

CLIMATE UNCERTAINTY AND RISK: RETHINKING OUR RESPONSE

By Judith Curry
Reviewed by Kenneth A. Barry*

I. INTRODUCTION

Judith Curry is unquestionably a well-credentialed climate scientist. Professor Emerita of Earth and Atmospheric Science at the Georgia Institute of Technology, and now leading her own climate forecasting organization, she has toiled in the trenches of classrooms and international conferences alike. She is also, manifestly, an independent thinker. Since the 1990s, she has been taking a hard squint at the evolving climate consensus espoused by the majority of her colleagues and posing tough-minded questions. To her, maintaining a degree of skepticism is not a disservice to her profession, but rather essential in scientific research as well as the task of crafting recommendations for policy framers.

In her 2023 book, *Climate Uncertainty and Risk: Rethinking our Response (Climate Uncertainty)*, Curry mixes insights from her personal journey with a wealth of data and analysis drawn from a wide array of climate researchers. Her primary themes, as the book's title foreshadows, are (1) the underappreciated degree of uncertainty in the current state of the science; and (2) how the risks posed by climate change in the 21st century might best be comprehended and planned for. An undercurrent is her disappointment that more than a few scientists have swallowed their skepticism and donned an activist mantle, the better to forge a global, doubt-resistant climate consensus.

In that drama – the inherent tension between scientific skepticism and the yearning for a consensus that drives bold action to curtail greenhouse gas emissions – Curry's leading protagonist is the U.N.'s Intergovernmental Panel on Climate Change (IPCC). Founded in 1988 and reinforced by the U.N. Framework Convention on Climate Change, the IPCC has assumed a major role in assessing the state of research findings in climate change, issuing periodic reports thereon, and alerting policymakers and the wider public of what might transpire absent preventative action (famously enunciating the goal of constraining emissions so that global average temperatures won't exceed 1.5 °C – or at worst, 2.0 degrees – above the preindustrial average).

Curry does not seek to eviscerate the work of the IPCC, which has included many respected scientists, but neither does she take its projections, prescriptions, and sprawling range of possible scenarios as gospel. Rather, she homes in on the periodic reports' uncertainties and diversity of potential outcomes, while taking to

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task those who seize upon the most alarming and extreme possibilities. “How concerned should we be about climate change?” she asks early on, and responds:

The IPCC Assessment Reports do not support the concept of imminent global catastrophe associated with global warming. However, a minority of scientists, some very vocal, believe that catastrophic scenarios are more realistic than the IPCC’s *likely* scenarios. There is also a very vocal contingent among journalists and politicians that support the catastrophic narrative.¹

Readers may be surprised by Curry’s take on the periodic IPCC assessments – documents which, as publicized in general circulation media, appear to sound an unequivocal alarm that the world is on the brink of dangerous, even irreversible, global warming. However, critics of the U.N.-sponsored process have often observed that the IPCC’s detailed underlying assessments are not as cataclysmic as the accompanying executive summaries, much less the media, activist, and political glosses. *Climate Uncertainty* falls somewhere within that school of criticism in suggesting that politicization of the IPCC’s work has resulted in a skewed understanding of its implications.²

Curry demonstrates a mastery of both the fortes and foibles of climate change modeling – a topic she returns to repeatedly, given its centrality in the projections emanating from the IPCC. While she accepts their usefulness in exploring the impacts of various inputs, placing *too much* stock in them, according to the author, understates the profound complexity and variety of oftentimes weakly understood factors that shape the climate. For readers who are not themselves experts in climate studies or allied fields (such as weather forecasting, computer modeling, or statistics), it’s a challenge to consistently follow Curry’s explanations and reasoning. As a lawyer in the energy industry and occasional consumer of books on the impacts of energy production (among other drivers) on global warming, I was reasonably familiar with the subject and yet not infrequently tripped on some of the technical jargon and concepts related in *Climate Uncertainty*. In certain chapters, this is an in-depth science book, not a treatise dumbed down for lay readers to digest in easy spoonfuls. Nonetheless, most readers will understand the broad themes and get the gist of what Curry is presenting, if not all the particulars.³

It is helpful that Curry’s prose is clear and straightforward, even if some terminology is less so. Another plus is the organization of *Climate Uncertainty*. Chapters are relatively short, and themselves broken down into subsections of just a page or two, each preceded by a title and brief quotation. The latter are sometimes amusing (e.g., drawn from pop culture or well-known literature), sometimes from scientists opining on some idiosyncrasy of climate change or science more generally, but always intended to introduce the discrete matter being explored with

