ARTICLES

Managing Uncertain Causation in Toxic Exposure Cases: Lessons for the European Court of Human Rights from U.S. Toxic Tort Litigation
Katalin Sulyok.................................................................519

Candidate Conservation Agreements and ESA Listing Decisions: Underlying Incentives That Drive Stakeholder Behavior
Michael Margherita.......................................................570

The Coastal Act, Power Plants, and the Case for “Undevelopment”
Molly Loughney Melius, Sarah Reiter, & Sarah Newkirk...............592

Exiled by Emissions—Climate Change Related Displacement and Migration in International Law: Gaps in Global Governance and the Role of the UN Climate Convention
Rina Kuusipalo............................................................614

NOTE

Heat Up Those Leftovers, Not the Planet: How Combatting Food Waste Can Affect Climate Change
Bonnie L. Smith..........................................................648

WHITE RIVER ENVIRONMENTAL LAW WRITING COMPETITION WINNER

A Billion Grains of Truth: Distributional Impacts of Household-Level Climate Change Tax Subsidies in the United States
Lynsey Gaudioso.........................................................666
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MANAGING UNCERTAIN CAUSATION IN TOXIC EXPOSURE CASES: LESSONS FOR THE EUROPEAN COURT OF HUMAN RIGHTS FROM U.S. TOXIC TORT LITIGATION

Katalin Sulyok*

Introduction ........................................................................................................................................ 521

I. The Challenge of Uncertain Causation: Establishing Causal Links Based on Uncertain Scientific Evidence ............................................................. 524

A. The Gap Between Legal and Scientific Notions of Causation, Evidence, and Uncertainty ........................................................................................................ 525

1. Causes and Causal Inference ................................................................................................. 525

2. Standard of Required Proof: Acceptance of Probabilistic Evidence ........................................ 527

3. Comfort with Uncertainty in Law and in Science ................................................................. 528

B. Multiple Sources of Uncertain Causation in Toxic Exposure Cases 530

II. The European Court of Human Rights confronts uncertain causation. 533

A. Primer on the Strasbourg Framework .................................................................................... 534

B. Uncertain Causal Links Before the Strasbourg Court in Toxic Exposure Cases ....................... 538

1. Relevance of Uncertain Causation Under Article 2 .......................................................... 538

2. Uncertain Causation Under Article 8 ................................................................................. 539

3. Uncertain Causation Under Article 41—Latency Periods ................................................. 541

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III. Techniques of the European Court of Human Rights to Manage Uncertain Causation .................................................. 542

A. Using Proxies to Substitute Causal Assessment of Uncertain Evidence ................................................................. 543

1. Decoupling Article 8 Obligations from the Uncertain Causal Link ........................................................................... 543

2. The Proxies that Substitute for Causal Inquiry: Identification and Assessment ......................................................... 544

B. Drawbacks of the Proxy-Based Method ........................................ 549

C. Dismissive Approach Toward Probabilistic Evidence of Causation ...................................................... 552

1. Too high a level of certainty is required. ........................................ 552

2. Probabilistic Evidence—Rare and Exceptional Acceptance .... 555

IV. Remedyng Health Injuries Caused by Pollution Under U.S. Toxic Tort Law ................................................................. 555

A. Primer on the U.S. Toxic Tort Law Framework ............................................ 556

B. Causation Theories in U.S. Toxic Tort Cases: Adaptation to Uncertain Causation ......................................................... 556

1. The Two-Step Cause-in-Fact Inquiry ........................................ 556

2. But-for Causation, Substantial Factor Test ................................ 557

3. Problems and Solutions in Cases Involving Multiple Causal Agents ........................................................................ 558

C. Proof of Uncertain Causation—Probabilistic Evidence, Probability of Causation ........................................................... 561

1. Burden of Proof ........................................................................ 561

2. The “More Likely than Not” Standard—And Even Less Likely than 50 Percent? ................................................................. 562

3. Relying on Statistical Evidence ................................................. 563

4. Doubling the Relative Risk: An Evidentiary Rule for Both General and Specific Causation? ........................................ 563

V. Lessons for the Strasbourg Court from the U.S. Toxic Tort Approach 565

1. Considering Scientific Proof of Causation ..................................... 566

2. Accepting Probabilistic, Statistical Proof of Causation ............... 568
INTRODUCTION

Scientific uncertainty is often cited as being among the most daunting challenges in adjudicating cases involving environmental harm.¹ Problems engendered by scientific uncertainty emerge when courts have to identify the legally relevant cause of the unlawful harm based on uncertain scientific facts. The ways in which judges handle scientific evidence and the inherent uncertainty that flows from the statistical and probabilistic nature of scientific evidence, play a definitive role in shaping the prospects of success for victims’ environmental claims. Notably, courts differ in their approaches to adjudicate claims burdened with scientific uncertainty. While some judges hesitate to decide cases on the basis of highly technical, scientific evidence on the grounds of their lack of expertise, others go to great lengths to evaluate scientific inputs and decide such cases on the merits.

This article scrutinizes two markedly different judicial approaches to handling this challenge: the practice of the European Court of Human Rights (Strasbourg Court) in claims for toxic injuries and that of United States courts in toxic torts. The Strasbourg Court avoids a causal analysis based on scientific evidence in favor of an overall assessment of the non-causal aspects of the case when it decides whether a state is to be held liable for a toxic exposure.² In more than two decades of environmental jurisprudence, the Court has consistently avoided considering scientific proof of causation and has refused to rely on probabilistic, statistical evidence.³ In contrast, United States courts have developed ample evidentiary and causal techniques to accommodate the special features of scientific evidence in toxic torts. Even though scientific evidence is “likely


². See infra Part III.

to stress and strain the law," United States courts are willing to hold tortfeasors liable on the basis of statistical probabilities presented by scientific proof of causation.

One may argue that the difference in how these courts handle uncertain causal links is justified by the different legal basis on which they adjudicate cases. While United States courts hear cases under tort law, the Strasbourg Court has a human-rights-based mandate and adjudicates toxic exposure claims under the right to respect for private and family life (Article 8) and the right to life (Article 2) enshrined in the European Convention on Human Rights (Convention). I will contend, however, that this difference is not relevant for the causal analysis of toxic exposure claims and, thus, that it does not justify the Strasbourg Court’s less-nuanced causal inquiry. The Court has a tort law function because it provides pecuniary and non-pecuniary damages for human rights violations caused by environmental pollution, which requires a thorough causal inquiry. This shared function suggests that the practices United States courts employ in assessing statistical evidence in toxic tort cases can profitably guide the inquiry of the Strasbourg Court.

Thus far, scholars have paid little attention to the Strasbourg Court’s mode of causal analysis in toxic exposure cases. The most authoritative commentary on its environmental jurisprudence was delivered by Boštjan M. Zupančič, a current judge at the Court and a former President of its

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4. Cranor, supra note 1, at 261.
5. Major differences lie in the source of obligation (the International Human Rights Convention versus the common law and statutory law), the subject of obligation (states versus private and public parties), and in the definition of damage (interference with rights versus causing physical or psychological harm). See infra Parts II.A, IV.A.
7. Some authors explicitly call the Strasbourg regime a "system of tort law." Ken Oliphant & Katarzyna Ludwichowska, Damage, in TORT LAW IN THE JURISPRUDENCE OF THE EUROPEAN COURT OF HUMAN RIGHTS 397, 447 (Attila Fenyves et al. eds., 2011).
Third Chamber. Judge Zupančič criticizes the Court for subscribing to an “archaic perception of causation,” meaning that it refuses to hold a state liable on the basis of probabilistic proof of causation.

Despite this opening, no comprehensive analysis has been made of the ways in which the Strasbourg Court’s unwillingness to address causation on the basis of probabilistic proof impacts the enforceability of toxic exposure claims before it. This article aims to provide such an analysis by examining the Court’s reasoning for finding, or not finding, a violation. The Court announced in the López Ostra case that a violation takes place if severe environmental pollution that is attributable to a state adversely affects the applicant’s wellbeing, even if it did not cause actual health injuries to the applicant. Yet in the Court’s practice, virtually no applicant was able to successfully prove a violation by claiming health injuries that had been allegedly caused by severe environmental pollution. This article contends that the principal reason for this lies in the Court’s approach to causal inquiry in toxic exposure cases.

This research into the toxic exposure case law of the Strasbourg Court reveals that instead of investigating the actual cause of health injuries, the Court decides cases by assessing certain proxies of cause. This proxy-based method hollows out the tort law function of the Strasbourg system by allowing injuries to escape judicial scrutiny; additionally, it leads to different outcomes in factually similar cases. By avoiding complex causal inquiries and evidentiary assessments, the Strasbourg Court sacrifices predictable and nuanced judicial decision-making and leaves future plaintiffs without guidance as to the court’s evidentiary requirements. These shortcomings, if left unaddressed, could undermine the Court’s reputation of being a leading advocate of environmental protection based on human rights.

In contrast to the Strasbourg practice, United States toxic tort case law shows that uncertainty is not an obstacle to establishing causation and allocating liability based on probabilistic scientific proof. This article analyzes the innovative causal and evidentiary methods of United States

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12. The Strasbourg Court has the oldest and most extensive case law on human right violations caused by environmental pollution. See Alan Boyle, Human Rights or Environmental Rights? A Reassessment, 13 FORDHAM ENVTL. L. REV. 471, 484 (2007) (focusing on Europe because that is where most cases on human rights and the environment have been decided).
courts and highlights three that appear to be readily transferable to the Strasbourg system. It is argued that by applying these techniques, the Strasbourg Court could respond more effectively to the challenges of uncertainty in making thorough causal assessments.

The article proceeds in five main parts. Part I addresses the challenge posed for courts in both regimes by various forms of uncertain causation in toxic exposure cases. Part II analyzes the causal links between a state’s conduct, toxic exposure, and the harmful consequences that invite assessment under Article 2 (right to life), Article 8 (right to respect for private and family life), and Article 41 (just satisfaction). These links could, and should, play a more decisive role in the Strasbourg Court’s analysis when it decides on a violation. Part III analyzes the Court’s proxy-based method of assessing violations and the ways it handles probabilistic scientific proof of uncertain causation in its judgments. Part IV examines the approaches of United States courts, which are known for modifying their causal assessment and evidentiary rules in order to decide cases on the merits, even on the basis of uncertain scientific evidence. Finally, Part V concludes with the proposal that the Strasbourg Court borrow techniques from United States toxic tort case law in order to improve its decision-making related to uncertain scientific facts. This part further advances reasons for adopting these techniques and discusses procedural aspects of their adoption.

I. THE CHALLENGE OF UNCERTAIN CAUSATION: ESTABLISHING CAUSAL LINKS BASED ON UNCERTAIN SCIENTIFIC EVIDENCE

In both United States tort law and the Strasbourg regime, victims must establish a causal link between the harm and the allegedly wrongful conduct in order to prove the breach or the tortious conduct and receive damages. This requirement entails adducing pieces of scientific evidence concerning the victim’s health condition and the extent of environmental pollution that allegedly caused the injury.

The prospects of success for a toxic exposure claim are substantially influenced by hurdles arising from the law–science interface in both tort

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14. With respect to the confines of this paper, it will not address the procedural aspects of dealing with scientific expert evidence (admissibility criteria, cross-examination, etc.).
and human rights law. The following section explores the causes of these difficulties, namely, the fundamental difference in the way law and science treat the concepts of cause and causation, their different approaches to what constitutes valid evidence, and their different levels of tolerance toward uncertainty.

