Vanderbilt Journal of Transnational Law

Volume 48
Issue 4 *October 2015*

Article 7

2015

Nuclear Power, Risk, and Retroactivity

Emily Hammond

Nuclear Power, Risk, and Retroactivity

Emily Hammond[*]

ABSTRACT

The 2011 Fukushima nuclear disaster presented a familiar scenario from a risk perception standpoint. It combined a classic "dread risk" (radioactivity), a punctuating event (the disaster itself), and resultant stigmatization (involving worldwide repercussions for nuclear power). Some nuclear nations curtailed nuclear power generation, and decades-old opposition to nuclear power found a renaissance. In these circumstances, risk theory predicts a regulatory knee-jerk response, potentially resulting in inefficient overregulation. But it also suggests procedural palliatives that conveniently overlap with administrative law values, making room for the engagement of the full spectrum of stakeholders. This Article sketches the U.S. regulatory response to Fukushima. From a positive perspective, this story provides a useful case study for understanding administrative agencies' responses to disasters and the concomitant role of risk perception. But this story also invites using an administrative law lens to take a fresh look at the issues of retroactivity and stakeholder engagement. This Article concludes by identifying insights as well as research needs for both regulatory responses to disaster and classic administrative law.

TABLE OF CONTENTS

I. INTRODUCTION

The tragic 2011 Tohuku Earthquake and Tsunami in Japan presented a familiar scenario from a risk perception standpoint. The events combined a classic "dread risk" (radioactivity), a punctuating event (the Fukushima nuclear disaster), and resultant stigmatization (involving worldwide repercussions for nuclear power). [1] The Fukushima disaster revived memories of the Three Mile Island and Chernobyl disasters and provided a reminder of the global interconnectedness of nuclear power. In response, some nations curtailed nuclear power generation, and decades-old opposition to nuclear power found a renaissance.[2] In the United States, Fukushima coincided with increasing concerns about spent-fuel policy that threatened to dampen recent initiatives aimed at a nuclear resurgence.[3]

With much at stake for nuclear power, the Nuclear Regulatory Commission (NRC) quickly appointed a task force to review its regulations and make recommendations in light of lessons learned from Fukushima. [4] The resulting Near-Term Task Force (NTTF) Report concluded that continuing reactor operation would not "pose

---

* Associate Dean for Public Engagement and Professor of Law, The George Washington University Law School. This work was prepared in connection with the Vanderbilt Journal of Transnational Law's 2015 Symposium, *This is Not a Drill: Responding to International Disasters.* I thank the symposium participants and editors, including Lincoln Davies for his thoughtful comments on an earlier draft, as well as Shirley Qin, GWU Law 2016, for her helpful research assistance.

1. *See* Paul Slovic, *Perception of Risk*, 236 SCI. 280, 283–84 (1987) [hereinafter Slovic, *Perception of Risk*]. For discussion of these concepts, see *infra* Part I.

2. *See* Brian Walsh, *Japan Mulls Nuclear Revival Not Even 3 Years After Fukushima*, TIME (Feb. 25, 2014), http://time.com/9684/japan-mulls-nuclear-revival-not-even-3-years-after-fukushima/ [http://perma.cc/8V7Z-DFM8] (archived Sept. 4, 2015) (describing international reactions to Fukushima); *see also* Lincoln L. Davies, *Beyond Fukushima: Disasters, Nuclear Energy, and Energy Law*, 2011 BYU L. REV. 1937, 1938 (2011) ("We flip switches all day long without wondering where our electrons come from, and then there is a Chernobyl, or Three Mile Island, or Fukushima, and anti-nuclear protestors take to the streets.").

3. *See* Emily Hammond & David B. Spence, *The Regulatory Contract in the Marketplace*, 68 VAND. L. REV. (forthcoming) (manuscript at 25, 32), http://ssrn.com/abstract=2584619 [http://perma.cc/MDZ5-9UMK] (archived Sept. 5, 2015) (providing examples). *But see* In re Aiken County, 725 F.3d 255 (D.C. Cir. 2013) (granting writ of mandamus and directing NRC to proceed with its consideration of Department of Energy's Yucca Mountain license application); Emily Hammond Meazell, *Presidential Control, Expertise, and the Deference Dilemma*, 61 DUKE L.J. 1763, 1766 (2012) [hereinafter *Deference Dilemma*] (recounting Obama administration's withdrawal of support for Yucca Mountain).

4. *See generally* U.S. NUCLEAR REGULATORY COMM'N [NRC], RECOMMENDATIONS FOR ENHANCING REACTOR SAFETY IN THE 21ST CENTURY: THE NEAR–T ERM TASK FORCE REVIEW OF INSIGHTS FROM THE FUKUSHIMA DAI-ICHI ACCIDENT (July 12, 2011) [hereinafter NTTF REPORT].

an imminent risk to public health and safety."[5] However, it also made a number of recommendations, many of which NRC has begun to implement. Some of the recommendations and resulting regulatory activity are detailed below. For now, the important point is that to carry out the NTTF recommendations, NRC issued a series of orders modifying existing nuclear power plant licenses.[6]

The prospect of modifying existing licenses—termed "backfitting"—raises a host of issues. First, backfitting is a form of retroactivity, which is disfavored throughout American law. To be sure, there are several types of retroactivity.[7] For example, suppose NRC were to adopt a rule requiring all existing operators to install emergency back-up electricity generation equipment. If NRC also imposed penalties for failing to have such equipment prior to the new rule's issuance, it would be imposing new sanctions on past conduct. This type of retroactivity is particularly problematic.[8] But if NRC merely required the equipment going forward, the rule would be only "secondar[ily]" retroactive in that it would upset operators' expectations by imposing new costs in connection with existing licenses.[9] Courts are far more worried about the first category than the second. But both have the potential to upset expectations, undermine reliance, and destabilize the economic assumptions under which regulated entities operate.[10]

Second, backfitting is situated at the intersection of high-stakes interests: costs to industry, safety for workers and the public, and confidence in the nation's nuclear agency. Yet it has received scant treatment in the courts and scholarly literature.[11] The procedures by which backfitting is ordered, and the substantive analyses that accompany such regulatory action, deserve a closer look. Nuclear

---

5. *Id.* at vii.

6. *See infra* Part II (detailing regulatory response to Fukushima).

7. *See* William V. Luneburg, *Retroactivity and Administrative Rulemaking*, 1991 DUKE L.J. 106, 109–10; Russell Weaver, *Retroactive Regulatory Interpretations: An Analysis of Judicial Responses*, 61 NOTRE DAME L. REV. 167, 167 n.1 (1986).

8. *See* Bowen v. Georgetown Univ. Hosp., 488 U.S. 204, 208 (1988) (rejecting retroactive rulemaking authority unless expressly conveyed by Congress).

9. *Id.* at 219 (Scalia, J., concurring).

10. Luneburg, *supra* note 7, at 110 (noting that variations on retroactivity share characteristics including "surprise" and "destabilizing effects").

11. Only one set of judicial opinions directly examines backfitting. *See* Union of Concerned Scientists v. NRC (*Concerned Scientists II*), 880 F.2d 552, 555-61 (D.C. Cir. 1989) (upholding revised backfitting rule following remand). A search of Westlaw's JLR database for NRC/p backfit! yields eight articles. For the most directly relevant to the topic of this essay, see Peter Huber, *The Old–New Division in Risk Regulation*, 69 VA. L. REV. 1025, 1063–64, 1064 n.180 (1983) (describing preferences for prospective risk regulation over retrofitting, citing the backfitting example); Anthony Z. Roisman et al., *Regulating Nuclear Power in the New Millennium (The Role of the Public)*, 26 PACE ENVTL. L. REV. 317, 333-35 (2009) (arguing the NRC has relied on backfitting too infrequently and criticizing one backfitting standard).

energy is uniquely poised to offer insights for disaster response in many different contexts that may call for *post hoc* regulatory adjustments. Indeed, the field is in some sense an ideal laboratory: it provides a closed system of regulation,[12] a unified industry,[13] a discrete number of regulated units,[14] a comprehensive statutory scheme,[15] and a relatively unchanged technology since its first deployment.[16]

Yet all these attributes point to a third set of issues lurking behind the backfitting model. During the 1970s and 1980s, nuclear power construction was famously plagued by delays and cost overruns.[17] Some of these problems were caused by the need to make safety upgrades throughout the three-part licensing process; others were caused by litigation; still others related to the overall economy.[18] Certainly Three Mile Island and Chernobyl raised serious safety concerns during this same time period. In fact, no new reactors were

---

12. The Atomic Energy Act places sole authority for nuclear safety with the NRC and preempts state and local attempts at regulating that field. *See* Entergy Nuclear Vt. Yankee, LLC v. Shumlin, 733 F.3d 393, 428 (2d Cir. 2013) (holding Vermont regulatory statutes were preempted by the Atomic Energy Act). *But cf.* Pac. Gas & Elec. Co. v. State Energy Res. Conservation & Dev. Comm'n, 461 U.S. 190, 208-15 (1983) (upholding California law that conditioned nuclear plant construction on findings by the state commission and distinguishing other preemption cases).