1. JUDITH A. CURRY, CLIMATE UNCERTAINTY AND RISK: RETHINKING OUR RESPONSE 3 (2023).

2. Steven E. Koonin’s book on climate change uncertainty, *Unsettled* (2021), charts a similar path in underscoring a distinction between the IPCC’s executive summaries and underlying detailed analyses, as well as the difficulty in sorting out natural climate variability versus that caused by human activities. See the review, also by this reviewer: Kenneth Barry, *Unsettled: What Climate Science Tells Us What it Doesn’t and Why it Matters*, 43 ENERGY L.J. 237 (2022).

3. It can be debated whether Curry should have spliced in explanations for general readers to overcome deterrents to full understanding. The drawback is that doing so would substantially lengthen the book, and perhaps bore specialists who don’t need handholds.

a touch of wit and wisdom. If the reader is beginning to feel at sea, these miniature prologues serve as islands of humor and common sense.

II. THE BIRTH OF A SKEPTIC

Curry recounts in an early chapter her journey from being a conventional climate scientist to a more skeptical practitioner. Her skepticism, it should be emphasized, isn't about whether the planet has shown some warming since preindustrial times, or whether carbon dioxide emissions from fossil fuels are a contributing factor. Those are givens. Instead, it's about *how much* warming can be attributed to greenhouse gas emissions, *how well* projections of future warming and climate impacts are supported, and *how to cope* with the manifest uncertainties that surround these questions. Her analysis insists on foregrounding the natural changes in climate that have occurred, from time immemorial, across multiple periodic cycles. As Curry puts it in the book's introduction:

A changing climate has been the norm throughout the Earth's 4.6-billion-year history. The Earth's temperature and weather patterns change naturally over timescales ranging from decades to millions of years. Natural variations in the surface climate originate in two ways. Internal climate fluctuations associated with circulations in the atmosphere and ocean produce exchanges of energy, water, and carbon between the atmosphere, oceans, and ice. External influences on the climate system include variations in the energy received from the sun and the effects of volcanic eruptions.⁴

At the same time, Curry does not shortchange the contributions of mankind. Human activities, she notes, "influence climate through changing land use and land cover [as well as by] changing atmospheric composition by increasing the emissions of CO₂ and other greenhouse gases and by altering the concentrations of aerosol particles in the atmosphere."⁵

However, one of the objectives of Curry's book is to restore more balance in the public perception of the two great forces – natural variations and human actions – behind climate change. She laments:

Any change that is observed over the past century is now implicitly assumed to be caused by human emissions in the atmosphere. This assumption leads to connecting every unusual weather or climate event to human-caused climate change from fossil fuel emissions.⁶

In the same passage, Curry takes matters a step further, suggesting that climate change is blamed for a whole spectrum of social ills: "Everything that goes wrong reinforces the conviction that there is only one thing we can do to prevent societal problems – stop burning fossil fuels."⁷ Thus, an implicit aim of *Climate Uncertainty* is to counter the practice of scapegoating greenhouse gas emissions as the root cause of problems that require a much wider perspective to solve.

4. CURRY, *supra* note 1, at 4.

5. *Id.*

6. *Id.* at 5.

7. *Id.*

Curry wants us to know something else essential to understanding climate change: its mysteries are a lot more complicated to unravel than “laboratory physics and chemistry.”⁸ In her words:

Complexity of the climate system arises from the chaotic behavior and nonlinearity of the equations for motions in the atmosphere and oceans, and the feedbacks between subsystems for the atmosphere, oceans, land surface, and glacier ice.⁹

All this, insists the book, is more than a handful for contemporary computer modeling of climate systems to tackle. As one of many examples, Curry points out that “[t]he wide differences among climate model simulations of clouds and ocean circulations continue to be primary sources of uncertainties in the current generation of climate models.”¹⁰ Her treatise is thus, among other things, a sustained call for humility in construing the readouts of computer modeling runs.