A. The Gap Between Legal and Scientific Notions of Causation, Evidence, and Uncertainty

1. Causes and Causal Inference

Causes of legal relevance (i.e., factual causes) are of narrower scope than naturally occurring factors that lead to the same outcome. Although there is a virtually infinite number of the naturally occurring factors, not all of them are equally relevant for the purposes of law.\(^{17}\) Reflecting these qualitative differences in approach to causal argument, H.L.A. Hart and Tony Honore distinguish between causally relevant factors (causes) and “mere conditions.”\(^{18}\) Those factors identified as causal have legal relevance, while mere conditions do not form part of legal inquiry. Accordingly, typical causal questions in law emerge as to whether a specific harm was caused by a certain human conduct or omission.\(^{19}\)

Legal regimes, thus, adopt certain tests to establish the causes they regard as legally appreciable among the various conditions of an outcome.\(^{20}\) According to the Third Restatement of the Law of Torts (Third Restatement), “a conduct is a factual cause of a harm when the harm would not have occurred absent the conduct.”\(^{21}\) This definition allows that there can be several factual causes of an outcome;\(^{22}\) as long as a conduct is necessary for the outcome, it is regarded as a factual cause (cause-in-fact, but-for cause).\(^{23}\) Therefore, a particular conduct need only be a cause and not the cause of the harm for qualifying as a factual cause.\(^{24}\) A causal agent is regarded as a cause-in-fact if, but for its presence, the result would not

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17. Examples from everyday experiences that illustrate this point are weather conditions “causing” slippery roads before a car accident or an enduring drought that “generates” dry leaves, feeding a bush fire.
19. Id. at 84.
20. Id. at 112–13.
22. Id.
23. Id.
24. Id.
have occurred or would have occurred later.\textsuperscript{25} Other causal agents that complement the necessary causal sets are regarded as background causes.\textsuperscript{26}

The Third Restatement provides further guidance with respect to more complicated causal scenarios. In exceptional cases, there are multiple acts, each of which would have been a factual cause of the outcome alone in the absence of the other acts.\textsuperscript{27} This situation is known in tort law as the “multiple sufficient causes” scenario.\textsuperscript{28} According to the Third Restatement, each of the multiple sufficient causes should be regarded as a cause-in-fact,\textsuperscript{29} even though none is by itself a but-for cause of the harm.\textsuperscript{30} This scenario is often called causal overdetermination.\textsuperscript{31} Multiple sufficient causes are to be distinguished from multiple causes, as the latter simply accounts for a scenario when there are multiple but-for causes of a certain outcome.\textsuperscript{32}

Multiple sufficient causal sets can also emerge consecutively, in what is called the preemptive causes scenario.\textsuperscript{33} In that case, the supervening act or omission, the so-called duplicative factor, cannot be regarded as a factual cause\textsuperscript{34} as the harm would have occurred anyway.\textsuperscript{35} Different tort law causal theories handling the above causal scenarios will be addressed later.\textsuperscript{36}

The concept of causation in law is different in many respects from the causal concepts used in science.\textsuperscript{37} Carl F. Cranor suggests that the scientific understanding of causation is “more complex than the law legitimates.”\textsuperscript{38} The but-for test of legal causation favors a “mechanistic understanding of causation” that is predicated upon the metaphor of a causal chain consisting of discrete events, where each event is dependent upon the previous one.\textsuperscript{39}

\textsuperscript{25} See, e.g., Sander Greenland, Relation of Probability of Causation to Relative Risk and Doubling Dose: A Methodologic Error that Has Become a Social Problem, 89 AM. J. PUB. HEALTH 1166, 1166 (1999) (“[E]xposure is a contributory cause of the plaintiff’s disease if, but for exposure, that disease would have occurred later in life or not at all.”).

\textsuperscript{26} RESTATEMENT (THIRD) OF TORTS § 26.

\textsuperscript{27} Id. § 27.

\textsuperscript{28} Id.

\textsuperscript{29} Id.

\textsuperscript{30} Id. § 26.

\textsuperscript{31} SANDY STEEL, PROOF OF CAUSATION IN TORT LAW 18–20 (2015).

\textsuperscript{32} RESTATEMENT (THIRD) OF TORTS § 26.

\textsuperscript{33} Id.

\textsuperscript{34} Id.

\textsuperscript{35} Id.

\textsuperscript{36} See infra Part IV.B.


\textsuperscript{38} Cranor, supra note 1, at 261.

\textsuperscript{39} Brennan, supra note 37, at 485–86.
However, in fact, elements of the chain might be independent of the first triggering action and hence, the causal process is better conceived as a “complex set of conditions.”

Consequently, judges often run into difficulties when they try to select a certain event from the hypothetical chain of events to be the but-for cause of the injury.

Finally, law and science also differ in their methods of reasoning. Consistent with their thinking in terms of the metaphor of a causal chain, lawyers tend to apply deductive reasoning. But, this approach in itself creates the illusion of causality because it is necessarily loaded with causal assumptions. As a result, the substantiated causal link may only result from the method of deductive reasoning. Scientists, in contrast, normally use inductive reasoning.

2. Standard of Required Proof: Acceptance of Probabilistic Evidence

Legal regimes establish a particular standard of proof to determine the required level of proof above which a causal claim is to be accepted as valid and legally appreciable. Tort law, for instance, uses the preponderance of the evidence standard, i.e., the balance of probability. By contrast, there is no generally agreed standard for proof of causality in science.

These different approaches toward proof of causation might be attributable to the fact that the basis of scientific inquiry is the rejection of the null hypothesis that posits that the factors examined are random variables. In fact, scientists, by collecting statistically significant evidence, “disprove the null hypothesis” instead of proving the actual hypothesis.

There is also a striking difference in the approach of lawyers and scientists toward probabilistic evidence. While statistical evidence is treated as normal in science, it is conceived only as “a second best” option in law. The robustness of evidence in science is assessed in terms of the level of

40. HART & HONORE, supra note 18, at 72.
41. Brennan, supra note 37, at 486.
42. Id. at 482.
43. Id.
44. Id.
45. Id.
46. STEEL, supra note 31, at 50.
47. Peter Feldschreiber et al., Biostatistics and Causation in Medicinal Product Liability Suits, in PERSPECTIVES ON CAUSATION 179, 190 (Richard Goldberg ed., 2011).
48. Brennan, supra note 37, at 511.
49. Id. (emphasis added).
50. Id. at 490.
significance (so-called p value), which is conceived to be a statement of probability.\footnote{Id. at 482.}

In contrast to the approach used in science, judges often do not want to engage in probabilistic reasoning \footnote{Id. at 490–91.} and tend not to regard the preponderance rule as a purely mathematical question according to which a statistical chance bigger than 50% automatically results in a finding of causation.\footnote{Id. at 493.} One reason for this difference might be that this so-called naked statistical-evidence approach can easily lead to counterintuitive results. The \textit{Smith v. Rapid Transit} case well illustrates the dilemmas of basing the preponderance rule solely on one mathematical probability calculation.\footnote{Smith v. Rapid Transit, 58 N.E.2d 754, 755 (Mass. 1945).} In the material case, a bus pushed the plaintiff’s car off a road on which one company, Rapid Transit, had the exclusive right to run coach service.\footnote{Id.} The court was not ready to accept, purely on the basis of mathematical calculations of probability, that Rapid Transit was the actual tortfeasor.\footnote{Id.} Evaluating the conclusion of the court, Sandy Steel emphasizes the importance of subjective belief embedded in the preponderance rule, as it requires “that the factfinder believe[s] that \( p \) actually occurred not merely that probably \( p \) [occurred].”\footnote{STEEL, supra note 31, at 92.}

The same theoretical problem arises when courts must decide whether to rely on naked statistical evidence, such as epidemiological data, in toxic exposure cases. Similarly to the \textit{Rapid Transit} dilemma, courts’ approach to statistical scientific evidence in such cases largely depends on the factfinders’ subjective understanding of the scientific evidence.\footnote{See Smith, 58 N.E.2d at 755 (explaining that an objective understanding, such as knowing that relatively few men die of cancer, is insufficient to “warrant a finding that a particular man did not die of cancer”).} For this reason, the gaps between legal and scientific approaches to causation and evidence affect the evidentiary standards that courts apply.

3. Comfort with Uncertainty in Law and in Science

Scientific facts underlying environmental harm are highly complex and uncertain. Furthermore, their effects are temporally and spatially spread out.\footnote{RICHARD J. LAZARUS, THE MAKING OF ENVIRONMENTAL LAW 20 (2004).} In scientific literature, the concept of scientific uncertainty, in the broad sense, means that human knowledge will always remain imperfect.
when it comes to understanding and describing highly complex natural phenomena. In the narrow sense, scientific uncertainty stands for the fact that scientific research can only provide probabilistic results, as some uncertainty always remains as to the precise value of a given parameter due to imperfect measurement devices, scarce and ambiguous data, simplifying models, or natural variability. Throughout this article, uncertainty is used in this narrow sense.

It is common knowledge among scientists that scientific uncertainty is inherent to some degree in all scientific results and can never be fully eliminated. Lawyers, however, often do not have a proper understanding of the true nature of scientific uncertainty. As Troyen A. Brennan warns, courts tend to subscribe to the “positivist” philosophy of science, which assumes a constant expansion of scientific knowledge, and to hold associated belief to a view that uncertainty can be fully eliminated. In the last century, scientists abandoned this view on account of their increasing awareness of the ever uncertain and probabilistic nature of scientific results. Still, judges seem to be reluctant to accept the concept of irreducible uncertainty.

60. See James D. Brown, Prospects for the Open Treatment of Uncertainty in Environmental Research, 34 PROGRESS PHYSICAL GEOGRAPHY 75, 77 (2010) (discussing scientific uncertainty as a result of imperfect knowledge).
61. Donald Ludwig et al., Ecology, Conservation, and Public Policy, 32 ANN. REV. ECOLOGY EVOLUTION & SYSTEMATICS 481, 487 (2001). This is why scientists attach a confidence interval to every result. This indicates the range in which the parameter lies in a given percentage of the time. As a scientific consensus, the 95% confidence interval stands for a statistically significant finding. Brennan, supra note 37, at 510.
63. Id.
64. Id. at 620.
65. Id. at 618, 620.
66. In legal literature, scientific uncertainty is sometimes used to describe the lack of conclusive evidence regarding the health effects of a hazardous substance. Mark Geistfeld, Scientific Uncertainty and Causation in Tort Law, 54 VAND. L. REV. 1011, 1012 (2001). This paper uses scientific uncertainty in a somewhat broader sense, referring to the statistical, probabilistic nature of scientific results.
68. Brennan, supra note 37, at 478.
69. Id. at 479.
71. Brennan, supra note 37, at 481.
72. Id. at 491.
Nevertheless, uncertainty is not alien to law because law itself “never requires absolute certainty.” 73 This, however, “does not mean comfort with error.” 74 This especially holds true for tort law, which serves two main goals: deterrence and corrective justice. 75 Tort law causation theory is key to serving the latter goal by requiring that the tortious conduct be a but-for cause of the harm, and only those responsible for causing the harm are compelled to pay compensation. 76

B. Multiple Sources of Uncertain Causation in Toxic Exposure Cases

Tort law causation theories are often disrupted by uncertain causation (also referred to as causal uncertainty, 77 indeterminate causation, 78 and causal indeterminacy): 79 that is, our incomplete knowledge about “the empirical causal truth” in the given case. 80 This phenomenon is ubiquitous in all tort situations and is in no way unique to environmental cases. Causal uncertainty typically arises from: the multiplicity and similarity of possible causes; the passage of time, which impedes gathering relevant evidence; unobservability of causation; incomplete knowledge of causal mechanisms; the counterfactual nature of causation; human error, especially that of experts, which has obvious repercussions on expert evidence; and the costs of obtaining causal knowledge. 81

However, in toxic exposure cases, scientific uncertainty further aggravates these ordinary sources of uncertain causation. As a result of peculiar challenges present in these cases, judges in the Strasbourg regime and in toxic tort law face a specific set of evidentiary problems in establishing causality.

74. Id. at 6.
75. Id. at 10.
76. Id. at 10–11.
77. STEEL, supra note 31, at 5.
78. John Paterson, Law’s Approach to Harm Under Uncertainty, in PERSPECTIVES ON CAUSATION 383, 385 (Richard Goldberg ed., 2011). Paterson uses the term in a narrower sense, as a reference to the scenario when the plaintiff’s harm and the defendants’ breach of duty are established; however, it is not possible under the current state of scientific knowledge to determine with the balance of probability which of the defendants was the actual cause of the harm. Id. This scenario combines two problems: defendant indeterminacy and the threshold of burden of proof, which will be addressed separately. See infra Parts IV.B.3, IV.C.1.
80. STEEL, supra note 31, at 15.
81. Steel provides a detailed analysis of these sources. Id. at 7–10.
Throughout the article, uncertain causation is understood as referring to the following specific problems common to toxic exposure cases:

(i) The most typical difficulty is illustrated by the accident metaphor. In a car accident, the cause of physical injuries is readily discernible and can rarely be attributed to anything else other than the collision. However, in toxic exposure cases, identifying the cause of injury can be particularly complicated as there might be numerous possible sources of exposure, as in occupational-disease cases. Moreover, when there is an accident, the cause-and-effect relations between the collision and the injuries are plausibly justified in our everyday experiences. However, in toxic exposure cases, the mechanism of disease development is usually not well understood and not directly observable.

