infrastructure, including a taxonomy of the sector by asset types,⁶ and then outlines important economic context, focusing on public goods, externalities, and public utility regulation.⁷ Subsequently, it analyzes the layered relationship

4. *Investment Forecasts for United States*, GLOB. INFRASTRUCTURE OUTLOOK, <https://outlook.gihub.org/countries/United%20States> [<https://perma.cc/35JD-ZYJP>] (estimating a \$3.8 trillion U.S. investment gap in 2021); see AM. SOC’Y OF CIV. ENG’RS, 2021 REPORT CARD FOR AMERICA’S INFRASTRUCTURE 2 (2021), https://infrastructurereportcard.org/wp-content/uploads/2020/12/National_IRC_2021-report.pdf [<https://perma.cc/N337-RKBC>].

5. Though traditionally a marketing term, a recent book uses the term “hyperlocal” in reference to localized governance structures. See HYPERLOCAL: PLACE GOVERNANCE IN A FRAGMENTED WORLD *passim* (Jennifer S. Vey & Nate Storrings eds., 2022).

6. See *infra* Section I.A.1.

7. See *infra* Section I.A.2.

between climate change and infrastructure,⁸ which is both directly exposed to damage from large-scale climate events—which have increased fourfold from the 1980s to the 2010s⁹—and also critical for climate change mitigation strategies.¹⁰

The history of U.S. infrastructure reflects a perpetual tug-of-war between federal, state, and local governments, as well as private interests, dating back to the very founding of the republic.¹¹ Over time, infrastructure policy has been significantly impacted by the ebbs and flows of America’s federalist balance, with the contemporary structure reflecting a broadly limited federal government role.¹² While our infrastructure challenges are not new, they in many ways are distinctly American. This is because, unlike most other developed economies, the United States utilizes a “hyperlocal”¹³ infrastructure provision model, promulgated by a hodgepodge of nearly 90,000 local governments.¹⁴ Despite some benefits, a critical limitation of this approach is that local governments are often ill-resourced to navigate the growing costs and complexities of climate change.¹⁵ At the same time, given America’s legacy of segregationist policies, this allocative approach can also perpetuate inequities, in some respect paralleling long-standing concerns with property tax-based public school funding.¹⁶

Local governments largely finance infrastructure through municipal debt,¹⁷ and specifically the \$2.5 trillion “revenue bond” market.¹⁸ Though perceived as innocuous instruments, infrastructure revenue bonds are in reality complex securities that give investors remarkably underestimated power over municipal operations, including indirectly effectuating rate increases or diversion of capital investments.¹⁹

8. *See infra* Section I.B.

9. *See, e.g., infra* Section III.B.

10. *See infra* Section I.B.

11. *See infra* Section II.A.1.

12. *See infra* Section II.A.2.

13. *See supra* note 5.

14. *See* DJ Gribbin, *Why Is Federal Infrastructure Policy So Difficult?*, BROOKINGS INST. (Feb. 28, 2019), <https://www.brookings.edu/blog/the-avenue/2019/02/28/why-is-federal-infrastructure-policy-so-difficult/> [https://perma.cc/PP6T-57CX].

15. *See infra* Section II.A.2.

16. *See infra* Section II.A.2.

17. *See infra* Section II.B.1.

18. *See infra* Section II.B.2.

19. As discussed in Section II.B.2.a, municipal bond investors are unable to exercise control through traditional governance mechanisms. However, the operation of revenue bonds’ contractual covenants and authorizing legislation can, often without creditor action, “effectively” produce a similar outcome, forcing the infrastructure issuer to raise rates or defer investment to meet debt service covenants. *See infra* Section II.B.2.c. Jackson, for instance, once had to raise certain rates over 100%. *See infra* Section III.B.1.a.

Further, courts have interpreted revenue bond-specific bankruptcy provisions as effectively precluding cuts to revenue bond obligations in Chapter 9 municipal bankruptcy—creating near-permanent obligations.²⁰ Chapter 11, in contrast, focuses on right-sizing business balance sheets to facilitate a “fresh start.”²¹ The inability to adjust multi-decade obligations in response to critical developments like demographic shifts or climate damage can leave shrinking communities in a vicious cycle of growing bills, unyielding debt, and deteriorating service.²²

This problematic model impacts some communities much more acutely than others, with the EPA finding that “minorities are most likely to currently live in areas [with] . . . the highest levels of climate change impacts.”²³ This concentration of minority groups in undesirable areas reflects the pervasive legacy and continuing impact of America’s long and awful history of segregation, including through so-termed “redlining.”²⁴

This Article contextualizes these dynamics through case studies of the respective water and energy crises facing Jackson, Mississippi, and Puerto Rico. Despite clear differences, their common themes—including demographic changes, excessive debts, and acute climate change exposure—reflect infrastructure challenges experienced in communities from Michigan to Louisiana, Alabama, and New York.²⁵

Indeed, the vast scale and scope of deficiencies underscore the failure of our prevailing approach and clear need for a new forward-thinking and equitable infrastructure paradigm for the twenty-first century.²⁶ In many respects, this ethos is consistent with the Biden administration’s recent legislative package—including the Infrastructure Investment and Jobs Act (“IIJA”) and the Inflation Reduction Act (“IRA”).²⁷ This “Infrastructure New Deal” represents a material evolution of the federalist infrastructure construct premised on the federal government reclaiming a leadership role it has not held for decades.²⁸

20. *See infra* Section II.B.2.b.

21. One of the primary purposes of bankruptcy is to discharge certain debts to give an honest individual debtor a “fresh start.” *Process - Bankruptcy Basics*, U.S. CTS. <https://www.uscourts.gov/services-forms/bankruptcy/bankruptcy-basics/process-bankruptcy-basics> [https://perma.cc/J5WH-3MT3].

22. *See infra* Section II.B.2.c.

23. EPA, CLIMATE CHANGE AND SOCIAL VULNERABILITY IN THE UNITED STATES 6 (2021), https://www.epa.gov/system/files/documents/2021-09/climate-vulnerability_september-2021_508.pdf [https://perma.cc/5BJF-FGJS].

24. *See infra* Section III.A.

25. *See infra* Section III.B.

26. *See infra* Part IV.

27. *See infra* Section IV.B.

28. *See infra* Part IV.

Yet, while well-intentioned, the Infrastructure New Deal may disappoint. First, despite large headline figures, this Article’s empirical analysis shows that the allocated amounts are quite limited relative to the scale of infrastructure needs, with the IIJA, for instance, estimated to fill only 18% to 22% of the multitrillion-dollar U.S. investment gap. Further, the structure of certain legislation, and particularly expansive federal agency roles, may heighten jurisdictional frictions in an already polarized environment, potentially risking policy objectives. To mitigate these risks, this Article suggests incorporating aspects of successful approaches from other jurisdictions, including Australia.²⁹

This Article is organized in four parts. Part I sets the stage for the broader discussion by laying out an infrastructure sector taxonomy, core economic concepts, and an empirical analysis of the relationship between infrastructure and climate change. Part II assesses the causes underlying the United States’ infrastructure struggles, focusing on certain uniquely American features relating to federalism, capital markets, and public finance. Part III connects this backdrop to the United States’ legacy of segregation and environmental racism, discussing how the confluence of these factors drives infrastructural racism today through case studies on the respective water and energy crises in Jackson, Mississippi, and Puerto Rico. Part IV details the Biden administration’s underappreciated “Infrastructure New Deal,” including empirical analyses of the IIJA and IRA, focusing on key provisions, shortcomings, and mitigating strategies.

I. WHAT IS INFRASTRUCTURE—AND WHY IS IT IMPORTANT?

The United States suffers from a long-standing infrastructure “investment gap” estimated between \$2.6 and \$3.8 trillion,³⁰ hindering our quality of life, economic growth, and long-term prosperity.³¹ While infrastructure provision challenges are not uncommon, America persistently fares poorly compared to

29. See *infra* Section IV.C.

30. AM. SOC’Y OF CIV. ENG’RS, *supra* note 4, at 5; *Investment Forecasts for United States*, *supra* note 4.

31. See David Alan Aschauer, *Why Is Infrastructure Important?*, in FED. RSRV. BANK OF BOS., IS THERE A SHORTFALL IN PUBLIC CAPITAL INVESTMENT?: PROCEEDINGS OF A CONFERENCE HELD IN JUNE 1990, at 21, 21–22 (Alicia H. Munnell ed., 1990) [hereinafter Aschauer, *Why Is Infrastructure Important?*]; see also *infra* notes 39–42 and accompanying text.

its peer group,³² with the G7's largest infrastructure investment gap and relative spending levels far below most major economies.³³

Part I focuses on infrastructure's unique attributes and issues, providing background for the Article's subsequent discussion. First, it outlines a taxonomy of infrastructure types and discusses core economic foundations, including externalities and the imperfect public good construct. Second, it empirically illustrates and analyzes the critical interplay between infrastructure and climate change.

A. "Shared Means to Many Ends"³⁴

Though a commonly used term, "infrastructure" reflects a complex and evolving definition.³⁵ Broadly, we can think of infrastructure as the basic physical and organizational structures and facilities needed for the operation of a society or enterprise. These "shared means to many ends" do not directly produce goods or services but provide the "underlying framework" or foundation to facilitate processes that do.³⁶

1. Taxonomy

Taxonomically, as detailed in Figure 1 below, infrastructure is sometimes divided between: (i) "traditional" ("hard" or "economic") infrastructure, relating to the physical "built environment," and (ii) "nontraditional" ("soft" or "social") infrastructure, encompassing nonphysical shared resources, such as

32. The state of affairs was aptly illustrated when a Pittsburgh bridge collapsed shortly before President Biden's scheduled visit to promote the 2021 Infrastructure Act. Campbell Robertson & Sophie Kasakove, *Pittsburgh Bridge Collapses Hours Before Biden Infrastructure Visit*, N.Y. TIMES (Jan. 28, 2022), <https://www.nytimes.com/2022/01/28/us/pittsburgh-bridge-collapse-biden.html> [<https://perma.cc/TQK9-E67C> (staff-uploaded, dark archive)].

33. James McBride, Noah Berman & Anshu Siripurapu, *The State of U.S. Infrastructure*, COUNCIL ON FOREIGN RELS., <https://www.cfr.org/background/state-us-infrastructure> [<https://perma.cc/AXK7-WB79>] (last updated Sept. 20, 2023, 11:30 AM).

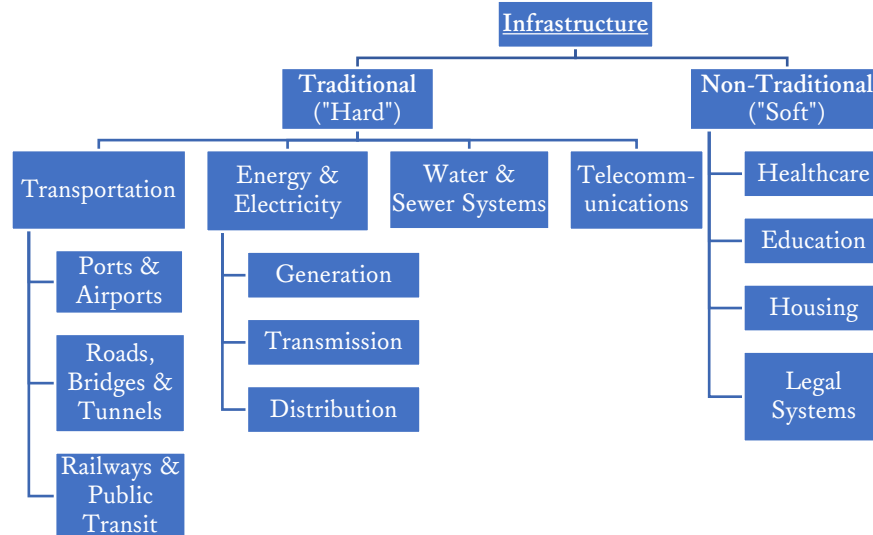
34. BRETT M. FRISCHMANN, *INFRASTRUCTURE: THE SOCIAL VALUE OF SHARED RESOURCES* 4 (2012).

35. See *id.* (defining "infrastructure resources" as "shared means to many ends"); see also Edward Glaeser & James Poterba, *Economic Perspectives on Infrastructure Investment*, in *REBUILDING THE POST-PANDEMIC ECONOMY* 182, 185 (Melissa S. Kearney & Amy Ganz eds., 2021) ("The term 'infrastructure' is a relatively recent addition to our national vocabulary, and its meaning has evolved over time."); *Infrastructure*, BLACK'S LAW DICTIONARY (11th ed. 2019) (noting standard definitions of infrastructure); WILLIAM J. MALLETT, CONG. RSCH. SERV., *IF10592 INFRASTRUCTURE INVESTMENT AND THE FEDERAL GOVERNMENT* 1 (2018), <https://crsreports.congress.gov/product/pdf/IF/IF10592> [<https://perma.cc/ZF56-KXRE> (staff-uploaded archive)] ("There is no agreed meaning of 'infrastructure.' The term generally refers to long-lived, capital-intensive systems and facilities.").

36. See FRISCHMANN, *supra* note 34, at 3–4; Jeffrey E. Fulmer, *What in the World Is Infrastructure?*, *INFRASTRUCTURE INV.*, July–Aug. 2009, at 32 (defining infrastructure as "[t]he physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions").

financial platforms, legal systems, and healthcare.³⁷ This distinction—and the prospective inclusion of nontraditional infrastructure—explains much of the politicized debate around the recent IIJA legislation and infrastructure policy more broadly.³⁸

Figure 1: Infrastructure Taxonomy



Because this Article largely focuses on traditional infrastructure, for the sake of relative simplicity, it will generally use the broader term “infrastructure” in reference to just those elements of the taxonomy. As shown in Figure 1,

37. This “classical” economic framework is intentionally simplified for purposes of this analysis. Some scholars, for instance, further taxonomize infrastructure along two dimensions: (i) between economic and social, and (ii) between services (“soft” infrastructure) and assets (“hard” infrastructure). See Mark Dyer, Rachel Dyer, Min-Hsien Weng, Shaoqun Wu, Thomas Grey, Richard Gleeson & Tomás García Ferrari, *Framework for Soft and Hard City Infrastructures*, 172 URB. DESIGN & PLAN. 219, 220–22 (2019).

38. Compare Jim Tankersley & Jeanna Smialek, *Biden Plan Spurs Fight over What ‘Infrastructure’ Really Means*, N.Y. TIMES, <https://www.nytimes.com/2021/04/05/business/economy/biden-infrastructure.html> [<https://perma.cc/UE4H-FUEC> (staff-uploaded, dark archive)] (last updated June 24, 2021) (defending an expanded definition of infrastructure), with Editorial Board, Opinion, *A Not So Grand Infrastructure Deal*, WALL ST. J. (July 29, 2021, 6:47 PM), <https://www.wsj.com/articles/a-not-so-grand-infrastructure-deal-senate-democrats-republicans-11627597534> [<https://perma.cc/286U-HABL> (staff-uploaded, dark archive)] (arguing that appropriations for broadband and green subsidies do not belong in the infrastructure act). The Republican National Committee, for instance, has argued that only 7% of the IIJA’s “spending is for what Americans traditionally think of as infrastructure”; CNN has described that claim as “misleading.” See Tommy Pigott, *Only 7%*, REPUBLICAN NAT’L COMM. (Apr. 1, 2021), <https://gop.com/rapid-response/only-7/> [<https://perma.cc/8WQD-93UH> (staff-uploaded archive)]; *Does Only 7% of Biden’s Infrastructure Plan Go Toward US Infrastructure?*, CNN, https://www.cnn.com/factsfirst/politics/factcheck_621624db-b99a-452d-b798-559a9e857582 [<https://perma.cc/CVZ4-4AN7>].

traditional infrastructure can be broadly divided into four subcategories—(i) transportation, (ii) water and sewer systems, (iii) energy and electricity, and (iv) telecommunications—with considerable variation in governance, regulatory, and operating models between them.³⁹

Transportation and water infrastructure, for instance, are almost entirely subject to public sector ownership and provision, with debt capital provided through the municipal bond market.⁴⁰ Telecommunications infrastructure, in contrast, has largely transitioned toward private sector ownership, while the electric system is perhaps closer to the middle, with significant parts of the value chain owned by investors, but portions still publicly held.⁴¹ The common threads across the four categories of economic infrastructure include large, capital-intensive assets with potential externalities and market structure often exhibiting elements of a natural monopoly.⁴²

2. Economic Foundations

Appreciating the complexities inherent to infrastructure provision requires a brief background regarding the sector's unique economic attributes, including: (i) infrastructure as an imperfect (or impure) public good, (ii) natural monopolies and public utility regulation, and (iii) the nature of externalities and market disequilibria.

39. This traditional infrastructure taxonomy is based in large part around market practice with respect to financing, funding, and investing in infrastructure assets. See MARTIN BLAIKLOCK, *INFRASTRUCTURE FINANCE: AN INSIDE VIEW* 23–25, 29–30 (2017); see also *Overview to INFRASTRUCTURE DELIVERY: PRIVATE INITIATIVE AND THE PUBLIC GOOD*, at xiii, xx to xxiv (Ashoka Mody ed. 1996).

40. See *infra* Section II.B. There are, of course, certain exceptions, including freight railroads. See U.S. GOV'T ACCOUNTABILITY OFF., GAO-08-763T, *PHYSICAL INFRASTRUCTURE 4* (2008) (noting that “the private sector owns almost all freight railroad infrastructure”).

41. See U.S. GOV'T ACCOUNTABILITY OFF., GAO-22-104462, *CRITICAL INFRASTRUCTURE PROTECTION 1* (2021) (“The Communications Sector [is] comprised of broadcast, cable, satellite, wireless, and wireline systems and networks primarily owned and operated by the private sector.”); Aneil Kovvali & Joshua C. Macey, *The Corporate Governance of Public Utilities*, 40 *YALE J. ON REGUL.* 569, 572 (2023).

42. These features are sometimes discussed within the broader umbrella of “common carrier regulation.” See Richard A. Posner, *Natural Monopoly and Its Regulation*, 21 *STAN. L. REV.* 548, 549 (1969) (“The regulated industries provide the essential infrastructure of modern industrial society.”); see also Michele Lee Wong, Jeffrey Czajkowski, Kaitlyn Kaminski, Eric Kolchinsky & Hanchun Zhang, NAT'L ASS'N OF INS. COMM'RS, *ECONOMIC INFRASTRUCTURE DEFINITION 2* (2020), <https://content.naic.org/sites/default/files/cipr-report-economic-infrastructure-definition.pdf> [<https://perma.cc/P33R-GEED>] (defining economic infrastructure as “[l]ong-lived, capital intensive, large physical assets that provide essential services or facilities to a country, state, municipality or region and contributes to its economic development or prosperity”).

a. *An Imperfect Public Good*

Though infrastructure is frequently termed a “public good,”⁴³ contextualizing a historic U.S. norm of public sector provision,⁴⁴ that framing is at best imprecise and more often incorrect.⁴⁵

As shown in Figure 2 below, the economic definition of a public good requires that it be: (i) “nonrivalrous,” or accessible by all, such that one individual’s use does not impede another’s,⁴⁶ and (ii) “nonexcludable,” such that it is impossible to prevent other individuals from consuming it.⁴⁷

Figure 2: Public Goods Summary Matrix

	<u>Excludable</u>	<u>Nonexcludable</u>
<u>Rivalrous</u>	<u>Private Goods.</u> Clothing; food; most consumption goods	<u>Common-Pool Resources.</u> Fish stocks; certain natural resources ⁴⁸
<u>Nonrivalrous</u>	<u>Club Goods.</u> Private parks; television subscriptions	<u>Public Goods.</u> National defense; public fireworks; lighthouses

43. See Paul A. Samuelson, *The Pure Theory of Public Expenditure*, 36 REV. ECON. & STAT. 387, 387 (1954) (defining “public goods” as “[goods] which all enjoy in common in the sense that each individual’s consumption of such a good leads to no subtraction from any other individual’s consumption of that good”).

44. See Geoffrey Garrett, Opinion, *What the U.S. Could Learn from Australia About Financing Infrastructure*, KNOWLEDGE AT WHARTON (June 8, 2018), <https://knowledge.wharton.upenn.edu/article/u-s-needs-embrace-private-sector-involvement-infrastructure/> [<https://perma.cc/5HPV-SUCJ>] (staff-uploaded archive)] (“The classical position on infrastructure is that it is a ‘public good’—something critical to society that ‘the market’ would undersupply—and hence the natural domain of government.”).

45. Charles D. Jacobson & Joel A. Tarr, *No Single Path: Ownership and Financing of Infrastructure in the 19th and 20th Centuries*, in INFRASTRUCTURE DELIVERY: PRIVATE INITIATIVE AND THE PUBLIC GOOD 1, 1 (Ashoka Mody ed. 1996). The impetus to allocate infrastructure within the construct may be because contemporary legal frameworks can trend toward viewing public and private goods as a binary divide, roughly corresponding to the respective public and private law frameworks. See Jesse Malkin & Aaron Wildavsky, *Why the Traditional Distinction Between Public and Private Goods Should Be Abandoned*, 3 J. THEORETICAL POL. 355, 356–57 (1991); Elinor Ostrom, *Beyond Markets and States: Polycentric Governance of Complex Economic Systems*, 100 AM. ECON. REV. 641, 642–43 (2010).

46. Perhaps the simplest example of a *rivalrous* good is food; once consumed, it is no longer accessible to others.

47. See FRISCHMANN, *supra* note 34, at 24–25.

48. Common-pool resources are particularly susceptible to the so-called “tragedy of the commons.” See Alexandra Spiliakos, *Tragedy of the Commons: What It Is and 5 Examples*, HARV. BUS.