Curry also faults the U.N. and its IPCC for implying that the preindustrial climate was “just right,” in the Goldilocks sense. Few would want to return to the 18th century climate, part of the so-called Little Ice Age, she notes, with “viciously cold winters” in the US, Europe, and China.¹¹ In reality, she continues, the migration of populations in North America in more recent times has evinced a preference for warmer winters.¹² However, this relativism does not mean that the book is cavalier about concerns over extreme weather events and “dangerous” global warming. Over many pages of *Climate Uncertainty*, Curry examines the IPCC’s identification of such risks to human civilization and the ecosystem, while evaluating whether they are overstated or justified. She also interrogates whether “tipping points” are close at hand, debunking most of these “catastrophic scenario[s]” as “unlikely” in the IPCC’s own estimation.¹³

In Chapter 2, the author takes a special interest in documenting how the requirement for a “consensus” among scientists has evolved, under the auspices of the IPCC and urged on by major political figures. This is a section in which the author takes a clear personal interest, but her analysis is nuanced. She records the observation of a social scientist that the IPCC “adopted a ‘speaking consensus to power’ approach that sees uncertainty and dissent as problematic and attempts to mediate these into a consensus.”¹⁴ The hitch is that, where “available knowledge

8. CURRY, *supra* note 1, at 6.

9. *Id.*

10. *Id.* at 7. Curry provides a longer bullet-point list of climate science “gaps” she noted as early as 2014 when attending a workshop. These include solar impacts; multi-decadal and century scale “internal variability” associated with ocean circulations; vertical heat transfer mechanism in oceans; thermodynamic feedbacks (from water vapor, clouds, and atmospheric “lapse rates” that determine the climate sensitivity to greenhouse gases; and (added in later years) the planet’s “carbon budget and . . . cycle”; ice sheet dynamics; and geothermal heat transfers under oceans and ice sheets. The book details these phenomena and understanding gaps in ensuing chapters. *Id.* at 8.

11. CURRY, *supra* note 1, at 9.

12. *Id.*

13. *Id.* at 11.

14. *Id.* at 21.

is inconclusive,” consensus becomes “a proxy for truth,” reflecting “a specific vision of how politics deals with scientific uncertainty.”¹⁵ The approach may be a pragmatic strategy to transcend gaps in our understanding, but is a constant source of worry underlying *Climate Uncertainty* insofar as it fosters an attitude of “over-confidence” that isn’t warranted by the actual state of the science. Indeed, an “extended group of scientists” has absorbed this “confidence in the consensus,” Curry alleges, via a “second-hand manner from the institutional authority of the IPCC and the emphatic way in which the consensus is portrayed.”¹⁶

Curry goes on in Chapter 2 to argue the essentiality of skepticism in sorting through hypotheses and advancing science.¹⁷ In a rather poignant passage, Curry asks:

[H]ow did skepticism about climate change come to be an accusation, with some scientific researchers in academia being branded as deniers, heretics, misinformers, and anti-science?¹⁸

In this environment, “independent thinkers, who are not supportive of the IPCC consensus, are suspect,” Curry frets.¹⁹ She adduces a roster of scientists with impressive credentials whom activists have denounced in such terms. The “denier” label has even been pinned on scientists well known for raising concerns about climate change but who have dared to suggest that renewable energy sources aren’t sufficient to power the grid (and have therefore voiced support for nuclear energy).²⁰

Curry emerges as an advocate for *not* camouflaging scientific uncertainties and dissent in a veneer of consensus. While she acknowledges that the IPCC’s bent towards consensus-building was “useful” in forging an “early synthesis” of the basic science behind climate change, she maintains that “[g]reater openness about scientific uncertainties and ignorance, plus more transparency about dissent and disagreement, would provide policymakers with a more complete picture of climate science and its limitations.”²¹

III. A PLEA FOR POLICY FRANKNESS

Another dimension to the book is a call to recognize “inconvenient truths” in the realm of what is *politically and economically* feasible. In this regard, Curry has serious doubts about whether carbon neutrality by 2050 – a route the U.N. bodies have prescribed as vital to holding the global temperature average to just 1.5 degrees °C above the preindustrial level – is achievable. There’s a “wide gap,” she notes, between “ambition and obligation” in the 2016 Paris Agreement on climate change. Moreover, she adds:

The proposed stabilization of CO₂ emissions has revealed and created new problems in terms of energy policy. Energy policy is driven by a complicated mix

15. CURRY, *supra* note 1, at 21.

16. *Id.* at 26.

17. *Id.* at 27.

18. *Id.* at 29.

19. CURRY, *supra* note 1, at 29.

20. *Id.* at 30.