(ii) An injury may have a long latency period, even trans-generational, that may render the identification of a causal link especially challenging. Latency periods complicate the finding of general causation, and the lapse of time impedes identifying past exposures.

(iii) Though human epidemiological studies provide the most precise and certain proof of causal links surrounding human health impairment, such studies are often not conducted for ethical reasons. Observational data on human exposure might be available; however, they can easily fall short of statistical significance due to the infrequency of the outcome of interest. In the absence of human studies, experimental animal studies may be relied on, but the need to extrapolate from such results weakens their probative value.

82. Alan Rudlin et al., Causation and the Use of Experts, in TOXIC TORT LITIGATION 139, 139 (Arthur F. Foerster & Christine Gregorski Rolph eds., 2013).
83. RESTATMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL AND EMOTIONAL HARM § 28 (AM. LAW. INST. 2010).
84. Id.
85. Id.
87. For instance, the DES litigation concerned a drug containing diethylstilbestrol, the harmful effects of which manifested in the offsprings of the women who took the miscarriage prevention drug during their pregnancy. See infra Part IV.B.3.
89. CRANOR, supra note 86, at 9–10.
90. This obstacle arose in the In re Neurontin case where the causal factor leading to suicide was disputed. In re Neurontin Mktg., 612 F. Supp. 2d 116, 121–22, 126 (Mass. 2009). The court noted that the infrequency of suicide diminishes the probative value of the small number of such occasions. Id.
91. CRANOR, supra note 86, at 10.
(iv) Epidemiological studies are resource intensive; therefore, research results concerning a particular toxin are often not readily available. The costs are compounded if one faces a rare disease, which requires studies involving larger samples.

(v) Toxins rarely have signature effects that allow fingerprinting the causal agent. It is far more common that several disease factors contribute to a symptom common to all of them. Additionally, the same causal agent might cause numerous health impairments, while only a few of them are unique enough that they can be regarded as signature diseases. For instance, while asbestos might cause asbestosis, mesothelioma, lung cancer, and fibrosis, only asbestosis and mesothelioma are regarded as signature diseases.

(vi) Uncertainty may surround the diagnosis of injury. Certain diseases can only be fully recognized after death has occurred, and some commentators highlight possible biases on the experts’ side if they are aware of the dose of exposure when making the diagnosis.

(vii) The level of exposure is often uncertain; yet in the case of certain diseases, exposure occurring within a specific time can be of particular relevance. Quantifying the latter can be difficult.

(viii) Epidemiological studies are group-based, meaning that they can only describe the incidence of a disease in a group and not the cause of a given individual’s disease within that group. Specific problems arise in the context of determining whether the association of data indicates a causal connection. In group-based studies, selection bias and random error are particularly relevant. Even if the sample data are correct, attributing the group-based epidemiological findings to individual cases inevitably involves uncertainty.

92. Id. at 9.
93. Id. at 173–74.
94. Id. at 175.
95. Id.
97. Id.
98. Green, supra note 88, at 379.
99. KUNDIS CRAIG ET AL., supra note 96, at 159.
100. Green, supra note 88, at 378. In certain cases, early or peak doses can be relevant, while in others, the total length of the exposure is more critical than magnitude. Id.
101. Id. at 352.
103. Green, supra note 88, at 380–81.
104. Brenman, supra note 37, at 512.
To avoid such problems of group-based data, it might be advisable to supplement them with “particularized” evidence describing the individual plaintiff’s characteristics. However, the individualized approach does not preclude other types of uncertainty because the role that toxic exposure and individual background risks play in developing a given disease may be in doubt. And, even if science can substantiate the existence of genetic background risks, it remains uncertain whether the exposure and the genetic risk factor have additive, antagonistic, or synergetic effects.

Finally, multiple competing causal agents may be present, among which some have only “weak causal effects,” i.e., they create only a small incremental increase in disease risk, while others are of “strong causal effects,” conferring a substantial increase of risk.

United States courts in toxic torts and the Strasbourg Court face all these complexities when they must identify the legally relevant causes of a toxic harm. The following sections analyze their solutions to make such decisions.

II. THE EUROPEAN COURT OF HUMAN RIGHTS CONFRONTS UNCERTAIN CAUSATION.

Although Judge Zupančič dubs causation the “missing link in adjudicating human rights” at the Strasbourg Court, human rights scholars have noted the challenges of assessing causation in environmental pollution cases without analyzing the Court’s solutions. Dinah Shelton takes note of the role of causality in developing the substantive content of a right to a healthy environment, and Philippe Sands acknowledges that proving environmental damage “is notoriously difficult,” while Alan Boyle highlights the evidentiary burdens of establishing proof of causation based on scientific facts. The following sections develop an analytic

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106. Id. at 394.
107. Id.
109. CRANOR, supra note 86, at 176.
110. Zupančič, supra note 9, at 113.
framework for examining situations involving uncertain causation in toxic exposure cases before the Strasbourg Court under Articles 2, 8 and 41 of the Convention.

A. Primer on the Strasbourg Framework

Although the Convention contains no express provision on environmental protection, the Court gradually began discerning environmental considerations from various provisions by interpreting the text “as a living instrument.” The Strasbourg Court hears claims concerning toxic exposures predominantly under Article 2 (right to life) and Article 8 (right to private and family life) of the Convention.

Although the environmental scope of the two provisions is similar, the magnitude of the risk involved determines the applicable provision. Article 2 applies only to life-threatening circumstances; thus, harms failing

114. This is unsurprising given that it was drafted in 1950. BERNADETTE RAINÉY ET AL., JACOBS, WHITE & OVEY: THE EUROPEAN CONVENTION ON HUMAN RIGHTS 4 (6th ed. 2014).
115. Environmental considerations are present under Article 2 (right to life), Article 6 (right to fair trial and access to courts), Article 8 (right to private and family life), Article 10 (Right to information), Article 1 of Additional Protocol No 1 (right to property). European Convention on Human Rights, supra note 6, at arts. 2, 6, 8, 10; Protocol to the Convention for the Protection of Human Rights and Fundamental Freedoms art. 1, Mar. 20, 1952, E.T.S. No. 009 [hereinafter Protocol to the European Convention on Human Rights].
117. The Strasbourg Court may hear a complaint if the applicant exhausted at least one of the effective remedies provided under domestic law and if the application is filed within six months from the date on which the final decision was made. European Convention on Human Rights, supra note 6, at art. 35(1). The Strasbourg Court shall render a claim inadmissible if the complaint’s subject matter is substantially the same as have been previously examined or is “manifestly ill-founded.” Id. at art. 35(2)(b), (3)(a).
118. Id. at art. 2 (“(1) Everyone’s right to life shall be protected by law. No one shall be deprived of his life intentionally save in the execution of a sentence of a court following his conviction of a crime for which this penalty is provided by law. (2) Deprivation of life shall not be regarded as inflicted in contravention of this Article if it results from the use of force which is no more than absolutely necessary: (a) in defence of any person from unlawful violence; (b) in order to effect a lawful arrest or to prevent the escape of a person lawfully detained; (c) in action lawfully taken for the purpose of quelling a riot or insurrection.”).
119. Id. at art. 8 (“(1) Everyone has the right to respect for his private and family life, his home and his correspondence. (2) There shall be no interference by a public authority with the exercise of this right except such as is in accordance with the law and is necessary in a democratic society in the interests of national security, public safety or the economic wellbeing of the country, for the prevention of disorder or crime, for the protection of health or morals, or for the protection of the rights and freedoms of others.”).
to meet this relatively high threshold will be assessed under Article 8. The table below provides a brief overview of the doctrinal framework of inquiries under Articles 2 and 8 of the Convention in toxic exposure cases.

<table>
<thead>
<tr>
<th>Subject of protection</th>
<th>Article 2 (right to life)</th>
<th>Article 8 (right to private life)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Party under obligation</td>
<td>Individual</td>
<td>State</td>
</tr>
<tr>
<td>Triggering conditions for application</td>
<td>The physical integrity of an applicant was threatened (i) by the action of the state (or state agent) or (ii) by a third party’s action when the state had regulatory obligations vis-à-vis the third party.</td>
<td>(i) Pollution exceeding a minimum level of severity (ii) which is caused by a state directly or indirectly (in a failure to regulate private industry) and (iii) which has a “direct adverse effect” on the individuals’ private or family life or well-being.</td>
</tr>
<tr>
<td>Obligation of state</td>
<td>(i) Negative: refrain from unlawful killing (ii) Positive: to take appropriate measures to safeguard lives or prevent avoidable loss of lives in cases of</td>
<td>(i) Positive: to adopt measures vis-à-vis private actors causing environmental harm to guarantee the right to private life. A “failure to regulate private</td>
</tr>
</tbody>
</table>

121.  _Id._ at 26.
122.  See discussion _infra_ Part II.B.2.
127.  RAINNEY ET AL., _supra_ note 114, at 143.
dangerous activities and natural disasters by putting in place a legislative and administrative framework and enact regulations for practical measures.

Procedural (positive): In case of loss of lives on account of an infringement of the right, the state should provide adequate response (by investigating and providing civil, administrative, or disciplinary remedies).

Cases when the state can be held liable for injuries caused by private entities

| States’ positive obligations also arise when human lives are at “real and immediate risk” due to private companies’ activity in case the state had known or ought to have known about the risks. |
| If there is a “sufficient nexus” between the polluter and the state (in such a case the “state could reasonably be expected to act so as to prevent and to put an end to the alleged infringements”). |

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129. COUNCIL OF EUROPE, supra note 124, at 37.


131. COUNCIL OF EUROPE, supra note 124, at 19.


133. Id.

134. Id.

135. Id. at 37.

136. Id. at 283.

137. Id. at 282.
<table>
<thead>
<tr>
<th>Actionable damage</th>
<th>(i) Death or real and imminent risk to life</th>
<th>Direct interference with private and family life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Causation should be established between:</td>
<td>The conduct and the applicant’s death or imminent threat to her life</td>
<td>Pollution and “direct adverse effect” on private life</td>
</tr>
<tr>
<td>Causal test</td>
<td>No specific test has been announced.</td>
<td>No causal test exists, the case is decided by assessing proxies.</td>
</tr>
<tr>
<td>Judicial test of finding a violation</td>
<td>States have a wide margin of appreciation; thus, impossible or disproportionate burden must not be imposed on them without considering their choices and resources.</td>
<td>(i) Negative obligations: emissions exceeding domestic safety levels from a state-owned source is automatically unlawful. (ii) Positive obligations: States have a wide margin of appreciation (deferential review). The test is whether national authorities have struck a fair balance between the individual’s right and the interest of the community in furthering economic development.</td>
</tr>
<tr>
<td>Burden of proof</td>
<td>On the applicant</td>
<td></td>
</tr>
<tr>
<td>Standard of proof</td>
<td>Beyond reasonable doubt (met by “the coexistence of sufficiently strong, clear and concordant</td>
<td></td>
</tr>
</tbody>
</table>
inferences or of similar unrebuted presumptions of fact”).\(^{147}\) It allows flexibility with a view to the evidentiary difficulties.\(^{148}\)

| Remedy (under Article 41) | (i) Obligation to put an end to the breach\(^{149}\)  
(ii) Just satisfaction: pecuniary and non-pecuniary damages or finding of a violation\(^{150}\) (damages are not automatic consequences) and costs and expenses\(^{151}\) |
|--------------------------|----------------------------------------------------------------------------------------------------------|

Table 1. Doctrinal Framework of Articles 2 and 8 of the Convention in Toxic Exposure Cases

B. Uncertain Causal Links Before the Strasbourg Court in Toxic Exposure Cases

Although causal analyses remain hidden or, at best, marginal in the Strasbourg Court’s judgments, certain causal requirements have been flagged in few cases. These causal links impact the applicability of Articles 2 and 8, the violation of these provisions, or the awarding of damages under Article 41.