In reality, economic infrastructure generally most closely resembles an *imperfect* (or impure) public good: one that satisfies the two public good conditions only to a certain extent, or only some of the time.⁴⁹ For instance, national defense reflects a true public good, for which public sector provision is logical. A road without tolls or traffic can often functionally *resemble* a public good. Yet, that same road can also feel closer to a private good through the *rivalrous* impact of rush-hour traffic and the *exclusionary* effect of tolls. The *imperfect* public good construct—and its distinction to true public goods—informs much of the incongruence and, at times, normative disconnect regarding how society and policymakers view infrastructure.⁵⁰

b. Natural Monopolies & Public Utility Regulation

Economic infrastructure often exhibits characteristics of a natural monopoly, which refers to “[a]n industry in which multi-firm production is more costly than production by a monopoly.”⁵¹ Typically, this occurs in sectors characterized by high costs of entry difficult to reasonably recoup by multiple competitors, stable marginal costs, and economies of scale or scope.⁵² These economics allow a natural monopoly to amortize the up-front capital cost over a sufficient volume of transactions, ultimately providing the goods or services cheaper than multiple providers.⁵³

The idea of a single producer dominating a market presents obvious regulatory and policy concerns. Accordingly, concepts of public utility regulation were developed to oversee sectors of the U.S. economy characterized by such dynamics, including railroads, gas, electric, and telecommunications.⁵⁴

SCH. ONLINE (Feb. 6, 2019), <https://online.hbs.edu/blog/post/tragedy-of-the-commons-impact-on-sustainability-issues> [<https://perma.cc/43SU-NR7K>].

49. Aman A. Bara & Bidisha Chakraborty, *Is Public-Private Partnership an Optimal Mode of Provision of Infrastructure?*, 44 J. ECON. DEV. 97, 99 (2019) (“This paper considers infrastructure as an impure public good and examines whether a public-private partnership in financing infrastructure service is optimal.”).

50. See Randall Bartlett, *Is Infrastructure a Public Good? No, Sort Of, and What Role for the Public and Private Sectors*, INST. FISCAL STUD. & DEMOCRACY (May 15, 2017), <https://www.ifsd.ca/en/blog/last-page-blog/infrastructure-public-good> [<https://perma.cc/LS3Z-5Z5K>].

51. William J. Baumol, *On the Proper Cost Tests for Natural Monopoly in a Multiproduct Industry*, 67 AM. ECON. REV. 809, 810 (1977). While some of these dynamics may arguably be shifting as a result of emerging technologies, including distributed solar power and transportation alternatives, discussion of such considerations is beyond the scope of this analysis.

52. See generally Posner, *supra* note 42 (defining natural monopoly and exploring the appropriate regulatory controls for natural monopolies in public utilities).

53. See *id.* at 548 (“If the entire demand within a relevant market can be satisfied at lowest cost by one firm rather than by two or more, the market is a natural monopoly, whatever the actual number of firms in it.”).

54. See William K. Jones, *Origins of the Certificate of Public Convenience and Necessity: Developments in the States, 1870 - 1920*, 79 COLUM. L. REV. 426, 427 (1979) (“Among the powers frequently exercised

Public utility regulation differs from the oversight of other sectors. First, public utilities are “generally shielded from competition,” with prospective new entrants requiring regulatory approval.⁵⁵ Second, to offset the utilities’ potential power to charge supranatural rents, “regulators set the rates utilities are permitted to charge their customers.”⁵⁶ This approach is broadly intended to provide customers protection from excessive prices while ensuring sufficient investor incentives to supply capital.⁵⁷ However, as discussed in Section II.B., certain U.S. infrastructure financing instruments appear incongruent to this model due to commonly-included provisions allowing rate increases without regulatory oversight.⁵⁸

c. Externalities & Market Disequilibrium

Infrastructure generates “externalities,” or second-order effects on individuals not party to the underlying activity or transaction,⁵⁹ including positive “spill-over” externalities as well as the ability to reduce negative externalities.⁶⁰

Because of this, thoughtful and disciplined infrastructure investment can often be a productive use of capital. For instance, a large-scale 3,000-paper meta study found an average cumulative 1.5x “multiplier effect”⁶¹ across

by agencies regulating public service companies is control over the entry of new companies and the expansion of existing ones. In most cases, entry and expansion may not be undertaken without a certificate of public convenience and necessity.”).

55. Kovvali & Macey, *supra* note 41, at 582–83.

56. *Id.* at 583.

57. For instance, for many electric utilities, regulators set a statutory rate of return, calculated from a so-termed “rate base” which reflects the aggregation of utility capital investments. *See, e.g., Rate of Return (ROR) (Actual and Authorized)*, CAL. PUB. UTILS. COMM’N, <https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-costs/historical-electric-cost-data/rate-of-return> [<https://perma.cc/DZX7-9QEB>].

58. For a discussion on the impacts of the Jackson, Mississippi, rate covenant violation and statutorily mandated rate increase, see *infra* Section III.B.1.

59. FRISCHMANN, *supra* note 34, at 37–38; *see also* R.H. Coase, *The Problem of Social Cost*, 56 J.L. & ECON. 837, 837–38 (2013).

60. FRISCHMANN, *supra* note 34, at 37–38; *see also* The Economic Lowdown Podcast Series, *Externalities*, FED. RSRV. BANK OF ST. LOUIS, at 0:55, <https://www.stlouisfed.org/education/economic-lowdown-podcast-series/episode-11-externalities> [<https://perma.cc/SCU7-2RYW>] (“[S]ometimes, costs or benefits may *spill over* to a third party not directly involved in the transaction. These spillover costs and benefits are called externalities.” (emphasis added)).

61. A multiplier effect refers to gains in total output greater than the change in spending that caused it; in other words, it reflects societally productive returns on capital. *See* Christine Smith, *Meet the Multiplier Effect*, FED. RSRV. BANK OF ST. LOUIS (Feb. 12, 2020), <https://www.stlouisfed.org/open-vault/2020/february/meet-multiplier-effect> [<https://perma.cc/BN8Z-C7RC>]. A 2022 World Bank report and literature review also found a roughly 1.5x multiplier. Vivien Foster, Maria Vagliasindi & Nisan Gorgulu, *The Effectiveness of Infrastructure Investment as a Fiscal Stimulus: What We’ve Learned*, WORLD BANK BLOGS: GETTING INFRASTRUCTURE FIN. RIGHT (Feb. 2, 2022), <https://blogs.worldbank.org/ppps/effectiveness-infrastructure-investment-fiscal-stimulus-what-weve-learned> [<https://perma.cc/PZT5-M3JV>].

infrastructure capital spending,⁶² while other research indicates even better results for targeted investments, including a 3x multiplier for transportation infrastructure.⁶³ Some economists have argued that reduced public infrastructure expenditures have contributed to declining U.S. productivity growth in the 1970s and 1980s, relative to the brisk post–World War II period.⁶⁴

Infrastructure’s capacity to reduce negative externalities is equally important. For instance, driving produces negative externalities through congestion, noise, and pollution, with the transportation sector accounting for 36% of U.S. emissions.⁶⁵ Infrastructure, including public transit, can provide a viable lower-emission substitute, mitigating negative externalities and enhancing the aggregate welfare.⁶⁶

The presence of these broad-based externalities suggests that the private sector will tend to undersupply infrastructure (as it is agnostic toward externalities it cannot capture), supporting government engagement.⁶⁷ Yet, the

62. *Fiscal Multiplier Effect of Infrastructure Investment*, GLOB. INFRASTRUCTURE HUB (Dec. 14, 2020), <https://www.github.org/infrastructure-monitor/insights/fiscal-multiplier-effect-of-infrastructure-investment/> [<https://perma.cc/VAD2-6XE2>] (finding an average two-to-five-year cumulative multiplier of 1.5x, and 1.6x in recessionary environments, compared to 1.0x and 1.4x for public spending as a whole).

63. JEFFREY WERLING & RONALD HORST, NAT’L ASS’N OF MFRS., *CATCHING UP: GREATER FOCUS NEEDED TO ACHIEVE A MORE COMPETITIVE INFRASTRUCTURE* 45 (2014), <https://www.ourenergypolicy.org/wp-content/uploads/2015/06/Infrastructure-Full-Report-2014.pdf> [<https://perma.cc/P9TZ-5EDC>].

64. See Aschauer, *Why Is Infrastructure Important?*, *supra* note 31, at 31–39. Professor Aschauer attributes a significant portion of the 1970s and 80s productivity slowdown to reduced infrastructure investment. David Alan Aschauer, *Is Public Expenditure Productive?*, 23 J. MONETARY ECON. 177, 194–195 (1989) (“After averaging 2.0% during the two decades from 1950 to 1970, the annual growth rate of total factor productivity in the private business economy slumped to .8% per year during the period 1971 to 1985. . . . The results of this paper suggest the importance of considering public capital expenditures in attempting to explain the productivity decline.”); Alicia H. Munnell, *Why Has Productivity Growth Declined?*, NEW ENG. ECON. REV., Jan.–Feb. 1990, at 4 (“[Professor Aschauer’s] results . . . suggest that the decline in labor productivity and multifactor productivity in the 1970s may be attributable in very considerable part to the near cessation of investment in public infrastructure.”); DAVID ALAN ASCHAUER, *PUBLIC INVESTMENT AND PRIVATE SECTOR GROWTH: THE ECONOMIC BENEFITS OF REDUCING AMERICA’S ‘THIRD DEFICIT’* 14 (1991); Charles R. Hulten & Robert M. Schwab, *A Fiscal Federalism Approach to Infrastructure Policy*, 27 REG’L SCI. & URB. ECON. 139, 144–45 (1997) (summarizing Professor Aschauer’s argument that a lack of infrastructure investment has historically been a contributing factor to poor economic performance).

65. Brett Marohl, *In 2020, the United States Produced the Least CO2 Emissions from Energy in Nearly 40 Years*, U.S. ENERGY INFO. ADMIN. (July 26, 2021), <https://www.eia.gov/todayinenergy/detail.php?id=48856> [<https://perma.cc/TH9L-49A2>].

66. See Hannah Ritchie, *Which Form of Transport Has the Smallest Carbon Footprint?*, OUR WORLD IN DATA, <https://ourworldindata.org/travel-carbon-footprint> [<https://perma.cc/S8EM-H2CH>] (last updated Aug. 30, 2023).

67. Buttonwood, *Are Big Infrastructure Projects Castles in the Air or Bridges to Nowhere?*, ECONOMIST (Jan. 16, 2017), <https://www.economist.com/buttonwoods-notebook/2017/01/16/are-big-infrastructure-projects-castles-in-the-air-or-bridges-to-nowhere> [<https://perma.cc/LB46-Q4L4>] (staff-

public sector seemingly also falls short, with the aforementioned infrastructure funding gap suggesting pervasive and problematic disequilibria in the “market” for infrastructure development.⁶⁸

These failures have real world implications. Transit systems from Boston to Chicago and San Francisco face unsustainable debt burdens.⁶⁹ Our electric grid is “increasingly unreliable.”⁷⁰ Flint’s water poisoned a generation of children.⁷¹ As the full costs of climate change are internalized, the importance of infrastructure will only grow—as will the costs of our prevailing disequilibrium, and the failure to act.⁷²

B. *Climate Change & Infrastructure*

While America’s infrastructure challenges are well documented, the interplay between infrastructure and climate change is only beginning to be fully appreciated.⁷³ This dynamic, as discussed in Part III, is compounded by

uploaded, dark archive)] (“[I]nfrastructure can have positive externalities that are not captured by investors but will benefit society (the building of the internet or America’s interstate highway system, for example).”).

68. One way of thinking about this is that there is, at least theoretically, a societally optimal level of infrastructure investment where, in broad strokes, the demand for infrastructure meets the supply of capital investment. The existence, persistence, and scale of the U.S. infrastructure investment gap suggest a lack of equilibrium in this particular market. See *Investment Forecasts for United States*, *supra* note 4.

69. See Lev E. Breydo, *Infrastructure Finance for the Public Good: Federalism, Asset Recycling & Untangling the New York MTA’s \$50 Billion Debt Load*, J.L. & MOBILITY (forthcoming) (manuscript at 40) [hereinafter Breydo, *Infrastructure Finance*] (on file with the North Carolina Law Review); KPMG LLP, MASSACHUSETTS BAY TRANSPORTATION AUTHORITY, FINANCIAL STATEMENTS AND REQUIRED SUPPLEMENTARY INFORMATION 8–9 (2021); CROWE LLP, CHICAGO TRANSIT AUTHORITY, FINANCIAL STATEMENTS AND SUPPLEMENTARY INFORMATION 19 (2020); WASH. METRO. AREA TRANSIT AUTH., COMPREHENSIVE ANNUAL FINANCIAL REPORT 17 (2021).

70. Katherine Blunt, *America’s Power Grid Is Increasingly Unreliable*, WALL ST. J. (Feb. 18, 2022, 10:06 AM), <https://www.wsj.com/articles/americas-power-grid-is-increasingly-unreliable-11645196772> [<https://perma.cc/U8ED-CNSZ> (staff-uploaded, dark archive)].

71. Melissa Denchak, *Flint Water Crisis: Everything You Need To Know*, NRDC (Nov. 8, 2018), <https://www.nrdc.org/stories/flint-water-crisis-everything-you-need-know> [<https://perma.cc/UB8C-AKVX>] (“In Flint, nearly 9,000 children were supplied lead-contaminated water for 18 months.”).

72. Lola Woetzel, Dickon Pinner, Hamid Samandari, Hauke Engel, Mekala Krishnan, Brodie Boland, Peter Cooper & Byron Ruby, *Will Infrastructure Bend or Break Under Climate Stress?*, MCKINSEY SUSTAINABILITY (Aug. 19, 2020), <https://www.mckinsey.com/business-functions/sustainability/our-insights/will-infrastructure-bend-or-break-under-climate-stress> [<https://perma.cc/3J2C-BXDG>] (noting that infrastructure is essential to climate change mitigation and will “bear the brunt” of adaptation costs); MCKINSEY GLOB. INST., *THE NET-ZERO TRANSITION*, at viii (2022), <https://www.mckinsey.com/capabilities/sustainability/our-insights/the-net-zero-transition-what-it-would-cost-what-it-could-bring> [<https://perma.cc/8NBJ-GCAE>] (click “Download the full report”) (estimating global annual cost of \$9.2 trillion to achieve net-zero transition).

73. AM. SOC’Y OF CIV. ENG’RS, *supra* note 4, at 8 (estimating a \$2.6 trillion investment gap); *Investment Forecasts for United States*, *supra* note 4 (estimating a \$3.8 trillion U.S. investment gap in 2021).

America's history of environmental racism, resulting in highly disparate day-to-day impacts from a global threat, with "minorities . . . most likely to currently live in areas where the [Environmental Protection Agency's] analyses project the highest levels of climate change impacts."⁷⁴

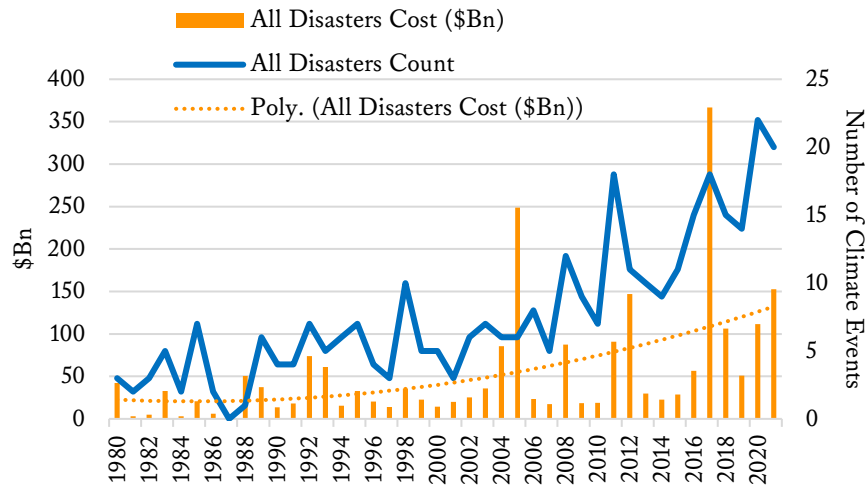
Infrastructure has a layered relationship with climate change through both (i) its high direct exposure to climate risk and (ii) its role in climate mitigation and adaptation.

As a threshold matter, infrastructure is physically on the front line of accelerating climate dangers, which our stock of 1950s- and 60s-vintage assets appears exceptionally ill-suited to handle.⁷⁵ Figure 3 below, based on National Center for Environmental Information data, shows that the frequency and destructiveness of large-scale climate disasters has increased more than fourfold between the 1980s and 2010s.⁷⁶ While the 1980s averaged 3.1 climate events a year, with average annual costs of \$20.2 billion, by the 2010s these figures rose to an average of 12.8 climate events at a cost of \$91.9 billion. The trend is only worsening, with 2020 and 2021 averaging a shocking 21 events at a cost of \$132.1 billion.

74. The EPA's analysis focuses on five particular minority groups, which the EPA defines as "[i]ndividuals identifying as Black or African American; American Indian or Alaska Native; Asian; Native Hawaiian or Other Pacific Islander; and/or Hispanic or Latino." EPA, *supra* note 23, at 4–6.

75. IPCC, SUMMARY FOR POLICYMAKERS 15 (2022); *see* AM. SOC'Y OF CIV. ENG'RS, *supra* note 4, *passim*.

76. The data set shows aggregate costs and does not enumerate infrastructure-specific damages. However, the trend of large-scale climate events becoming more frequent and destructive appears unambiguous, with increasing damage to infrastructure not difficult to infer. *See United States Billion Dollar Climate Disasters*, NAT'L CTR. FOR ENV'T INFO., <https://www.ncei.noaa.gov/access/billions/time-series> [<https://perma.cc/93G6-4GAD>] (last updated Feb. 14, 2024, 11:00AM).

Figure 3: U.S. Major Climate Events, 1980–2021⁷⁷Table 1: U.S. Major Climate Disasters, Summary by Decade⁷⁸

Time Period	Annual Averages	
	Event Count	Event Cost (\$Bn)
1980–89	3.1	20.2
1990–99	5.5	30.8
2000–09	6.9	57.6
2010–19	12.8	91.9
2020–21	21.0	132.1

Beyond the data, these shifts are evident through headline-grabbing climate disasters across the United States,⁷⁹ as ferocious storms have flooded New York’s subways,⁸⁰ devastated Puerto Rico’s electric grid and left Jackson,

77. Data sourced from the National Centers for Environmental Information for events with reported damage exceeding \$1 billion. See *Data Access*, NAT’L CTRS. FOR ENV’T INFO., <https://www.ncei.noaa.gov/access/search/index> [<https://perma.cc/78BT-LUSX>].

78. *Id.*

79. While the data reflects damage beyond just infrastructure, the prevalence of harms appears not difficult to infer.

80. CITY OF N.Y., A STRONGER, MORE RESILIENT NEW YORK 13 (2013); see also Winnie Hu & Anne Barnard, *Why the New York Subway Has a Water Problem*, N.Y. TIMES (July 9, 2021), <https://www.nytimes.com/2021/07/09/nyregion/nyc-subway-flooding-climate-change.html> [<https://perma.cc/CY9Q-FNMY> (staff-uploaded, dark archive)].

Mississippi, without water for months.⁸¹ Changing weather patterns have exacerbated California wildfires—bankrupting the state’s largest electric utility⁸²—while cold snaps decimated the Texas power grid, leaving hundreds dead from exposure.⁸³ Rising water levels increasingly menace coastal and inland communities from Miami and the Boston seaport to Chicago.⁸⁴

Infrastructure is also key for climate change mitigation and adaptation.⁸⁵ For instance, electric grid decarbonization through renewables and storage can mitigate emissions from coal and natural gas,⁸⁶ while enhanced public transportation can offer viable alternatives to driving, which remains dependent on emissions-heavy petroleum.⁸⁷ Climate change adaptation, meanwhile, refers to adjustment strategies, including asset retrofitting and development of so-

81. See *infra* Section III.B.

82. Steven Mufson, *Inside a California Utility: Mandatory Blackouts amid Wildfire Threats and Bankruptcy*, WASH. POST (Dec 21, 2019, 8:19 PM), https://www.washingtonpost.com/climate-environment/inside-pgandes-choices-blackouts-and-the-threat-of-wildfires/2019/12/21/868d58e8-107c-11ea-9cd7-a1becbc82f5e_story.html [<https://perma.cc/3W9N-7BYP> (dark archive)].

83. Christine Hauser & Edgar Sandoval, *Death Toll from Texas Winter Storm Continues To Rise*, N.Y. TIMES (July 14, 2021), <https://www.nytimes.com/2021/07/14/us/texas-winter-storm-deaths.html> [<https://perma.cc/6H8L-XTLH> (staff-uploaded, dark archive)].

84. Craig Pittman, Guest Essay, *Hurricane Ian Proved Why Ron Desantis’s Version of Climate Resilience Is a Disaster*, N.Y. TIMES (Oct. 13, 2022), <https://www.nytimes.com/2022/10/13/opinion/environment/ron-desantis-hurricane-ian-climate-change.html> [<https://perma.cc/7VYN-KCTM> (staff-uploaded, dark archive)]; Christopher Flavelle & Patricia Mazzei, *Miami Says It Can Adapt to Rising Seas. Not Everyone Is Convinced.*, N.Y. TIMES (Mar. 2, 2021), <https://www.nytimes.com/2021/03/02/climate/miami-sea-level-rise.html> [<http://perma.cc/ZB5A-LRFY> (staff-uploaded, dark archive)]; Prashant Gopal & Brian K. Sullivan, *Boston Built a New Waterfront Just in Time for the Apocalypse*, BLOOMBERG (June 18, 2019, 5:00 AM), <https://www.bloomberg.com/news/articles/2019-06-18/boston-built-a-new-waterfront-just-in-time-for-the-apocalypse> [<https://perma.cc/C2D3-FQAL> (staff-uploaded, dark archive)]; Dan Egan, *The Climate Crisis Haunts Chicago’s Future: A Battle Between a Great City and a Great Lake*, N.Y. TIMES (July 7 2021), <https://www.nytimes.com/interactive/2021/07/07/climate/chicago-river-lake-michigan.html> [<https://perma.cc/ZG3Q-S8KP> (staff-uploaded, dark archive)].