13. For example, the Nuclear Energy Institute (NEI) provided a unified response to Fukushima. *See* NEI, FUKUSHIMA RESPONSE, http://www.nei.org/Issues-Policy/Safety-Security/Fukushima-Response (last visited Sept. 5, 2015) [http://perma.cc/6GCC-LKFT] (archived Sept. 5, 2015).

14. There are currently ninety-nine reactor units in operation in the United States. *See* NRC, NUCLEAR REACTORS, http://www.nrc.gov/reactors/power.html (last updated February 18, 2015) [http://perma.cc/EV34-Z2J2] (archived Sept. 5, 2015).

15. The primary scheme is embodied in the Atomic Energy Act [AEA], 42 U.S.C. §§ 2011–259 (2011).

16. Next-generation reactors are still in the research and development phase. A new design certification was issued for the AP1000 reactor design in 2011, which will be installed at the Vogtle Units in Georgia. *See* Design Certification Rule for the AP1000 Design, 10 C.F.R. pt. 52, app. D. To be sure, these features of the nuclear field also make it exceptional, which raises the possibility that drawing conclusions generalizable to other fields could be problematic. For purposes of this Article, however, I argue that the features unique to nuclear can also amplify various regulatory issues, making them easier to identify and thereby promoting their further study in other fields.

17. *See generally* Richard J. Pierce, Jr., *The Regulatory Treatment of Mistakes in Retrospect: Canceled Plants and Excess Capacity*, 132 U. PA. L. REV. 497 (1984).

18. For further discussion, see Hammond & Spence, *supra* note 3, at Part II; JOEL B. EISEN ET AL., ENERGY, ECONOMICS & THE ENVIRONMENT: CASES AND MATERIALS 401–02 (Robert C. Clark et al. eds., 4th ed. 2015). An influential study of the economics of nuclear power by the Massachusetts Institute for Technology (MIT) considered many such factors. *See* MIT, The Future of Nuclear Power: An Interdisciplinary MIT Study 38 (2003), http://web.mit.edu/nuclearpower/pdf/nuclearpower-full.pdf [http://perma.cc/2EBV-X6WB] (archived Sept. 5, 2015); MIT, Update of the MIT 2003 Future of Nuclear Power: An Interdisciplinary MIT Study (2009), http://web.mit.edu/nuclearpower/pdf/nuclearpower-update2009.pdf [http://perma.cc/V8V2-TPU3] (archived Sept. 5, 2015).

completed after Chernobyl, save Tennessee Valley Authority's Watts Bar 1, which came online in 1996 but had been ordered in 1970.[19]

Despite the many concerns about nuclear power, it fills an important need for electricity reliability by providing steady baseload power, comprising 20 percent of U.S. electricity generation. Its lifecycle carbon emissions are comparable to hydro and wind power, making it an important player in climate change policy.[20] And it emits none of the criteria pollutants and toxics that plague its baseload competitor, coal.[21] Of all the electricity fuels, nuclear power most comprehensively internalizes negative externalities.[22] But this puts it at a competitive disadvantage in the wholesale markets—particularly relative to coal and natural gas-fired generation—and several plants have announced closures and plans not to renew their licenses.[23] The industry argues that unless there are significant market reforms, nuclear power plants will not be economically viable.[24] In other words, the future of nuclear power is uncertain, and the industry's ability to respond to newly identified safety needs while operating economically is only becoming more urgent.[25]

---

19. EISEN, *supra* note 18, at 402.

20. *See, e.g.*, NAT'L RENEWABLE ENERGY LAB., DEP'T OF ENERGY, LIFECYCLE GREENHOUSE GAS EMISSIONS FROM ELECTRICITY GENERATION (2012), http://www.nrel.gov/docs/fy13osti/57187.pdf [http://perma.cc/GB4B-5LPC] (archived Sept. 5, 2015). EPA envisions a role for nuclear power in the Clean Power Plan. *See, e.g.*, Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 79 Fed. Reg. 34830, 34934 (proposed June 18, 2014) (to be codified at 40 C.F.R. pt. 60) (permitting new nuclear and capacity uprates as eligible for use in adjusting CO_2 emission rates).

21. *See* Hammond & Spence, *supra* note 3, at 17 (describing how coal extraction and emissions generate health and safety concerns, as well as water and air pollution). *See generally* Pushker A. Kharecha & James E. Hansen, *Prevented Mortality and Greenhouse Gas Emissions from Historical and Projected Nuclear Power*, 47 ENVTL. SCI. & TECH. 4889 (2013) (modeling deaths prevented by use of nuclear power rather than coal).

22. *See* Hammond & Spence, *supra* note 3, at Part II.A (providing details and comparisons to other fuels).

23. *See* Matthew Wald, *Vermont Yankee Plant to Close Next Year as the Nuclear Industry Retrenches*, N.Y. TIMES (Aug. 27, 2013), http://www.nytimes.com/2013/08/28/ science/entergy-announces-closing-of-vermont-nuclear-plant.html?_r=0 [http://perma. cc/7WYD-6677] (archived Sept. 5, 2015) (describing planned retirement of Vermont Yankee and the "rapid decline" of the nuclear industry).

24. *See* News Release, Nuclear Energy Inst., NEI Warns Wall Street Analysts of Flawed Electricity Markets (Feb. 13, 2014), http://www.nei.org/News-Media/Media-Room/News-Releases/NEI-Warns-Wall-Street-Analysts-of-Flawed-Electrici [http://perma.cc/QM4E-YAPT] (archived Sept. 5, 2015).

25. The policy issues related to spent nuclear fuel are likewise in urgent need of attention. *See Deference Dilemma*, *supra* note 3, at 1783–90 (describing the history of the Nuclear Waste Policy Act); *see also* EISEN, *supra* note 18, at 437–53 (describing legal and policy developments through fall 2014).

These many issues are beyond the scope of a single essay.[26] My modest goals here are twofold. First, I document NRC's application of the backfit rule as a response to Fukushima, drawing from the risk perception literature to shed light on this regulatory approach. Second, I examine the backfit rule through an administrative law lens, focusing on retroactivity and the "administrative law values of participation, deliberation, and transparency."[27] The role of these principles is of particular importance in a field where safety is paramount, risk perceptions run high, and disasters can never be fully predicted. And accounting for administrative law principles sheds light on how other regulatory regimes might approach hazard mitigation and disaster response in light of lessons learned.[28]

This Article proceeds as follows. Part I sets the stage by providing a brief overview of the risk perception mechanisms at work in nuclear power, linking those mechanisms to nuclear power regulation, and describing the regulatory structure for backfitting. Part II details the regulatory response to Fukushima, including the use of the backfitting rule to date. Part III takes up the administrative law concerns that backfitting raises and explores how the retroactivity principles fare in this particular regulatory context. Part IV identifies links between broad statutory discretion, highly detailed regulatory regimes, and deferential judicial oversight that can inform the rationality of agency behavior in the wake of disasters.

II. RISK PERCEPTION AND NUCLEAR RISK REGULATION

Basic risk perception principles aid in understanding the importance of the nuclear regulatory scheme to public acceptance of nuclear power. First, a distinction is helpful. The term "risk" can refer to risk assessment, risk perception, and/or risk management. Much of the nuclear regulatory scheme implements risk assessment methods, which attempt to measure the cumulative likelihood and magnitude of various hazards.[29] The assessments of risk are used to develop

---

26. For a more detailed discussion of the economics of nuclear power, see generally Hammond & Spence, *supra* note 3.

27. *See* Emily Hammond & David L. Markell, *Administrative Proxies for Judicial Review: Building Legitimacy from the Inside-Out*, 37 HARV. ENVTL. L. REV. 313, 316–17 (2013) (enumerating values and collecting sources).