1. Relevance of Uncertain Causation Under Article 2

In cases decided under the right to life, the causal link between the alleged violation and the applicant’s death or imminent threat to her life lies at the core of the inquiry.\(^{152}\) The *L.C.B. v. United Kingdom* case illustrates that a state’s positive obligations are triggered by a probable causal link between the injury and the state measure.\(^{153}\) This case featured claims by an applicant who had suffered from leukemia since her early childhood, allegedly due to her father’s exposure to radiation during his service at a United Kingdom nuclear military base before the applicant was born.\(^{154}\) The judgment clearly articulates that “the State could only have been required of

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148. Id.
151. Id. at 15.
152. See COUNCIL OF EUROPE, supra note 124, at 37 (describing how the Court in *Budayeva and Others v. Russia* found a causal link to the administrative flaw and applicant’s death); see *Budayeva*, 2008-II Eur. Ct. H.R. at 295–96 (stating the Court’s finding of a causal link).
154. Id. at 3–4.
its own motion to take steps in relation to the applicant if it had appeared likely at that time that any such exposure of her father to radiation might have engendered a real risk to her health.” A failure to demonstrate such causal link, thus, is fatal to a claim under Article 2.

2. Uncertain Causation Under Article 8

In claims brought under the right to private life, causality is relevant at several stages of the inquiry: first, in deciding the applicability of the provision, and subsequently, as to the finding of a breach.

a. Pollution that Triggers Application

According to the Strasbourg case law, which is consistent on this point, Article 8 is applicable when there is pollution caused by the state directly or indirectly in a failure to regulate private industry, when the pollution exceeds a certain minimum level of severity, and when it has a “direct adverse effect” on the individual’s private and family life or wellbeing. There is no arguable claim if the detriment is “negligible in comparison to the environmental hazards inherent to life in a modern city.”

In the case of toxic emissions, the Strasbourg Court may find a “direct effect” even when the pollution did not seriously impair the victim’s health. In Brândușe v. Romania, a prisoner suffering from noxious odors from a nearby rubbish tip succeeded with his claim in the clear absence of any health injury. The Court found that wellbeing can be affected even in such cases. The test of applicability focuses on whether the interference was capable of causing the harm at hand, or in other words, whether it was “potentially harmful.”

In practical terms, this requirement means that proving a causal link between the pollution and the health impairment is a sufficient, but not necessary, requirement for applying Article 8.

155. Id. at 13.
156. Fadeyeva, 2005-IV Eur. Ct. H.R. at 282 (stating that state’s responsibility “may arise from a failure to regulate private industry”).
157. Id. at 277.
160. See COUNCIL OF EUROPE, supra note 124, at 47 (providing a summary of the Strasbourg Court’s decision in Brânduse v. Romania and López Ostra v. Spain).
162. Id. at 19; see also Dzemyuk v. Ukraine, App. No. 42488/02, 2014 Eur. Ct. H.R. at 14.
b. The Necessary Causal Link for Finding a Violation—That Remains Hidden in the Analysis

As addressed above, states have a negative obligation to refrain from interference with private life by engaging in severely polluting activity. Furthermore, by virtue of their power to regulate potentially harmful industrial activities, they have a positive duty to prevent others from interfering with the enjoyment of the amenities of one’s home and family life.  

In order to decide whether severe pollution—whether caused by a public or a private actor—constitutes a breach of Article 8, the Strasbourg Court requires “the existence of proven and serious consequences for the health of the applicant” as this triggers states’ positive obligation “to adopt and implement reasonable and appropriate measures that protect [applicant’s] well-being.” Accordingly, a state cannot be held liable for a failure to regulate private industry if the harm complained of is a result of preexisting conditions and not that of the emission at hand. This formulation of the Court’s test renders causal links a prerequisite in finding a violation.

Problems engendered by preexisting conditions, which appear as competing possible causes (also referred to as plurality of causes), are pervasive in toxic exposure cases. The Strasbourg Court makes clear in Ledyayeva and Others v. Russia that even though “serious industrial pollution negatively affects public health in general[,] . . . it is often impossible to quantify its effects in each individual case[] and distinguish them from the influence of other relevant factors, such as age, profession, etc.” Such statements, however, are never followed by a causal inquiry deciding the causal link. The Strasbourg Court, instead, “refrain[s] from making any conclusive findings as to whether or not the industrial pollution was the cause of the applicants’ specific diseases.”

It is notable that an applicant has almost never successfully proven causation based on uncertain evidence when the causal link is disputed by the other party. Instead, violations are declared when the defendant government does not contest the causal link surrounding the harmful
2017] Managing Uncertain Causation in Toxic Exposure Cases 541

effects.\textsuperscript{169} This provides a convenient factual basis for the Strasbourg Court to find a violation without assessing the probative value of scientific evidence. In exceptional cases, when the Strasbourg Court has found a violation, it has not elaborated on the reasons for accepting the evidence submitted; rather, it has simply concluded that it “has accepted the link between the medical conditions . . . and the exposure.”\textsuperscript{170}

The relevance of causal links is also demonstrated by the Leon judgment, where the Strasbourg Court dismissed the application with reference to the applicant’s failure to submit “a valid claim supported by medical record” demonstrating adverse health effects caused by the lawful noise pollution.\textsuperscript{171} This statement implies that the Strasbourg Court might consider finding a violation even if the pollution did not exceed domestic safety standards, provided that its adverse health effects and the respective causal link are established.

3. Uncertain Causation Under Article 41—Latency Periods

A causal connection between the violation and the damage sustained is also relevant to awarding compensation.\textsuperscript{172} The Strasbourg Court is often criticized for its restrictive view when it comes to assessing causation under Article 41, even in cases when the underlying facts do not involve complex scientific expert evidence.\textsuperscript{173}

The Court is normally reluctant to engage in speculation as to what would have happened had the violation not taken place.\textsuperscript{174} This is even more the case when the Court faces complex medical issues in which long latency periods disrupt the finding of a causal link with the pollution. The lack of causality, in turn, precludes awarding damages. The problem of latency periods is well illustrated by the judgment in which the Strasbourg


\textsuperscript{172} Marcus Kellner & Isabelle C. Durant, Causation, in TORT LAW IN THE JURISPRUDENCE OF THE EUROPEAN COURT OF HUMAN RIGHTS 449, 455 (Attila Fenyves et al. eds., 2011).

\textsuperscript{173} See Christa Kissling & Denis Kelliher, Compensation for Pecuniary and Non-Pecuniary Loss, in TORT LAW IN THE JURISPRUDENCE OF THE EUROPEAN COURT OF HUMAN RIGHTS 579, 590 (Attila Fenyves et al. eds., 2011) (referring to the question of compensation as “ancillary” to the question of a violation under the Convention).

Court denied pecuniary damages for loss of earnings associated with the health impairment caused by the violation. Among the reasons for awarding no pecuniary damages, the Strasbourg Court explicitly referred to the “prevailing perceptions and lack of precise knowledge at the material time about the possible long-term effects.” This reveals latency periods to be an additional source of uncertain causation that burdens the applicant in toxic exposure cases.

III. TECHNIQUES OF THE EUROPEAN COURT OF HUMAN RIGHTS TO MANAGE UNCERTAIN CAUSATION

The Strasbourg Court uses different tests for assessing alleged violations of negative and positive obligations. In terms of the negative obligations of states, Article 8(2) explicitly provides that a state’s interference with the right to private life can only be justified if it is in accordance with the law. In the context of toxic pollution, this means that a state-owned company’s emissions in excess of domestic safety standards automatically constitute a violation.

In contrast, the test for finding a violation of a state’s positive obligations is not so straightforward. In such cases, the applicant claims that the interference with her private life resulted from a failure of the state to ensure the effective enjoyment of her right. As the domestic legality of a regulatory measure complained of is not a conclusive test for complying with positive obligations, a breach of a given domestic law does not automatically trigger a violation of the Convention. Due to the great deference that the Court accords under Articles 2 and 8, by according them a wide margin of appreciation, states can freely choose among the alternative avenues provided under domestic law in order to comply with their positive duties. For this reason, the Court has recourse to various tests for assessing whether the state’s conduct amounts to a violation of positive duties. This section analyzes and evaluates these judicial methods.

176. Id.
177. European Convention on Human Rights, supra note 6, at art. 8(2) (providing in that “there shall be no interference by a public authority with the exercise of this right except such as is in accordance with the law and is necessary in a democratic society in the interests of... the economic well-being of the country”).
179. Id. at 284.
180. Rainey et al., supra note 114, at 403.
182. Id.
A. Using Proxies to Substitute Causal Assessment of Uncertain Evidence

The Strasbourg Court has never expressly articulated its methodology for finding a violation of positive obligations under Article 8. Based on a survey of case law, I argue that the Strasbourg Court has recourse to certain proxies when it decides about violations and does not assess the existence of a legally appreciable causal link between the toxic pollution and the health injury claimed. By virtue of this proxy-based methodology, the Court can adjudicate environmental cases without reexamining complex scientific evidence, which undoubtedly eases and accelerates its procedure. However, this proxy-based judicial approach has serious shortcomings.  

1. Decoupling Article 8 Obligations from the Uncertain Causal Link

The proxy-based approach is a corollary of the test announced in the López Ostra case, where the Strasbourg Court decoupled Article 8 obligations from the requirement of causing health impairment to the plaintiff. In the material case, the first occasion when the Strasbourg Court found a violation regarding pollution, the Court awarded damages to the applicant who suffered from excessive toxic air pollution emanating from a neighboring plant.

The López Ostra test is formulated as follows: “severe environmental pollution may affect individuals’ well-being and . . . affect their private and family life adversely without . . . seriously endangering their health,” As a consequence, the applicant does not need to prove causation between the environmental pollution and its harmful physical or mental consequences to support his or her claim. The test, in fact, circumvents the problems arising from uncertain causation by requiring a “sufficiently close link” between the state’s measure—or omission—and the sphere of private life, not the actual health injury itself. Under the judicially protected sphere of Article 8, the scope of the right to private life is thus broader than health. It encompasses not only protection against health injuries, but also other aspects of wellbeing. However, health injuries caused by a state’s action or omission remain relevant under Article 8 as being the most direct form of interference that is prohibited by the provision.
The López Ostra test indicates a conscious turn away from assessing scientific evidence relevant to adjudicating causes of toxic exposure. Tellingly, the European Commission of Human Rights, which examined the case as to admissibility at a quasi-preliminary stage of the Strasbourg Court’s proceeding, concluded that the plant at hand “could endanger the health of those living nearby and that there could be a causal link between those emissions and the applicant’s daughter’s ailments.”\(^{189}\) Given that the judgment itself cites this finding, it is difficult to escape the conclusion that the Strasbourg Court purposefully formulated the López Ostra test so as to circumvent the issue of causation by not requiring proof of a causal link involving the health injury.

The Lopez Ostra decision is usually praised by human rights scholars\(^ {190}\) because it has brought considerable benefits in terms of enforcing environmental claims, especially in light of the Strasbourg Court’s previous practice, which was to dismiss environmental pollution claims.\(^ {191}\) Indeed, relying on the abstract and less tangible concept of private life alleviates the evidentiary burden that rests with the applicant as it enables the Strasbourg Court to find violations even when the causal link between the pollution and the harm cannot be substantiated.\(^ {192}\)

As a consequence of this approach, one might expect that human-rights-based environmental protection would entail “a slight easing of the requirements for scientific proof of causation.”\(^ {193}\) However, in the practice of the Strasbourg Court, plaintiffs rarely win toxic exposure cases for reasons that will be explored later in the analysis.

2. The Proxies that Substitute for Causal Inquiry: Identification and Assessment

The Strasbourg Court evaluates whether defendants’ conduct amounted to a breach of their positive obligation based on certain criteria that intuitively seem to be reliable factors for estimating the harmful nature of


\(^{192}\) Indeed, judgments declaring a violation often note that the causal link with the injury claimed was dubious. See Fadeyeva, 2005-IV Eur. Ct. H.R. at 279 (stating that the applicant did not present evidence that would “clearly connect” the environmental pollution to the applicant’s illness); see Ledyaeva, 2006 Eur. Ct. H.R. at 7 (stating that the medical documents produced did not certify a causal link between the pollution and illness); see also Grimkovskaya v. Ukraine, App No. 38182/03, 2011 Eur. Ct. H.R. at 15–16 (stating that it is impossible to determine what caused the illnesses).

\(^{193}\) Boyle & Harrison, supra note 113, at 270.
the pollution at hand. Although the Court has never articulated its proxy-based methodology as a doctrinal approach to evaluating states’ conduct, it justifies its findings of a violation with reference to the non-causal criteria that I dub here as proxies.