85. Mitigation refers to efforts aimed at reducing rates of climate change through initiatives such as the Paris Accords. Paris Agreement art. 2, *adopted* Dec. 12, 2015, T.I.A.S. No. 16-1104, 3156 U.N.T.S. 54113; see also U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE, REPORT OF THE CONFERENCE OF THE PARTIES ON ITS TWENTY-FIRST SESSION ADDENDUM 1, at 15 (2013) (“[The Conference] [r]esolves to ensure the highest possible mitigation efforts in the pre-2020 period.”); *Key Aspects of the Paris Agreement*, U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE, <https://unfccc.int/most-requested/key-aspects-of-the-paris-agreement> [<https://perma.cc/V6HE-U379>] (“Developed countries should continue to take the lead by undertaking absolute economy-wide reduction targets, while developing countries should continue enhancing their mitigation efforts.”).

86. *Beyond Batteries: Decarbonisation of Electric Grids Reliant on Renewables Requires Long-Duration Energy Storage*, ECONOMIST TECH. Q., June 25, 2022, at 6, 6.

87. See *supra* notes 65–66 and accompanying text (detailing emissions footprints of different modes of transportation).

termed resilient infrastructure,⁸⁸ which researchers view as critical to managing climate change day-to-day.⁸⁹

II. WHY THE UNITED STATES STRUGGLES WITH INFRASTRUCTURE

The often-fraught history of American infrastructure provision reflects a perpetual tug-of-war between federal, state, and local governments, as well as private interests dating back to the very founding of the republic.⁹⁰ The issues are in focus today due to the sheer scale of deficiencies, accelerating climate change, and a growing understanding of the system's inequities.

Though a function of myriad factors, present-day challenges are exacerbated by certain distinctively American features, including a federalist allocation of infrastructure responsibility to the states and their subsequent sub-delegation to local governments. Under the guise of autonomy, this has the peculiar effect of leaving the typically least-equipped units of government to manage the brunt of global climate issues.

U.S. infrastructure finance evolved to support this policy model by developing unique instruments, including so-called "revenue bonds." Contrary to common perception as simple and innocuous, infrastructure revenue bonds are complex securities that provide investors vastly underappreciated control over municipal operations,⁹¹ including the ability to indirectly raise rates and divert capital investments.⁹²

Part II details the United States' approach to infrastructure, including the legal and historical context as well as key features of the U.S. infrastructure funding model and municipal market dynamics, focusing on revenue bonds' legal protections and unique levers for creditor control.

88. Woetzel et al., *supra* note 72, at 23.

89. OECD, BUILDING RESILIENCE: NEW STRATEGIES FOR STRENGTHENING INFRASTRUCTURE RESILIENCE AND MAINTENANCE 2, 24 (2021), <https://www.oecd-ilibrary.org/docserver/354aa2aa-en.pdf> [<https://perma.cc/3GUF-9GYV> (staff-uploaded archive)]; CAROLINE EVANS, BRUNO GODART, JÜRGEN KRIEGER, JEAN-BERNARD KOVARIK, MARC MIMRAM & FABIEN PALHOL, BUILDING RESILIENT INFRASTRUCTURE SYSTEMS 2, 6–7 (2019), <https://www.global-solutions-initiative.org/wp-content/uploads/2022/11/t20-japan-tf4-5-building-resilient-infrastructure-systems-2.pdf> [<https://perma.cc/GK8E-XYHB>].

90. Susan Nagel, *A Conflict Among the Founders Is Still Shaping Infrastructure Debates in 2021*, WASH. POST (Aug. 30, 2021, 6:00 AM), <https://www.washingtonpost.com/outlook/2021/08/30/conflict-among-founders-is-still-shaping-infrastructure-debates-2021/> [<https://perma.cc/G3J9-WCAT> (dark archive)] (discussing Alexander Hamilton and James Madison's ultimately failed efforts during the Philadelphia Convention "to explicitly grant the power to develop canal systems to the federal government (instead of privately owned companies) in the Constitution").

91. For discussion regarding the governance and control aspects of debt, see generally Tomer S. Stein, *Debt as Corporate Governance*, 74 HASTINGS L.J. 1281 (2023).

92. See *infra* Section II.B.2.

A. *Federalism & Infrastructure Policy*

Infrastructure provision is notoriously difficult. Between financial, political, and operational complexities, projects are difficult to start and often even harder to complete.⁹³ Reflecting these hurdles, the history of U.S. infrastructure development displays a dissonance underscored by “[t]wo sets of broad and at times conflicting ideas”⁹⁴: maximizing “economic development and individual economic opportunity,”⁹⁵ tempered by “broad fears of irresponsible accumulations of either political or economic power.”⁹⁶

Over time, the allocation of responsibility for infrastructure has ebbed, flowed, and evolved as between different levels of government and at times also the private sector.⁹⁷ In recent decades, however, any equilibrium appears to have fully broken, with the federal government largely out of the infrastructure business and the private sector ill-positioned to make up the difference. Given the sorry state of U.S. infrastructure and accelerating impacts of climate change, the timing could not be worse.

1. Constitutional Context

Federalism is at the heart of contemporary U.S. infrastructure policy, with many associated issues implicating allocations of power between levels of government, complicated by an oftentimes uneasy relationship with private capital.⁹⁸

93. Though often used interchangeably, “funding” and “financing” have distinct meanings in the infrastructure context. Financing refers to the party providing capital and owning risk, whereas funding refers to how infrastructure will be paid for. INT’L BANK FOR RECONSTRUCTION & DEV. & WORLD BANK, PUBLIC-PRIVATE PARTNERSHIPS REFERENCE GUIDE 18–21 (3d ed. 2017), <https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/documents/PPP%20Reference%20Guide%20Version%203.pdf> [https://perma.cc/K3R7-JM2G]; RICHARD ABADIE, PWC INFRA TRENDS, THE GLOBAL FORCES SHAPING THE FUTURE OF INFRASTRUCTURE 11 (2020), <https://www.pwc.com/gx/en/capital-projects-infrastructure/pdf/global-infrastructure-trends.pdf> [https://perma.cc/2TK8-UK46].

94. Charles D. Jacobson & Joel A. Tarr, *Ownership and Financing of Infrastructure: Historical Perspectives* 4 (World Bank, Off. of the Vice President, Dev. Econ., Pol’y Rsch. Working Paper No. 1466, 1995).

95. *Id.*

96. *Id.* See generally CHARLES W. CALOMIRIS & STEPHEN H. HABER, FRAGILE BY DESIGN: THE POLITICAL ORIGINS OF BANKING CRISES & SCARCE CREDIT 153–202 (2014) (discussing historical concerns about concentrations of power as a reason for relative industry and regulatory fragmentation in the U.S. banking sector).

97. During earlier periods of more limited federal support, the private sector was more active, particularly with respect to transportation infrastructure. Part of the challenge may also reflect normative uncertainties regarding the appropriate economic paradigm for infrastructure. See *supra* Section I.A.

98. See Gribbin, *supra* note 14 (“Unlike many countries, most infrastructure in the U.S. is owned at the state and local level.”).

America's constitutional construct is broadly predicated on individual states as "dual" sovereigns alongside the federal government,⁹⁹ with powers not granted to the federal government generally reserved for the state level.¹⁰⁰ Infrastructure always fit uneasily into this framework given the interstate nature of its economic impacts and externalities. Indeed, debate regarding the proper balance between federal, state, local, and private interests in respect of infrastructure provision dates back to the very founding of the republic.¹⁰¹ Reflecting an uneasy Constitutional Convention compromise, while the federal government has clear authority to provide for the national defense and regulate interstate commerce, it lacks "a clearly defined constitutional role" or "explicit [funding] authority" with respect to infrastructure.¹⁰²

The effects of this equivocation have been felt ever since. Grappling with questions not dissimilar from those facing President Biden today, President Monroe was initially apprehensive regarding federal authority to fund a national transportation system he otherwise supported.¹⁰³ Ultimately, Monroe settled on a broader interpretation of Article I, which paved the way for perhaps the first federal infrastructure program.¹⁰⁴

The evolution of U.S. federalism has had significant implications for infrastructure policy.¹⁰⁵ Of particular importance was the New Deal and subsequent era of "cooperative federalism,"¹⁰⁶ which embraced a significant

99. In some other jurisdictions, the construct is closer to administrative units under a single sovereign. *See, e.g.*, Jesse Burkhead, *Federalism in a Unitary State: Regional Economic Planning in England*, PUBLIUS, Spring 1974, at 39, 43 (discussing how in a unitary system like England the lack of residual powers at local levels results in strong central control). Others, like Australia, incorporate a model more comparable to the United States. *See infra* note 321 and accompanying text.

100. Though not entirely unique to the United States, the American construct is perhaps more pronounced. *See* U.S. CONST. amend. X ("The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people."). Interpretation regarding the scope of the Tenth Amendment has colored much of the evolution of U.S. federalism. *See* KEVIN J. HICKEY, BRYAN L. ADKINS, WHITNEY K. NOVAK & JAY B. SYKES, CONG. RSCH. SERV., R45323, FEDERALISM-BASED LIMITATIONS ON CONGRESSIONAL POWER: AN OVERVIEW 26–32 (2023).

101. Nagel, *supra* note 90.

102. *Id.*

103. Daniel Preston, *James Monroe: Domestic Affairs*, UNIV. VA. MILLER CTR., <https://millercenter.org/president/monroe/domestic-affairs> [<https://perma.cc/D4M7-WCFY>].

104. Nagel, *supra* note 90 ("Monroe effectively declared that interstate connectivity was essential to interstate commerce and defense. That gave Congress the power to fund it because Article 1, Section 8 included a clause granting the legislature the authority to enforce the rest of the section.").

105. While "federalism" is often referenced as a system "that favors states," in reality it is better characterized as a "continuum defined by . . . poles" of exclusive domain. *See* Robert L. Fischman, *Cooperative Federalism and Natural Resources Law*, 14 N.Y.U. ENV'T L.J. 179, 183 (2005).

106. John Joseph Wallis & Wallace E. Oates, *The Impact of the New Deal on American Federalism*, in *THE DEFINING MOMENT: THE GREAT DEPRESSION AND THE AMERICAN ECONOMY IN THE TWENTIETH CENTURY* 156 (Michael D. Bordo, Claudia Goldin & Eugene N. White eds., 1998).

federal role, including “large-scale comprehensive government planning.”¹⁰⁷ The paradigm continued after World War II: “For the first time, the federal government sought to plan on a national level” through vast projects including hydroelectric dams and the interstate highway system.¹⁰⁸

Yet, despite aggregate benefits, many New Deal projects unfortunately also reflected aspects of environmental racism,¹⁰⁹ creating burdens that “fell disproportionately on marginalized communities.”¹¹⁰ By the Reagan years, the United States transitioned to a “new federalism” model predicated on greater state-level control and responsibility.¹¹¹ The states, however, often lacked infrastructure-scale financial resources, requiring the development of new financing tools, including municipal revenue bonds.¹¹² Though an important innovation at the time, as discussed below, revenue bonds’ innate inflexibility makes them increasingly less-suited to fast-evolving twenty-first century infrastructure needs.¹¹³

2. Local Government Subdelegation

While under the contemporary federalist division of labor, individual states are formally responsible for most social¹¹⁴ and economic infrastructure,¹¹⁵

107. Jonathan English, *How U.S. Infrastructure Plans Shrank in Ambition*, BLOOMBERG (Jan. 11, 2022, 11:49 AM), <https://www.bloomberg.com/news/articles/2022-01-11/today-s-american-infrastructure-spending-is-no-new-deal> [<https://perma.cc/EU2K-656N> (staff-uploaded, dark archive)].

108. *Id.*; see also Federal-Aid Highway Act of 1956, ch. 462, 70 Stat. 374 (codified as amended in scattered sections of 23 U.S.C.).

109. Benjamin Chavis coined the term “environmental racism,” a form of systematic racism, which he defined as “racial discrimination in environmental policymaking and the enforcement of regulations and laws, the deliberate targeting of communities of color for toxic waste facilities, the official sanctioning of the life-threatening presence of poisons and pollutants in our communities.” See Tseming Yang, *Melding Civil Rights and Environmentalism: Finding Environmental Justice’s Place in Environmental Regulation*, 26 HARV. ENV’T L. REV. 1, 7 n.22 (2002).

110. English, *supra* note 107.

111. Robert Pear, *Reagan Modifies ‘New Federalism’ Plan*, N.Y. TIMES, Jan. 26, 1983, at A17, <https://www.nytimes.com/1983/01/26/us/reagan-modifies-new-federalism-plan.html> [<https://perma.cc/B5RW-2Y52> (staff-uploaded archive)]; see also Bruce Katz, *Nixon’s New Federalism 45 Years Later*, BROOKINGS INST. (Aug. 11, 2014), <https://www.brookings.edu/articles/nixons-new-federalism-45-years-later/> [<https://perma.cc/R99B-M29H>].

112. See *infra* Section II.B.2.

113. See *infra* Section II.B.

114. This includes police, education, and healthcare. Charles M. Tiebout, *A Pure Theory of Local Expenditures*, 64 J. POL. ECON. 416, 418 (1956) (observing: “Musgrave and Samuelson implicitly assume that expenditures are handled at the central government level. However, the provision of such governmental services as police and fire protection, education, hospitals, and courts does not necessarily involve federal activity. Many of these goods are provided by local governments.”).

115. This is in part facilitated by state control over land use and property laws critical for physical asset development. See U.S. GOV’T ACCOUNTABILITY OFF., GAO-08-44, HIGHWAY PUBLIC-PRIVATE PARTNERSHIPS: MORE RIGOROUS UP-FRONT ANALYSIS COULD BETTER SECURE

as a practical matter, within states the task is typically subdelegated to cities and local governments.¹¹⁶ Particularly in recent decades, declines in federal support and “less predictable” state funding¹¹⁷ have led local governments¹¹⁸ to assume ever-greater fiscal and operational control. Because of this, “[a]s we move further into the twenty-first century, our infrastructure needs will be increasingly defined by our 89,004 local governments, not by one federal government.”¹¹⁹ However, this transition toward a localized model “has not been sufficiently matched with funding or decision making authority.”¹²⁰

In the aggregate, state and local governments own 87% of all infrastructure—including 98% of highways and streets, as well as nearly all sewer and water systems—and are responsible for over 75% of infrastructure spending, as shown in Figure 4 below based on CBO data.¹²¹ Other types of infrastructure, such as electric systems, have more private sector involvement but are typically regulated at the state level with some overlapping federal jurisdiction.¹²²

POTENTIAL BENEFITS AND PROTECT THE PUBLIC INTEREST 12 (2008) (noting the state’s responsibility to maintain highways); *see also* Joseph F. Zimmerman, *National-State Relations: Cooperative Federalism in the Twentieth Century*, 31 PUBLIUS, Spring 2001, at 15, 23 (“States have been stripped of their powers to engage in economic regulation of airlines, bus, and trucking companies.”); James R. Alexander, *State Sovereignty in the Federal System: Constitutional Protections Under the Tenth and Eleventh Amendments*, 16 PUBLIUS, Spring 1986, at 1, 7.

116. Smaller municipal issues often use specially created public corporations as financing vehicles for infrastructure and other capital investment projects. Significant infrastructure assets are formally owned at the county levels, including 38% of bridges. *See Legislative Analysis for Counties: The Bipartisan Infrastructure Law*, NAT’L ASSOC. CNTYS. (Mar. 4, 2022), <https://www.naco.org/resources/legislative-analysis-counties-bipartisan-infrastructure-law> [<https://perma.cc/2RLH-7CQK>] [hereinafter *Legislative Analysis for Counties*].

117. NICOLE DUPUIS & CHRISTIANA K. MCFARLAND, NAT’L LEAGUE OF CITIES, PAYING FOR LOCAL INFRASTRUCTURE IN A NEW ERA OF FEDERALISM: A STATE-BY-STATE ANALYSIS 3–7 (2016), https://www.nlc.org/wp-content/uploads/2016/12/NLC_2016_Infrastructure_Report.pdf [<https://perma.cc/7RCK-AYJG>].

118. *Legislative Analysis for Counties*, *supra* note 116.

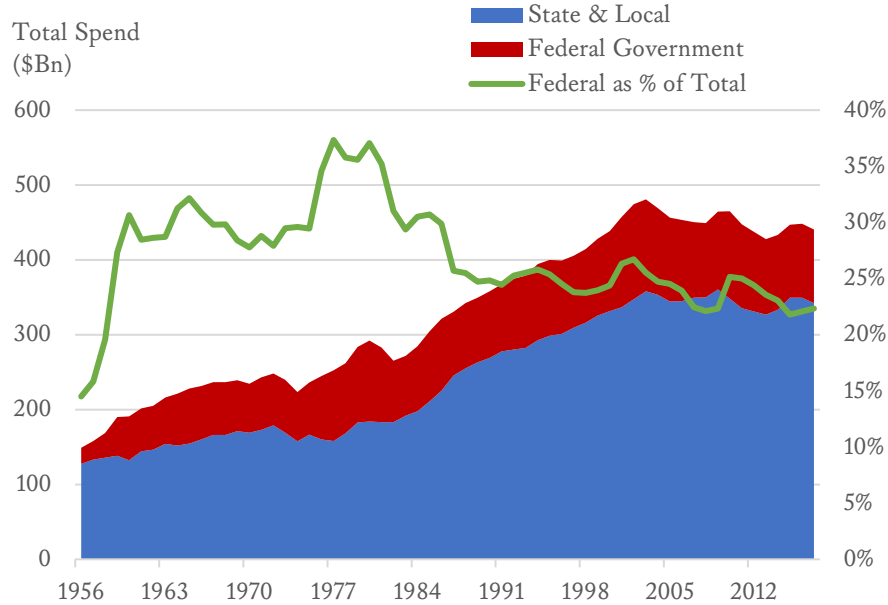
119. Gribbin, *supra* note 14.

120. DUPUIS & MCFARLAND, *supra* note 117, at 3.

121. Chris Edwards, *Who Owns U.S. Infrastructure?*, CATO INST. (2017), <https://www.cato.org/tax-budget-bulletin/who-owns-us-infrastructure> [<https://perma.cc/Q2ZZ-7TAP>]; *see infra* Figure 4.

122. FED. ENERGY REGUL. COMM’N, DEP’T OF ENERGY, STAFF REPORT TO THE FEDERAL ENERGY REGULATORY COMMISSION ON WESTERN MARKETS AND THE CAUSES OF THE SUMMER 2000 PRICE ABNORMALITIES 4-1 to -12 (describing overlapping state and federal regulatory regimes); Travis Miller, *PG&E: Regulatory Proposals Suggest Constructive Outcome to 2023 Rate Review*, MORNINGSTAR (Oct. 17, 2023), <https://www.morningstar.com/stocks/pge-regulatory-proposals-suggest-constructive-outcome-2023-rate-review> [<https://perma.cc/8VFY-H2HA>] (discussing investor ownership and implications of regulatory decisions); *see also supra* Section I.A.1.

**Figure 4: Water and Transportation Infrastructure Spending
Allocation: Federal vs. State & Local Governments¹²³**



This localized model reflects certain advantages often attributed to federalism, including a Brandeisian “laboratories of democracy” ethos with potential to facilitate experimentation and innovation in critical service provision.¹²⁴ One substantive strength is the general alignment of end users with decision-making, as asset-level control within the political structure allows for a level of citizen-ratepayer ballot box oversight. Practical proximity may also be helpful to understanding on-the-ground problems and developing realistic solutions.

At the same time, given past injustices, for many historically marginalized communities, like Jackson and Puerto Rico, there is deep apprehension regarding surrendering local control.¹²⁵ Reflecting that history, the NAACP has

123. Public Spending on Transportation and Water Infrastructure, 1956 to 2017, CONG. BUDGET OFF. (Oct. 15, 2018), <https://www.cbo.gov/publication/54539> [<https://perma.cc/Y6AT-YRRQ>]; Data Underlying Figures, CONG. BUDGET OFF. (Oct. 15, 2018), https://www.cbo.gov/system/files/2018-10/54539-Data_Underlying_Figures_0.xlsx [<https://perma.cc/HLB9-U4FH>]; Supplemental Tables, CONG. BUDGET OFF. (Oct. 15, 2018), https://www.cbo.gov/system/files/2018-10/54539-Supplemental_Tables.xlsx [<https://perma.cc/ALP8-3AMH>]. Federal spending includes direct outlays and grants provided to states.

124. *New State Ice Co. v. Liebmann*, 285 U.S. 262, 311 (1932) (Brandeis, J., dissenting).

125. See *infra* Part III.

argued against “a state takeover of [Jackson’s] water system”—a sentiment widely shared among Puerto Rico community groups.¹²⁶

Yet, localized responsibility also has significant drawbacks. As a threshold matter, local governments are often ill-equipped to provide requisite expertise or sufficient capital for highly complex, large-scale projects.¹²⁷ For developed projects, infrastructure costs are primarily funded through user payments, such as water or electric bills, with secondary support through tax-based subsidies.¹²⁸ This means that critical resources are paid for by residents of highly circumscribed geographic areas. Tax-based support, meanwhile, is subject to state-specific heterogeneity as well as potential politicization, which can result in jurisdictional frictions, particularly in areas where legacy issues permeate dynamics between different levels of government.¹²⁹ As a result, this allocative model can perpetuate historical injustices, in some respects paralleling concerns around inequities from property tax-based public school funding.¹³⁰ Further, the “hyperlocal” allocation of responsibility irrespective of financial means often creates a financial mismatch that local governments must bridge through complex capital market instruments.