21. *Id.* at 32.

of economics and economic development, energy security and reliability, environmental quality and health issues, and resource availability. It is becoming increasingly apparent that we don't know how to address the challenge of rapidly stabilizing atmospheric concentrations of CO₂ at a low level. The green energy revolution has barely begun. Large-scale sequestration of CO₂ emissions is an idea that is far from reality.²²

The carbon neutrality goal is further hindered by the need to get all countries on board with the proposed strategies. Curry suggests readjusting emissions policy goals that “almost certainly will not be met since they aim beyond the scope of the knowable and doable and what is politically feasible.”²³

While she's at it, Curry takes another controversial shot, this time at what she calls the “sustainability trap” (which she locates “at the heart of the [U.N.] agenda”).²⁴ Sustainability, she adds, treats carbon emissions as a “control knob” in the service of maintaining a stable climate; but this notion is “being increasingly challenged,” maintains Curry, because the “world and its climate are thought to be continually out of balance.”²⁵ Instead, she suggests more policy focus and resource investment should be directed at “resilience” which “looks for ways to manage in a continually imbalanced world . . . the ability to bounce back in the face of shocks . . . reorganize and retain essentially the same functional structure.”²⁶

In Chapter 3 (“Mixing Science and Politics”), Curry returns to her theme that climate science has been undermined by political activism – this time with even more vigor. Her main beef is that many climate scientists have allowed their craft to bleed over into policy advocacy, whereas, in her view, they should be kept separate: “The phrase ‘follow the science’ has a virtuous ring to it. But it does not lead anywhere. It can illuminate various courses of action and quantify the risks and tradeoffs. But science cannot make choices for us.”²⁷

In addition to disapproving of scientists who have leveraged public trust in science to promote their political agendas, Curry chastises editors of scientific journals who've acted as gatekeepers in filtering out research papers that don't align with the IPCC consensus. She cites as just one example the editor of *Science*, who proclaimed in an op-ed in 2015 that “[t]he time for debate has ended. Action is urgently needed.”²⁸ The result has been suppression of dissenting voices:

How many studies providing quality data and analyses relevant to climate controversies have gone unpublished because the researcher feared repercussions, did not see the value of reporting it, or did not want the results to be widely known? How many skeptical papers were not published by activist editorial boards? How many published papers have buried results in order to avoid highlighting findings that conflict with preferred narratives?²⁹

22. *Id.* at 41.

23. CURRY, *supra* note 1, at 41.

24. *Id.*

25. *Id.*

26. *Id.* at 42.

27. CURRY, *supra* note 1, at 55.

28. *Id.* at 58.

29. *Id.* at 59.

The questions are rhetorical, in that the actual numbers are “unknowable,” Curry reflects, but she states that she’s aware of anecdotal examples of each such form of suppression.³⁰

The upshot is that science has been distorted and misused by the relevant U.N. bodies, Curry concludes, as the latter have asked for more precision from their expert panels “in support of a preordained policy solution” than permitted by the “complexity, chaos, and our current understanding,” resulting in “an impossible situation for scientists and misleading outcomes for policy makers.”³¹

IV. PLAUSIBILITY OF WORST-CASE SCENARIOS

After decrying the atmosphere in which climate scientists who question the IPCC’s advertised “consensus” work, *Climate Uncertainty* in Chapter 9 (“What’s the worst case?”) takes a closer look at the predicate for worst-case scenarios – possibilities that seem to get the most oxygen in widespread publicity surrounding the panel’s periodic reports. Inevitably, this steers the book into a dissection of the science. Curry takes a hard look at the spectrum of possible global warming outcomes – both potential average temperatures and adverse consequences (storms, floods, draughts, heat waves, etc.). Her skepticism that the more extreme possibilities will occur is rooted in historical precedents, offsetting natural variability phenomena, the feedbacks and inherent boundaries of the climate system, and above all the limitations of complex computer modeling to meaningfully capture and predict the myriad of factors that affect weather and climate trends. A recurrent point is that *global* climate models are particularly weak at predicting *regional* weather and climate changes, which require “high resolution” and localizing parameters.