The Strasbourg Court uses the assessment by proxies as a substitute for a cause-and-effect inquiry. Instead of providing an elaborate causal assessment reconstructing the elements of the causal scenario that led to the injurious interference, the Court relies on the overall impression of the case. This approach enables the Court to circumvent assessing the uncertain causal link between the pollution and the injury and eliminates the peculiar scientific aspects of the case in order to avoid confrontation with its scientific (and uncertain) details. Even when the causal link could be established based on scientific evidence, the Strasbourg Court justifies its finding of a breach with reference to other criteria. This approach, however, can only result in rough justice. As will be seen shortly, the majority of the proxies cannot be justified scientifically and, therefore, do not offer persuasive legal tests for distinguishing cases concerning factually comparable pollution.

I argue that six such proxies can be discerned from the Court’s environmental jurisprudence: (1) the distance between the polluter and the applicant’s home; (2) whether the pollution was ongoing or only a byproduct of previous industrial activity; (3) the occurrence of prior accidents producing large-scale pollution; (4) the lawfulness of the toxic emission under domestic law; (5) exceptional facts bearing on the case or the egregiousness of the circumstances; (6) whether the state’s decision-making process failed to comply with rule of law or procedural guarantees.

In some instances, the Court examines several of the proxies while in others, it only considers one of them. These proxies have not been articulated as exclusive criteria for applying Article 8 or for finding a breach under the provision. The Court did not announce the proxies a priori, rather, it developed them gradually in response to particular circumstances. However, the fact that the Strasbourg Court dismissed a claim expressly because it did not meet its proxies suggests that it tends to regard them as exclusive criteria. Nevertheless, the Court is certainly free to add new proxies. What follows is a discussion of each of the proxies.

(1) The Strasbourg Court tends to attach particular relevance to the distance between the polluter’s location and the applicant’s home, which is used as a proxy for assessing the “direct effect” of the toxic pollutant, a

195. See Sands, supra note 112, at 615 (noting that the Strasbourg Court was “particularly impressed by the fact that the applicant lived just 12 meters from the offending plant”).
criterion for applying Article 8. As a reason for refusing to apply Article 8 in Atanasov v. Bulgaria, the Strasbourg Court referred to the fact that the applicant’s home was “a considerable distance” from the tailings pond of a former copper mine, the source of the pollution. In this case, justifying the claim’s dismissal by the distance proxy was problematic in light of the risk assessment report of the national authority, which showed heavy metal concentration in the pond’s sludge in excess of statutory levels, and estimated a risk of contamination within a radius of ten kilometers around the pond. Given that the applicant lived only one kilometer away from the pond (and thus, within the zone of possible contamination), the facts of the case would have enabled the Strasbourg Court to find a direct effect, had it engaged in proper evidentiary inquiry instead of relying solely on the formalistic distance proxy.

This proxy is objectionable from a scientific point of view as the toxicity and the associated health risks of pollution cannot be examined merely with reference to the distance between the source and the exposed individual. Further, this proxy-based decision is also inconsistent with Guerra and Others v. Italy, where the polluting factory was similarly one kilometer away from the applicants’ home, yet, the distance did not prevent the Strasbourg Court from finding a violation under Article 8.

(2) When it comes to assessing the conformity of state conduct with the Convention, the Strasbourg Court also weighs whether the pollution is a “result of an active production” that “can lead to the sudden release of large amounts of” toxins. This proxy, however, cannot be justified from a scientific point of view either. Hazardous substances released from a former industrial site can well remain dangerous for many decades; thus, the fact that the factory ceased to operate has, in fact, no bearing on the toxic nature of the site.

(3) In terms of Article 8 obligations, the Strasbourg Court also considers whether prior incidents occurred involving the industrial activity under consideration. Prior industrial accidents were an explicit ground

196. See Atanasov, 2010 Eur. Ct. H.R. at 17 (finding that the severity of toxic substances contained in sludge that directly affected the applicant triggered Article 8).
197. Id. at 20.
198. Id. at 7.
for finding a violation of Article 8 in Guerra and Others v. Italy. However, this proxy is clearly too permissive as it identifies only the most egregious instances of pollution. As discussed above, the protected sphere of private life under the López Ostra test is much broader than prohibiting interference caused by severe industrial accidents.

(4) The lawfulness of an emission under domestic law is another important proxy for assessing the facts of a case. A state-owned entity’s unlawful emission automatically triggers a violation, while a private industrial actor’s unlawful emission is only one relevant factor out of many for deciding whether a state has fulfilled its positive obligations.

The Strasbourg Court attaches a causal presumption to this proxy by holding that where pollution exceeds domestic safety levels it “becomes potentially harmful to the health and well-being of those exposed to it. This is a presumption, which may not be true in a particular case.” Applying the presumption, the Strasbourg Court may find that “the applicant’s health deteriorated as a result of her prolonged exposure to the industrial emissions.”

The presumption is evoked with two caveats. First, it is only triggered by pollution “significantly above statutory levels.” Thus, pollution that only slightly exceeds statutory limits—which is often the case—falls short. Second, the applicant needs to establish a “very strong combination of indirect evidence,” which is contingent upon the Strasbourg Court’s approach to appraising scientific evidence. As will be seen shortly, the Court applies a rather strict approach to scientific evidence and tends not to rely on statistical probabilities, which narrows the scope of the presumption.

Nevertheless, the domestic legality proxy is the only one that can be justified on scientific grounds. In cases when the pollution exceeds health-based standards, the proxy directly relates to the toxic nature of the pollution and, thus, approximates the causal link between the exposure and the injury. Accordingly, when the Strasbourg Court has invoked the presumption, it has noted that the applicable domestic safety levels were

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203. Id. (distinguishing Atanasov from Guerra on the grounds of lack of prior incidents).
206. Id.
health-based standards. However, domestic safety levels may be established irrespective of the pollution’s health effects (e.g., technology-based standards). In these cases, this proxy can be over-inclusive, namely, it can result in a violation even if the adverse health effects were not caused by the toxic emissions. Overall, this proxy leads to mixed results because it provides a less precise outcome than a causal assessment based on the evidence of the particular case.

(5) As Professor Sands noted regarding the López Ostra case, “it is . . . difficult to escape . . . the conclusion that the exceptional facts of this case provided the principal basis for the Court’s finding.” This stance holds true for subsequent decisions as well. Thus, the egregiousness of the circumstances (such as the death toll among exposed individuals, the duration of pollution, and the obsolete nature of industrial technology involved) serves as an additional proxy. Although this proxy can undoubtedly be useful for finding a violation where the dirtiest polluters are involved, state-of-the-art technology that is equally destructive to the individual’s well-being would escape scrutiny. Similarly, the duration of unabated pollution would certainly work well as a proxy for violation to find a breach in cases of long-standing emissions. However, it falls short of catching transient, though injurious, emissions.

(6) Finally, compliance with the rule of law in states’ regulatory obligations also seems to play a major role in the Strasbourg Court’s analysis. This proxy was relied on in Taškin and Others v. Turkey, which concerned environmental and health risks imposed by a gold mine using cyanide technology. The authorities first refused to give a permit to the mine; however, after the Prime Minister intervened, they ultimately issued authorization. The Strasbourg Court noted that when state organs fail to comply with requirements for the proper administration of justice, the procedural guarantees that the state should ensure under Article 8 are “rendered devoid of purpose.” Thus, it declared a violation.

210. Id.
211. See, e.g., Bor, 2013 Eur. Ct. H.R. at 5 (finding a violation under Article 8 when noise exceeded permitted levels).
212. Sands, supra note 112, at 616.
214. Bor, 2013 Eur. Ct. H.R at 6 (noting that it took 16 years for the state to respond adequately and abate the excessive noise pollution).
217. Id. at 6–9.
218. Id. at 25.
219. Id.
B. Drawbacks of the Proxy-Based Method

Although the use of proxies might appear to be suitable for determining the vague scope of private life and, in many cases, provides a remedy against the most severe forms of environmental pollution, this method has several shortcomings.

Because proxies disregard underlying causal links, their use allows certain kinds of pollution to escape judicial scrutiny even when the injury was, in fact, caused by the toxic agent released. This application of the López Ostra test runs afoul of its original meaning according to which Article 8 prohibits even less severe interferences than actual health injuries. In avoiding complex causal inquiries and evidentiary assessments, the Strasbourg Court sacrifices predictable and nuanced judicial decision-making based on an objective and consistent approach to the scientific evidence available in the case file. Moreover, the use of proxies can only provide rough justice as the decision results from an overall assessment of the facts rather than from a thorough causal analysis of the harm and the alleged violation and, therefore, risks being over- or under-inclusive.

Without considering scientific evidence of causation, the Strasbourg jurisprudence inevitably leads to highly controversial results by not remedying the very core of the interference with private and family life: namely, the cause of physical injury to the applicant. Equally disturbing outcomes are findings of a violation where the actual harm was not a result of the defendant state’s action or omission even though that action satisfied many proxies. Diminishing the role that causation plays in the Court’s assessment hollows out the tort law function of the Strasbourg regime and narrows the scope of environmental harm against which the Convention provides protection.

Furthermore, the proxy-based approach yields inconsistent results by leaving certain victims uncompensated. This shortcoming is flagged by sets of cases where, despite similar facts and scientifically comparable harm, the Strasbourg Court has reached different outcomes as to whether they constitute a violation.

One of these sets is Giacomelli v. Italy and Atanasov v. Bulgaria. The former complaint addressed a waste treatment plant, while the latter focused on a restoration of the tailings pond of a former copper mine that

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221. See, e.g., Taşkin, 2004-X Eur. Ct. H.R. at 25, 29 (holding that the government did not meet its obligation to secure rights related to private and family life under Article 8).
contained heavy metals. Both cases concerned situations where the authorities failed to prepare a proper environmental impact assessment (EIA) study prior to the industrial activity. In Atanasov, robust expert evidence suggested the existence of considerable risks of heavy-metal pollution; in Giacomelli, there was a risk of toxic-waste leakage. In Giacomelli, the applicant did not prove that any harm was sustained, nor did the Strasbourg Court require actual harm for the Court to find a violation. In Atanasov, the applicant did not claim harm either as his application concerned pervasive risks of a reclamation scheme that were left unabated by the state.

However, while in Giacomelli, the Strasbourg Court found a violation, in Atanasov, it reached the opposite outcome. It listed five reasons (proxies) for not finding a violation: (1) the distance between the pond and the applicant’s home; (2) the lack of active production on the site; (3) the lack of prior accidents; (4) the absence of proof of an increased morbidity rate; and (5) the lack of a showing of actual harm to the applicant’s health. The only proxy whereby Giacomelli produced a different result was the presence of active operation. However, this is hardly a scientifically sound reason for treating these cases differently if one considers the grave health risks posed by non-restored former industrial sites. Hence, this proxy cannot justify the different judicial outcome.

Another set concerns the difference in the awarding of pecuniary damages under Article 41 for adverse health consequences. In Tătar, the “plurality of causes” problem barred the Strasbourg Court from deciding whether the cyanide leakage was the cause of the applicant’s aggravated asthma. As a result, the Court did not award damages to the applicant.

227. Id. at 362.
234. Id. at 43.
In contrast, in Vilnes, competing causes were not an obstacle to the finding of a violation and the awarding of non-pecuniary damages. This complaint concerned health damages incurred by seven former divers who worked for oil-drilling companies at the North Sea and sustained damage to their central nervous systems after their employment. To prevent divers from getting decompression sickness, domestic authorities were responsible for enforcing safety standards set out in decompression tables for governing the length of time for decompression. In this case, the Strasbourg Court concluded that the diving company’s overly rapid decompression tables “had probably been a strong contributory cause of the applicants’ health deteriorations.” Possible competing causes, thus, did not preclude the finding of a causal link.

Still, another inconsistency emerges from a comparison of the L.C.B. and Brincat cases. The judgments in these cases took different directions on whether the defendant state ought to have known about the existence of health risks associated with toxic exposures caused by the state. In the first case, the underlying hazardous activity consisted of nuclear tests run by the United Kingdom between 1952 and 1967 to which the applicant’s father was exposed. The second case featured Malta’s ship-repair industry, which, from the 1950s, exposed unprotected workers to asbestos who later either died of mesothelioma or sustained various types of cancer.

In both cases, the states submitted that they were not aware of the risks imposed on their citizens. They also contested the causal link between the exposures and the health injuries claimed. A further similarity is that scientific discourse had begun to raise awareness about the pervasive health risks of both types of exposure at the time of the states’ conduct. The applicant in L.C.B. relied on research that was conducted prior to his exposure—right after the Hiroshima and Nagasaki bombings—which showed a statistical association between the incidence of leukemia and radioactive exposure. In Brincat, the Strasbourg Court acknowledged that the World Health Organization (WHO) and the International Labour
Organisation (ILO) already began raising awareness about the dangers of asbestos in the 1950s. Therefore, the extent of uncertainty surrounding the harmful effects of both exposures was arguably comparable at the time of the states’ injurious conduct; thus, the respective states ought equally to have known about the health hazards.