28. *See also* Jacqueline L. Weaver, *Offshore Safety in the Wake of the Macondo Disaster: The Role of the Regulator*, 36 HOUS. J. INT'L L. 379 (2014) (documenting massive regulatory shifts following BP-Deepwater Horizon oil spill).

29. *See* Stanley Kaplan & B. John Garrick, *On the Quantitative Definition of Risk*, 1 RISK ANALYSIS 11, 12–17 (1981) (setting forth a quantitative definition of risk); *see also* Elisabeth Paté-Cornell, *Risk and Uncertainty Analysis in Government Safety Decisions*, 22 RISK ANALYSIS 633, 635–36 (2002) (providing examples of probabilistic risk analysis).

mitigation strategies, which attempt to reduce the likelihood of a hazard, its magnitude, or both.[30] Part II below provides details on how these concepts were implemented post-Fukushima. The ways people perceive risk, however, relate to both the extent of any regulatory response, and the public's acceptance of such response. This Part provides a brief overview of just a few of the risk perception concepts that relate to Fukushima and nuclear power.

A. *Risk Perception and Nuclear Power*

Decades ago, pioneers of risk perception Amos Tversky and Daniel Kahneman observed that humans perceive risk in ways that deviate from mathematical predictions.[31] Indeed, due at least in part to their perceptions, humans seldom behave as rational economic actors.[32] It so happened that risk perception research came of age at the same time as atomic energy. As a result, many of the pioneering studies of risk perception involved nuclear power.[33]

One such line of research resulted in the theory of the psychometric paradigm,[34] which categorizes risks according to how dreaded[35] and how familiar[36] they are. Risks that are high-dread and low-familiarity are perceived to be the worst, and include nuclear power, nuclear waste disposal, and uranium mining.[37] People are more likely to desire strict regulation for these types of risks.[38]

---

30. *See, e.g.*, NRC, MITIGATION OF BEYOND-DESIGN-BASIS EVENTS 3, http://www.nrc.gov/reactors/operating/ops-experience/japan-dashboard/emergency-procedures.html [http://perma.cc/QN8Q-JXM5] (archived Sept. 21, 2015) (collecting sources).

31. *See, e.g.*, Daniel Kahneman & Amos Tversky, *Prospect Theory: An Analysis of Decision Under Risk*, 47 ECONOMETRICA 263, 263, 265 (1979) [hereinafter *Prospect Theory*]; Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics and Biases*, 185 SCI. 1124, 1130-31 (1974).

32. *See generally Prospect Theory*, *supra* note 31.

33. *See, e.g.*, Hank C. Jenkins-Smith, *Modeling Stigma: An Empirical Analysis of Nuclear Images of Nevada*, *in* RISK, MEDIA, AND STIGMA 107, 128–29 (2001); Paul Slovic et al., *Perceived Risk, Stigma, and Potential Economic Impacts of a High-Level Nuclear Waste Repository in Nevada*, 11 RISK ANALYSIS 683, (1991) [hereinafter Slovic, *Perceived Risk*]. *See generally* Stanley Rothman & S. Robert Lichter, *Elite Ideology and Risk Perception in Nuclear Energy Policy*, 81 AM. POL. SCI. REV. 383 (1987) (testing various hypotheses to account for public distrust of nuclear power).

34. *See* Slovic, *Perception of Risk*, *supra* note 1, at 281.

35. Dread is "catastrophic, hard to prevent, fatal, inequitable, threatening to future generations, not easily reduced, increasing, involuntary and [personally] threatening . . . ." Paul Slovic et al., *Facts and Fears: Understanding Perceived Risk*, *in* SOCIETAL RISK ASSESSMENT: HOW SAFE IS ENOUGH? 181, 199 (Richard C. Schwing & Walter A. Albers, Jr. eds., 1980) [hereinafter Slovic, *Facts and Fears* 1980].

36. Familiarity relates to a risk's "observability, knowledge, immediacy of consequences, and familiarity." *Id.*

37. *Id.* at 203–04 tbl.8. Examples of low-dread, high-familiarity risks include bicycles, chainsaws, and trampolines. *Id.*

38. *Id.* at 206.

Moreover, high-dread risks are highly susceptible to affect heuristics; that is, given inputs suggesting a high risk (like Fukushima), people will infer that the benefit of a particular technology (like nuclear power) is low. [39] Punctuating events, like Three Mile Island, Chernobyl, and Fukushima, reinforce these notions and contribute to even deeper distrust of such technologies.[40]

The implications of such perceptions of nuclear power are many; with respect to responses to Fukushima in particular, consider the following statement of Paul Slovic: "[B]eliefs about the catastrophic nature of nuclear power are a major determinant of public opposition to that technology. This is not a comforting conclusion because the rarity of catastrophic events makes it extremely difficult to resolve disagreements by recourse to empirical evidence." [41] And as Cass Sunstein comments, "Both private and public institutions will overreact" in the face of fear.[42] In other words, it is very likely that incidents such as Fukushima will lead to additional regulatory obligations that may well be inefficient.

The great difficulty, of course, is determining whether such inefficiency exists. Professor Sunstein and others have argued that cost-benefit analysis should be at least part of the guard against overregulation.[43] But as many other scholars have shown, cost-benefit analysis is subject to numerous deficiencies of its own.[44] Moreover, as the Slovic quote above indicates, it is extremely difficult to attach analytical numbers to catastrophic events that by definition almost

---

39. Paul Slovic et al., *Risk as Analysis and Risk as Feelings: Some Thoughts about Affect, Reason, Risk, and Rationality*, 24 RISK ANALYSIS 311, 315 (2004) [hereinafter Slovic, *Risk as Analysis*].

40. *See* Paul Slovic et al., *Facts and Fears: Understanding Perceived Risk*, *in* THE PERCEPTION OF RISK 137, 150–51 (2000) [hereinafter Slovic, *Facts and Fears* 2000] (describing how accidents that signal a breakdown in safety-control systems may "greatly enhance perceived risk and trigger strong corrective action"); *see also* Roger E. Kasperson et al., *Stigma and the Social Amplification of Risk: Toward a Framework of Analysis*, *in* RISK, MEDIA, AND STIGMA 9, 27 (2001).

41. Slovic, *Risk as Analysis*, *supra* note 39, at 149. *But see* Dan M. Kahan et al., *Cultural Cognition of Scientific Consensus*, 14 J. RISK RESEARCH 147, 175–79 (2011) (demonstrating, using cultural cognition theory, that risk perceptions are unlikely to change when people are confronted with facts contrary to their cultural worldviews).

42. CASS R. SUNSTEIN, LAWS OF FEAR: BEYOND THE PRECAUTIONARY PRINCIPLE 206 (2005).

43. *Id.* at 129; *see* STEPHEN BREYER, BREAKING THE VICIOUS CIRCLE 21–29 (1993). Professor Sunstein is also a leading advocate of libertarian paternalism, which is "an approach that preserves freedom of choice but that encourages both private and public institutions to steer people in directions that will promote their own welfare." Cass R. Sunstein & Richard H. Thaler, *Libertarian Paternalism is Not an Oxymoron*, 70 U. CHI. L. REV. 1159, 1201 (2003) (describing and defending libertarian paternalism).