B. *U.S. Infrastructure Financing Model*

Divisions of labor between federal, state, and local governments directly impact how the United States develops, finances, and funds infrastructure. At

126. *Jackson Water Crisis*, NAACP, <https://naacp.org/campaigns/jackson-water-crisis> [<https://perma.cc/J4VZ-ZGRY>]; Jose Anazagasty-Rodriguez, *Colonial Waterscapes: The Water Issue in Puerto Rico*, BROOKLYN RAIL, https://brooklynrail.org/special/River_Rail_Puerto_Rico/river-rail/Colonial-Waterscapes-The-Water-Issue-in-Puerto-Rico [<https://perma.cc/XU4Z-MU35>].

127. *See infra* Section III.B.

128. Such subsidies are typically downstreamed from another level of government. For instance, New York City helps support the Metropolitan Transportation Authority through allocations of certain city-specific taxes. This is also compounded by the so-called suburban flight problem, which allows individuals to derive their wealth from a city by working there but can avoid contributing to the tax base (including property tax) that could repair the city-level infrastructure. *See How Much Do City Taxpayers Really Contribute to the MTA?*, CITIZENS BUDGET COMM’N: TRANSP. (Feb. 21, 2020), <https://cbcny.org/research/how-much-do-city-taxpayers-really-contribute-mta> [<https://perma.cc/7SHJ-GXN5>]; *see also* Breydo, *Infrastructure Finance*, *supra* note 69, at 31–32 (describing use of tax securitizations in light of a “a system built around subsidizing the NYC subway—a deliberate policy determination intended to optimize the associated externalities”).

129. *See infra* Part III.

130. *See* Janet Yellen, Chair, Bd. of Governors of the Fed. Rsrv. Sys., Remarks at the Federal Reserve Bank of Boston Conference on Economic Opportunity and Inequality: Perspectives on Inequality and Opportunity from the Survey of Consumer Finances (Oct. 17, 2014), <https://www.federalreserve.gov/newsevents/speech/yellen20141017a.htm> [<https://perma.cc/XT8X-LR36>] (noting that the United States is “one of the few advanced nations that funds primary and secondary public education mainly through subnational taxation. Half of U.S. public school funding comes from local property taxes, a much higher share than in other advanced countries, and thus the inequalities in housing wealth and income . . . enhance the ability of more-affluent school districts to spend more on public schools.”).

a high level, paralleling the federalist construct, the United States in effect has two distinct “sovereign” debt markets: the \$21 trillion treasuries market, reflecting federal borrowing, and the \$4 trillion municipal bond market, corresponding to state and municipal entities.¹³¹ About two-thirds of infrastructure projects are funded through municipal bonds; infrastructure, in turn, represents the bulk of municipal debt.¹³²

The two charts below illustrate these dynamics. Figure 5 shows the relative sizes of the treasuries and municipal bond markets,¹³³ while Figure 6 compares state and federal infrastructure spending.¹³⁴ Two trends are notable. First, prior to the 2008 financial crisis, the municipal and treasury markets were of roughly similar size; subsequently, the treasuries market grew nearly fivefold, while the municipal market ticked up only about 11%. Second, despite the increased borrowing, federal infrastructure spending has remained fairly flat since the 1960s and also uniformly low compared to state outlays, reflecting infrastructure being a state-level responsibility.¹³⁵

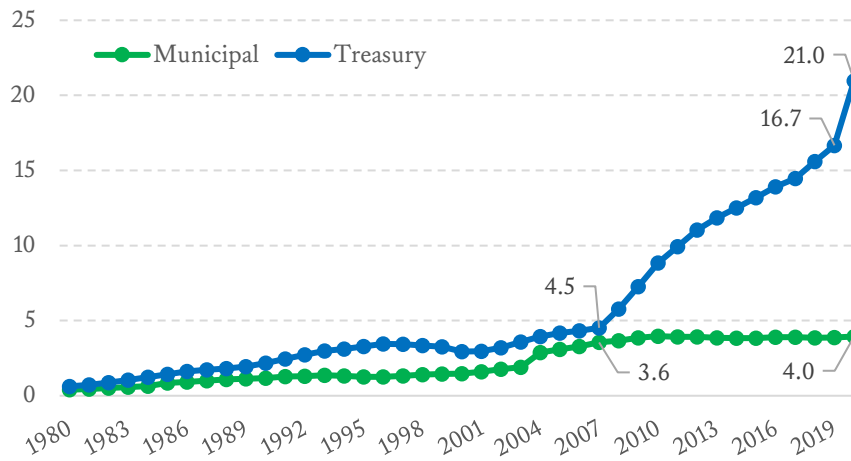
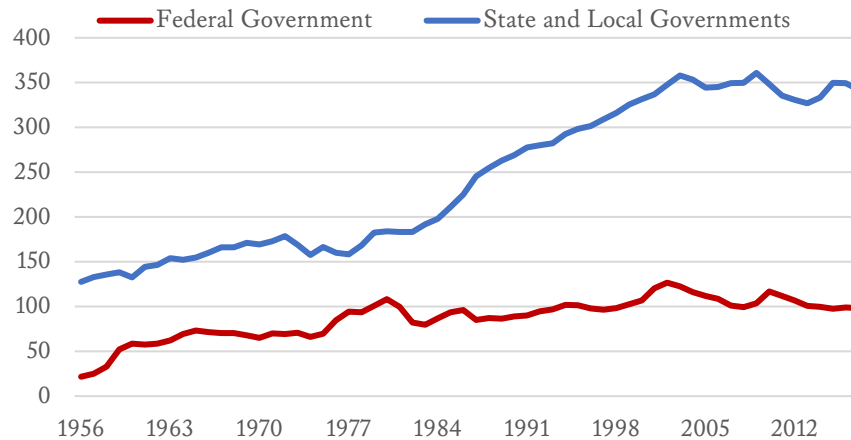
131. Yesha Yadav, *The Failed Regulation of U.S. Treasury Markets*, 121 COLUM. L. REV. 1173, 1186 (2021); Andrea Riquier, *Munis 101: Players, Capital Flows and Mechanics in the \$4 Trillion Municipal-Bond Market*, IMPACTALPHA (Feb. 9, 2023), <https://impactalpha.com/munis-101-players-capital-flows-and-mechanics-in-the-4-trillion-municipal-bond-market/> [<https://perma.cc/FR42-M5Q2>]. The much larger U.S. Treasury market is used to fund the federal government, which may at times send resources downstream to support the states, including through COVID-19 relief programs. *See infra* Section III.B.

132. *See* MUN. SEC. RULEMAKING BD., MUNI FACTS: MUNICIPAL MARKET BY THE NUMBERS, <http://iabcn.org/wp-content/uploads/2020/09/MSRB-fact-sheet.pdf> [<https://perma.cc/PKE9-AL9V>].

133. Analysis based on data from Securities Industry and Financial Markets Association (“SIFMA”). *US Fixed Income Securities Statistics*, SIFMA (Dec. 7, 2023), <https://www.sifma.org/resources/research/us-fixed-income-securities-statistics/> [<https://perma.cc/S5T5-UDJB>].

134. McBride et al., *supra* note 33.

135. *See generally* *What Does America Spend on Infrastructure? Is the State of Our Infrastructure Improving?*, USA FACTS, <https://usafacts.org/state-of-the-union-2020/transportation-infrastructure/> [<https://perma.cc/CeB8-Z6P9>] (noting that “most infrastructure spending comes directly from state and local governments”); Elizabeth McNichol, *It’s Time for States To Invest in Infrastructure*, CTR. ON BUDGET & POL’Y PRIORITIES, <https://www.cbpp.org/research/state-budget-and-tax/its-time-for-states-to-invest-in-infrastructure> [<https://perma.cc/VF8X-MGAZ>] (last updated Mar. 19, 2019) (finding that states own 93% of nondefense “public capital”).

Figure 5: Municipal & Treasury Bonds Outstanding (\$Tn)¹³⁶Figure 6: Infrastructure Spending: State & Local vs. Federal Government, 1956–2017 (\$Bn)¹³⁷

At the same time, despite increasing aggregate spending, the widening U.S. infrastructure funding gap suggests insufficient resource allocation, which, as discussed in Part IV, reinforces the need for a broader paradigm shift in our provision model for shared resources.

136. Data sourced by author from SIFMA. See *US Fixed Income Security Statistics*, *supra* note 133 (data on file with the North Carolina Law Review).

137. Public Spending on Transportation and Water Infrastructure, 1956 to 2017, *supra* note 123; Data Underlying Figures, *supra* note 123. Federal spending includes direct outlays and grants provided to states. Figures are for transportation and water infrastructure spending.

1. The Municipal Bond Market

The \$4.1 trillion municipal bond market is characterized by asset-level complexity and high fragmentation with about 36,000¹³⁸ unique issuers.¹³⁹ While a significant portion of outstanding obligations reflect states and large cities, the vast majority of issuers are local governments or infrastructure-specific financing vehicles. As a result, municipal bond issuances tend to be relatively small, averaging \$18.4 million, with about 34% unrated.¹⁴⁰

Table 2: Municipal Bond Issuances: 1998 to 2017¹⁴¹

	Issuances	Amount Raised (\$Bn)	Average (\$MM)
Rated Bonds	132,417	3,192	24.11
Unrated Bonds	68,690	507	7.38
Total / Average	201,107	3,699	18.39

The municipal bond market is composed of two main instruments¹⁴²: (i) general obligation (“GO”) bonds generally issued at the state or city levels (corresponding to a unit of government with taxing authority);¹⁴³ and (ii) revenue bonds, typically issued to finance a specific infrastructure project, like the Jackson water and sewer system, and then backed by revenues generated

138. CARMEN NUZZO & JASPER COX, PRINCIPLES FOR RESPONSIBLE INV., ESG INTEGRATION IN SUB-SOVEREIGN DEBT: THE US MUNICIPAL BOND MARKET 9 (Casey Aspin ed., 2021), <https://www.unpri.org/download?ac=14049> [<https://perma.cc/GL8A-PRHN>]. The figure is sometimes quoted as 50,000 municipal issuers; however, that figure reflects the total number of entities to have issued municipal bonds, some of which have since retired. *Id.* at 9 n.9.

139. *Id.* at 9 (noting that municipal issuers “operat[e] in different sectors”).

140. Matthew D. Peppe & Haluk Unal, *Do Municipalities Pay More To Issue Unrated Bonds?* 2 (Fed. Deposit Ins. Corp. Ctr. for Fin. Rsch., Working Paper No. 2022-12, 2022), <https://www.fdic.gov/analysis/cfr/working-papers/2022/cfr-wp2022-12.pdf> [<https://perma.cc/4AXY-G5G9>] (finding 201,107 total issuances between 1998 and 2017 with a total of \$3.7 trillion raised).

141. *Id.*

142. Shorter-term bonds are sometimes referenced as a third category; however, that distinction is not relevant for purposes of this analysis. *See, e.g.*, ROBERT S. AMDURSKY, CLAYTON P. GILLETTE & G. ALLEN BASS, MUNICIPAL DEBT FINANCE LAW: THEORY AND PRACTICE § 1.3, at 37–47 (2d ed. 2013).

143. GO bonds are typically considered “full faith and credit” obligations; however, municipalities may circumscribe the extent of that pledge. *See* KROLL BOND RATINGS, NOT ALL G.O. BONDS ARE CREATED EQUAL 4 (2013), <http://www.treasurer.ca.gov/cdiac/seminars/2014/20140205/kroll.pdf> [<https://perma.cc/P6PE-ENJM>] (listing and comparing three forms of GO bonds); Robert Doty, *Diversity and Default Risks of Municipal Bonds*, 34 MUN. FIN. J. 55, 57–67 (2013) (describing all three types of municipal securities and comparing them).

from that asset.¹⁴⁴ Revenue bonds constitute about two-thirds of the total municipal market.¹⁴⁵

2. Revenue Bonds & Infrastructure

Revenue bonds are a uniquely American financing structure, straddling elements of secured, unsecured, and asset-backed financing,¹⁴⁶ and developed to address government finance-specific challenges through unique contractual structure and bankruptcy treatment.¹⁴⁷ Taken together, these features provide revenue bond investors significantly underappreciated protections and control over municipal infrastructure.¹⁴⁸

a. Instrument Structure

The revenue bond structure exists because municipal entities cannot borrow on a traditional secured basis, as it is generally impossible to enforce a lien with respect to government property.¹⁴⁹ However, as long-lived capital-

144. SEC. & EXCH. COMM'N OFF. OF INV. EDUC. & ADVOC., MUNICIPAL BONDS: UNDERSTANDING CREDIT RISK 1–3 (2012), <https://www.sec.gov/files/municipalbondsbulletin.pdf> [<https://perma.cc/CR2X-HMRW> (staff-uploaded archive)].

145. Cooper Howard, *Choosing Municipal Bonds: GO or Revenue?*, CHARLES SCHWAB (Jan. 18, 2023), <https://www.schwab.com/learn/story/choosing-municipal-bonds-go-or-revenue> [<https://perma.cc/Z8JY-CZ96>]. Between 1996 and 2022, annual GO bond issuance averaged \$129.1 million relative to \$231.6 million of revenue bonds, based on SIFMA data. Data sourced by author from Refinitiv. See REFINITIV, <https://www.refinitiv.com/en> [<https://perma.cc/6HR9-8PQK>] (data on file with the North Carolina Law Review). Because a portion of annual issuance reflects refinancing of obligations (rather than new capital), aggregate issuance figures exceed the amounts allocated to new infrastructure projects. See *US Municipal Bonds Statistics*, SIFMA, <https://www.sifma.org/resources/research/us-municipal-bonds-statistics/> [<https://perma.cc/WNP2-BVYV>] (last updated Mar. 7, 2024).

146. The closest comparable instrument is likely commodity-backed loans utilized by distressed frontier markets. See Lev E. Breydo, *Health of Nations: Preventing a Post-Pandemic Emerging Markets Debt Crisis*, 23 NEV. L.J. 463, 470–81 (2023).

147. As discussed below, these factors included constitutional constraints and a complex historical backdrop. See *infra* Section III.A. Conceptually, revenue bonds transform small, fragmented, and highly idiosyncratic credits into assets often perceived as *nearly* information-insensitive debt, representing a financial engineering innovation.

148. An additional notable feature is that municipal bonds are typically tax-exempt for residents of the issuing state, which encourages individuals to hold municipal bonds directly, resulting in a diffuse investor base that is difficult to negotiate with, while entrenching the hyperlocalized nature of infrastructure finance. Unlike corporate debt, most municipal bonds are held by individuals—46% directly, and 26.8% through mutual funds—on a geographically circumscribed basis. *US Fixed Income Securities Statistics*, *supra* note 133.

149. Juliet M. Moringiello, *Municipal Capital Structure and Chapter 9 Creditor Priorities 8–10* (July 5, 2016) (unpublished manuscript), <https://www.brookings.edu/wp-content/uploads/2016/10/moringiello1.pdf> [<https://perma.cc/3GD9-DYQV>]. The basic issue is that action against governmental property can raise police power-related concerns. See David A. Skeel, Jr., *What Is a Lien? Lessons from Municipal Bankruptcy*, 2015 U. ILL. L. REV. 675, 690 (2015); see also S. REP. NO. 100-506, at 25 (1988) (“[M]ost municipalities cannot mortgage their real property”); *Legislation To Amend Chapter 9 of the Bankruptcy Code: Hearing on H.R. 3845 Before the Subcomm. on Monopolies and Com. L. of the H. Comm.*

intensive assets sensitive to costs of capital, infrastructure projects are a logical candidate for secured financing. After all, higher-cost unsecured borrowing ultimately translates to higher utility bills.

Revenue bonds bypass this secured lending challenge by granting liens not in the asset itself, but in a compartmentalized revenue stream generated by the asset's operation.¹⁵⁰ These cash flows form the so-termed "Trust Estate," which reflects cash in a bank account, in which lenders can take a lien. Revenue bonds' cash flows are essentially a waterfall with respect to the infrastructure project, as follows:

- *gross revenues* from user fees are typically first used to cover operating expenses;
- *net revenues* flow to the trust estate, and then to bondholders; and
- *excess funds* (if applicable) are kept in reserve or used for other debtor needs.¹⁵¹

Revenue bonds' cash flow structure is often enforced through contractual "Rate Covenants," which require the municipal issuer to maintain a certain level of "Net Revenues"¹⁵² typically measured relative to debt service costs.¹⁵³ If revenues fall short, the Rate Covenants leave a municipal infrastructure issuer with few options aside from raising rates or potentially deferring maintenance spending.¹⁵⁴ The effect of Rate Covenants is most acute for municipalities

on the Judiciary, 100th Cong. 70 (1988) (statement of James E. Spiotto, Partner, Chapman and Cutler) ("[M]unicipal law prohibits the encumbrance of municipal property with mortgages.").

150. Through revenue bonds, a lender receives security in the form of a pledge of revenues—though, special revenue bonds are nonrecourse debt, making the bonds payable only from the municipality's pledged special revenues. *See In re Heffernan Mem'l Hosp. Dist.*, 202 B.R. 147, 148–49 (Bankr. S.D. Cal. 1996).

151. Security for special revenue bonds can be in the form of: (i) a gross pledge where the bondholders' lien attaches to the entire revenue stream; or (ii) a net pledge, where the bondholders' lien attaches only to the revenues that are in excess of the expense of the operation and collection. *Bank of N.Y. Mellon v. Jefferson Cnty.* (*In re Jefferson Cnty.*), 482 B.R. 404, 414 (Bankr. N.D. Ala. 2012).

152. Net Revenues conceptually correspond to system revenues net of operating expenses (though precise definitions of the accounting terms can vary across obligations).

153. DAN SEYMOUR & GEORDIE THOMPSON, *MOODY'S INVESTOR SERV., REP. NO. 1312726, US MUNICIPAL UTILITY REVENUE DEBT METHODOLOGY 8* (2022), <https://ratings.moody.com/api/rmc-documents/386721> [<https://perma.cc/4UVW-QZMN> (staff-uploaded archive)] ("Utilities usually enter into a rate covenant under which they pledge to achieve a given level of debt service coverage each year. The covenant helps ensure that the utility utilizes its assets to generate sufficient income to pay bondholders.").

154. *See infra* note 236 and accompanying text; *cf.* Joseph W. Kane & Shalini Vajjhala, *Prioritize People, Not Projects: Addressing the Harms of Legacy Infrastructure in the COVID-19 Recovery*, BROOKINGS INST. (Dec 17, 2020), <https://www.brookings.edu/research/prioritize-people-not-projects-addressing-the-harms-of-legacy-infrastructure-in-the-covid-19-recovery> [<https://perma.cc/GFW9-S27Z>] (discussing need to address legacy infrastructure issues to promote economic growth).

experiencing sudden crises or adjusting to structural changes like population declines. Jackson's Rate Covenants, for instance, at one point required rate increases exceeding 100%, exacerbating the system's challenges and pushing residents' bills past affordability without meaningful oversight.¹⁵⁵

Particularly for financially weaker issuers, Rate Covenants are frequently included in legislation used to authorize the bond issuance, giving those provisions the effective force of law.¹⁵⁶ This creates a difficult tension with utility regulation principles, which generally require oversight of rate increases as a safeguard against excessive charges by natural monopoly providers.¹⁵⁷ Arguably, such Rate Covenants can provide municipal creditors more control than corporate bond covenants, which often offer borrowers more options for meeting contractual thresholds.

b. Unique Bankruptcy Protections

Revenue bonds are also eligible for distinctive bankruptcy protections, which operate together with the bonds' contractual structures to provide investors with security arguably beyond that of most corporate secured debt.¹⁵⁸ The genesis for revenue bonds' special bankruptcy protections stems in part from a troublesome era of late nineteenth-century defaults,¹⁵⁹ including alleged tactical bankruptcies by municipalities that effectively chose to "impose the costs of imprudently incurred obligations on creditors rather than to require that residents bear them."¹⁶⁰

The combination of this historical backdrop and the inability to obtain liens against municipal assets left investors concerned about exploitative debtor

155. CITY OF JACKSON, MISSISSIPPI WATER AND SEWER SYSTEM REVENUE REFUNDING BONDS, SERIES 2016, at 15 (2016) [hereinafter JACKSON W&S OS]; see *infra* notes 237–44 and accompanying text.

156. See *infra* Section III.B.1 (discussing Jackson bonds' Rate Covenants).

157. Kovvali & Macey, *supra* note 41, at 585 ("Most directly, regulators set rates, and . . . if a utility can convince regulators to permit a rate increase, the increase flows directly to shareholders."); see also *supra* notes 54–58 and accompanying text.

158. See S. REP. NO. 100-506, at 12 (1988) (describing special revenue amendment designed "to ensure that revenue bondholders receive the benefit of their bargain with the municipal issuer and that they will have unimpaired rights to the project revenues pledged to them"); see also David A. Skeel, Jr., *Is Bankruptcy the Answer for Troubled Cities and States?*, 50 HOUS. L. REV. 1063, 1067–69 (2013) (discussing the potential for "bond contagion" in state bankruptcy legislation); Alexander D. Flachsbart, Note, *Municipal Bonds in Bankruptcy: § 902(2) and the Proper Scope of 'Special Revenues' in Chapter 9*, 72 WASH. & LEE L. REV. 955, 982 (2015) ("[T]he first key to bondholder treatment in municipal bankruptcy is the presence or absence of property rights to municipal revenue.").

159. Clayton P. Gillette, *Fiscal Federalism, Political Will, and Strategic Use of Municipal Bankruptcy*, 79 U. CHI. L. REV. 281, 283–85 (2012). See generally Robert S. Amdursky, *The 1988 Municipal Bankruptcy Amendments: History, Purposes, and Effects*, URB. LAW., Winter 1990, at 1 (detailing legislative background that led to amendments for municipal bankruptcy).