Many readers may find these sections edifying but slow-going, simply because the discussion gets increasingly granular and technical. Those who lack expertise in climate research and modeling may be challenged, but persistence should yield a deeper appreciation of why a fair number of independent-minded scientists like Curry are hesitant to join the chorus forecasting climate and ecological devastation as the 21st century unfolds. Her hard-headed, anti-alarmist attitude is well summed up in this passage:

There is not a straightforward continuum between the plausible and implausible. Rather, there is a spectrum from the extremely plausible . . . to the implausible, which is nearly inconceivable or incredible. . . . Articulation of plausible scenarios provides a pathway away from prediction and probabilistic thinking that creates a more fruitful basis for making decisions for complex problems with large uncertainties.³²

Her argument to focus on the “plausible” leads her to denigrate high estimates of the “economic cost of carbon” that derive from a “statistically manufactured fat tail whose outcome values have no scientific justification.”³³ Her own analytic

30. *Id.*

31. CURRY, *supra* note 1, at 61.

32. *Id.* at 141.

33. *Id.* at 142.

framework is then applied in short sections on the risks of West Antarctic Ice Sheet collapse, sea level rises, and other “worst-case scenarios.”

V. LIVING WITH, AND MANAGING RISK, IN DEEP UNCERTAINTY

Much of the latter half of *Climate Uncertainty* is consumed by a wide-ranging meditation on how society deals with risks and unknowns. Overcorrecting for risks that resist easy identification or quantification can be as bad, or worse, than taking them too lightly, in the author’s view. The uniqueness of climate change risk forecasting is something Curry continually stresses. While it is tempting to treat climate change as a “well-understood problem with a strong consensus” that traditional risk management can address, she counters that “the diversity of climate-related drivers and their complex linkages, various inherent and irreducible uncertainties . . . and the unequal distribution of exposure and effects across geographies and time . . . confound any simple or uncontested application of traditional risk management approaches.”³⁴

In Chapter 11, squarely titled “Risk Management,” Curry prescribes for the unique challenges of climate or extreme weather a form of “dynamic risk assessment and management” with responses that can be “monitored and adjusted.”³⁵ It is clear from the pages that follow that Curry has given extensive thought to the anatomy of risk associated with climate change and to pragmatic, adaptive management strategies. Her enlargement of the subject shuttles between the abstract and the concrete. As an instance of the latter, Curry reviews how Germany’s “single-minded focus” on eliminating the risk of a nuclear power plant accidents in the wake of Japan’s Fukushima disaster – specifically, by phasing out its nuclear capacity – resulted in a Pandora’s box of ill effects: high prices and energy “impoverishment,” an increase in reliance on fossil fuels (including coal when Russia’s invasion of Ukraine imperiled natural gas supplies), and a “spike in greenhouse gas emissions and air pollution.”³⁶ The lesson is to broaden risk analysis to take more potential downsides into account.

The book then turns from flexible risk assessment to adjacent fields: robustness and resilience of systems that can be impacted by extreme weather. As typical in *Climate Uncertainty*, Curry provides a clear, well-organized, bullet-pointed overview of the myriad considerations that go into these capabilities. Notably, she opines that setting a specific target level to stabilize greenhouse gas emissions is a “non-robust strategy” given the complex web of uncertainties, feedbacks, and non-linear drivers entailed. She prefers to deploy a “broad technological portfolio of mitigation and adaptation measures. . . .”³⁷

The discussion, as it proceeds, takes on the flavor of a management seminar on the science of decision-making in a context of flux and high-stakes risks (Chapter 12, in fact, is titled “Decision-Making under Deep Uncertainty”). With its core of common sense, the dissertation is useful in delineating concepts and processes that are more likely to succeed (i.e., lead to decisions society won’t regret later on)

34. *Id.* at 163.

35. CURRY, *supra* note 1, at 164.

36. *Id.* at 194-96.

37. *Id.* at 206-07.

where the goal is to optimize for a future that is rife with uncertainties. Curry favors collaborative processes that are, in some ways, the inverse of traditional decision-making and lead to stakeholder buy-in, a set of feasible alternatives, and flexibility later on to hone the decision to fit future developments.

In a succeeding chapter (Chapter 13, “Adaptation, Resilience, and Development”), Curry tackles a subject that has been a sore subject over the long haul of climate debate. “For the last 30 years,” she observes, the U.N. bodies addressing climate change have chosen “eliminating emissions from burning fossil fuels” to be their “dominant goal.”³⁸ Activists, she adds, have looked down on adaptation approaches as “capitulation and a distraction from the need to curb emissions . . . in essence, a copout that lets the fossil fuel companies off the hook.”³⁹ However, the author discerns a countertrend over the last decade that has admitted adaptation strategies into the conversation. She then traces some of these signs and concrete actions.⁴⁰