44. *See, e.g.*, Amy Sinden, *Cass Sunstein's Cost-Benefit Lite: Economics for Liberals*, 29 COLUM. J. ENVTL. L. 191, 192, 192 n.7 (2004) (raising normative issues and collecting sources).

never happen. And there is another important consideration flowing from this very brief overview of risk perception and nuclear power: given the deep objections many have against nuclear power, it seems problematic—even illegitimate—to say that such objections should be dismissed out of hand.[45]

This core issue for legitimacy lies at the intersection of procedure and substance, and is at the heart of the U.S. response to Fukushima. If it is paternalistic to snub deeply felt concerns about nuclear safety by attempting to erase them with cost-benefit analysis, and it is counter to the efficiency imperative of regulation to regulate far beyond what is necessary, one is left wondering how to respond to a disaster in a way that is both fair and efficient. In some sense, this question reflects a longstanding conundrum of administrative law generally: how best to reconcile the need for efficient government with the need for participation, deliberation, and transparency.[46] Indeed, the issue is even more salient for nuclear disasters, where protection of public health and safety is paramount.[47]

It is of great interest, then, that the risk perception literature itself suggests process-oriented palliatives. Identity affirmation, pluralistic advocacy, and narrative framing are all variables that hold potential for increasing individuals' likelihood of considering information more open-mindedly.[48] These concepts map neatly onto procedural justice considerations—voice, treatment with respect, trustworthiness, and neutrality—which in turn dovetail with administrative-law values.[49] In a field as perception-prone as nuclear power, this understanding offers a further utility for administrative law as both a critical feature of, and a metric for, legitimacy.

---

45. Democratic legitimacy, a mainstay of administrative law theory, assumes that agencies should attempt to achieve the results that the average voter would seek given the opportunity. *See* David B. Spence & Frank Cross, *A Public Choice Case for the Administrative State*, 89 GEO. L.J. 97, 99–100 (2000) (devising public choice rationale supporting agencies' democratic legitimacy). Procedural legitimacy, also a core component of administrative doctrine, requires, among other things, opportunities for voice and treatment with respect. Hammond & Markell, *supra* note 27, at 323.

46. *See* Paul R. Verkuil, *The Emerging Concept of Administrative Procedure*, 78 COLUM. L. REV. 258, 279 (1978) (noting the need to balance these considerations).

47. I assume that the nuclear industry, agency, and the public are aligned generally with this view. Of course, they may disagree considerably as to the best way to effectuate this goal. Furthermore, the agency and industry are likely aligned in recognizing the risks to the industry itself that are posed by nuclear disasters. Neither institution, presumably, would want all nuclear plants to halt operation. *See* Davies, *supra* note 2, at 1985–89. The public, of course, is divided on this issue. *See* Rebecca Riffkin, *U.S. Support for Nuclear Energy at 51%*, GALLUP.COM, (Mar. 30, 2015), http://www.gallup.com/poll/182180/support-nuclear-energy.aspx [http://perma.cc/UM82-WFZ8] (archived Sept. 6, 2015) (showing historical trends).

48. Kahan, *supra* note 41, at 33.

49. *See* Hammond & Markell, *supra* note 27, at 322–26.

B. *The Nuclear Regulatory Scheme and the Backfitting Rule*

With these principles in mind, consider the nuclear regulatory regime and the backfitting rule—one of NRC's most powerful tools for responding to disasters.[50] The Atomic Energy Act (AEA) is "virtually unique" in the extent to which the statute lodges broad discretion with the agency.[51] With respect to developing licensing requirements, NRC is authorized to require "such . . . information" as it "may, by rule or regulation, deem necessary" in order to determine whether the nuclear facility's technical specifications "will provide adequate protection to the health and safety of the public."[52] When NRC sets adequate protection standards, it may not consider the role of cost, but it can consider other factors like the nature of the risks involved.[53] Even so, adequate protection does not require zero risk; rather, it necessitates "reasonable assurance that a nuclear reactor could be safely operated."[54] NRC may also impose additional safety measures beyond adequate protection, and in doing so is authorized—and does—consider the costs and benefits of such measures.[55]

Nuclear power plants must comply with NRC's defense-in-depth philosophy, which relies on a multilayered system of fail-safes and backup planning to employ both active and passive protections in the event that something goes wrong. Moreover, plants must be prepared for "design-basis events"—anticipated operational events as well as accidents, for which mitigation technology and strategies must be deployed.[56] The design-basis approach is informally equated with the legal requirement of "adequate protection."[57] By comparison, beyond-

---

50. There are several types of backfits. This Article is concerned with those needed to ensure adequate protection and those providing safety enhancements. *See* 10 C.F.R. § 50.109 (1986).

51. Siegel v. Atomic Energy Comm'n, 400 F.2d 778, 783 (D.C. Cir. 1968); *see also* Westinghouse Elec. Corp. v. NRC, 598 F.2d 759, 771 (3d Cir. 1979).

52. 42 U.S.C. § 2232(a) (2015).

53. Pub. Citizen v. NRC, 573 F.3d 916, 918 (9th Cir. 2009); *see* Union of Concerned Scientists v. NRC (*Concerned Scientists I*), 824 F.2d 108, 114–18 (D.C. Cir. 1987) (providing discussion). Thus, the adequate protection standard is distinguishable from many other statutory mandates involving risk regulation. *See, e.g.*, Entergy Corp. v. Riverkeeper, Inc., 556 U.S. 208, 223 (2009) (upholding EPA's consideration of cost for cooling water intake structures under Clean Water Act); *cf.* Whitman v. Am. Trucking Ass'n, 531 U.S. 457, 469–70, 471 (2001) (finding no consideration of costs in developing NAAQS, but identifying other Clean Air Act provisions expressly contemplating cost).

54. Carstens v. NRC, 742 F.2d 1546, 1551 (D.C. Cir. 1984); *see also* Nader v. Ray, 363 F. Supp. 946, 954 (D.D.C. 1973) (rejecting "complete," "entire," or "perfect" assurance of safety as the standard for issuing facility operating licenses).

55. *Pub. Citizen*, 573 F.3d at 918–19.

56. This concept has been employed since the licensing of some of the earliest reactors in the 1960s and 1970s. NTTF Report, *supra* note 4, at 15. The current design certification approach to licensing (*see* 10 C.F.R. § 52 (2015)) takes a probabilistic risk assessment approach. *See id.* at 17 (describing distinction).

57. *Id.* at 15.

design-basis events are informally equated with safety enhancements, that is, requirements beyond adequate protection that would be mandated only if their benefits outweighed their costs.[58]

The backfitting process maps onto this framework in the following ways. First, backfitting is defined as "the modification of or addition to systems, structures, components, or design of a facility; . . . which may result from a new or amended provision in the Commission's regulations or the imposition of a regulatory staff position interpreting the Commission's regulations that is either new or different from a previously applicable staff position."[59] Relevant here, NRC shall impose backfitting requirements on existing licensees without regard to cost if "necessary to ensure that the facility provides adequate protection."[60] If the agency issues such a backfitting order, it must provide "appropriate documented evaluation," including the objectives of, and reasons for, the modification.[61] Additional safety measures may be ordered through the backfitting procedure if the NRC determines that there will be a "substantial increase in the overall protection of the public health and safety" and that the costs are justified by the increased protection.[62] The applicable regulations provide a list of factors to consider.[63]

The history of NRC's approach to backfitting provides insights into its modern operation. The original rule, promulgated in 1970, attracted criticism from nuclear watchdogs for its failure to establish a systematic method of assessing needed upgrades, particularly in the wake of the Three Mile Island accident.[64] On the other hand, industry critics charged that NRC implemented the rule haphazardly, resulting in billions of dollars of costs to consumers and contributing to the legendary cost overruns of nuclear construction in the 1970s and early 1980s.[65] NRC attempted to address this concern in a 1985 revision to the rule, a major component of which required that the

---

58. *Id.*

59. 50 C.F.R. § 50.109 (2015).

60. 50 C.F.R. § 50.109(a)(4)(ii); *see also* § 50.109(a)(5) ("The Commission shall always require the backfitting of a facility if it determines that such regulatory action is necessary to ensure . . . adequate protection"). This provision is framed as an exemption from a backfit analysis. Actions to ensure compliance with existing regulations are also exempt from a backfit analysis. § 50.109(a)(4).

61. 50 C.F.R. §§ 50.109(a)(4), (6).

62. 50 C.F.R. § 50.109(a)(3).

63. 50 C.F.R. § 50.109(c).