160. Gillette, *supra* note 159, at 284; see also ERIC H. MONKKONEN, *THE LOCAL STATE: PUBLIC MONEY AND AMERICAN CITIES* 69–77 (1995).

behavior, including using bankruptcy to renege on revenue pledges. To address this, the Municipal Bankruptcy Amendments of 1988 (“1988 Amendments”) enhanced revenue bonds’ protections by attempting to synthetically mirror safeguards comparable to secured creditors’ in the Chapter 11 context.¹⁶¹ This rendered “the rights of a revenue bondholder in Chapter 9 comparatively more favorable than” a GO bondholder—and arguably even secured creditors in Chapter 11.¹⁶²

Pursuant to the 1988 Amendments, revenue bonds¹⁶³ protections are a function of the operation of three bankruptcy code provisions (the “Special Revenue Provisions”)¹⁶⁴:

- Section 902(2) defines “special revenues” to include revenues derived from the operation or ownership of transportation or utility projects.¹⁶⁵
- Section 928(a) provides that special revenues received by the debtor after commencement of Chapter 9 remain secured subject to the prepetition pledge¹⁶⁶—a significant departure from Section 552(a), applicable to corporate debtors, which

161. Act To Amend the Bankruptcy Law To Provide for Special Revenue Bonds, and for Other Purposes, Pub. L. No. 100-597, 102 Stat. 3028 (1988) (codified as amended in scattered sections of 11 U.S.C.).

162. Henry C. Kevane, *Chapter 9 Municipal Bankruptcy: The New “New Thing”?* Part II, BUS. L. TODAY, June 2011, at 2.

163. Formally, these bankruptcy protections refer to obligations secured by “special revenues” as defined in § 902(2) of the Bankruptcy Code, however this Article uses the term “revenue bonds” for general simplicity.

164. These provisions were enacted through the 1988 Amendments which were adopted to address “concern in the municipal bond market that the application of general commercial finance concepts rendered the extension of credit to a troubled municipality fraught with risk.” James Spiotto, *Chapter 9 and Alternatives – Part Three: Competing Interests in Chapter 9 and Bondholders’ Rights*, U. CHI.: MUNINET GUIDE (May 7, 2015), <https://muninet.harris.uchicago.edu/2015/05/07/chapter-9-and-alternatives-part-three-competing-interests-in-chapter-9-and-bondholders-rights/> [https://perma.cc/97NB-QM4T]; see also *In re Jefferson Cnty.*, 474 B.R. 228, 271 (Bankr. N.D. Ala. 2012) (noting that a major purpose of the 1988 Amendments “was to change from using corporate debt principles in the municipal financing context when their application would be at odds with how municipal financing has evolved. This was and remains especially apt for revenue based municipal financing transactions.”).

165. 11 U.S.C. § 902(2).

166. See *All. Cap. Mgmt v. Cnty. of Orange (In re Cnty. of Orange)*, 179 B.R. 185, 191–92 (Bankr. C.D. Cal. 1995) (“Prior to 1988, when a municipality filed Chapter 9, a risk existed that § 552(a) could strip revenue bondholders of their liens on post-petition property of the debtor. Code § 928 was enacted to remedy this problem by making § 552(a) inapplicable to revenue bonds. Section 928 was narrowly crafted to apply only to special revenue bonds. Congress could have made § 928 applicable to all municipal bonds, but it chose to limit its application.”).

provides that after-acquired property is not subject to prepetition liens to facilitate bankruptcy's "fresh start."¹⁶⁷

- Section 922 provides that the automatic stay does not apply to the application of pledged revenues to pay special revenue bond debt,¹⁶⁸ requiring the debtor to continue payments during Chapter 9.¹⁶⁹

A contrast with the rights of a Chapter 11 secured party helps illustrate the power of the Special Revenue Provisions. Bankruptcy cannot deprive a party of a property interest (which a lien represents) without compensation.¹⁷⁰ Correspondingly, the process offers secured lenders significant protections relative to unsecured parties, allowing them to either retain their lien¹⁷¹ or receive "just compensation" if the lien is impaired.¹⁷² Revenue bond holders lack an asset-level lien, making the cash flows understandably more important.

During a Chapter 11 case, a secured party does not continue to receive payments (due to the automatic stay), and their prebankruptcy liens do not extend to property the debtor acquires after filing.¹⁷³ Furthermore, under certain circumstances, the bankruptcy court can authorize impairment of secured claims, providing a safeguard against unreasonable creditors.¹⁷⁴

In the municipal context, however, debtors continue payments during the case, while liens attach to property postpetition.¹⁷⁵ Further, reflecting the 1988 Amendments' congressional intent that creditors "have unimpaired rights to the

167. This concept was first articulated in *Local Loan Co. v. Hunt*, 292 U.S. 234, 244–45 (1934); see also *In re Nielsen*, 48 B.R. 274, 276 (D.N.D. 1984) ("The purpose of [§ 552(a)] is to facilitate a debtor's 'fresh start' by enabling him or her to use after-acquired property free and clear of prebankruptcy liens.").

168. See 11 U.S.C. § 922.

169. As discussed below, a recent decision in the Puerto Rico bankruptcy interpreted the statute as giving the debtor the option (but not the legal obligation) to continue paying. See *infra* Section III.B.3.

170. This protection reflects an "uneasy relationship between the Bankruptcy Clause and the Takings Clause" resulting in protections for claims based in property rights, including secured claims. Flachsbarth, *supra* note 158, at 980–81; U.S. CONST. amend. V, cl. 4 ("[N]or shall private property be taken for public use, without just compensation."); see James Steven Rogers, *The Impairment of Secured Creditors' Rights in Reorganization: A Study of the Relationship Between the Fifth Amendment and the Bankruptcy Clause*, 96 HARV. L. REV. 973, 977–97 (1983) ("[A]ny impairment of the liquidation value of a secured creditor's collateral attributable to the exercise of powers conferred on the reorganization court by bankruptcy legislation is, in the absence of just compensation, a violation of the takings clause of the fifth amendment.").

171. 11 U.S.C. § 101(37) (defining a "lien" as any "charge against or interest in property to secure payment of a debt or performance of an obligation").

172. See *id.* § 506(a); U.S. CONST. amend. V, cl. 4.

173. 11 U.S.C. §§ 362(a), 541.

174. *Id.* § 1129(b). The contemplated circumstance is a so-termed "cram-down."

175. *Id.* § 928(a).

project revenue pledged to them,¹⁷⁶ the Special Revenue Provisions have been interpreted to effectively preclude reduction of special revenue bond obligations through the bankruptcy process—a stark contrast to corporate debt treatment.¹⁷⁷

c. Underappreciated Power over Municipalities

At first glance, relative to their corporate counterparts, municipal bond investors would appear to be in a precarious position given their inability to exercise liens, liquidate assets, or effectuate management changes.¹⁷⁸ That commonly held narrative, however, is often largely wrong. In fact, the combination of extensive bankruptcy protections, contractual structure, and legislative safeguards provides revenue bond holders significant—and significantly underappreciated—power over municipal infrastructure debtors. This directly translates to debtors receiving more limited bankruptcy protections and less optionality to adjust debts.

For many infrastructure projects, meeting Rate Covenants can necessitate rate increases¹⁷⁹ that push costs beyond affordability for constituencies or deferred maintenance that risks compromising reliability.¹⁸⁰ Oftentimes, rate increases are effectuated automatically without additional action by

176. S. REP. NO. 100-506, at 12 (1988). The code operates to ensure “that revenue bondholders receive the benefit of their bargain with the municipal issuer, namely, they will have unimpaired rights to the project revenue pledged to them.” *Id.*

177. David Lemke, Blake Roth & Courtney Rogers, *Municipal Debtors: “Cram Down” of Special Revenue Debt*, MONDAQ (Apr. 28, 2014), <https://www.mondaq.com/unitedstates/insolvencybankruptcy/314920/municipal-debtors-cram-down-of-special-revenue-debt> [<https://perma.cc/3642-D9D3>] (“By incorporating section 1111(b) into chapter 9, but also limiting the conversion of nonrecourse debt to recourse debt, Congress made the section 1111(b)(2) election automatic, providing that the debtor must pay the full value of the claim.”).

178. See Vincent S.J. Buccola, *The Logic and Limits of Municipal Bankruptcy*, 86 U. CHI. L. REV. 817, 820 (2019) (noting that municipal “[c]reditors have exceedingly weak remedies under state law [and] cannot foreclose on municipal property in any meaningful sense”); Moringiello, *supra* note 149, at 2 (“Public debtors are unique in that their assets are not available to creditors, thus limiting creditor remedies against municipalities.”).

179. See *supra* Section II.B.1. “One such remedy is the right to the appointment of a receiver to oversee the particular project in question, and, if appropriate, raise rates sufficient to pay the special revenue debt issued to finance the project.” Lemke et al., *supra* note 177.

180. For instance, some courts have required issuers to raise rates in order to repay bond obligations. See *State ex rel. Allstate Ins. Co. v. Union Pub. Serv. Dist.*, 151 S.E.2d 102, 109–10 (W. Va. 1966); see also *AMDURSKY ET AL.*, *supra* note 142, § 5.4.2 (noting that “[t]he remedy as interpreted in *Allstate* effectively shifts the risk of the project’s success from bondholders to the ratepayers”). Though recent decisions have pared back certain revenue-bond protections, significant uncertainty remains. See *infra* notes 270–77 and accompanying text; see also *In re Fin. Oversight & Mgmt. Bd. for P.R.*, 919 F.3d 121, 132 (1st Cir. 2019); Laura E. Appleby, James Heiser & Franklin H. Top III, *First Circuit Panel Opens Protections Available to Special Revenue Bondholders*, 15 PRATT’S J. BANKR. L. 278, 281–82 (2019).

bondholders, reflecting an immense power over critical aspects of day-to-day constituent life.¹⁸¹

If the costs become untenable, unlike corporate debtors under Chapter 11, bankruptcy offers Chapter 9 municipal debtors little reprieve or “fresh start.”¹⁸² Municipal debtors’ postpetition net revenues remain subject to prepetition liens¹⁸³ and they typically continue making payments after filing for bankruptcy (without the benefit of the automatic stay), requiring constituents to keep paying utility bills.¹⁸⁴ Further, the debtor generally cannot reduce its revenue bond obligations, irrespective of how unrealistic the debts become.¹⁸⁵

The combination of limited bankruptcy protections and inability to “right-size” obligations is most difficult for poor areas grappling with low-quality infrastructure, population declines, and climate change. Indeed, the financing model can have the predatory effect of trapping poor communities in a vicious debt cycle. As discussed in Section III.B.3 below, while recent decisions¹⁸⁶ have begun to pare back certain revenue-bond protections,¹⁸⁷ significant uncertainty remains both in light of ongoing appeals and regarding the extent of broader market impact.¹⁸⁸

III. ENVIRONMENTAL RACISM & CLIMATE CHANGE

America’s infrastructure policy, funding model and legacy of structural racism interplay dangerously with climate change to create an untenable reality

181. See *infra* Section III.B.1 (discussing automatic rate increases in respect of Jackson water utility).

182. A “fresh start” refers to the concept of a debtor receiving a clean slate and ability to turn around their affairs following bankruptcy proceedings and court confirmation of a plan. *Process - Bankruptcy Basics*, *supra* note 21.

183. Compare 11 U.S.C. § 928, with *id.* § 552(a) (showing distinct treatment for security interests on special revenues in Chapter 9 bankruptcy).

184. See *id.* § 922.

185. See *infra* Section III.B.2 (discussing Puerto Rico Electric Power Authority’s inability to reduce bond obligations).

186. *In re Fin. Oversight & Mgmt. Bd. for P.R.*, 649 B.R. 381, 422 (D.P.R. 2023); see also Richard A. Cosgrove, Juliet H. Huang, Scott A. Lewis & Eric R. Hebert, *Court Rules PREPA Bondholders Do Not Have a Secured Claim on Current and Future Net Revenues*, CHAPMAN (Apr. 14, 2023), <https://www.chapman.com/publication-court-rules-prepa-bondholders-do-not-have-a-secured-claim-on-current-and-future-net-revenues> [<https://perma.cc/9LDW-EP49>].

187. In a 2019 decision, the First Circuit held that the holders of special revenue bonds cannot compel the debtor to apply special revenues to debt service postpetition (though the debtor could do so voluntarily). *In re Fin. Oversight & Mgmt. Bd. for P.R.*, 919 F.3d 121, 132 (1st Cir. 2019); see Appleby et al., *supra* note 180, at 278.

188. See Michelle Kaske, *Puerto Rico Utility’s Future Revenue at Stake in Bondholder Fight*, BLOOMBERG (Jan. 30, 2024, 12:24 PM), <https://www.bloomberg.com/news/articles/2024-01-30/puerto-rico-utility-s-future-revenue-at-risk-in-bondholder-fight> [<https://perma.cc/8H5J-47SU> (staff-uploaded, dark archive)]; Brief of the Commonwealth of Virginia and 13 Other States as Amici Curiae in Support of Defendants-Appellants at 1–2, *In re Fin. Oversight & Mgmt. Bd. for P.R.*, No. 23-2036 (1st Cir. Dec. 19, 2023), Doc. No. 58.

where communities of color bear the brunt of a global environmental crisis.¹⁸⁹ Appreciating how the United States got to this point requires some context regarding earlier eras of deliberate, government-mandated infrastructural racism,¹⁹⁰ the effects of which are compounded by ongoing policy¹⁹¹ to create the dynamics in place today.¹⁹²

Part III is organized into two sections. First, it briefly outlines past governmental policies, such as redlining, and connects their long-term effects to the present-day infrastructure inequities. Second, it analyzes the impact of these challenges through cases studies regarding: (i) the Jackson, Mississippi water system; and (ii) Puerto Rico's energy infrastructure.

A. *Historical Context*

The depth of America's infrastructure inequity is difficult to appreciate without discussing the compounding effects of past injustice. Much of U.S. history was characterized by measures to confine Black Americans and other minority groups to specifically undesirable areas while denying them essential resources.¹⁹³ The resulting disparities in access to basic human needs—water, heat, and light—reflect a pervasive race and class divide incompatible with moral norms and a nation's responsibility to provide for all citizens.¹⁹⁴

A particularly destructive component of the United States' vast and varied program of structural racism included government-mandated housing discrimination through so-called "redlining," which perpetuated de facto segregation across America. In the 1930s, at the depths of the Great Depression, the federal government sought to stabilize housing markets through a national

189. EPA, *supra* note 23, at 6.

190. As Pete Buttigieg put it: "We can't ignore the basic truth: some of the planners and politicians behind those projects built them . . . [s]ometimes as an effort to reinforce segregation." See Hope Yen, *Buttigieg Launches \$1B Pilot To Build Racial Equity in Roads*, ASSOCIATED PRESS (June 30, 2022, 3:26 PM), <https://apnews.com/article/race-and-ethnicity-racial-injustice-transportation-pete-buttigieg-48e09f253781c89359d875f19fc70f9d> [<https://perma.cc/WW3X-QTFV>].

191. Prior work has explored how "federalism and a racial hierarchy define American social policy" in context of disaster relief. See Andrew Hammond, *On Fires, Floods and Federalism*, 111 CALIF. L. REV. 1067, 1114 (2023).

192. Terry Gross, *A 'Forgotten History' of How the U.S. Government Segregated America*, NPR (May 3, 2017, 12:47 PM), <https://www.npr.org/2017/05/03/526655831/a-forgotten-history-of-how-the-u-s-government-segregated-america> [<https://perma.cc/XM94-VRJG>] [hereinafter Gross, *Forgotten History*].

193. See *infra* notes 195–212 and accompanying text.

194. See, e.g., Coral Murphy Marcos, *Solar Power Offers Puerto Ricans a Lifeline but Remains an Elusive Goal*, N.Y. TIMES (May 9, 2022), <https://www.nytimes.com/2022/05/09/business/energy-environment/puerto-rico-solar-power.html> [<https://perma.cc/N4T3-P647> (staff-uploaded, dark archive)].

lending program¹⁹⁵ implemented under the Federal Housing Administration (“FHA”), which insured mortgages, and the Home Owners’ Loan Corporation (“HOLC”), which offered refinancing and was tasked with developing nationwide neighborhood-level credit risk segmentation frameworks.¹⁹⁶ The resulting maps, though not publicly available, divided over 200 neighborhoods between “Type A” (marked desirable), and “Type D,” which were the highest risk and included most Black households.¹⁹⁷

The “ramifications were obvious to Black homeowners who could not get home loans that were backed by government insurance programs,” quickly causing private lenders to shun them as well.¹⁹⁸ The FHA also subsidized housing development “with the requirement that none of the homes be sold to African Americans.”¹⁹⁹

Subsequent policies built upon these injustices, with New Deal projects²⁰⁰ designed “to reinforce segregation . . . or eliminate Black neighborhoods”²⁰¹ and urban planning that ensured inequitable access,²⁰² leaving “transit agencies . . . managing and operating systems that have racism embedded in them.”²⁰³ Further, health hazards—from factories to environmental waste sites—were concentrated in Type D neighborhoods,²⁰⁴ creating a “clear and consistent”

195. Danielle Vermeer, *Redlining and Environmental Racism*, UNIV. MICH. SCH. FOR ENV’T & SUSTAINABILITY (Aug. 16, 2021), <https://seas.umich.edu/news/redlining-and-environmental-racism> [https://perma.cc/23VZ-X9RT]; Manann Donoghoe & Andre M. Perry, *The Case for Climate Reparations in the United States*, BROOKINGS INST. (Mar. 2023), <https://www.brookings.edu/articles/the-case-for-climate-reparations-in-the-united-states/> [https://perma.cc/P2G3-MU4W].

196. Darryl Fears, *Redlining Means 45 Million Americans Are Breathing Dirtier Air, 50 Years After It Ended*, WASH. POST (Mar. 9, 2022, 8:00 AM), <https://www.washingtonpost.com/climate-environment/2022/03/09/redlining-pollution-environmental-justice/> [https://perma.cc/G7KU-6YZH (dark archive)].

197. Type D areas were labeled red, giving rise to the term “redlining.” Candace Jackson, *What Is Redlining?*, N.Y. TIMES (Aug. 17, 2021), <https://www.nytimes.com/2021/08/17/realestate/what-is-redlining.html> [https://perma.cc/6YBC-U3BL (staff-uploaded, dark archive)].

198. *Id.*

199. Gross, *Forgotten History*, *supra* note 192.

200. See Doug Irving, *Environmental Racism: How Historic Redlining Continues To Affect Communities*, RAND CORP. (June 27, 2022), <https://www.rand.org/blog/rand-review/2022/06/environmental-racism-how-historic-redlining-continues.html> [https://perma.cc/7PNY-RVZ7].

201. Yen, *supra* note 190.

202. For instance, famed New York official Robert Moses specifically developed overpasses that could not accommodate buses used by Black and Latino families. Thomas J. Campanella, *Robert Moses and His Racist Parkway, Explained*, BLOOMBERG (July 9, 2017, 12:03 PM), <https://www.bloomberg.com/news/articles/2017-07-09/robert-moses-and-his-racist-parkway-explained> [https://perma.cc/XZ5M-R3QR (staff-uploaded, dark archive)].

203. Christof Spieler, *Racism Has Shaped Public Transit, and It’s Riddled with Inequities*, RICE UNIV.: KINDER INST. FOR URB. RSCH. (Aug. 24, 2020), <https://kinder.rice.edu/urbanedge/racism-has-shaped-public-transit-and-its-riddled-inequities> [https://perma.cc/6JYG-HCCN] (noting that “[i]n the United States, race has always been a part of transit”).

204. See Vermeer, *supra* note 195; Irving, *supra* note 200.

pattern of “more pollution, more hazards, more risk in the redlined communities.”²⁰⁵

As a result, previously redlined areas—which remain predominantly low-income and minority²⁰⁶—suffer worse health outcomes, including lower life expectancies,²⁰⁷ and more acute impacts from the “quintessential threat multiplier”²⁰⁸ of climate change.²⁰⁹ Unfortunately, contemporary policies often compound this uneven baseline, particularly through a localized infrastructure model that requires communities to pay for legacy assets,²¹⁰ incentivizing out-migration by the wealthy²¹¹ and leaving less-affluent neighbors with crumbling, debt-laden infrastructure.²¹²

B. Case Studies

“Whether you’re in rural Kentucky or downtown Philadelphia, you should be able to turn on a faucet and drink clean water.”—President Joe Biden²¹³

The aggregate effects of past and present U.S. policy are well illustrated by infrastructure crises facing Jackson, Mississippi, and Puerto Rico.²¹⁴ Though reflecting distinct dynamics, the case studies highlight common themes around infrastructure inequity, including demographic changes, excessive debts, and exceptionally acute climate change exposure.²¹⁵ Indeed, similar circumstances

205. Irving, *supra* note 200.

206. Vermeer, *supra* note 195; BRUCE MITCHELL & JUAN FRANCO, NAT’L CMTY. REINVESTMENT COAL., HOLC “REDLINING” MAPS: THE PERSISTENT STRUCTURE OF SEGREGATION AND ECONOMIC INEQUALITY 4 (2018), https://ncrc.org/wp-content/uploads/dlm_uploads/2018/02/NCRC-Research-HOLC-10.pdf [<https://perma.cc/X37X-6LEX>].

207. Maria Godoy, *In U.S. Cities, the Health Effects of Past Housing Discrimination Are Plain To See*, NPR (Nov. 19, 2020, 5:00 AM), <https://www.npr.org/sections/health-shots/2020/11/19/911909187/in-u-s-cities-the-health-effects-of-past-housing-discrimination-are-plain-to-see> [<https://perma.cc/HE9F-H58B>].

208. Renee N. Salas, *Environmental Racism and Climate Change—Missed Diagnosis*, 385 NEW ENG. J. MED. 967, 968 (2021).

209. Haley M. Lane, Rachel Morello-Frosch, Julian D. Marshall & Joshua S. Apte, *Historical Redlining Is Associated with Present-Day Air Pollution Disparities in U.S. Cities*, 9 ENV’T SCI. TECH. LETTERS 345, 348 (2022).