Despite these similarities, the Strasbourg Court reached different outcomes. In L.C.B., the court subscribed to the view that the United Kingdom should not have known about the risks of nuclear radiation, whereas in Brincat, Malta was held liable for violating the workers’ right to life because, in the Strasbourg Court’s view, Malta ought to have known about the health hazards of asbestos.

Finally, due to the lack of a clear causal inquiry, the Court’s reasons for finding or not finding a violation remain obscure, and thus, future plaintiffs are left with little guidance as to the evidentiary requirements of the Strasbourg Court.

**C. Dismissive Approach Toward Probabilistic Evidence of Causation**

1. Too high a level of certainty is required.

The Strasbourg Court’s standard of proof is generally high as it uses the beyond-a-reasonable-doubt standard, which is met by “the coexistence of sufficiently strong, clear and concordant inferences or of similar unrebutted presumptions of fact.” While the Court emphasized that it allows flexibility in this respect with regard to the evidentiary difficulties involved, in its practice, it rarely accepts probabilistic proof of causation.

The Court’s approach to statistical evidence was at the core of the decision reached in Tătar v. Romania. Several pieces of evidence were not refuted by the Strasbourg Court; however, it still refused to accept them as adequate proof of causation. A report jointly issued by the United Nations Environment Programme (UNEP) and the Romanian authorities established the existence of excessive cyanide pollution near the applicant’s home. The city hospital reported an increased number of respiratory

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251. *Id.*
253. *Id.* at 37.
254. *Id.* at 35.
diseases among local children, and many experts agreed that cyanide might cause irritation to the respiratory tract. However, the Court found that these pieces of evidence were insufficient “to create a causal probability” between the cyanide leaching and the aggravated asthma. The Court refused to engage in “probabilistic reasoning” as in its view, this would only be acceptable if the claim is “accompanied by sufficient and convincing statistics.”

In his dissent, Judge Zupančič heavily criticized the Strasbourg Court for the overly formalistic “classical causal approach,” which “does not know the concept of uncertainty.” Later, he also emphasized that:

> It is disappointing that the European Court of Human Rights remains . . . in the . . . not really enlightened perception of what is cause and effect in law – in a situation in which the environmental pollution is at least one of the major contributing factors to problems that led the plaintiff to the Court.

As is demonstrated by the case of *Brincat and Others v. Malta*, even when the Strasbourg Court finds a breach, it avoids evaluating uncertain scientific proof of causation. This case concerned liability for a state’s omission that resulted in health injuries. The Strasbourg Court “accepted the link between the medical conditions affecting the relevant applicants and their exposure to asbestos” but did not provide any reasoning for its causal findings. This stance is interesting because the underlying facts were far from being entirely clear, and the Court has a high threshold for accepting scientific claims. Thus, the finding of a causal link would certainly have deserved a more in-depth discussion.

The medical certificate of the deceased worker only indicated that the death was “likely to be a result of asbestos exposure.” Also, the National Cancer Institute held that whether asbestos-related diseases develop

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255. *Id.* at 37.
256. *Id.*
257. *Id.* The author translated “raisonnement probabiliste” from French.
258. *Id.* The author translated “scientifique accompagnée d’éléments statistiques suffisants et convaincants” from French.
259. *Id.* at 46 The author translated “la démarche causale classique” and “qui ne maîtrise pas la notion d’incertitude” from French.
262. *Id.* at 2–3 (noting the lack of information regarding asbestos dangers by the employer, which led to health implications for the employees).
263. *Id.* at 41.
264. *Id.* at 23 (emphasis added).
depends on a number of factors, among them, smoking.\footnote{Id.} This is especially important given that some of the applicants were smokers.\footnote{Id. at 3 (inferring that some applicants were smokers).} However, instead of weighing the contradictory evidence, the Strasbourg Court found Malta liable for endangering the lives of the applicants on the grounds that, on account of its ILO membership, the government “knew or ought to have known” about the dangers of asbestos.\footnote{Id. at 31–33.} This statement implies that the Court was convinced that the asbestos was the cause of the harm sustained, although not primarily on the basis of the expert evidence but on account of widely held views on the toxic nature of asbestos.

The \textit{ad hoc} weighing of non-scientific evidence is objectionable from a doctrinal point of view as it obfuscates the evidentiary requirements of the Strasbourg Court. Liability for a state’s omission that allegedly resulted in health injuries simply cannot be decided without considering the evidence on causality. This is not to say that the outcome of the judgment could not have been justified from a moral, or even from a scientific, point of view; nevertheless, it illustrates the Court’s ambivalent approach toward scientific evidence.

Interestingly, the Strasbourg Court has generally been more open to evaluating (and finding) causal links when facing non-scientific uncertainties. The Court appears to be more comfortable coping with ordinary causes of uncertain causation that are relatively common in everyday life. This is evidenced by the decision in \textit{Kolyadenko and Others v. Russia}, where the Court heard claims under Article 2 after a flood that occurred subsequent to a heavy rainfall and threatened human lives.\footnote{Kolyadenko v. Russia, App. No. 17423/05, 20534/05, 20678/05 and 35673/05, 2012 Eur. Ct. H.R. at 32, 34.} In this case, the Court confronted uncertainty surrounding the causal role of the state’s negligent maintenance of the river channels in generating life-threatening circumstances.\footnote{Id. at 33–34.} Irrespective of the causal role of excessive rain, the Strasbourg Court had no doubt that there was a legally appreciable causal link between the negligence and the endangerment of lives.\footnote{Id.} This instance suggests that the Court’s dismissive approach to the establishment of causal links is heavily influenced by the peculiarities of scientific facts and causal concepts.
2. Probabilistic Evidence—Rare and Exceptional Acceptance

The Strasbourg Court famously considered the possibility to engage in “probabilistic reasoning” in Tătar; though, ultimately, it decided not to find a causal link based on the statistical evidence submitted to it. In contrast, a more recent decision suggests that the Court is moving to the laudable direction of assessing probabilistic scientific evidence.

The Court accepted a probabilistic proof of causation for the first time in Vilnes and Others v. Norway. Despite the lapse of time between the applicants’ diving and the manifestation of their health impairments, during which many possible competing causes could have emerged, the Court found “a strong likelihood that the applicant’s health had significantly deteriorated as a result of decompression sickness.” This time, the likelihood provided a sufficient basis for the Court to find a violation.

It should be noted, however, that much of the credit for the Strasbourg Court’s turn in this instance belongs to the domestic court. The Court only reiterated the relatively straightforward statement of the Norwegian High Court, which acknowledged the existence of a causal link between the overly rapid decompression tables and the victims’ health injuries. Nevertheless, this case might also be an indication of the Strasbourg Court’s growing understanding of the true nature of probabilistic scientific evidence, which is a core prerequisite to creating an effective judicial remedy against environmental harms.

IV. REMEDYING HEALTH INJURIES CAUSED BY POLLUTION UNDER U.S. TOXIC TORT LAW

The Strasbourg Court’s heavy reliance on proxies in making causal findings raises the question of the legal techniques that could be used to make scientifically based causal assessments. A ready answer can be found in United States toxic tort law. The Strasbourg Court could borrow from United States toxic tort law approaches in order to enhance its responsiveness to uncertain causation.

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272. See supra Part III.B above for the facts of the case.
274. Id. at 34.
A. Primer on the U.S. Toxic Tort Law Framework

Toxic tort cases involve claims of personal injury, such as physical or psychological harm caused by exposure to a hazardous substance, which can include a variety of causal agents, from pathogens to chemicals and radiation. In order to keep pace with the advancement of science and technology, traditional tort law theories adapted to the peculiarities of toxic exposure. They provide remedies for an expanding scope of “harm” under the theory of trespass, negligence, public and private nuisance, strict liability, and product liability. In toxic tort cases, United States courts award damages for physical harm, increased risk of disease, medical monitoring, and psychological distress, such as fear of future harm. With radical developments in the genomic sciences, it became feasible to detect cellular injuries that fall short of clinically detectable adverse changes. Some commentators see great potential in this “genomic revolution” of toxic torts, referring to the possibility of expanding the scope of actionable damages. However, the majority of courts still require more than proof of subclinical changes.

B. Causation Theories in U.S. Toxic Tort Cases: Adaptation to Uncertain Causation

1. The Two-Step Cause-in-Fact Inquiry

Perhaps the most salient way in which scientific evidence modifies traditional causal inquiry is the emergence of two distinct elements: general and specific causation. Courts first assess general causation, i.e., whether

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275. L. Neal Ellis, Jr., Introduction to TOXIC TORT LITIGATION 3, 3 (Arthur F. Foerster & Christine Gregorski Rolph eds., 2013). Environmental torts allow recovery for natural-resource damages. Bruce Jones et al., THEORIES OF LIABILITY AND DAMAGES, in TOXIC TORT LITIGATION 9, 47 (Arthur F. Foerster & Christine Gregorski Rolph eds., 2013). These will be not addressed in detail as they fall outside the scope of the paper.
276. Rudlin et al., supra note 82, at 139.
277. Ellis, supra note 275, at 5.
278. Jones et al., supra note 275, at 35.
280. Id. at 1684.
281. Id. at 1675.
283. RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL AND EMOTIONAL HARM § 26 (AM. LAW INST. 2010).
the causal agent at hand is capable of causing the harm complained of.\textsuperscript{284} Normally, the inquiry only reaches the question of specific causation if the factfinder is satisfied that the test of general causation has been met.\textsuperscript{285} Two caveats apply here. First, when group-based data are unavailable, the two analytic steps merge into one.\textsuperscript{286} Second, in cases of well-known signature diseases, courts generally find causation if the exposure and the manifestation of the disease are both established.\textsuperscript{287}

If general causation is found to be established, the court investigates specific causation, i.e., whether the causal agent did actually cause the plaintiff’s harm.\textsuperscript{288} In this respect, courts should examine whether the plaintiff: (1) was indeed exposed to a dose at least comparable to that for which general causation is established; (2) was exposed to other potential causal agents; and (3) has individual genetic or behavioral characteristics that might present a background risk of the harm that occurred.\textsuperscript{289}

2. But-for Causation, Substantial Factor Test

The primary test of tort law causation is the but-for (\textit{sine qua non} or factual) causal test.\textsuperscript{290} However, all tort law systems acknowledge certain exceptions from this general-causation theory.\textsuperscript{291} The Third Restatement endorses the substantial-factor test in cases of multiple sufficient causal sets, i.e., when none of the causal sets in itself would be a but-for cause.\textsuperscript{292} The substantial-factor test can also be used for ruling out causal agents that only have a \textit{de minimis} causal contribution.\textsuperscript{293} Moreover, courts employ the substantial-factor test in enhanced-injury cases, when only the extent of the harm that has been caused by a given defendant is uncertain.\textsuperscript{294} In such cases, the plaintiff need only establish that the tortfeasor’s conduct was a substantial factor in the enhanced harm.\textsuperscript{295}

The Third Restatement repudiated a wider scope for the application of the substantial-factor test,\textsuperscript{296} which some courts employ in cases involving

\textsuperscript{284} Id.
\textsuperscript{285} Id. supra note 88, at 371.
\textsuperscript{286} \textit{Restatement (Third) of Torts} § 28.
\textsuperscript{287} Gold, supra note 105, at 401.
\textsuperscript{288} \textit{Restatement (Third) of Torts} § 26.
\textsuperscript{289} Id. § 28.
\textsuperscript{290} Steel, supra note 31, at 16.
\textsuperscript{291} Id. at 16-17 (surveying the tort law systems of Germany, France, and the United Kingdom).
\textsuperscript{292} \textit{Restatement (Third) of Torts} § 26.
\textsuperscript{293} \textit{Kundis Craig et al.}, supra note 96, at 370.
\textsuperscript{294} \textit{Restatement (Third) of Torts} § 26.
\textsuperscript{295} Id.
\textsuperscript{296} Id.
dose-sensitive exposures (e.g., asbestos when causing asbestosis). This will be addressed below.