Here, Curry circles back to a previous peeve: using climate change as an all-purpose excuse. Politicians around the globe, she notes, are prone to invoking climate change to deflect blame for chronic problems with other root causes, such as natural climate variability, inter-class discrimination, resource exploitation, or their own government’s inadequacies.⁴¹ This can lead to neglect or misdirected efforts in tackling economic or environmental dysfunctions with more relevant solutions.⁴²

Another swipe at IPCC orthodoxy comes with Curry’s observation that a key building block of resilience and adaptation is economic development (because underdeveloped societies are most exposed to harsher weather events). Yet, the most recent IPCC assessment (AR6), while specifically addressing “climate resilient development,” has an inherent tension, in that its insistence on “sustainability” (i.e., ruling out fossil fuel-based energy) “conflicts with the objective of poverty eradication.”⁴³ The upshot is that:

Development and resilience are potentially being slowed down by a growing emphasis on linking international development funds to reducing emissions . . . [which] comes at the expense of development funds that have historically been targeted for poverty reduction.⁴⁴

VI. MORE ENLIGHTENED ENERGY POLICIES

Of even greater interest to those in the energy field is one of the concluding chapters, simply titled “Mitigation” (Chapter 14). *Mitigation* is shorthand for

38. *Id.* at 231.

39. CURRY, *supra* note 1, at 231.

40. *Id.* at 231-32.

41. *Id.* at 232-33.

42. *Id.* at 233-34. Curry provides some concrete examples of such misidentification.

43. CURRY, *supra* note 1, at 246.

44. *Id.* at 248. Curry returns to this theme (“Conflicts with Mitigation”), where she deplores the U.N. Secretary General, the governments of the U.K., the U.S., and such major lenders as the IMF and World Bank for “aggressively limiting fossil fuel investments” at the expense of economic development for poor countries. This forbearance includes “natural gas [which is] regarded as the best near-term solution for most countries.” *Id.* at 234.

strategies to cut carbon emissions and atmospheric concentrations of greenhouse gases as the linchpin for preventing excessive global warming. “Reducing CO₂ emissions,” argues Curry, “has become an end in itself, with the implicit assumption that [it] will rapidly decrease atmospheric CO₂ and improve the climate.”⁴⁵ But even if the brakes are slammed on greenhouse gas emissions in the near term, she maintains:

The bottom line is that there is substantial inertia in the global carbon cycle and the climate system. Even if the emissions are successfully reduced/eliminated, it takes time for the CO₂ concentration in the atmosphere to respond . . . [and] for the climate to respond to the change in atmospheric CO₂.⁴⁶

Several pages later in the chapter, Curry surveys the state of carbon sequestration. “Natural” sequestration (though planting vegetation that stores carbon dioxide) is an obvious “no regrets” strategy, but technological methods of carbon capture, she continues, are “in relatively early stages of development.”⁴⁷ Curry finds it “prudent” to continue development of such carbon sequestration technologies – noting that the IPCC’s latest report deems them “an essential element of scenarios that limit warming to 1.5° C or likely below 2° . . . regardless of whether net-zero emissions goals are reached.”⁴⁸

There are also compact but enlightening subsections on (1) short-lived but potent emissions (e.g., methane and “black carbon” or soot) – whose control in the nearer term Curry finds potentially impactful and more feasible than a precipitous clampdown on CO₂ emissions; and (2) the history of past energy transitions and the state of the current transition (i.e., from fossil fuels to “cleaner” technologies).⁴⁹ She describes a bumpy road so far in Europe’s and China’s clean energy transitions, due to spells of uncooperative weather coupled with insufficient planning for wind and solar intermittency.⁵⁰ In the U.S., Curry delineates several obstacles to rapid deployment of wind and solar, including growth of the transmission network “at a pace that is a fraction of that required for net-zero emissions.”⁵¹ As for biofuels, Curry’s comments point to largely ill-considered, politically-driven policies – both in the U.S. and E.U. – pushing the dedication of farm and woodlands to this variety of renewables.⁵²

Uncertainties notwithstanding, Curry also takes a crack at imagining the electric grid as the 21st century ends – bearing in mind that fossil fuels are finite and increasing electrification of energy usage incorporating lower-carbon resources is likely a long-term trend. The subsection is well worth reading in detail, but the biggest takeaway is that nuclear power will have to serve as a “backbone” and that some combination of super-regional “macro” and smart “micro” grids will best serve to distribute the diverse energy sources and demand response opportunities

45. *Id.* at 263.