210. *See supra* Section II.A.2.

211. *See infra* Sections III.B.1, 2.

212. *See, e.g., infra* notes 238–39 and accompanying text.

213. Remarks on the Infrastructure Investment and Jobs Act, 2022 DAILY COMP. PRES. DOC. 1 (Jan. 14, 2022).

214. Kane & Vajjhala, *supra* note 154.

215. *See* Nicquel Terry Ellis, *In the Wake of Jackson, Mississippi, Water Crisis, One Resident Faces a \$4,000 Water Bill*, CNN, <https://www.cnn.com/2022/10/14/us/jackson-water-bills-reaj/index.html> [<https://perma.cc/HVE9-7N2Z>] (last updated Oct. 14, 2022, 8:53 AM) (describing Jackson resident receiving \$4,000 bill for water deemed unsafe to use); *see also* Andre M. Perry, Joseph W. Kane & Carl Romer, *In Jackson, Miss., a Water Crisis Has Revealed the Racial Costs of Legacy Infrastructure*, BROOKINGS INST. (Mar. 29, 2021), <https://www.brookings.edu/blog/the-avenue/2021/03/26/in-jackson-miss-a>

exist in countless communities across the nation, from Michigan²¹⁶ to Louisiana,²¹⁷ Alabama,²¹⁸ and New York.²¹⁹

1. Jackson's 2022 Water Crisis

In August 2022, 150,000 residents of Jackson, Mississippi, found themselves without running water for over a month after storm damage to the city's largest treatment plant; "It means the city cannot produce enough water to fight fires, to reliably flush toilets, and to meet other critical needs," explained Mississippi Governor Tate Reeves.²²⁰

While tragic, the crisis was not unexpected—and hardly Jackson's first, given an eerily similar "nightmare water crisis" the prior year.²²¹ The city has been under an EPA consent decree since 2013,²²² with residents experiencing frequent supply disruptions and boil water notices.

Though the underlying causes are complex and myriad, at its core, the plight of 82% Black and largely poor Jackson presents a microcosm of the challenges facing U.S. infrastructure—including the compounding impact of

water-crisis-has-revealed-the-racial-costs-of-legacy-infrastructure/ [https://perma.cc/SV5Y-Z3B9]; Anna Wolfe, *'A Profound Betrayal of Trust': Why Jackson's Water System Is Broken*, MISS. TODAY (Mar. 24, 2021), <https://mississippitoday.org/2021/03/24/why-jacksons-water-system-is-broken/> [https://perma.cc/B7GT-NKXB] (quoting Alan Mallach, senior fellow at the Center for Community Progress: "You have this whole phenomenon which has been going on really since the 1950s, where older cities, central cities, have essentially been abandoned by large parts of the middle class, especially the white middle class, for the suburbs.").

216. Denchak, *supra* note 71 ("In Flint, nearly 9,000 children were supplied lead-contaminated water for 18 months.").

217. Bridgett Cecilia McCoy, Note, *Critical Infrastructure, Environmental Racism, and Protest: A Case Study in Cancer Alley, Louisiana*, 53 COLUM. HUM. RTS. L. REV. 582, 594 (2022).

218. Glenn Thrush, *An Alabama Town's Sewage Woes Test Biden's Infrastructure Ambitions*, N.Y. TIMES, <https://www.nytimes.com/2022/01/12/us/politics/infrastructure-environmental-racism-alabama-black-belt.html> [https://perma.cc/75EK-E2MS (staff-uploaded, dark archive)] (last updated Jan. 24, 2022).

219. See Catherine Flowers & Mitchell Bernard, Opinion, *When Environmental Racism Causes a Hygienic Hell*, N.Y. TIMES (Aug. 25, 2021), <https://www.nytimes.com/2021/08/25/opinion/environmental-racism-wastewater-broken.html> [https://perma.cc/3HYW-P9WX (staff-uploaded, dark archive)] ("Does anyone genuinely believe that what's happening in Mount Vernon would be happening in one of the richer, predominantly white communities also in Westchester County in the shadow of New York City?").

220. Rick Rojas, *Mississippi's Capital Loses Water as a Troubled System Faces a Fresh Crisis*, N.Y. TIMES (Aug. 30, 2022), <https://www.nytimes.com/2022/08/30/us/mississippi-jackson-water.html> [https://perma.cc/PM52-6E5J (staff-uploaded, dark archive)].

221. Molly Schwartz, *The Water Crisis in Jackson, Mississippi, Is a Dire Warning Sign*, MOTHER JONES (Mar. 24, 2021), <https://www.motherjones.com/politics/2021/03/water-crisis-in-jackson-mississippi-is-a-dire-warning-sign/> [https://perma.cc/9TDD-2Z9Q].

222. Consent Order at 100, *United States v. City of Jackson, Miss.*, No. 12-cv-790 (S.D. Miss. Mar. 1, 2013), Doc. No. 10; JACKSON W&S OS, *supra* note 155, at 11, B-14 (discussing EPA Consent Decree with the City of Jackson).

past policy injustice.²²³ Indeed, the inequity is crystalized by the contrast between the plight of Jackson residents and wealthier suburbanites unaffected by the storm due to separate water systems.²²⁴

a. *Water System: Debts & Covenants*

Jackson's combined water and sewer system (the "W&S System") was developed in the 1970s,²²⁵ when the city was notably larger and wealthier.²²⁶ Over the following decades, however, Jackson shrunk, with its population decreasing from 197,000 in 1990 to 150,000 by 2021.²²⁷ Jackson experienced "two separate migrations out of the city," with the 1970s characterized by "white flight" to nearby suburbs followed by a subsequent wave of better-off Black residents escaping Jackson's "failing infrastructure" and continuing decline.²²⁸

Jackson's W&S System is operated by the Department of Public Works, which reports to the mayor.²²⁹ As of 2022, the system had about \$191 million of special revenue bond debt,²³⁰ with estimated annual debt service of \$19.15

223. Zahra Hirji, Kriston Capps, Ella Ceron, Leslie Kaufman & Brentin Mock, *Jackson, Mississippi, Water Crisis Previews a Wetter, Hotter US Future*, BLOOMBERG (Sept. 2, 2022, 8:00 AM), <https://www.bloomberg.com/news/articles/2022-09-02/jackson-mississippi-water-crisis-previews-a-wetter-hotter-us-future> [https://perma.cc/8ACU-TXKP (staff-uploaded, dark archive)].

224. Stephan Bisaha, *A Jackson, Mississippi Suburb Decided To Create Its Own Water System*, NPR (November 3, 2022, 5:02 AM), <https://www.npr.org/2022/11/03/1133790763/a-jackson-mississippi-suburb-decided-to-create-its-own-water-system> [https://perma.cc/MG6G-V3V4] (discussing the existence of over 50,000 water systems in the United States and asking, "[I]f you're one of the other Jackson suburbs that already has its own perfectly reliable water system . . . why join up with Jackson's failing one?").

225. JACKSON W&S OS, *supra* note 155, at B-1 to -3.

226. The timing also suggests that critical portions of the W&S System are likely approaching the end of their useful life. Asset useful life varies significantly across the water infrastructure value chain. The EPA estimates treatment plants to have a useful life of 20 to 50 years, while pipes' useful life ranges from 15 to 100 years. AM. WATER WORKS ASS'N, *DAWN OF THE REPLACEMENT ERA: REINVESTING IN DRINKING WATER INFRASTRUCTURE* 11–12 (2001), <https://www.awwa.org/Portals/0/AWWA/ETS/Resources/DawnReplacementEra.pdf> [https://perma.cc/34CC-4YAU] (discussing trends in useful life of vintage cast-iron water pipes). This is consistent with Jackson experiencing challenges at the treatment plants. See *Things Local Officials Should Know About Sustainable Water Infrastructure*, EPA, <https://www.epa.gov/sustainable-water-infrastructure/things-local-officials-should-know-about-sustainable-water> [https://perma.cc/YUT3-NXG6] (last updated Aug. 23, 2023).

227. *Jackson, Mississippi – Population*, DATA COMMONS, https://datacommons.org/tools/timeline#&place=geoId/2836000&statsVar=Count_Person [https://perma.cc/6PP7-5JNP (staff-uploaded archive)].

228. Molly Hennessy-Fiske, *White Then Black Residents Abandoned Jackson, Propelling Its Water Crisis*, WASH. POST (Sept. 4, 2022, 6:00 AM), <https://www.washingtonpost.com/nation/2022/09/04/jackson-water-crisis/> [https://perma.cc/6MWF-5NKB (dark archive)].

229. The sewer system is operated by a private-sector third party under a long-term concession but is still owned by the City of Jackson. JACKSON W&S OS, *supra* note 155, at B-1 to -2.

230. Thomas Nocera, *Drinking Water Crisis Envelops Junk-Rated Jackson, Mississippi, System*, BOND BUYER (Aug. 31, 2022, 3:38 PM), <https://www.bondbuyer.com/news/drinking-water-crisis-envelops-junk-rated-jackson-mississippi-system> [https://perma.cc/SD73-BQ3M (staff-uploaded, dark archive)].

million.²³¹ As is common, the obligations are secured by a pledge of the system's Net Revenues²³² which are deposited to a dedicated fund and then used for bond payments.²³³ The bonds' Rate Covenant requires Net Revenues to exceed 120% of annual debt service requirements, equivalent to about \$23 million.²³⁴ The Rate Covenant is also included in the city's General Bond Resolution, authorizing the bond issuance, meaning that Jackson is both contractually and legislatively bound to maintain that level of Net Revenues.²³⁵

As a regulated natural monopoly serving a fixed area, Jackson W&S has limited commercial levers; unlike a private company, it cannot market new products or expand its footprint, for instance. The economics of its obligations and Rate Covenant are premised on a consistent or growing customer base. Population decline is particularly problematic because it requires spreading the system's expenses over fewer ratepayers, leaving two unpalatable options: spending less by deferring maintenance or raising rates. After years of deferred maintenance and significant asset deterioration,²³⁶ by 2013, Jackson's W&S was forced to increase sewer rates 108% and water rates 29%, which occurred without regulatory review or impact assessment.²³⁷

Jackson's unfortunate combination of out-migration and fixed long-term expenses reflect a so-termed utility "death spiral."²³⁸ While its costs and debt load remain relatively fixed, the number of customers decreases, forcing the utility to raise rates and reduce investment, resulting in higher bills for lower quality resources. This deterioration pushes more residents to leave the city, further compounding pressure on the system.²³⁹

231. JACKSON W&S OS, *supra* note 155, at 10.

232. *See supra* note 152.

233. JACKSON W&S OS, *supra* note 155, at 4–5.

234. *See id.* at 5. The Rate Covenant provides an alternative condition, requiring Net Revenues to be equal to 100% of the sum of: (i) Annual Debt Service Requirements (on the bonds and all subordinate indebtedness), (ii) the amounts required to be paid in the Debt Service Reserve Fund and Contingent Fund, and (iii) the amount of "all other charges and liens" payable out of revenues. *Id.* at 5–6.

235. The Jackson W&S OS states that the Rate Covenant is provided pursuant to the General Bond Resolution, which authorized the bond issuance. *Id.* at 4–5.

236. Shah, *supra* note 2 (observing that the water crisis developed due "a set of accumulated problems based on deferred maintenance that has not taken place over decades").

237. *See* JACKSON W&S OS, *supra* note 155, at 15, 23; *see also supra* Section III.B.1.

238. A utility "death spiral" refers to a negative feedback loop where rate base erosion requires a network with high fixed cost amortization to raise rates on remaining members, causing further rate base erosion. *See* Monica Castaneda, Maritza Jiminez, Sebastian Zapata, Carlos J. Franco & Isaac Dyer, *Myths and Facts of the Utility Death Spiral*, 110 ENERGY POL'Y 105, 115 (2017); Pranshu Verma, *Public Transit Officials Fear Virus Could Send Systems into 'Death Spiral'*, N.Y. TIMES, <https://www.nytimes.com/2020/07/19/us/coronavirus-public-transit.html> [<https://perma.cc/4KU9-AYQ4> (staff-uploaded, dark archive)] (last updated Aug. 15, 2020).

239. Jackson attempted to stem the migration by annexing surrounding unincorporated areas, but Mississippi provides judicial review of annexation by statute. The Mississippi Supreme Court held

b. “Unbearable” Life in a City Without Water

The “intensifying impacts of a changing climate . . . deliver[ed] a final blow” for Jackson’s W&S System, leaving the city without running water for over a month.²⁴⁰ Yet, even when it “worked,” the system performed so poorly that residents had to spend hundreds of dollars on bottled water to avoid the “infected” city supply.²⁴¹

Despite consistent rate increases, “[t]he city’s water infrastructure has languished for decades because there isn’t enough tax revenue or state funds to pay for essential upgrades,” resulting in a \$2 billion investment backlog.²⁴² Yet, in part reflecting revenue bond contractual protections, during the crisis, residents continued to receive bills, with some charged as much as \$4,000.²⁴³

Following the crisis, Jackson was forced to appoint a third-party operator for the water system, which has mandated further rate increases.²⁴⁴ The situation has not been helped by Jackson’s “sour relationship with the state,”²⁴⁵ as “[o]ngoing tensions . . . have only made infrastructure upgrades more challenging.”²⁴⁶

One group that did not experience much pain? Jackson’s revenue bond investors. In fact, following the water crisis, Jackson’s water & sewer bonds traded around 101.5 cents-on-the-dollar—reflecting confidence that the system

that the need to raise the revenue base was not a reasonable basis for annexation. *See* Bunch v. City of Jackson (*In re* Enlargement & Extension of Mun. Boundaries of the City of Jackson), 691 So. 2d 978, 983–87 (Miss. 1997).

240. Hadas Thier, *Broken by Design: A Special Report on Jackson’s Water System*, PULITZER CTR. (Feb. 22, 2023), <https://pulitzercenter.org/stories/broken-design-special-report-jacksons-water-system> [<https://perma.cc/ZB68-S6VL>].

241. Emmanuel Felton, *Living in a City with No Water: ‘This Is Unbearable,’* WASH. POST (Sept. 3, 2022, 9:11 AM), <https://www.washingtonpost.com/nation/2022/09/03/jackson-mississippi-water-crisis/> [<https://perma.cc/LC3H-69GJ>] (dark archive).

242. Benji Jones, *How Jackson, Mississippi, Ran Out of Water*, VOX, <https://www.vox.com/2022/8/31/23329604/jackson-mississippi-water-crisis> [<https://perma.cc/9VUH-SQWK>] [hereinafter Jones, *How Jackson, Mississippi, Ran Out of Water*] (last updated Sept. 1, 2022, 9:29 AM).

243. Ellis, *supra* note 215.

244. Stipulated Order on Sewer System at 10, 17, United States v. City of Jackson, No. 12-cv-790 (S.D. Miss. July 26, 2023), Doc. No. 36-1. Following the crisis, Jackson must raise water rates by 8% each year and sewer rates by 6% each year for two years, with even sharper increases recommended after that. Nathan Clark, *Jackson Water Rates Must Increase, Study Finds Ahead of Council Vote in Favor*, MLIVE (May 24, 2023, 1:07 PM), <https://www.mlive.com/news/jackson/2023/05/jackson-water-rates-must-increase-study-finds-ahead-of-council-vote-in-favor.html> [<https://perma.cc/UW9F-44Z2>]; BAKER TILLY MUN. ADVISORS, CITY OF JACKSON SEWAGE FUND – RATE STUDY 18 (2023), <https://cityofjackson.diligent.community/document/f48b30e8-e7da-4b62-a338-478adca07882/> [<https://perma.cc/2E3B-6K5K>].

245. Ross Reily, *Jackson Third-Party Water Manager Says Talks with MS Leaders Keep Him from Getting Work Done*, MISS. CLARION LEDGER, <https://www.clarionledger.com/story/news/2023/03/07/jackson-ms-water-manager-ms-governor-tate-reeves-at-odds-over-jackson-water-crisis/69980123007/> [<https://perma.cc/Y9FD-XVLX>] (last updated Mar. 7, 2023, 6:35 PM) (quoting Jackson Water System third-party manager, Ted Henifin).

246. Jones, *How Jackson, Mississippi, Ran Out of Water*, *supra* note 242.

would continue to charge residents, guaranteeing investors full repayment, no matter what.²⁴⁷

2. Puerto Rico Energy Crises

Over the past decade, Puerto Rico's electric infrastructure has lurched from crisis to crisis with regular blackouts, sky-high bills, and a public utility mired in financial distress.²⁴⁸ Many of Puerto Rico's woes have significant parallels to Jackson's, including large and complex obligations, adverse demographic shifts, and acute climate change exposure. An important distinction, however, is the interplay between Puerto Rico's energy challenges and the territory's broader debt crisis and \$70 billion debt restructuring pursuant to the newly enacted Puerto Rico Oversight, Management, and Economic Stability Act ("PROMESA").²⁴⁹ Extensive litigation with investors has complicated the restructuring process, but may ultimately prove impactful due to important decisions, including key matters concerning revenue bonds.²⁵⁰

a. *The Puerto Rico Electric Power Authority*

The Puerto Rico Electric Power Authority ("PREPA"), the largest United States public utility, is an integrated monopoly provider of power for the entire island of Puerto Rico.²⁵¹ PREPA has something of a troubled history, including EPA consent decrees,²⁵² a multibillion-dollar oil corruption scandal,²⁵³ and deep

247. Municipal Securities Rulemaking Board data shows five trades on September 16, 2022, between 101.2 and 101.497. *City of Jackson Mississippi Water and Sewer System Revenue Refunding Bonds Series 2016*, ELEC. MUN. MKT. ACCESS, <https://emma.msrb.org/Security/Details/AAD4903AEFEC15B3FEA1AC15069886AFA> [perma.cc/4358-N7XB (staff-uploaded archive)].

248. See *infra* Section III.B.2.b.

249. D. ANDREW AUSTIN, CONG. RSCH. SERV., R46788, PUERTO RICO'S PUBLIC DEBTS: ACCUMULATION AND RESTRUCTURING 1–10 (2021); Puerto Rico Oversight, Management, and Economic Stability Act, Pub. L. No. 114-187, 130 Stat. 549 (2016) (codified as 48 U.S.C. §§ 2101–2241).

250. See *infra* Section III.B.3.

251. FIN. OVERSIGHT & MGMT. BD. FOR P.R., 2023 CERTIFIED FISCAL PLAN FOR THE PUERTO RICO ELECTRIC POWER AUTHORITY 23–30 (2023), <https://drive.google.com/file/d/1aqXCP728HU7s7uE1Ys-nHvchnJ85dvIJ/view> [https://perma.cc/N9EB-W3KV (staff-uploaded archive)].

252. Mary Williams Marsh, *At Puerto Rico's Power Company, A Recipe for Toxic Air, and Debt*, N.Y. TIMES (Feb. 15, 2016), <https://www.nytimes.com/2016/02/16/business/dealbook/at-puerto-ricos-power-company-a-recipe-for-toxic-air-and-debt.html> [https://perma.cc/Q947-C3LF (staff-uploaded, dark archive)].

253. Alex Nussbaum, *Big Oil Traders Accused of Bilking Puerto Rico's Power Utility*, BLOOMBERG, <https://www.bloomberg.com/news/articles/2019-04-24/big-oil-traders-accused-of-cheating-puerto-rico-s-power-utility?ref=OOpRUZ8l> [https://perma.cc/S694-4AE9 (staff-uploaded, dark archive)] (last updated Apr. 24, 2019, 10:39 AM). The scandal involved a fraudulent scheme whereby PREPA purchased "low-quality oil at high-quality prices" for a period that may have stretched "as long as 30 years." TOM SANZILLO & CATHY KUNKEL, INST. FOR ENERGY ECON. & FIN. ANALYSIS,

financial challenges, with a nearly \$9 billion debt load, including \$8 billion of revenue bonds.²⁵⁴

This debt load has been the crux of PREPA's problems, hindering urgently needed capital investments. The result has been a dangerously outdated system relying on environmentally destructive technology, including using carbon-intensive fuel oil for generation.²⁵⁵ Further, despite charging some of the highest electricity rates in the country, PREPA's systems "suffer outages at about 12 times the frequency of utilities on the U.S. mainland,"²⁵⁶ creating a significant headwind for the island's economic development and growth.

By 2014, PREPA's challenges grew too much to bear, requiring it to seek forbearance from creditors.²⁵⁷ The following year, PREPA reached a preliminary accord with creditors, but failed to gain meaningful concessions from revenue bond investors, with the instruments' unique legal protections creating a persistent and seemingly-intractable roadblock that hindered every step of PREPA's decade-long restructuring efforts, resulting in countless rounds of creditor negotiations and short-term accords often lasting as little as

MULTIBILLION-DOLLAR OIL SCANDAL GOES UNADDRESSED IN PREPA CONTRACT REFORM AND PRIVATIZATION 2 (2018), https://ieefa.org/wp-content/uploads/2018/07/Multibillion-Dollar-Oil-Scandal-Goes-Unaddressed-in-PREPA-Contract-Reform-and-Privatization-_July-2018.pdf [<https://perma.cc/CJ5R-J6HJ>].

254. Mary Williams Walsh, *Puerto Rico's Power Authority Effectively Files for Bankruptcy*, N.Y. TIMES (July 2, 2017), <https://www.nytimes.com/2017/07/02/business/puerto-ricos-electric-power-authority-effectively-files-for-bankruptcy.html> [<https://perma.cc/7ZQY-HZLD> (staff-uploaded, dark archive)]; *Fitch Affirms and Withdraws Puerto Rico Electric Power Authority's 'D' Ratings*, FITCHRATINGS (July 5, 2023, 5:15 PM), <https://www.fitchratings.com/research/us-public-finance/fitch-affirms-withdraws-puerto-rico-electric-power-authority-d-ratings-05-07-2023> [<https://perma.cc/3SUL-S6NS>] (noting that PREPA has \$8.3 billion of power revenue bonds).