3. Problems and Solutions in Cases Involving Multiple Causal Agents

Perhaps the most pervasive problem in toxic exposure cases is that the same injury might have been caused by numerous possible causal agents. The causal relevance of each agent should be assessed scientifically and then evaluated legally. However, sometimes it is impossible to identify the actual cause, a situation that is called the defendant-indeterminacy problem. In other instances, the tortfeasors are identifiable but their contributions cannot be measured precisely—only estimated based on disease-development models. Further complications arise when multiple causal agents have synergistic effects. The legal methods to cope with these scenarios are addressed below.

a. Defendant Indeterminacy: Alternative Liability, Market-Share Liability

In cases where it is not possible to prove which one of the defendants’ identical conduct was the actual cause of injury, tort law applies alternative liability. This test has been recognized in United States tort law ever since the two hunters’ dilemma entertained in *Summers v. Tice.* In the toxic tort context, the textbook example of defendant indeterminacy is the flood of litigation related to a miscarriage-prevention drug containing diethylstilbestrol (DES), the harmful effects of which were only manifested in the daughters of the women who took the drug during pregnancy.

In *Sindell v. Abbott Laboratories,* the California Supreme Court applied alternative liability and reversed the burden of proof so that plaintiffs did not need to prove which specific defendant’s drug they had taken because...
adducing such evidence on specific causation would have been virtually impossible due to the lapse of time. As there were hundreds of manufacturers who produced drugs containing DES, the California Supreme Court had to devise a new rule in order to allocate liability and not allow exculpation for the manufacturers. The method it used became known as “market-share liability” because the court imposed liability on the defendants according to their respective market shares.

Even though market-share liability was an innovative and exceptionally useful tool to solve the specific problems posed by the DES cases, the Third Restatement warns that it will be of limited use in the future because it is only applicable to cases where the manufacturers of the drug are unknown. This is exceptionally rare under present-day circumstances. All pharmaceutical products are now protected by patents; thus, the manufacturers are known. Moreover, market-share liability is only operational where all toxic products pose equivalent risks.

b. Multiple Exposures: Dose-Dependent (Threshold) Disease Development and One-Hit Exposure Theory

An ubiquitous challenge in toxic exposure cases is identifying which causal agent was the cause of injury when the victim was exposed to many agents, each of which is known to have been capable of causing the injury. The toxic tort solution for this problem is to distinguish among the evidentiary requirements for different models of disease development. Science differentiates between two main types of disease development: the threshold model, which describes dose-dependent diseases that manifest only above a certain threshold of exposure and whose severity is correlated with the exposure level (e.g., asbestosis), and the one-hit exposure model, applicable for non-dose-dependent illnesses (e.g., certain forms of cancer). Under the one-hit exposure theory, each exposure imposes distinct risks of developing the non-dose-dependent disease, and thus, each

303. See Sindell v. Abbott Labs., 607 P.2d 924, 924 (Cal. 1980) (holding that manufacturers of a drug are liable for a proportion of the share of the drug in the market).
304. See id. at 937 (describing the new market-share approach for allocating liability).
305. For more details on the market-share liability see STEEL, supra note 31, at 165–67.
306. RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL AND EMOTIONAL HARM § 28 (AM. LAW INST. 2010).
307. Id.
308. Id.
309. Id.
310. Id.
311. Id.
312. Id.
exposure is a separate cause of the disease.\textsuperscript{313} The threshold model implies that each dose of exposure creates a marginal additional harm.

For dose-dependent illnesses, the traditional rule of causation requires the plaintiff to show which of the multiple exposures was the actual cause of the disease (i.e., resulted in reaching the threshold).\textsuperscript{314} However, to ease the evidentiary requirements for demonstrating the cause of such diseases, courts began applying the so-called Lohrmann test in asbestos litigation.\textsuperscript{315} This text requires the plaintiff to adduce “evidence of exposure to a specific product on a regular basis over some extended period of time in proximity to where the plaintiff actually worked.”\textsuperscript{316} If the three-fold requirement of frequency, regularity, and proximity is met, courts are willing to regard the exposure as a “substantial cause” of the harm.\textsuperscript{317}

Similarly, in \textit{Rutherford v. Owens-Illinois, Inc.}, the plaintiff had to demonstrate that the defendant’s product was “a substantial factor in causing or contributing to his risk of developing cancer,”\textsuperscript{318} but he did not need to “prove...that fibers from a particular defendant’s asbestos-containing products were those...that actually began the cellular process of malignancy.”\textsuperscript{319} This alternative causal test, thus, allows the plaintiff to prove that each of the multiple exposures was a cause in fact of the disease.\textsuperscript{320} The Third Restatement promotes the adoption of this test in all cases when the exact disease-development mechanism is unknown; this is the best way of “adapting proof requirements to the available scientific knowledge.”\textsuperscript{321}

c. Synergistic Effects of Multiple Causes

Causal agents can have synergistic effects in developing a harm. The Third Restatement provides that “[i]f the synergistic effect is sufficiently large, the excess incidence of disease due to synergistic effect will be greater than the excess incidence due to each of the agents separately.”\textsuperscript{322} In such cases, the factfinder is allowed to rule that the combined synergistic

\begin{flushright}
\textsuperscript{313} \textit{Id.}  \\
\textsuperscript{314} \textit{Id.} \\
\textsuperscript{316} Lohrmann v. Pittsburgh Corning Corp., 782 F.2d 1156, 1162–63 (4th Cir. 1986).  \\
\textsuperscript{317} Rudin et al., \textit{supra} note 82, at 149.  \\
\textsuperscript{318} Rutherford v. Owens-Ill., Inc., 941 P.2d 1203, 1206 (Cal. 1997).  \\
\textsuperscript{319} \textit{Id.}  \\
\textsuperscript{320} \textit{RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL AND EMOTIONAL HARM \S~28 (AM. LAW. INST. 2010).}  \\
\textsuperscript{321} \textit{Id.}  \\
\textsuperscript{322} \textit{Id.}
\end{flushright}
exposure was the cause of the harm. Courts usually allow harm to be apportioned in cases of synergistic effects between toxic exposure and causes inherent in lifestyle, such as smoking. The plaintiff’s genetic background risk of disease does not preclude the liability of a negligent actor if his conduct was a cause of the disease.

The above developments show that multiple causal agents can fit well into the causal requirements of tort law and that tort law judges do not shy away from adjusting proof requirements to the available scientific knowledge. What is more, the ever-improving scientific models of disease developments help United States courts better understand the cause-and-effect relations of injurious exposures.

C. Proof of Uncertain Causation—Probabilistic Evidence, Probability of Causation

Another striking difference between toxic tort law and the Strasbourg case law is the widespread acceptance of, and reliance on, probabilistic proof of causation. The Third Restatement is aware of the need for adapting traditional tort rules of proof “to a greater uncertainty inherent in agent-disease causation and the specialized types of evidence.” Tellingly, tort law scholars dub the evidence of causation “the holy grail of toxic torts.”

The Third Restatement is mindful that all causal inquiries presuppose inferential reasoning and only allow reasonable inferences, not impermissible speculations. Within these confines, courts should make causal inferences on a case-by-case basis. The preponderance rule and the use of naked statistical evidence, along with the doubling of relative risk standard, are important United States toxic-tort-law tools that enable reliance on uncertain scientific evidence.

1. Burden of Proof

The burden of proof is normally born by the plaintiff; however, special rules accommodate the challenges of toxic tort cases. As one exception, in alternative-defendants situations, the burden of proof is
reversed for the benefit of the plaintiff in certain jurisdictions.\textsuperscript{330} There are no generally accepted rules on the burden of proof where preexisting conditions contribute to the harm as the nature of these conditions varies considerably and influences the imposition of the burden.\textsuperscript{331} In this respect, courts generally consider whether the preexisting condition was a result of innocent forces (such as the plaintiff’s genetic heritage) or involved a conscious choice (such as one of lifestyle) and whether the plaintiff was contributorily negligent.\textsuperscript{332}

2. The “More Likely than Not” Standard—And Even Less Likely than 50 Percent?

The Third Restatement generally requires that the plaintiff prove the causal link by a preponderance of the evidence, meaning that the factor was more likely than not to be the cause of the injury.\textsuperscript{333} The preponderance rule entails an “all-or-nothing” liability.\textsuperscript{334} If the plaintiff can prove the causal link on the balance of probability, the defendant is held liable for the entirety of the harm.\textsuperscript{335} The strong version of the preponderance rule allows for pure mathematical probabilities to meet the “more likely than not” standard; the weak version, as discussed earlier with reference to the Rapid Transit problem, requires an actual belief on the part of the factfinder to meet that standard.\textsuperscript{336}

Some scholars suggest that the preponderance rule can be abandoned and replaced by proportional liability based on the probability of causation.\textsuperscript{337} This would mean that a causal link could be established if there were less than a 50\% probability of causation, and the defendant would be held liable to the extent of that probability.\textsuperscript{338} Critics of proportional liability argue that it will result in excess damages due to the subjective judgments needed from scientists to interpret statistical data on probabilities.\textsuperscript{339}

\textsuperscript{330} Oliphant, supra note 299, at 1602.
\textsuperscript{331} Restatement (Third) of Torts § 28.
\textsuperscript{332} Id.
\textsuperscript{333} Id.
\textsuperscript{334} Rosenberg, supra note 79, at 857.
\textsuperscript{335} Id. at 858; see supra Part I.A.2
\textsuperscript{336} Id. at 857–58.
\textsuperscript{337} Id. at 859.
\textsuperscript{338} Green, supra note 88, at 359.
\textsuperscript{339} Id. at 388.
3. Relying on Statistical Evidence

In order to use group-based, statistical epidemiological evidence for proving general causation, courts must ascertain whether the association of data indeed reflects causal connection and not just spurious association. For this purpose, courts rely on the Bradford Hill criteria, which were developed and originally used by scientists. A legion of case law demonstrates courts’ willingness to accept epidemiological data as proof of general causation. However, statistical evidence alone is not always treated as adequate proof of specific causation. In certain cases, biological-mechanism evidence combined with differential diagnosis may also be regarded as persuasive proof of causation if the differential diagnosis rules out all other known causes, if general causation is established, and if there is a short latency period or an acute disease development.

4. Doubling the Relative Risk: An Evidentiary Rule for Both General and Specific Causation?

A certain type of statistical data gained special importance in United States toxic torts, namely, epidemiological data showing the “doubling of relative risk” (RR>2) as proof of causation. The computation of the doubling of relative risk is illustrated by Professor Gold through the following example: “[I]f 5% of smokers get lung cancer, but only 1% of non-smokers do, the relative risk of smokers for lung cancer would be five, implying that smoking explains four of every five cases of lung cancer in smokers.”

340. Gold, supra note 105, at 373. Epidemiological studies either compare the rate of disease occurrence in populations exposed to the causal agent to those populations not exposed or they examine the rate of exposure to the causal agent in populations where the disease is manifest to those populations which do not manifest the disease. Id.


342. RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL AND EMOTIONAL HARM § 28 (AM. LAW. INST. 2010).

343. Id. In such cases, case reports on instances of an individual’s disease and biological mechanism evidence can serve as additional proof. Id.

344. Id.

345. Id.

346. Gold, supra note 105, at 373. Professor Gold suggests that the threshold of more than doubling the relative risk reflects the preponderance test because a relative risk of two describes a case when the incidence of the disease in the exposed population is exactly double than that in the exposed population where the disease is attributable to background risks. Id. at 376. In such a case, a randomly
Toxic tort jurisprudence is split over whether courts should regard the doubling of relative risk as a proof of general or specific causation. Understandably, many courts find it troublesome to infer specific causation from group-based data that, in fact, provide no proof of an actual causal link to a specific individual’s disease. The Third Restatement allows for the use of RR>2 as a proof of specific causation as well. However, it stresses that it is “usually inappropriate” to require demonstrating RR>2 when other types of evidence are available and general causation is established. Nevertheless, the use of the RR>2 standard shows courts’ willingness to accept naked statistical evidence to establish causation in toxic torts. Importantly, RR>2 is not a general panacea for every problem that arises in the “black-box” of uncertain causation. It is blind to the distinction of whether but for the exposure, the disease would not have occurred at all or would have occurred only later in the plaintiff’s life. Hence, the RR>2 standard can be misused as it systematically underestimates the probability of causation in cases when the exposure only accelerates the disease. Another possible misinterpretation of the RR>2 standard is that relative risk might vary depending on the genetic heritage of a given individual.