64. Union of Concerned Scientists. v. NRC (*Concerned Scientists I*), 824 F.2d 108, 110 (D.C. Cir. 1987).

65. *Id.* (collecting sources); *see also* Dean C. Dunlavey, *Government Regulation of Atomic Industry*, 105 U. PA. L. REV. 295, 331 (1957) (providing comprehensive, contemporaneous review of AEA of 1954, and noting early industry concerns about costliness of backfitting orders).

benefits of a backfit must justify the costs.[66] The D.C. Circuit vacated the rule,[67] and on remand NRC made clear that the adequate protection standard would never consider costs; however, *additional* safety measures not needed for adequate protection would be subject to a cost-benefit analysis.[68] For those additional safety measures, the agency must determine "that there is a substantial increase in the overall protection of the public health and safety or the common defense and security to be derived from the backfit and that the direct and indirect costs of implementation for that facility are justified in view of this increased protection."[69]

NRC has issued a guidance document further explaining the backfitting process and instructing staff on how to implement the backfit rule.[70] The document dedicates considerable attention to when a backfit analysis is needed, perhaps reflecting the difficulties posed by a standard—adequate protection—that lacks a set definition. Indeed, commenters to the backfit rule reflected this concern, some of which worried that *every* improvement would be subject to cost-benefit analysis, and others of which worried that *no* improvements would be so analyzed.[71]

Given these competing concerns, one might wonder what procedural protections are available. Regulated entities have the ability to challenge such orders within twenty days.[72] Persons who are not licensees must make a specific showing why their interests are adversely affected, addressing criteria set forth in 10 C.F.R. § 2.309(d). This code provision is directed generally to hearing requests, petitions to intervene, and standing requirements, the last of which is the subject of subsection (d). To request to intervene, the requestor

---

66. *See* 10 C.F.R. § 50.109(a)(3); *Concerned Scientists I*, 824 F.2d at 111 (reprinting and describing operative language).

67. *Concerned Scientists I*, 824 F.2d at 552.

68. *See* Union of Concerned Scientists. v. NRC (*Concerned Scientists II*), 880 F.2d 552, 555–56 (D.C. Cir. 1989) (describing revisions on remand). This case arose in the early post-*Chevron* years, in which some courts took *INS v. Cardoza-Fonseca*, 480 U.S. 421 (1987), to direct that *Chevron* did not apply to pure questions of statutory interpretations. *Concerned Scientists I*, 824 F.2d at 113. That view, of course, has not prevailed. Gary Lawson & Stephen Kam, *Making Law Out of Nothing At All: The Origins of the* Chevron *Doctrine*, 65 ADMIN. L. REV. 1, 67–73 (2013). However, this meant that the *Concerned Scientists I* court failed to analyze NRC's interpretation under *Chevron* principles. *Concerned Scientists I*, 824 F.2d at 113.

69. 10 C.F.R. § 50.109(a)(3).

70. U.S. NUCLEAR REGULATORY COMM'N, OFFICE FOR ANALYSIS AND EVALUATION OF OPERATIONAL DATA, BACKFITTING GUIDELINES NUREG-1409 (July, 1990), http://pbadupws.nrc.gov/docs/ML0322/ML032230247.pdf [http:// perma.cc/T8W3-BVDK] (archived Sept.1, 2015).

71. *See* Final Rule, Revision of Backfitting Process for Power Reactors, 53 Fed. Reg. 20,603, 20,605 (1988) (codified at 10 C.F.R. pt. 50) (describing opposite concerns of Union of Concerned Scientists and industry group).

72. 10 C.F.R. § 2.202 (2015). Interested governmental entities may participate in proceedings pursuant to 10 C.F.R. § 2.315(c) (2015).

must show a statutory right to be made a party or describe a property, financial, or other interest. [73] Even if the minimal requirements for standing are met, however, a prospective intervener must raise a valid contention.[74] Contentions must materially relate to the scope of the proceeding.[75] Because these proceedings are highly technical, these requirements for intervention present a high barrier to entry. In sum, regulated entities have much greater procedural access to argue that a backfit order goes too far than do interested parties who might argue that a backfit order is inadequate. As exemplified by the regulatory response to Fukushima, this tilt appears pervasive.

III. THE REGULATORY RESPONSE TO FUKUSHIMA

Following Fukushima, NRC convened a Near-Term Task Force (NTTF) to identify lessons learned, conduct a comprehensive review of NRC regulations, and make recommendations. In particular, the Task Force focused on risks posed by natural phenomena, how NRC has historically protected against such risks, and how NRC has handled events beyond the design basis of existing plants. [76] As mentioned previously, the NTTF's July 12, 2011 report concluded that continuing to both operate existing plants and engage in licensing activities would not "pose an imminent risk to public health and safety."[77] However, it also recommended an overhaul of NRC's regulatory framework to provide a more systematic and comprehensive set of rules for ensuring adequate protection. [78] Further, it recommended actions directed at (1) reevaluation of seismic and flooding risks; (2) enhancing mitigation capabilities, particularly for station blackouts, venting, spent fuel pool instrumentation, and emergency response capabilities; (3) emergency

---

73. 10 C.F.R. § 309(d) (2015).

74. *See* Conn. Coal. Against Millstone v. NRC, 114 Fed. Appx. 36, 38–39 (2d Cir. 2004) (rejecting petitioner's argument that NRC improperly denied motion to intervene, where petitioner had "shown little knowledge of the technical issues pertaining to the proposed license amendment") (quoting *In re* Dominion Nuclear Conn., 58 N.R.C. 207, 219 (2003)).

75. *See* Blue Ridge Envtl. Def. League v. NRC, 716 F.3d 183, 197, 199 (D.C. Cir. 2013) (rejecting petitioners' challenge to NRC's denial of contentions regarding Vogtle licensing where, inter alia, contentions provided no explanations of how NTTF Report raised previously unaddressed issues, and where contentions lacked specific links between Fukushima and Vogtle site).

76. *See generally* NTTF Report, *supra* note 4.

77. *Id.* at vii.

78. *Id.* at 15–23.

preparedness; and (4) improved oversight of licensee safety performance.[79]

Following the NTTF Report, NRC staff had "interactions with stakeholders"[80] and developed two reports, the first recommending actions to be taken without delay,[81] and the second recommending prioritization of such actions.[82] Although NRC agreed with the NTTF's determination that there was no imminent risk,[83] it determined that adequate protection required additional requirements for licensees and construction permit holders.[84]

The agency thus issued a series of backfit orders to modify existing licenses with respect to mitigation strategies,[85] venting systems for certain containment designs,[86] and spent fuel pool instrumentation.[87] The activity associated with venting systems illustrates the nuances that may arise. The original Venting Order, EA-12-050 (Mar. 12, 2012), required licensees with Mark I or Mark II containments[88] to install reliable hardened venting systems to ensure adequate protection.[89] *Venting Order I* emphasized that at Fukushima, operators' inability to successfully operate the containment venting system early during the event made it more difficult to cool the reactor core, leading to "extensive core damage, high radiation levels, hydrogen production, and containment failure."[90] After noting substantial variance among hardened vents in the United States, the order stated simply that reliable hardened

---

79. *Id.* at ix.

80. *See, e.g., U.S. Nuclear Regulatory Commission Issuances* (N.R.C), Order Modifying Licenses With Regard to Reliable Hardened Containment Vents, EA-12-050, at 3 (Mar. 12, 2012) [hereinafter *Venting Order I*].

81. R.W. BORCHARDT, U.S. NUCLEAR REGULATORY COMM'N, SECY-11-0124, RECOMMENDED ACTIONS TO BE TAKEN WITHOUT DELAY FROM THE NEAR-TERM TASK FORCE REPORT (2011).

82. R.W. BORCHARDT, U.S. NUCLEAR REGULATORY COMM'N, SECY-11-0137, PRIORITIZATION OF RECOMMENDED ACTIONS TO BE TAKEN IN RESPONSE TO FUKUSHIMA LESSONS LEARNED (2011).

83. *Id.* at 2.

84. *See id.* at 4.

85. *See generally U.S. Nuclear Regulatory Commission Issuances* (N.R.C.), Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events, EA-12-049 (Mar. 12, 2012).

86 *See generally Venting Order I, supra* note 80.

87. *See generally U.S. Nuclear Regulatory Commission Issuances* (N.R.C), Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, EA-12-051 (Mar. 12, 2012). Numerous other regulatory activities are detailed at NRC, *Japan Lessons Learned*, NRC (last updated Jan. 2015), http://www.nrc.gov/reactors/operating/ops-experience/japan-dashboard.html [http://perma.cc/AW5N-DQX7] (archived Sept. 21, 2015).

88. *Venting Order I, supra* note 80, at 3.