255. *Puerto Rico Territory Energy Profile*, U.S. ENERGY INFO. ADMIN., <https://www.eia.gov/state/print.php?sid=RQ> [<https://perma.cc/UZD5-D7ZE>] (last updated Jan. 19, 2023) ("Puerto Rico's reliance on petroleum as a fuel for electricity generation contributes to the island having a higher average electricity price than any U.S. state, except for Hawaii."). PREPA was unable to pay for fuel starting in 2014 and filed for a form of quasi-bankruptcy protection under the PROMESA legislation in 2017, as they were unable to utilize the bankruptcy code. Walsh, *supra* note 254. PROMESA established a so-called Oversight Board responsible for shepherding the Puerto Rico restructuring. *Id.*; see also Daniel Gross, *Why Is Puerto Rico Burning Oil To Generate Electricity?*, SLATE (May 30, 2014, 11:25 AM), <https://slate.com/business/2014/05/puerto-rico-is-burning-oil-to-generate-electricity-its-completely-insane.html> [<https://perma.cc/P9MR-5GRS>] ("Among these many options [to generate electricity], none possesses the lethal combination of high costs and deleterious environmental impact that torching petroleum does.").

256. See Nussbaum, *supra* note 253; see also FIN. OVERSIGHT & MGMT. BD. FOR P.R., 2021 FISCAL PLAN FOR THE PUERTO RICO ELECTRIC POWER AUTHORITY 20 (2021), <https://drive.google.com/file/d/1dXFJldZpOIsAObMZDBd7T2P3j2xMPaal/view> [<https://perma.cc/VG4V-LLPS>] ("The average PREPA customer loses power at least once every 5 to 6 weeks, compared to 1 to 2 times per year for the mainland customers.").

257. *Fitch Maintains Negative Watch on Puerto Rico Electric Power Auth's Rev Bonds*, FITCHRATINGS (Sept. 15, 2014, 4:38 PM), <https://www.fitchratings.com/research/us-public-finance/fitch-maintains-negative-watch-on-puerto-rico-electric-power-auth-rev-bonds-15-09-2014> [<https://perma.cc/R7E6-SSDK>].

a week.²⁵⁸ In 2017, PREPA initiated a proceeding under the PROMESA legislation.²⁵⁹

b. PREPA's Distress & PROMESA

Later in 2017, shortly after PREPA's PROMESA filing, Puerto Rico was devastated by near–Category 5 Hurricane Maria, which left thousands dead and damaged most of PREPA's infrastructure, with repairs taking nearly a full year.²⁶⁰ Despite government commitments to reform,²⁶¹ Puerto Ricans continue to experience blackouts following storms, and sometimes “with no bad weather in sight.”²⁶²

Despite the devastation and glaring need for climate-resilient investment,²⁶³ the limited legal precedent for impairing special revenue bonds

258. The 2015 accord contemplated bondholders receiving 85% of their claims in the form of new securitization notes. Robert Walton, *Puerto Rico's Electric Utility PREPA Reaches Deal with Bondholders*, UTILITY DIVE (Sept. 3, 2015), <https://www.utilitydive.com/news/puerto-ricos-electric-utility-prepa-reaches-deal-with-bondholders/405033/> [https://perma.cc/N38Y-6N46]. In contrast, a 2023 plan from the FOMB proposed to pay some investors the equivalent of about 12.5 cents on the dollar. Third Amended Title III Plan of Adjustment of the Puerto Rico Electric Power Authority at 5, *In re Fin. Oversight & Mgmt. Bd. P.R.*, No. 17-BK-3283 (D.P.R. Aug. 25, 2023), Doc. No. 3918; see also Danielle Moran & Michelle Kaske, *Puerto Rico Electric Power Bonds Fall on Proposed Debt Deal*, BLOOMBERG (Aug. 28, 2023, 3:35 PM), <https://www.bloomberg.com/news/articles/2023-08-28/puerto-rico-electric-power-bonds-fall-on-proposed-debt-deal> [https://perma.cc/Z5BB-C8PL (staff-uploaded, dark archive)].

259. PREPA's situation was further complicated by Puerto Rico's ineligibility for Chapter 9 bankruptcy relief due to its status as a territory, rather than a state. See *Puerto Rico v. Franklin Cal. Tax-Free Tr.*, 579 U.S. 115, 125 (2016) (holding Puerto Rico Public Corporations Debt Enforcement and Recovery Act preempted by a provision of Chapter 9 of the Bankruptcy Code, invalidating any “State” law purporting to implement a nonconsensual “method of composition” of a municipality's debts). The Court's holding is notwithstanding that Puerto Rico is not a state and even though Puerto Rico's municipalities are not eligible to file for relief under Chapter 9. *Id.* See generally John A.E. Pottow, *What Bankruptcy Law Can and Cannot Do for Puerto Rico*, 85 REV. JUR. U.P.R. 689 (2016) (outlining the constraints of the Bankruptcy Code as applied to Puerto Rico).

260. Adrian Florido, *2 Years After Hurricane Maria Hit Puerto Rico, The Exact Death Toll Remains Unknown*, NPR (Sept. 24, 2019, 4:24 PM), <https://www.npr.org/2019/09/24/763958799/2-years-after-hurricane-maria-hit-puerto-rico-the-exact-death-toll-remains-unkno> [https://perma.cc/8V9T-8SKH]; Frances Robles, *Puerto Rico Spent 11 Months Turning the Power Back On. They Finally Got to Her.*, N.Y. TIMES (Aug. 14, 2018), <https://www.nytimes.com/2018/08/14/us/puerto-rico-electricity-power.html> [https://perma.cc/49LH-BU9R (staff-uploaded, dark archive)].

261. See Andrew Scurria, *Puerto Rico Moves To Privatize Bankrupt Power Authority*, WALL ST. J., <https://www.wsj.com/articles/puerto-rico-moves-to-privatize-bankrupt-power-authority-1516664422> [https://perma.cc/VAM6-VNS8 (staff-uploaded, dark archive)] (last updated Jan. 22, 2018, 10:27 PM).

262. Laura N. Pérez Sánchez & Patricia Mazzei, *On Anniversary of Hurricane Maria, Storm Leaves Puerto Rico in the Dark*, N.Y. TIMES, <https://www.nytimes.com/2022/09/19/us/puerto-rico-power-hurricane-fiona.html> [https://perma.cc/QDR5-43A5 (staff-uploaded, dark archive)] (last updated Sept. 20, 2022). In September 2022, almost exactly five years after Maria, the far milder Hurricane Fiona once again left much of the island without water or power. *Id.*

263. In contrast to Chapter 11 corporate bankruptcy, which facilitates debt reduction toward a “feasible” level, see 11 U.S.C. § 1129(a)(11), the terms of PREPA's initial transaction in 2016

meant investors had little reason to provide concessions, preventing PREPA from reducing its debts.²⁶⁴ Yet, resolution of PREPA's challenges is critical for Puerto Rico's revitalization and energy sector modernization—including an ambitious 100% renewable energy target by 2050.²⁶⁵

By September 2022, PREPA's debt restructuring went to mediation between bond investors and the Puerto Rico Financial Oversight & Management Board ("FOMB"), a federally appointed body established under PROMESA.²⁶⁶ In December 2022, the FOMB filed an amended bankruptcy plan to cut PREPA's debt load by about 40%.²⁶⁷ As FOMB Chair Professor David Skeel explained, the plan was intended to "end PREPA's bankruptcy" and right-size its capital structure to make electricity more affordable for island residents.²⁶⁸ Yet, while the Commonwealth of Puerto Rico itself exited its PROMESA proceedings in March 2022, as of early 2024, PREPA's decade-long odyssey of investor legal disputes continued.²⁶⁹

contemplated a 15% reduction in obligations, far short of the relief needed, as evidenced by subsequent terms pushing for a reduction closer to 40%. Compare Restructuring Order at 77, *In re* Petition for Approval of Transition Order Filed by the PREPA Revitalization Corp., No. CEPR-AP-2016-0001 (P.R. Energy Comm'n 2016), <https://energia.pr.gov/wp-content/uploads/sites/7/2016/06/21-junio-2016-Restructuring-Order-English-1.pdf> [<https://perma.cc/A6T8-SCPS> (staff-uploaded archive)], with Title III Plan of Adjustment of the Puerto Rico Electric Power Authority at 14, *In re* Fin. Oversight & Mgmt. Bd. for P.R., No. 17-BK-3283 (D.P.R. Dec. 16, 2022), Doc. No. 23094.

264. William D. Cohan, *A Restructuring Deal That Helps Investors, Not Puerto Rico*, N.Y. TIMES (June 23, 2017), <https://www.nytimes.com/2017/06/23/business/dealbook/a-restructuring-deal-that-helps-investors-not-puerto-rico.html> [<https://perma.cc/3S5X-CRB5> (staff-uploaded, dark archive)] ("In other words, if the restructuring deal as proposed is approved, Prepa's customers—both consumers and businesses—effectively will be taxed in order for the hedge funds and other creditors that bought the bonds at a discount to make a profit. That's a profit that cannot be renegotiated if Prepa again finds itself in financial distress down the road because the new revenue generated from the surcharge will be placed in a new, bankruptcy-remote entity for the creditors' benefit.")

265. *Puerto Rico Grid Recovery and Modernization*, U.S. DEP'T ENERGY GRID DEPLOYMENT OFF., <https://www.energy.gov/gdo/puerto-rico-grid-recovery-and-modernization> [<https://perma.cc/69CC-QX98>].

266. The FOMB had proposed the equivalent of a recovery of about 70 cents-on-the-dollar while creditors pushed for 78.4. P.R. ELEC. POWER AUTH., SUMMARY OF MATERIALS EXCHANGED IN MEDIATION 2–3 (2022), <https://jayfonseca.com/wp-content/uploads/2022/10/FOMB-PREPA-Mediation-documents.pdf> [<https://perma.cc/7AZV-DDV9>].

267. Michelle Kaske, *Puerto Rico Power Utility Plan To Cut Debt by 40%*, BLOOMBERG (Dec. 17, 2022, 12:32 PM), <https://www.bloomberg.com/news/articles/2022-12-17/puerto-rico-board-seeking-to-cut-power-utility-s-9-billion-of-debt> [<https://perma.cc/5PNH-S7N6> (staff-uploaded, dark archive)]; see Title III Plan of Adjustment of the Puerto Rico Electric Power Authority at 14, *In re* Fin. Oversight & Mgmt. Bd. for P.R., No. 17-BK-3283 (D.P.R. Dec. 16, 2022), Doc. No. 23094.

268. David Skeel, *FOMB Chairman David Skeel's Message on PREPA's Plan of Adjustment*, YOUTUBE, at 0:53 (Dec. 16, 2022), <https://www.youtube.com/watch?v=dKTT0idZdn0> [<https://perma.cc/5L2Q-Z8SL>].

269. Lorae Stojanovic & David Wessel, *Puerto Rico's Bankruptcy: Where Do Things Stand Today?*, BROOKINGS INST. (Aug. 17, 2022), <https://www.brookings.edu/articles/puerto-ricos-bankruptcy->

3. Revenue Bond Decisions: Glimmers of Hope?

Two important decisions from the broader Puerto Rico insolvency proceedings may prove highly impactful for PREPA and potentially other financially challenged revenue bond issuers.

First, a 2019 decision concerning Puerto Rico’s highway authority (the “2019 HTA Decision”), another large revenue bond issuer, pared back the prevailing interpretation of Section 922 of the Bankruptcy Code as requiring a municipal debtor to continue paying special revenue obligations during Chapter 9.²⁷⁰ In the 2019 HTA Decision, the First Circuit determined that special revenue bondholders could not compel the debtor to apply special revenues to debt service (though the debtor could do so voluntarily),²⁷¹ allowing the issuer to conserve capital during bankruptcy.²⁷² Arguably, this approach also more closely parallels the protections afforded to a corporate debtor by the bankruptcy “automatic stay.”²⁷³

Perhaps even more significantly, a 2023 decision specific to PREPA appears to have opened the door to reducing revenue bond obligations through bankruptcy.²⁷⁴ Contrary to PREPA’s bondholders’ assertion that the bonds are “secured by all of PREPA’s current and future revenues, to which they can look for payment in perpetuity,”²⁷⁵ presiding Judge Laura Swain found the scope of security to be limited to specific reserve funds, with the balance representing an unsecured claim against PREPA’s net revenues.²⁷⁶ The

where-do-things-stand-today/ [https://perma.cc/T8DE-3345]; Michelle Kaske & Jim Wyss, *Puerto Rico’s Troubled Power Utility Faces Make-or-Break Moment*, BLOOMBERG (Nov. 28, 2022, 11:00AM), <https://www.bloomberg.com/news/articles/2022-11-28/a-decisive-moment-for-puerto-rico-s-broken-power-utility-is-at-hand> [https://perma.cc/4YS8-A5YE (staff-uploaded, dark archive)].

270. *In re Fin. Oversight & Mgmt. Bd. for P.R.*, 919 F.3d 121, 130 (1st Cir. 2019).

271. *Id.* (“Section 922(d)’s plain language . . . permits a debtor to pay creditors voluntarily during the pendency of the bankruptcy case and allows a secured claimholder to apply special revenues in its possession to pre-petition debt Nothing in the statute’s plain language, however, addresses actions to enforce liens on special revenues, which are specifically stayed [under] the Bankruptcy Code, or allows for the compelling of debtors, or third parties holding special revenues, to apply special revenues to outstanding obligations.”).

272. Issuers unable to provide service—such as Jackson’s W&S System, for instance—may also have a basis for reducing charges to constituents during the case.

273. *See supra* notes 168–77 and accompanying text.

274. *See In re Fin. Oversight & Mgmt. Bd. for P.R.*, 649 B.R. 381, 393–94 (D.P.R. 2023). Though a broader analysis of this important decision is beyond the scope of this Article, it is important to point out that the holding does appear to have upended market expectations considerably. This suggests that a legislative solution may ultimately be warranted for addressing the practical revenue bond challenges identified in the PREPA case, particularly in light of congressional expectations and intent with respect to the 1988 Amendments.

275. *Id.*

276. Judge Swain held that “[t]he bondholders have no currently enforceable security interest (indeed, they have no interest at all) in future revenues the Authority has not yet received and deposited into the Sinking Fund or other Funds in which the Trust Agreement specifically grants them interests.” *Id.*

ruling, if upheld on appeal, could provide troubled utilities greater flexibility to reduce revenue bond obligations in bankruptcy, though some, including a group of state attorneys general, have argued it could “threaten the continued viability of the primary revenue stream for vast swaths of municipal public works projects.”²⁷⁷

IV. TOWARD AN EQUITABLE INFRASTRUCTURE PARADIGM

For the United States, infrastructure policy presents both a critical challenge as well as an unprecedented opportunity to rectify past wrongs while building a better future. Indeed, “[w]hen we invest in infrastructure, we’re really investing in opportunity. . . . [It] protects health, cleans up the environment, and helps us fight climate change.”²⁷⁸

However, a history of crises, multitrillion-dollar underinvestment, and systematic racial inequities illustrates the failure of our current model and need for a new approach: an equitable infrastructure paradigm for the twenty-first century. In many respects, policy is starting to move in this direction, with the Biden administration recently passing significant infrastructure-related legislation.²⁷⁹ Yet, the factors that have made infrastructure policy so difficult not only remain, but are exacerbated by a backdrop of unprecedented polarization, compounding the critical challenges that must be addressed to ensure successful policy implementation.

Part IV proceeds in three sections, focusing on: (i) Biden’s “Infrastructure New Deal,” particularly with respect to the contemplated federal role expansion; (ii) empirical and legislative analysis of IIJA and IRA structure, financial profile, and limitations; and (iii) discussion of likely challenges, risks, and mitigation strategies.

A. Biden’s “Infrastructure New Deal”

Though often underappreciated,²⁸⁰ the Biden administration’s agenda represents a fundamental evolution of the prevailing federalist infrastructure construct.²⁸¹ Taken together, recent legislative actions—including the

277. Brief of the Commonwealth of Virginia and 13 Other States as Amici Curiae in Support of Defendants-Appellants, *supra* note 188, at 4.

278. Remarks on the Infrastructure Investment and Jobs Act, 2022 DAILY COMP. PRES. DOC. 1 (Jan. 14, 2022).

279. *See infra* Section IV.A.

280. *See, e.g.*, Timothy Puko, *Biden Infrastructure Plan Draws Attacks from Right, Left*, WALL ST. J. (Apr. 4, 2021, 4:10 PM), <https://www.wsj.com/articles/biden-infrastructure-plan-draws-attacks-from-right-left-11617565108> [<https://perma.cc/39C5-2JXC> (staff-uploaded, dark archive)].

281. Derek Brower, James Politi & Amanda Chu, *The New Era of Big Government: Biden Rewrites the Rules of Economic Policy*, FIN. TIMES (July 12, 2023), <https://www.ft.com/content/1c6be863-e147->

Infrastructure Investment and Jobs Act (“IIJA”),²⁸² the Inflation Reduction Act (“IRA”),²⁸³ and other measures²⁸⁴—reflect what may be termed an “Infrastructure New Deal,” predicated on the federal government reasserting a leadership role it has not held for more than half a century.

As a practical matter, given the scale of long-standing challenges, it appears difficult to conceptualize a solution set without an expanded federal infrastructure role. Yet, while largely constructive, this shift also corresponds to a de facto re-allocation of significant powers currently held by the states, inherently implicating complex constitutional, political, and practical dimensions. This appears particularly fraught in an environment of polarization and partisanship scholars have described as a “proxy war” filtering from Washington “down to the states.”²⁸⁵ Thus, to succeed, the Infrastructure New Deal must not unduly displace other levels of government, but instead leverage their comparative advantages—all while realizing the unmistakable benefits of federal government leadership.

A first-order benefit of a larger federal role is rectifying aspects of the “hyperlocal” allocation of infrastructure responsibility to local governments often ill-equipped to tackle the costs and complexities of climate change.²⁸⁶ In this arena, the federal government’s scale and scope offer distinctive advantages.²⁸⁷ Perhaps most importantly, all things being equal, the federal government will generally have a lower cost of capital than individual states or local units of government, making projects with federal dollars less expensive for end users.²⁸⁸

4799-a650-fe3569549295 [https://perma.cc/457D-XP7Y (staff-uploaded, dark archive)] (noting that Biden legislative actions “represent a profound shift in economic thinking in America” that goes “well beyond [an] immediate impact on specific industries”).

282. Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, 135 Stat. 429 (2021) (codified as amended in scattered sections of 23 U.S.C.).

283. Act of Aug. 16, 2022, Pub. L. No. 117-169, 136 Stat. 1818 (2022) (codified as amended in scattered sections of 26 U.S.C.).

284. See, e.g., Chips and Science Act, Pub. L. No. 117-167, 136 Stat. 1366 (2022) (codified as amended in scattered sections of 15 U.S.C.).

285. Charlie Savage & Jack Healy, *Fight over Texas Law Underscores a Battle of America vs. Its States*, N.Y. TIMES (Mar. 20, 2024), <https://www.nytimes.com/2024/03/20/us/politics/texas-law-states-immigration-migrants.html> [https://perma.cc/6ESU-DKBT (staff-uploaded, dark archive)].

286. See Christopher Flavelle, *Tiny Town, Big Decision: What Are We Willing To Pay To Fight the Rising Sea?*, N.Y. TIMES (Mar. 14, 2021), <https://www.nytimes.com/2021/03/14/climate/outer-banks-tax-climate-change.html> [https://perma.cc/9RHA-3NAL (staff-uploaded, dark archive)].

287. As a related matter, given the complex and diffuse nature of underlying externalities, it is unclear if competing levels of government would optimally allocate infrastructure resources. Indeed, the federal government may be best incentivized given its inherently nationwide stakeholder base and constitutional interstate commerce role. See Charles R. Hulten & Robert M. Schwab, *A Fiscal Federalism Approach to Infrastructure Policy*, 27 J. REG’L SCI. & URB. ECON. 139, 155–56 (1997).

288. HUNTER BLAIR, ECON. POL’Y INST., WHAT IS THE IDEAL MIX OF FEDERAL, STATE, AND LOCAL GOVERNMENT INVESTMENT IN INFRASTRUCTURE? 15–16 (2017), <https://files.epi.org>

Federal agencies, like the Department of Transportation (“DoT”) and the Department of Energy (“DoE”), also appear well-situated to develop and leverage expertise around infrastructure analysis, planning, and development.²⁸⁹ And, more broadly, a nationwide vantage point may help assess program performance in light of emissions targets and other objectives.²⁹⁰

At the same time, because infrastructure policy is closely linked to the inherently global issues of climate change, it necessitates leadership from the national government.²⁹¹ Particularly given the United States’ pivotal role in the world economy, multilateral institutions, and initiatives like the Paris Accords, the federal government must lead—not just domestically, but also on a global level.²⁹²

Finally, it is imperative that the Infrastructure New Deal does not repeat past mistakes, and unambiguously emphasizes equity and socio-economic justice for all communities. Scholars have rightly questioned whether “states that contributed to . . . inequities can be trusted to make decisions to right those wrongs.”²⁹³ Indeed, Jackson’s fraught relationship with the State of Mississippi illustrates the persistence of intergovernmental conflicts as well as the need for a fair and effective arbiter attuned to broader policy goals. From that perspective, the federal government appears best positioned for ensuring allocative equity and sufficient support for historically marginalized communities.²⁹⁴

/pdf/133917.pdf [https://perma.cc/K32L-BSHS] (“[T]here isn’t any particular reason to believe that financing of infrastructure by states or localities is more efficient than federal financing.”).

289. For instance, certain agencies such as the EPA may get exposure to a broader range of similar projects than any particular state agency, allowing for potentially transferable insights and incentives to develop institutional expertise. *See id.* at 17.