46. CURRY, *supra* note 1, at 266.

47. *Id.* at 267-68.

48. *Id.* at 268.

49. *Id.* at 268-75.

50. CURRY, *supra* note 1, at 273.

51. *Id.* at 274.

52. *Id.* at 273-74.

of tomorrow.⁵³ In a closer look at the state of nuclear power globally and in the U.S., Curry describes how advanced “modular” unit designs currently being developed can alleviate the safety and cost concerns that have dogged nuclear plant development in the last few decades.⁵⁴

VII. CONCLUSION

As *Climate Uncertainties* winds to a close, the author reprises some themes and arguments in previous chapters, shaping them into broader recommendations. Notably, Curry weighs the countervailing risks of energy shortages and high costs associated with a steep reduction in fossil fuel use versus the risks of a dangerously warmer climate. Her verdict is that the socioeconomic risk of a less reliable energy system is more definite and quantifiable than the far less certain risk of severe, worst-case climate scenarios coming to pass by mid-century. Hence, she prefers a less aggressive agenda for phasing out conventional fuels and bringing on new, greener technologies.⁵⁵

The final chapter of the book – “Climate Risk and the Policy Discourse” (Chapter 15) – is a compelling sermon on the intensified, partisan state of the public debate. As a scientist who has studied the technical issues in great detail but declines to pull the ripcord of a “climate emergency,” Curry laments the devolution of the debate into volleys from entrenched encampments:

Catastrophizing is motivated by a desire to amp up the urgency for action in eliminating fossil fuels. Continued catastrophizing has produced a public battle between two extremes: those who insist on urgent elimination of fossil fuels, and a range of others that are castigated as deniers of climate science because they do not support the rapid elimination of fossil fuels until reliable replacement fuels are in place.⁵⁶

In the last several pages, effectively an epilogue, Curry calls for bringing the temperature down, figuratively speaking, while listening to multiple perspectives: “The road ahead . . . requires moving away from the consensus-enforcing and cancel culture approach of attempting to restrict the dialogue surrounding climate change and the policy options. We need to open up space for dissent, disagreement, and discussion about scientific uncertainty and policy options”⁵⁷

I found *Climate Uncertainty* an impressive undertaking that is well-executed throughout. In just 300 pages, it covers a remarkably broad array of interrelated topics, from the science to energy technology to policies that are sensitive to the needs underdeveloped nations, with an attitude that’s more pragmatic than ideological. When Curry enters the thicket of IPCC warming scenarios, the discussion may get a bit esoteric for non-scientists, and some thought might be given to an expanded future edition that ameliorates the challenge.

53. *Id.* at 278-79.

54. CURRY, *supra* note 1, at 281-283. Curry suggests in this subsection that, notwithstanding some well-publicized accidents, the overall safety record of nuclear is good and concerns have been overblown.

55. *Id.* at 280.

56. *Id.* at 297.

57. *Id.* at 304.

Certainly, Judith Curry has some axes to grind – and at times the sparks fly – but for the most part she proves a patient, deeply researched, and objective guide through the labyrinth of issues and debates clustering around the future of our climate. The lengthy endnotes following each chapter attest to her recruitment of many authorities to buttress her explanations and arguments. Yet, she provides a distinct voice, whether you classify her as a “skeptic” or simply an apolitical, professionally detached observer.

Curry finished writing the book in mid-2022.⁵⁸ That means a plethora of new studies and data have flowed into the arena since she sent off her proofs to the publisher. With front-page stories in the *Washington Post* every week proclaiming fresh evidence of grave climate damage on the horizon, I wondered whether Curry has retreated from the stands she takes in *Climate Uncertainty*. A visit to the author’s website *Climate, Etc.*, featuring Curry blog posts quickly convinced me otherwise: all her core premises appear to remain intact.⁵⁹ Indeed, one can find a Curry lecture, posted on May 4, 2024, encapsulating the book in a convenient 30-minute video.⁶⁰

58. CURRY, *supra* note 1, at 292.

59. See CLIMATE ETC., <https://judithcurry.com/> (last visited May 8, 2024).

60. Judith Curry, *Annual GWPF lecture: Climate Uncertainty and Risk*, CLIMATE ETC. (May 4, 2024), <https://judithcurry.com/2024/05/04/annual-gwpf-lecture-climate-uncertainty-and-risk/>.