89. *Id.* at 4.

90. *Id.* at 3.

venting systems are needed to ensure adequate protection.[91] By contrast, the order explained that the issue whether to also require filtered vents—which would address concerns about the release of radioactive materials if venting systems were used during an accident—required resolution of "policy issues" that would be further evaluated by staff.[92]

Later that same year, NRC staff presented an analysis of the costs and benefits associated with requiring upgradable hardened vents as well as hardened vents with filtration systems.[93] For the latter, the analysis concluded that the quantitative costs ($15 to $20 million per reactor unit) outweighed the quantitative benefits.[94] Nevertheless, staff recommended that filtered vents be installed:

> A comparison of only the quantifiable costs and benefits of the proposed modifications, if considered safety enhancements, would not, by themselves, demonstrate that the benefits exceed the associated costs. However, when qualitative factors such as the importance of containment systems within the NRC's defense-in-depth philosophy are considered, as is consistent with Commission direction, a decision to require the installation of engineered filtered vent systems is justified.[95]

The full document includes a backfit analysis.[96] Notably, following industry complaints that costs of compliance would be too high, members of Congress asked the Government Accountability Office (GAO) to investigate and report on NRC's cost estimating methods generally, and its 2012 filtered venting system estimate specifically.[97] GAO's report, issued in 2014, concluded that the cost estimate was "not reliable because it did not fully or substantially meet any of the four characteristics of a reliable cost estimate."[98]

Meanwhile, NRC issued a new Venting Order on June 6, 2013, superseding the first, and modifying licenses to require that the reliable hardened vents would not only help prevent core damage, but

---

91. *Id.* at 4.

92. *Id.*

93. *See generally* R.W. BORCHARDT, U.S. NUCLEAR REGULATORY COMM'N, SECY-12-0157, CONSIDERATION OF ADDITIONAL REQUIREMENTS FOR CONTAINMENT VENTING SYSTEMS FOR BOILING WATER REACTORS WITH MARK I AND MARK II CONTAINMENT STRUCTURES (Nov. 26, 2012) [hereinafter STAFF ADDITIONAL REQUIREMENTS]. The NRC is not required by statute, regulation, or executive order to undertake a regulatory analysis, but it has been doing so voluntarily since 1976. U.S. GOV'T ACCOUNTABILITY OFFICE [GAO], GAO-15-98, NRC NEEDS TO IMPROVE ITS COST ESTIMATES BY INCORPORATING MORE BEST PRACTICES (Dec. 2014), at 6 [hereinafter GAO REPORT].

94. The industry expressed concern that costs would be much higher. GAO REPORT, *supra* note 93, at 3.

95. STAFF ADDITIONAL REQUIREMENTS, *supra* note 93, at 2.

96. *See id.* at 8 (citing Backfit Guidance Document).

97. GAO REPORT, *supra* note 93, at 3–4.

98. *Id.* at 15.

also function after core damage has already occurred (that is, in severe accident conditions).[99] *Venting Order II* incorporated the adequate protection provisions of the first order, but it added the post-core-damage protection as a cost-justified safety enhancement, relying on other portions of the staff's backfitting analysis.[100] Acknowledging that venting under such circumstances could lead to release of radioactive materials, the agency also directed staff to pursue filtered systems via the rulemaking process—apparently backing away from the position espoused in the staff analysis above.[101]

Thereafter, an industry working group under the Nuclear Energy Institute (NEI) developed a guidance document for implementing the modified order for NRC review.[102] NRC staff held several public meetings, provided its own comments, and, after a few revisions from NEI, issued a draft guidance document for public comment.[103] After a series of public meetings and further comments (including from the Advisory Committee on Reactor Safeguards), staff issued a final guidance document for complying with the modified order.[104]

This example—only one of the numerous activities responding to Fukushima—provides a flavor of the many regulatory iterations involved in reacting to a disaster. Although the NTTF Report issued quickly following Fukushima, it took several years to develop compliance criteria for the backfitting orders, and rulemakings are still underway. Of interest, in March 2015, Senate Republicans issued a letter to NRC requesting that the agency fold ongoing Fukushima investigations into its existing workload.[105] In particular, the letter cautioned NRC not to repeat post-Three Mile Island mistakes by failing to subject proposed requirements to structured review, risk prioritization, and cost-benefit analysis. It criticized the experience with the venting orders (recall that initially, NRC staff recommended

---

99. *U.S. Nuclear Regulatory Commission Issuances* (N.R.C), Order Modifying Licenses With Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions, EA–13–109, at 5 (June 6, 2013) [hereinafter *Venting Order II*].

100. *Id.* at 6–7.

101. *Id.* at 9.

102. *U.S. Nuclear Regulatory Commission Issuances* (N.R.C), Compliance with Order EA–13–109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions, JLD-ISG-2013-02, at 2 (Nov. 14, 2013).

103. *Id.*

104. *Id.* at 2–3.

105. Letter from Sen. Jim Inhoffe, U.S. S. Envtl. & Pub. Works Comm., to the Hon. Stephen G. Burns, NRC (Mar. 3, 2015), http://www.epw.senate.gov/public/index.cfm/press-releases-republican?ID=019C9287-BC15-25E6-AD61-8D6F2560A35A [http://perma.cc/T3SJ-9TV9] (archived Sept. 21, 2015).

requiring filters even though the quantitative costs outweighed the benefits) and endorsed NRC's ultimate decision to consider that issue in a rulemaking proceeding: "[NRC's] actions regarding external filters is, once again, a stark reminder that disciplined regulatory and cost benefit analysis provide a basis for distinguishing between matters that are truly safety-significant and those that merely appear so."[106]

Throughout the Fukushima response, the level of engagement by the regulated community is notable. Not only did that community provide comments and attend meetings, but it also developed the compliance criteria that NRC ultimately adopted. Moreover, the congressional activity—from the GAO Report to the letter above—reflected concerns that the regulatory response was perhaps exceeding efficient levels, as the risk perception literature might have predicted. The next section takes up retroactivity as a framing device for such concerns.

IV. RETROACTIVITY AND PRINCIPLES OF ADMINISTRATIVE LAW

A. *Retroactivity*

As demonstrated by the controversy regarding filtered vents, backfitting requirements can impose significant costs on nuclear operators by changing the legal framework and expectations within which they are already operating. Such orders are adjudicatory in the sense that they apply legal standards to a given set of facts, reaching specified licensees.[107] On the other hand, to the extent they also apply generally and hold future effect, they operate like rules.[108] Regardless of the characterization, the sort of retroactivity involved in the Fukushima backfitting orders is almost certainly unproblematic.

By their nature, cases addressing retroactivity take up the issue from the regulated entity's point of view; thus, courts frame the "principle concerns" of retroactivity as "lack of notice and the degree of reliance on former standards."[109] The test of retroactivity for

---

106. *Id.* It seems clear that the letter was motivated by concern that the regulated industry bears too many unjustified costs. *See id.* (requesting information on additional regulatory requirements that have been imposed over the last five years, beyond backfits).

107. *See* 5 U.S.C. § 551(6) (2015) (including licensing within the definition of order).

108. *See id.* § 551(4) (defining rule).

109. Clark-Cowlitz Joint Operating Agency v. Fed. Energy Regulatory Comm'n [FERC], 826 F.2d 1074, 1093 (D.C. Cir. 1987) (en banc) (Mikva, J., dissenting) (quoting Retail, Wholesale & Dep't Store Union v. NLRB, 466 F.2d 380, 390 n.22 (D.C. Cir. 1972)).

adjudicative policymaking balances the retroactive effect "against the mischief of producing a result which is contrary to a statutory design or to legal and equitable principles."[110] For retroactive rulemaking, we have already seen the critical distinction: rules that impose "new sanctions on past conduct"[111] must be expressly authorized,[112] while rules that only "upset expectations" are termed "secondarily retroactive" and are subject to the arbitrary-and-capricious standard. [113] The focus of an arbitrary-and-capricious review of secondarily retroactive agency action is on balancing the benefits and burdens of the action.[114]

The upshot is that the reason-giving requirement for adjudicative retroactivity is similar to that for secondarily retroactive rules: agencies must explain why the balancing of harms and benefits favors retroactivity; the failure to consider prospective application can be arbitrary and capricious.[115] These standards are not likely problematic for backfitting because of the larger statutory framework. First, the adequate protection standard expressly contemplates license modifications, putting licensees on notice of secondary retroactivity. As for adjudicatory retroactivity, the usual retroactivity challenge arises from a procedural claim—that the agency should have regulated by rule rather than by adjudication. But the premise to this argument is that if the agency were to operate by rule, it would apply its policy only prospectively (in contrast to the partial retroactivity common to adjudication). NRC would likely fail to comply with its statutory mandate if it chose to regulate only prospectively after having determined that adequate protection necessitated a particular practice or technology. And this is to say nothing of the substantive balancing that a retroactivity analysis would entail: even millions of dollars to the regulated industry is not likely going to win against the public benefit of "adequate protection" or even additional safety enhancements.