290. This is particularly pronounced because the United States is party to the Paris Accords and other global initiatives through the federal government, rather than the states, creating the potential for a disconnect in coordination. *See supra* note 85.

291. *See* Cary Coglianese & Jocelyn D’Ambrosio, *Policymaking Under Pressure: The Perils of Incremental Responses to Climate Change*, 40 CONN. L. REV. 1411, 1418 (2008).

292. Cary Coglianese & Shana Starobin, Opinion, *Let’s Be Real About State and Local Climate Action*, REGUL. REV. (Feb. 20, 2018), <https://www.theregreview.org/2018/02/20/coglianese-starobin-state-local-climate-action/> [https://perma.cc/948D-JU5T] (“[A] global problem like climate change will be best addressed through action at the broadest and highest governance level possible.”).

293. Andrea K. McDaniels, *Will Biden’s Infrastructure Bill Address the Legacy of Racist Transportation Policies?*, JOHNS HOPKINS BLOOMBERG SCH. PUB. HEALTH (Jan. 14, 2022), <https://publichealth.jhu.edu/2022/will-bidens-infrastructure-bill-address-the-legacy-of-racist-transportation-policies> [https://perma.cc/SP5C-Y8TU].

294. Brentin Mock & Hadriana Lowenkron, *The Infrastructure Bill Is a Trillion-Dollar Test for Environmental Justice*, BLOOMBERG (Aug. 11, 2021, 9:31 AM), <https://www.bloomberg.com/news/articles/2021-08-11/an-infrastructure-bill-built-on-environmental-justice> [http://perma.cc/SVA4-R5R6 (staff-uploaded, dark archive)].

B. *Key Legislation*

The Biden administration's Infrastructure New Deal encompasses a portfolio of legislation representing substantial—albeit inherently imperfect—steps forward for infrastructure (under the IIJA), climate change (under the IRA), and closely related matters. The legislation broadly contemplates implementation and allocation of funds through federal agencies, with the DoT responsible for allocating a plurality of IIJA funding²⁹⁵ and the DoE slated to take the lead under the IRA.²⁹⁶ However, notwithstanding the logic of substantial federal agency roles, the implementation must be carefully calibrated to mitigate jurisdictional frictions as well as associated legal and execution risks.

1. The Infrastructure Investment and Jobs Act (IIJA)

The IIJA represents the first broad-based federal infrastructure legislation in decades, with significant capital allocations to transportation, water systems, and the electric grid. Operationally, the IIJA relies on administrative agencies—particularly the DoT—to allocate the majority of funding through a combination of grants, loans, and guarantees.²⁹⁷

As a practical matter, the IIJA is best viewed as a start—not an end point—to resolving U.S. infrastructure challenges. Though often reported with a \$1.2 trillion headline figure, in reality the legislation provides about \$550 billion of new capital over the next decade, with the balance reflecting previously earmarked funds.²⁹⁸ Table 3 below details the IIJA's expected impact by category relative to the infrastructure funding gap estimated by the American Society of Civil Engineers.²⁹⁹ In the aggregate, the IIJA is estimated to fill less than 20% of the total shortfall, with the relative impact higher for certain categories, including waterways, ports, and electric grids, but lower for others such as surface transportation and water systems.³⁰⁰

295. *See infra* Section IV.B.1.

296. *See infra* Section IV.B.2.

297. Justin Badlam, Tony D'Emidio, Rob Dunn, Adi Kumar & Sara O'Rourke, *The US Bipartisan Infrastructure Law: Breaking It Down*, MCKINSEY & CO. (Nov. 12, 2021), <https://www.mckinsey.com/industries/public-sector/our-insights/the-us-bipartisan-infrastructure-law-breaking-it-down> [<https://perma.cc/27UU-XYVC>] [hereinafter Badlam et al., *Bipartisan Infrastructure Law*].

298. Heather Long, *What's in the \$1.2 Trillion Infrastructure Law*, WASH. POST, <https://www.washingtonpost.com/business/2021/08/10/senate-infrastructure-bill-what-is-in-it/> [<https://perma.cc/8XJS-TG2T> (dark archive)] (last updated Nov. 16, 2021, 11:27 AM) (“The infrastructure package contains \$550 billion in entirely new investments, including money for electric-car charging stations and zero-emission school buses.”).

299. *See infra* Table 3.

300. *See infra* Table 3. Notably, some of the \$550 billion of new spending is allocated to categories that are not reflected in the ASCE funding gap estimate. *Infrastructure Investment and Jobs Act (IIJA) Implementation Resources*, GOV'T FIN. OFFICERS ASS'N, <https://www.gfoa.org/the-infrastructure->

Table 3: Infrastructure Investment Gap, Pro Forma Estimated IIJA Impact³⁰¹

	ASCE Estimates (\$Bn)			Pro Forma IIJ Estimates		
	Total Needs	Funding Baseline	Est. Funding Gap	IIJ Funding (\$Bn)	Remaining Funding Gap (\$Bn)	IIJA Funding / Gap (%)
Surface Transportation	2,834	1,619	1,215	224	991	18.4%
Water (incl. waste/storm water)	1,045	611	434	60	374	13.8%
Electricity	637	440	197	73	124	37.1%
Airports	237	126	111	25	86	22.5%
Inland Waterways & Marine Ports	42	17	25	16	9	64.0%
Dams	94	13	81	-	81	0.0%
Hazardous & Solid Waste	21	14	7	-	7	0.0%
Levees	80	10	70	-	70	0.0%
Total (\$ Billions)	4,990	2,850	2,140	398	1,742	18.6%

investment-and-jobs-act-iija-was [<https://perma.cc/7TWP-WMA4>]; AM. SOC'Y OF CIV. ENG'RS, *supra* note 4.

301. Analysis based on review of the 2021 Infrastructure Act, supplemented by third-party analysis cited herein. ASCE estimates exclude data for social infrastructure, including public parks, recreation, and schools. See AM. SOC'Y OF CIV. ENG'RS, *supra* note 4, at 6; *Fact Sheet: President Biden Announces Support for the Bipartisan Infrastructure Framework*, WHITE HOUSE (June 24, 2021), <https://www.whitehouse.gov/briefing-room/statements-releases/2021/06/24/fact-sheet-president-biden-announces-support-for-the-bipartisan-infrastructure-framework/> [<https://perma.cc/VQ3U-3X5V>]; Badlam et al., *Bipartisan Infrastructure Law*, *supra* note 297, at 1–7; *At a Glance: What's in the Infrastructure Bill?*, EY, https://www.ey.com/en_us/infrastructure-investment-and-jobs-act [<https://perma.cc/6WAQ-WXT9> (staff-uploaded archive)].

Perhaps more problematic than underwhelming aggregate figures,³⁰² however, is the IJJA's reliance on a relatively murky funding profile, with a Congressional Budget Office analysis finding that the IJJA's contemplated approach could render the Highway Trust Fund insolvent by 2033.³⁰³ That is important because, notwithstanding the generally positive multiplier associated with infrastructure investment, the net economic impact is highly sensitive to funding profile, with the potential for negative economic returns from inapposite policy.³⁰⁴

The IJJA could also benefit from better calibrated allocations of responsibility between federal, state, and local government, based on both historical precedents and comparative advantages. Indeed, implementation has already hit roadblocks with the "administration . . . kind of in a silent war against itself" in balancing speedy provision with other legislative priorities.³⁰⁵ At the same time, notwithstanding the logic of significant administrative agency roles, the IJJA risks overconcentrating important powers. For instance, the DoT's responsibility for allocating more than half of funding, totaling \$274 billion,³⁰⁶ has left state-level counterparts feeling "undercut,"³⁰⁷ exacerbating jurisdictional frictions and threatening project development, capital allocation, and policy objectives.³⁰⁸

302. Li Zhou, *The Bipartisan Infrastructure Law Is Both Historic and Not Nearly Enough*, VOX, <https://www.vox.com/22770447/infrastructure-bill-democrats-biden-water-broadband-roads-buses> [<https://perma.cc/JL7S-FC92>] (last updated Nov. 15, 2021, 4:23 PM) ("[The IJJA] is a massive investment in roads, bridges, and water pipes. But it still falls short of the funding that the country needs").

303. CONG. BUDGET OFF., *BASILINE PROJECTIONS: HIGHWAY TRUST FUND ACCOUNTS 2 (2023)* (estimating \$180 billion and \$60 billion shortfalls in the highway and transit accounts, respectively).

304. See Jon Huntley, *Explainer: Economic Effects of Infrastructure Investment*, PENN WHARTON BUDGET MODEL (June 15, 2021), <https://budgetmodel.wharton.upenn.edu/issues/2021/6/15/economic-effects-of-infrastructure-investment> [<https://perma.cc/SPD2-ENA3>] ("Public infrastructure investment boosts the productivity of private capital and labor, leading to higher output, but this positive effect can be offset if the investment is financed with additional government borrowing," which can have the effect of crowding out private capital thus offsetting productivity gains.).

305. Mark Niquette & Enda Curran, *Billions of Dollars Are Flowing, but Money Alone Can't Fix US Infrastructure*, BLOOMBERG (July 20, 2023, 5:00 AM), <https://www.bloomberg.com/news/articles/2023-07-20/us-infrastructure-bill-spurs-repairs-but-money-alone-isn-t-a-fix?srnd=citylab&oref=OOpRUZ8l> [<https://perma.cc/C3ET-R854> (staff-uploaded, dark archive)].

306. Badlam et al., *Bipartisan Infrastructure Law*, *supra* note 297, at 5.

307. Kate Kelly, *One of the Infrastructure Plan's Biggest Winners is the Pavement You Drive On*, N.Y. TIMES (Feb. 19, 2022), <https://www.nytimes.com/2022/02/19/us/politics/infrastructure-plan-asphalt.html> [<https://perma.cc/N5PS-UB3L> (staff-uploaded, dark archive)] (discussing Federal Highway Administration guidance on project prioritization that state officials felt "undercut them").

308. See *Lawrence Cnty. v. Lead-Deadwood Sch. Dist.*, 469 U.S. 256, 257–58 (1985).

2. The Inflation Reduction Act (IRA)

In August 2022, President Biden signed into law what he described as “the biggest step forward on climate ever”: the Inflation Reduction Act of 2022 (“IRA”),³⁰⁹ which passed through an essentially “party-line vote.”³¹⁰ Though not expressly infrastructure-focused, the IRA represents “the single largest investment in climate and energy in American history”³¹¹ and, when combined with other measures, may prove transformative for the United States’ energy system.³¹²

The IRA legislation lays the financial groundwork for a broad-based, cross-sector transition of America’s economy away from fossil fuels, and toward renewables. Most consequentially, the IRA is expected to be a “decarbonization game changer,”³¹³ estimated to close “two-thirds of the remaining emissions gap between current policy and the nation’s 2030 climate target,” with a cumulative 6.3-billion-ton reduction in greenhouse gas emissions.³¹⁴

While the IRA is expected to have “no meaningful effect on inflation in the near term,” it is estimated to reduce cumulative deficits by as much as \$264 billion over the next decade.³¹⁵ This impact is achieved largely through increased corporate taxes, as shown in Figure 7 below, which is particularly constructive given the IIJA’s funding uncertainties.

309. Remarks on the Inflation Reduction Act of 2022, 2022 DAILY COMP. PRES. DOC. 1 (Aug. 16, 2022); see also Inflation Reduction Act of 2022, Pub. L. No. 117-169, 136 Stat. 1818 (codified as amended in scattered sections of 23, 26, 30, 42 & 43 U.S.C.).

310. Jim Tankersley, *Biden Signs Expansive Health, Climate and Tax Law*, N.Y. TIMES (Aug. 16, 2022), <https://www.nytimes.com/2022/08/16/business/biden-climate-tax-inflation-reduction.html> [<https://perma.cc/2F72-MYV2> (staff-uploaded, dark archive)].

311. LOAN PROGRAMS OFF., *Inflation Reduction Act of 2022*, U.S. DEP’T ENERGY, <https://www.energy.gov/lpo/inflation-reduction-act-2022> [<https://perma.cc/P6DE-7FJ8>] (last updated Sept. 22, 2023).

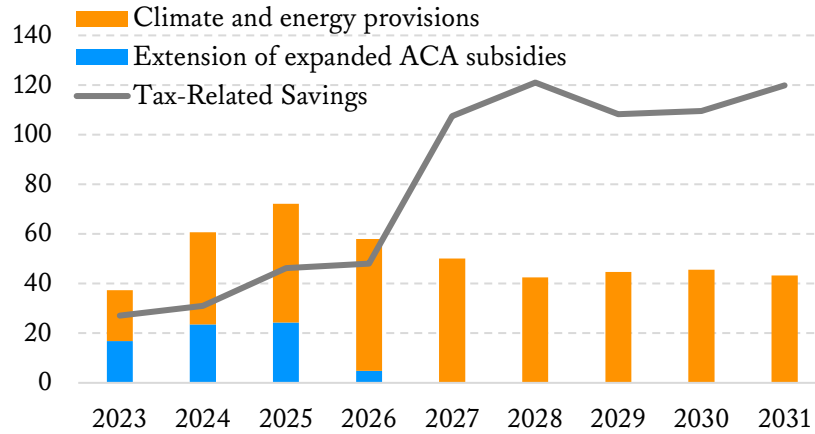
312. See Lev Breydo, *‘Game Changer’ Inflation Reduction Act Estimated To Cut Emissions Policy ‘Gap’ by Two-Thirds, Trim Budget Deficit over \$200B*, ABA: BUS. L. TODAY (Nov. 1, 2022), https://www.americanbar.org/groups/business_law/resources/business-law-today/2022-october/october-2022-in-brief-business-regulation-regulated-industries/ [<https://perma.cc/CZR5-EBUU>]. This blog post was based on and previewed research from this Article.

313. Aaron Denman, Cate Hight & Michael Short, *The Inflation Reduction Act Is a Decarbonization Game Changer*, BAIN & CO. (Oct. 27, 2022), <https://www.bain.com/insights/decarbonization-game-changer/> [<https://perma.cc/2DQD-KXXR>].

314. JESSE D. JENKINS, ERIN N. MAYFIELD, JAMIL FARBES, RYAN JONES, NEHA PATANKAR, QINGYU XU & GREG SCHIVLEY, PRELIMINARY REPORT: THE CLIMATE AND ENERGY IMPACTS OF THE INFLATION REDUCTION ACT OF 2022, at 6 (2022), https://repeatproject.org/docs/REPEAT_IRA_Preliminary_Report_2022-08-04.pdf [<https://perma.cc/3KCT-JALN>].

315. Jon Huntley, John Ricco & Alex Arnon, *Senate-Passed Inflation Reduction Act: Estimates of Budgetary and Macroeconomic Effects*, PENN WHARTON BUDGET MODEL (Aug. 12, 2022), <https://budgetmodel.wharton.upenn.edu/issues/2022/8/12/senate-passed-inflation-reduction-act> [<https://perma.cc/ZC5T-A4M8>].

Figure 7: Inflation Reduction Act, Budget Estimates, FY2022–2031
(\$Bn)³¹⁶



A centerpiece of the IRA legislation is a nearly \$400 billion climate and energy investment allocation, equal to about \$40 to \$50 billion annually, with the funds provided through tax credits, as well as grants and loans, largely administered by the Department of Energy.³¹⁷ The single largest component is \$200 billion—plus of corporate tax incentives “designed to catalyze private investment in clean energy, transport, and manufacturing.”³¹⁸

C. Risks & Mitigation Strategies

Notwithstanding commendable legislative efforts, the path forward for infrastructure policy remains fraught with risks. Many of the issues implicate allocations of power between levels of government, made all the more complicated in an increasingly partisan environment, while other hurdles stem from innate complexities of infrastructure policy. Reflecting these challenges,

316. *Id.* Tax-related savings include minimum corporation book income tax, share repurchase tax, extension excess noncorporation loss limitation, drug pricing reform, and IRS funding.

317. McKinsey estimates \$216 billion of corporate tax incentives, \$43 billion consumer incentives, \$82 billion of grants, and \$40 billion of loans. Justin Badlam, Jared Cox, Adi Kumar, Nehal Mehta, Sara O’Rourke & Julia Silvis, *The Inflation Reduction Act: Here’s What’s in It*, MCKINSEY & CO. (Oct. 24, 2022), <https://www.mckinsey.com/industries/public-sector/our-insights/the-inflation-reduction-act-heres-whats-in-it> [<https://perma.cc/8ELG-HN4B>] [hereinafter Badlam et al., *Inflation Reduction Act*]. Through provisions described as a “sleeping giant” of the legislation, the IRA also provides the increasingly active Department of Energy Loan Programs Office with \$11.7 billion in funding as well as significantly larger lending capacity. Ivan Penn, *Expansion of Clean Energy Loans Is ‘Sleeping Giant’ of Climate Bill*, N.Y. TIMES, <https://www.nytimes.com/2022/08/22/business/energy-environment/biden-climate-bill-energy-loans.html> [<https://perma.cc/AS7M-LCJQ> (staff-uploaded, dark archive)] (last updated Aug. 26, 2022); LOAN PROGRAMS OFF., *supra* note 311 (noting \$11.7 billion allocation for issuing new loans).

318. Badlam et al., *Inflation Reduction Act*, *supra* note 317.

the Biden administration's approach suffers from material uncertainties and limitations, particularly with respect to financial strategy, implementation structure and operational mechanics, which must be addressed to achieve critical policy objectives.

From a financial perspective, critical sets of questions concern project selection, financing strategy, and funding models. With respect to project selection, the emphasis should be productive projects that generate value well in excess of cost while enhancing Americans' lived experience.³¹⁹ Tactically, allocative efficiency, capital cost optimization, and potential private sector engagement can help ensure good use of taxpayer money. At the same time, while capital sufficiency is essential, an equally pressing issue is ensuring a cogent funding profile, for which the IRA presents a viable template, particularly compared to the IJJA's murky arithmetic.

Implementation structure, meanwhile, must ensure a calibrated balance that leverages federal government leadership while ensuring a role for other levels of government that does not render them wholly subordinate. For instance, an approach too closely resembling aspects of New Deal cooperative federalism may not be viable in today's environment, risking unduly displacing prevailing allocations of responsibility and creating execution challenges that complicate policy goals.³²⁰ Thus, as both a legal and practical matter, rather than top-down implementation, the model should take significant care to ensure a sufficient governance and implementation role beyond the federal government.

As a closely related matter, for the Infrastructure New Deal, legislation represents the starting point, with the devil in a decade-plus of implementation. While improved structure is operationally necessary, it is hardly sufficient given the difficulty of maintaining intergovernmental cooperation across the country in a fraught political environment over the course of multiple administrations. Tensions have already flared, but may worsen still, reflecting the inherent challenges of shifting power allocations. In that respect, it is critical for policymakers to ensure clear and consistent communication to all relevant constituencies, while avoiding real or perceived process politicization.

In addressing these challenges, other jurisdictions may offer instructive comparative data points. For instance, Australia—a dual federalist system with significant provincial powers—effectuated a successful large-scale infrastructure plan where provinces were responsible for project selection and

319. One benchmark may be at least meeting the average cumulative 1.5x “multiplier effect” for infrastructure investment, with a focus on projects with a multiplier of 2x and ideally 3x. *See supra* notes 61–64 and accompanying text.

320. Some have characterized the prevailing federalism model as “executive federalism,” with stronger executive power evolving to reflect and navigate otherwise politically gridlocked dynamics. *See* Jessica Bulman-Pozen, *Executive Federalism Comes to America*, 102 VA. L. REV. 953, 954 (2016).

execution, supported and subsidized by federal financial incentives.³²¹ Implementing a similar approach would allow the U.S. federal government to ensure equitable resource support without unnecessarily displacing state-federal divisions of responsibility. Numerous alternate approaches are possible, including for instance, a federal lending facility to favorably refinance smaller infrastructure projects, allowing municipalities to retain decision-making autonomy while freeing up capital for investment.

CONCLUSION

This Article illuminates unexplored policy dynamics, untangling how seemingly unrelated forces—federalism, municipal finance, and environmental racism—interplay with climate change to perpetuate inequitable access to critical shared resources. These long-standing issues are in focus today due to the sheer scale of deficiencies, accelerating climate change, and a growing understanding of the system's inequities. Given the daunting challenges and urgent need for solutions, following the same path is unlikely to yield better outcomes, underscoring the need for an equitable infrastructure paradigm for the twenty-first century.

With its emphasis on a reasserted federal infrastructure role, President Biden's "Infrastructure New Deal" is broadly consistent with that framework. Yet, as illustrated by this Article's empirical and legislative analyses, it suffers from material limitations with respect to financing, structure, and implementation, requiring swift action to meet policy objectives. The silver lining, however, is that challenges notwithstanding, a carefully implemented, forward-thinking infrastructure strategy truly represents a generational opportunity to develop world-leading resources that position the nation for a century of equitable growth and prosperity.

321. The program was called the Australian Asset Recycling Initiative. See INFRASTRUCTURE NSW, 2023–24 STATE INFRASTRUCTURE PLAN 16 (2023), <https://www.infrastructure.nsw.gov.au/> [<https://perma.cc/FLS2-AA2Q> (staff-uploaded archive)]; *Financing Greenfield Infrastructure Through the Sale of Brownfield Infrastructure*, GLOB. INFRASTRUCTURE HUB (Nov. 1, 2021), <https://www.gihub.org/emerging-funding-and-finance/case-studies/financing-greenfield-infrastructure-through-the-sale-of-brownfield-infrastructure/> [<https://perma.cc/5X3Q-TH5N>]; MARSH & MCLENNAN COMPANIES ASIA PACIFIC RISK CTR., INFRASTRUCTURE ASSET RECYCLING: INSIGHTS FOR GOVERNMENTS AND INVESTORS 7–10 (2018), https://www.marsh.com/content/dam/marsh/Documents/PDF/asia/en_asia/Infrastructure_Asset_Recycling_APRC.pdf [<https://perma.cc/GD4T-UW5E>].