---

110. SEC v. Chenery Corp. (*Chenery II*), 332 U.S. 194, 203 (1947).

111. Nat'l Petrochemicals & Refiners Ass'n v. EPA, 630 F.3d 145, 159 (D.C. Cir. 2010).

112. *See* Bowen v. Georgetown Univ. Hosp., 488 U.S. 204, 208–12 (1988).

113. *Id.* at 219 (Scalia, J., concurring); Nat'l Cable & Telecomms. Ass'n v. FCC, 567 F.3d 659, 670–71 (D.C. Cir. 2009); *see also* Landgraf v. USI Film Prods., 511 U.S. 244, 269–70 (finding that, for statutes, retroactivity does not encompass the mere upset of expectations that were based in prior law).

114. *See Nat'l Petrochemicals & Refiners Ass'n*, 630 F.3d at 166 (noting agency decided there was adequate lead time, obligated parties had received adequate notice, and other approaches were problematic); *Nat'l Cable & Telecomms. Ass'n*, 567 F.3d at 670–71 (determining that the agency carefully balanced benefits and burdens of applying rule to render certain existing contracts unenforceable).

115. Clark-Cowlitz Joint Operating Agency v. FERC, 826 F.2d 1074, 1094 (D.C. Cir. 1987) (en banc) (Mikva, J., dissenting); Yakima Valley Cablevision, Inc. v. FCC, 794 F.2d 737, 746 (D.C. Cir. 1986).

B. *Principles of Administrative Law and Stakeholder Engagement*

For industry challenging a backfit, is there anything to be made of the breadth of the statutory mandate? A nondelegation challenge is almost certain to fail. [116] As for the agency's substantive interpretation of the mandate, some scholars have suggested that agencies should set standards that limit their discretion, setting forth principles, for example, that would guide their decision making in particular cases.[117] But it is not difficult to see why the backfit rule is particularly hard to cabin with a forward-looking definition of "adequate protection." The mechanism has been invoked as a response to events that by definition were not foreseen; they are not part of the design basis for licensing ex ante.

Many scholars have argued that the best way to police agencies' behavior is through the ex post oversight supplied by judicial review and political checks.[118] On the surface, one might conclude that the backfit context makes judicial review all the more important because backfitting offers less in the way of ex ante participation and deliberation, at least compared to traditional rulemaking. Certainly this objection seems to be at the heart of the congressional letter above. Further, the traditional accounts of both secondary retroactivity and dread risks emphasize the potential for agency overreaching, enhance the importance of procedure in mitigating such behavior, and rely on judicial review to incentivize agencies to mitigate unfairness to regulated entities.[119]

But there are countervailing considerations. The traditional account of agency capture predicts that agencies will settle on positions less responsive to the public interest because they receive most of their information from the regulated industry and are incentivized to avoid litigation with the groups that most likely

---

116. *See* Whitman v. Am. Trucking Ass'ns, Inc., 531 U.S. 457, 457–73 (2001) (collecting examples of broadly worded statutory mandates that meet the "intelligible principle" standard).

117. *See* Kenneth Culp Davis, *A New Approach to Delegation*, 36 U. CHI. L. REV. 713, 713 (1969). Note that my reference to this approach does not include an agency *curing* an unlawful delegation through a limiting interpretation. *Cf. Whitman*, 531 U.S. at 472. It is also somewhat distinct from the use of rulemaking to narrow the issues in adjudications. *Cf.* United States v. Storer Broad. Co., 351 U.S. 192, 212–13 (1956) (Harlan, J., dissenting in part).

118. *See, e.g.*, Mark Seidenfeld & Jim Rossi, *The False Promise of the "New" Nondelegation Doctrine*, 76 NOTRE DAME L. REV. 1, 19 (2000); *see also* Hammond & Markell, *supra* note 27, at 321–27 (providing support).

119. *See, e.g.*, WILLIAM F. FUNK ET AL., ADMINISTRATIVE PROCEDURE & PRACTICE 326 (5th ed. 2014) (suggesting agencies can avoid retroactivity problems like those in *Retail, Wholesale* by issuing cease-and-desist orders rather than imposing financial penalties).

threaten appeals.[120] As Professor Wendy Wagner has observed, this is of particular concern in highly technical, specialized areas of law, where—even if regulators are opposed to skewed outcomes—the issues "are so technical and complicated that in practice they take place at an altitude that is out of the range of vision of the full set of normally engaged and affected parties."[121] Moreover, these concerns are reinforced when courts review agency exercises of discretion in light of a permissive statutory mandate in highly technical fields. "Super deference,"[122] which instructs that courts should be at their "most deferential" when reviewing agency actions at the "frontiers of science,"[123] undermines accountability by glossing over the details of agency reasoning.[124]

Consider again the particulars of the Fukushima response. Certainly NRC responded quickly—as would be predicted by risk theory and as appropriate given the high stakes.[125] Further, the backfitting orders issued for adequate protection did not need cost-benefit analyses, suggesting the potential for overreaching. It is, of course, impossible here to ascertain whether overreaching actually happened, but it is notable that no regulated entities used the procedures for challenging the adequate-protection backfitting.[126] On the other hand, the regulated industry appears to have used other means of influencing the results, as illustrated by the filtered vent issue—raising concerns directly with NRC and perhaps bringing congressional oversight to bear—with the result that NRC shifted away from backfitting and toward rulemaking.

A brief look at the opportunities for stakeholder engagement is also useful. One set of stakeholders, of course, is the regulated industry itself, which has been very actively engaged in developing applicable standards. Not only is this evident from NEI's role in drafting compliance standards, but it also is apparent from a brief

---

120. *See* ROGER NOLL, REFORMING REGULATION 40–43 (Brookings Inst. 1971); Wendy E. Wagner et al., *Rulemaking in the Shade: An Empirical Study of EPA's Air Toxic Emission Standards*, 63 ADMIN. L. REV. 99, 115 (2011) [hereinafter Wagner, *Rulemaking*].

121. Wendy E. Wagner, *Administrative Law, Filter Failure, and Information Capture*, 41 ENVTL. L. REP. 10732, 10734 (2011).

122. *See generally* Emily Hammond Meazell, *Super Deference, the Science Obsession, and Judicial Review as Translation of Agency Science*, 109 MICH. L. REV. 733, 765 (2011) [hereinafter Hammond, *Super Deference*].

123. Balt. Gas & Elec. Co. v. Nat. Res. Def. Council, 462 U.S. 87, 103 (1983).

124. Hammond, *Super Deference*, *supra* note 122, at 737–38. Notably, this standard originates with nuclear power. *See also* Blue Ridge Envtl. Def. League v. NRC, 716 F.3d 183, 195 (D.C. Cir. 2013) (citing *Baltimore Gas* in case challenging NRC actions related to Fukushima and new nuclear construction at Vogtle Electric Generating Plant). *See generally Balt. Gas & Elec. Co.*, 462 U.S.

125. *See supra* text accompanying notes 31–42.

126. There is no record of such challenges. *See generally Japan Lessons Learned*, *supra* note 87 (providing access to dockets).

review of the rosters of the public meetings NRC has held.[127] This is not to suggest anything untoward; certainly the industry has some of the best information about the options for, and feasibility of, compliance. The participation of those directly regulated by NRC is indeed necessary to the legitimacy of the regulatory exercise.

Still, one wonders where the other stakeholders are, particularly given the special risk characteristics of nuclear power and the sustained opposition to the industry that has existed for decades. They did not challenge the backfitting orders, and it would have been difficult to do so because of the technical showings that would be required to intervene. The regulatory dockets show little public interest group or community involvement in the "interactions with stakeholders" referenced by NRC. Instead, such groups have focused their efforts on petitions for rulemaking,[128] the courts,[129] Congress,[130] and the media.[131] With respect to petitions for rulemaking, that approach is notoriously unsuccessful.[132] The courts are difficult to

---

127. *See, e.g.*, Memorandum from Aaron L. Szabo, Cost Analyst, to Shana R. Helton, Chief, Rulemaking Branch, Summary of November 6, 2013 Public Meeting on the Filtering Strategies Rulemaking encl. (Dec. 6, 2013) (listing attendees, all but three individuals (affiliations not provided) from NRC or industry); Memorandum from Rajender Auluck, Senior Project Manager, to William D. Reckley, Chief, Policy & Support Branch, Summary of July 11, 2013 Meeting to Discuss Activities Associated with Implementation of Near-Term Task Force Recommendation 5.1 Related to Containment Venting Systems encl. 1 (Aug. 6, 2013) (listing attendees, all from NRC or industry).

128. *See, e.g.*, *U.S. Nuclear Regulatory Commission Issuances* (N.R.C), Station Blackout Mitigation Strategies, NRC–2011–0299, at 3–4, 28–29 (July 2013), http://pbadupws.nrc.gov/docs/ML1317/ML13171A061.pdf [http://perma.cc/9AFZ-N98E] (archived Sept. 21, 2015) (showing petitions for rulemaking filed by the Natural Resources Defense Council, and the Foundation for Resilient Societies); *see also* NRC, DD–15–01, IN THE MATTER OF ALL GENERAL ELECTRIC MARK I BOILING-WATER REACTORS OPERATING LICENSES (Jan. 15, 2015), http://pbadupws.nrc.gov/docs/ML1433/ML14337A243.pdf [http://perma.cc/X8FA-5MRP] (archived Sept. 21, 2015) (rejecting petition to immediately suspend operating licenses of such reactors following Fukushima).

129. *See, e.g.*, Blue Ridge Envtl. Def. League v. NRC, 716 F.3d 183, 186–87 (D.C. Cir. 2013) (rejecting NEPA challenges to NRC's decision not to supplement plant's EA for reactor design or EIS for Vogtle site following Fukushima).

130. *See, e.g.*, Press Release, U.S. S. Comm. on Env't & Pub. Works, Statement of Senator Barbara Boxer Oversight Hearing: "NRC's Implementation of the Fukushima Near-Term Task Force Recommendations and other Actions to Enhance and Maintain Nuclear Safety" (Dec. 3, 2014), http://www.epw.senate.gov/public/index.cfm/press-releases-democratic?ID=A6F46ADA-A42F-E3EA-0374-6318559A72B3 [http://perma.cc/PTK6-R8WD] (archived Sept. 21, 2015) (criticizing NRC for slow and incomplete response to Fukushima).

131. A good example is the work of the Union of Concerned Scientists, as represented by symposium participant David Lochbaum.

132. *See* Emily Hammond Meazell, *Deference and Dialogue in Administrative Law*, 112 COLUM. L. REV. 1722, 1730–31 (2012) (describing courts' deferential stance to many such petitions); *cf.* Hammond & Markell, *supra* note 27, at 353 (documenting higher-than-predicted EPA responsiveness to petitions to withdraw state authority to

predict; as noted above, there is strong line of super deference in nuclear power decisions, but there are occasional examples of much harder-look review.[133] Congress has proven to be an effective forum for major policy debates, as demonstrated by its involvement in overseeing NRC's cost-benefit analysis and certainly by its role in inhibiting the progress of Yucca Mountain.[134] And of course, the media actively participates in the nuclear policy debate.

But therein lies an important administrative law lesson of the Fukushima response. Stakeholder debate is robust at the policy level, but when it comes to actually formulating the technical and scientific data, options, and standards, the field of nuclear power leans heavily toward agency-industry dialogue. The industry-capture literature relies strongly on administrative procedure to counteract the potential ills of such a scenario, but as noted here, neither traditional administrative procedure nor the ultimate promise of judicial review offers meaningful checks. And with fewer stakeholder perspectives on the science and technology of nuclear power and safety engaged in actual decision making, the nuclear power discussion lurches toward policy arguments and political stalemates. This speaks to a frequent lament in regulatory policy more broadly—with administrative law as "bloodsport"[135] and congressional gridlock becoming only deeper,[136] significant pressure is placed on agencies to do the best they can.[137]

It is hard to prescribe a way for agencies to directly increase the scope of technical expertise among interested parties. After all, it can take an individual physicist or engineer years to develop expertise, particularly the kind borne of direct experience with nuclear power or materials. It is not to be expected that an interested observer of nuclear safety would have the same kind of experience and access to information. But perhaps one area for improvement lies in the avenues for public-interest stakeholders to gain a seat at the table. The risk perception literature predicts greater open-mindedness about risks where parties perceive pluralistic discussion.[138] The procedural justice literature also predicts greater acceptance of ultimate decisions when participants are offered a voice, respect, and

---

implement major environmental programs); Wagner, *Rulemaking*, *supra* note 120, at 137–38 (noting success of deadline suits, but relative lack of public interest participation in substantive rulemakings).

133. *See, e.g.*, New York v. NRC, 681 F.3d 471, 481–83 (D.C. Cir. 2012) (holding NRC's revised waste confidence decision was not supported by substantial evidence).

134. *See Deference Dilemma*, *supra* note 3, at 1784–85.

135. Thomas O. McGarity, *Administrative Law as Blood Sport: Policy Erosion in a Highly Partisan Age*, 61 DUKE L.J. 1671, 1681 (2012).

136. Hammond & Spence, *supra* note 3, at 39.

137. *See* Jody Freeman & David B. Spence, *Old Statutes, New Problems*, 163 U. PA. L. REV. 1, 19 (2014) (describing the challenges agencies face, but suggesting that they "are anything but out-of-control").

138. Kahan, *supra* note 41, at 23–24.

trustworthy and neutral decision makers.[139] And the administrative law literature predicts better decisions and improved legitimacy for agencies that can enhance participation, deliberation, and transparency.[140]

Can agencies find new ways to achieve these things? Certainly. As Professor David Markell and I have documented, an agency can further its "inside-out" [141] legitimacy by voluntarily engaging in legitimizing behavior, notwithstanding other procedural obligations.[142] A variety of informal mechanisms can promote such behavior, even when statutory mandates otherwise prescribe certain procedural requirements. Indeed, agency culture and professionalism can spur innovations,[143] and there is likely potential to leverage the relationships developed at the regional and state level to better create meaningful stakeholder engagement and, ultimately, results that match the intent of the statutory mandate. [144] More research is needed to identify ways to operationalize these general approaches, as is a more meaningful commitment from agencies themselves to improve in this regard. But the need for both—particularly in fields where dread risks can manifest as disasters—is critical.

V. CONCLUSION

Disaster requires response—both on the ground and within our legal systems. A nuclear disaster, moreover, invites fears about the safety of the nuclear fleet worldwide. NRC's quick approach to identifying lessons learned from Fukushima illustrates how a regulatory agency might structure disaster response in the face of significant risk—and risk perception. This Article has applied an administrative law lens to that response, considering issues of fairness, retroactivity, agency capture, and stakeholder engagement. While the regulated industry has worked very closely with NRC in formulating new standards, the numerous technical barriers to participation have shifted other stakeholders' attention away from the standard-setting process and into more policy-oriented venues. This dynamic stands to further polarize public opinion at a time when much is at stake for nuclear power. Emerging research suggests ways

---

139. *See* Hammond & Markell, *supra* note 27, at 317, 317 n.19 (collecting sources).

140. *See id.* at 316–17.

141. The term is attributed to Sidney A. Shapiro & Ronald F. Wright, *The Future of the Administrative Presidency: Turning Administrative Law Inside-Out*, 65 U. MIAMI L. REV. 577, 578 (2011).

142. Hammond & Markell, *supra* note 27, at 353–59.

143. *Id.* at 354–55.

144. *Id.* at 355–56.

forward; this Article concludes with the hope that further work toward stakeholder inclusion will only improve regulatory disaster response in the future.