By and large, the judicial use of the RR>2 standard stands as a laudable example of accepting irreducible uncertainty in scientific results. As the court noted in Merrell Dow Pharmaceuticals, Inc. v. Havner, “[t]he use of scientifically reliable epidemiological studies and the requirement of more than a doubling of the risk strikes a balance between the needs of our legal system and the limits of science.” Indeed, the standard appears to be a

347.  Restatement (Third) of Torts § 28.
349.  Gold, supra note 105, at 374.
351.  Id.
356.  Gold, supra note 105, at 390. Gold drew attention to some studies showing dramatic changes in relative risk of developing breast cancer among smoking women depending on whether they carried the protective allele. Id.
useful tool for establishing causation when the evidence inevitably falls short of the traditional requirement of certainty. Being able to measure the doubling of relative risk and then attaching probative force to it undoubtedly marks a great leap forward in bridging the gap between uncertain science and society’s legitimate need for a tort law system based on the theory of corrective justice.

V. LESSONS FOR THE STRASBOURG COURT FROM THE U.S. TOXIC TORT APPROACH

As evidenced by the above discussion, toxic tort case law has successfully adapted to the various challenges posed by the proof of uncertain causation. United States courts increasingly accept naked statistical evidence produced by epidemiology when the circumstances of the case make it impossible to obtain particularized evidence. This trend represents considerable progress compared to the 1980s, when a number of tort law scholars condemned United States courts for being too dismissive toward probabilistic evidence. By now, United States courts have developed a thorough approach to evaluating the probative force of scientific evidence and have become quite successful in integrating uncertain scientific results into legal theories of causation.

United States toxic tort case law offers an alternative approach for the Strasbourg Court’s avoidance of “science-intensive” evidentiary proceedings and detailed causal inquiries. The judicial practices employed in toxic tort litigation clearly show that uncertainty does not constitute an insurmountable obstacle to a thorough judicial assessment. United States courts deal with expert evidence proactively and adapt legal theories of causation to ensure that probabilistic scientific evidence meets the applicable standard. Certain practices are particularly important for handling uncertain causation in toxic tort cases.

On the one hand, United States courts adopt a nuanced approach to evaluating expert evidence in toxic tort cases. Judges make considerable efforts to translate scientific results into legally relevant standards. The use of the Hill criteria and the diverse pieces of scientific evidence, which range from differential diagnosis to biological-mechanism models, exemplify these efforts.

358. Cf. Cranor, supra note 1, at 261 (criticizing courts for struggling to recognize the scientific and legal relevance of scientific studies); Brennan, supra note 37, at 493–94.
359. See generally Hill, supra note 102, at 32–37 (proposing criteria for evaluating whether data association reflects causal connection).
On the other hand, United States courts employ innovative tools, such as imposing market-share liability, that signal the courts’ willingness to abandon traditional tort law causation requirements when those would prevent the plaintiffs’ claims from recovery. 360 Finally, the Third Restatement mirrors United States courts’ flexible approach to accepting statistical evidence. 361 The standard of RR>2 as proof of causation constitutes a reasonable compromise between the law’s need for certainty in allocating liability and the inherent limitations of scientific method in identifying causal links. 362 Further, the preponderance standard renders it possible to establish causation based on the probabilistic results provided by the relative-risk standard.

From the above toxic tort practices, three appear to be readily transferable to the Strasbourg system as there are no procedural obstacles to their application and they are compatible with the Strasbourg Court’s role. These include: (1) taking a closer look at scientific evidence and openly evaluating its probative force; (2) accepting probabilistic evidence as proof of uncertain causation; and (3) applying the balance of probability as the standard of proof of uncertain causation. Embracing these proposals would help the Strasbourg Court apply a more objective and consistent approach to decide the alleged violations in toxic exposure cases.

1. Considering Scientific Proof of Causation

This article presents a plea for causal inquiry by the Strasbourg Court in claims that involve health injuries that are allegedly caused by severe environmental pollution. It is argued that in such cases, the Court should revisit the scientific evidence submitted to it and should base its decision on whether a violation had taken place on the causal assessment of the scientific aspects of the case.

Conducting a thorough causal analysis in toxic exposure cases does not mean that the Strasbourg Court should disregard its proxies entirely. Neither it is incompatible with granting a margin of appreciation to states in ensuring the effective enjoyment of the rights at hand. Proxies can be suitable tools for determining unlawful conduct that encroaches upon the broader sphere of private life, i.e., those adverse effects on wellbeing that do not cause health injuries (e.g., grave health risks imposed on the individual). Violations of the procedural aspects of states’ environmental

360. RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL AND EMOTIONAL HARM § 28 (AM. LAW. INST. 2010).
361. Id.
362. Carruth & Goldstein, supra note 348.
obligations (e.g., conducting an EIA or providing access to environmental information) can also be assessed through proxies. However, once health injuries emerge in the context of a toxic exposure, consistent and predictable jurisprudence can only be achieved if the Court considers causation and evaluates the scientific evidence submitted when it decides whether the López Ostra test has been fulfilled.\textsuperscript{363}

Basing decisions on causal inquiry would produce more accurate results, and that, in turn, would ensure a more efficient jurisprudence. Moreover, conducting a transparent evidentiary assessment would result in a procedurally fairer jurisprudence by revealing the evidentiary standards that parties need to meet.

The Court does have the necessary powers to deal with the scientific aspects of the toxic-exposure claims submitted. The procedural rules of the Strasbourg Court allow for more scrutiny of scientific facts than is currently done in the Court’s practice. To surmount its lack of scientific expertise, the Court has the power to appoint experts.\textsuperscript{364} Pursuant to the Rules of Court, the Strasbourg Court can “ask any person or institution of its choice to express an opinion or make a written report on any matter considered by it to be relevant to the case.”\textsuperscript{365} By the time the Strasbourg Court started to decide environmental cases on the merits, scholars expected the Court to use its evidentiary powers in environmental cases.\textsuperscript{366} However, as shown above, judicial practice evolved in the opposite direction.

Irrespective of the reluctance to appoint experts, the Strasbourg Court could still have a closer look at the scientific evidence already in the casefile. Even though it relies primarily on the fact finding of domestic courts, this practice does not mean that it is bound by such findings.\textsuperscript{367} “The Court’s proceeding is governed by the . . . free admission and assessment of evidence”;\textsuperscript{368} therefore, it may reevaluate causal findings of domestic fora. The Court itself has stressed the need not to “rely blindly on the decisions of the domestic authorities, especially when they are obviously inconsistent or contradict each other. In such a situation it has to assess the evidence in its entirety.”\textsuperscript{369}

\textsuperscript{364.} HARRIS ET AL., supra note 249, at 144.
\textsuperscript{366.} See Sands, supra note 112, at 615 (observing that the Court would likely use its evidentiary powers to decide an increasing number of complex environmental cases).
\textsuperscript{367.} Shelton, supra note 111, at 115.
\textsuperscript{368.} HARRIS ET AL., supra note 249, at 147.
2. Accepting Probabilistic, Statistical Proof of Causation

The Strasbourg Court should use its existing evidentiary powers to engage in in-depth and meaningful evidentiary proceedings. A consistent and transparent methodology is essential to give future plaintiffs guidance as to the prospects for success of their claims. United States toxic tort case law proves that statistical evidence, such as epidemiological studies, can have probative force; therefore, the overly dismissive approach of the Strasbourg Court is hardly justifiable.

Examples from United States toxic tort law square with critiques that have long demanded that the Strasbourg Court be more open to probabilistic proof. They endorse the judicial acceptance of statistical evidence, arguing that in many cases, probabilities best approximate the fact pattern of the case. “So long as the statistical probability estimate takes into account enough features of the case at hand, it is not clear what complaint litigants (or others) could have.”

Acceptance of the RR>2 standard as a proof of causation would provide a valuable tool for the Strasbourg Court. It would affirm that uncertain scientific evidence can reach a level of legally appreciable (un)certainty on which the Court can rely. The widespread use of disease-development-mechanism models in adjusting causal proof requirements is another technique that could be useful for the Strasbourg Court when it faces multiple possible causes.

The Strasbourg Court needs to abandon its avoidance of probabilistic statements on causation. Evaluating and accepting (uncertain) scientific facts will help Strasbourg judges make decisions that better approximate scientific standards of knowledge, which will always remain in the realm of statistical probabilities.

3. Lowering the Standard-of-Proof Requirement

In order to accept statistical proof of causation, the Strasbourg Court ought to be committed to lowering its beyond-a-reasonable-doubt standard in every toxic exposure case. Such a judicial intent was articulated in Fadeyeva, although subsequent practice remained dismissive toward uncertain evidence and continued to demand proof beyond a reasonable

372. Harris et al., supra note 249, at 148.
doubt. Probabilistic evidence could meet a lenient standard more easily, which would improve the Court’s responsiveness to uncertainty.

The toxic tort example suggests that the balance of probability is a workable compromise between the law’s need for certainty and the inescapably uncertain results of scientific research. Favoring the preponderance standard would enable the Strasbourg Court to find causal links established on the basis of uncertain proof when the circumstances of a case preclude achieving clearer results.

However, in several instances, the Strasbourg Court has refused to rely on statistical evidence that could have satisfied the preponderance standard. In Tătar, epidemiologic group-based evidence was submitted that could have provided a sufficient evidentiary basis for finding a causal link under Article 41 and awarding damages for the health injury.

**CONCLUSION**

This comparative study has highlighted the distinctive paths that courts can take in compensating health injuries when facing uncertainty. They can either regard uncertainty as a reason for not dealing with the evidence at hand, or they can try to bridge the gap between law and science by employing various evidentiary and causal methods. The task of deciding whether to allocate liability based on an uncertain causal link ultimately rests with judges because there is no universal causal principle that would “relieve the courts of the burden of discretion or creative choice.”

At a time when growing scientific knowledge allows us to better understand disease developments and to identify the causal mechanisms underlying health injuries, a legal regime that distances itself from the scientific aspects of causation runs the risk of being detached from reality and, in turn, of losing legitimacy. Fortunately, courts have the power to close the gap between law and science by embracing uncertain evidence to the extent possible and translating probabilistic proof into legal consequences with due regard to the true nature of the scientific facts of the case.

374. In a judgment handed down in 2011, the Strasbourg Court noted that it “considers that there is insufficient evidence to prove all the applicant’s allegations ‘beyond reasonable doubt.”’ See Grimkovskaya, 2011 Eur. Ct. H.R. at 15.
376. HART & HONORE, supra note 18, at 130.
CANDIDATE CONSERVATION AGREEMENTS AND ESA LISTING DECISIONS: UNDERLYING INCENTIVES THAT DRIVE STAKEHOLDER BEHAVIOR

Michael Margherita*

Introduction.................................................................................................................. 571
I. The Endangered Species Act.................................................................................. 572
   A. Overview............................................................................................................. 572
   B. Listing: Threshold of the Endangered Species Act......................................... 573
   C. Unlisted and Warranted but Precluded Species............................................... 574
   D. Candidate Conservation Agreements .............................................................. 575
      1. Candidate Conservation Agreements with Assurances (CCAs) 576
      2. Policy for Evaluation of Conservation Efforts (PECE) ......................... 577
II. Current Status of CCAs: Federal Case Law on Three Species .............. 579
   A. Slickspot Peppergrass ..................................................................................... 579
      1. Background ................................................................................................... 579
      2. Otter v. Salazar ............................................................................................ 580
   B. Dunes Sagebrush Lizard ................................................................................ 581
      1. Background ................................................................................................... 581
      2. Proposal to List the Species ......................................................................... 582
      3. Defenders of Wildlife v. Jewell...................................................................... 583
   C. Prairie Chicken.................................................................................................. 584
      1. Background ................................................................................................... 584
      2. Permian Basin Petroleum Ass’n v. Department of Interior ..................... 585
III. Analysis................................................................................................................. 587

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INTRODUCTION

When Congress passed the Endangered Species Act (ESA) in 1976, it created a binary statutory system of listed and unlisted species.¹ Listed species received certain protections under the ESA that regulate human activities in order to reduce the likelihood of the species’s extinction and provide for its recovery.² Unlisted species, however, receive no protection.³ This system is administered by the Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) (collectively “the Services”) under the auspices of the Secretary of the Department of the Interior (Secretary or Interior).⁴ Unlike most other provisions of the ESA, the Services’ determination of whether to list a species must occur in the absence of economic considerations.⁵

Stakeholders whose interests would be affected by listing can become heavily invested in the outcome of that ESA listing decision. A stakeholder is anyone whose interests would be substantively affected by a decision to list or not list a species.⁶ For example, stakeholders often include, among others: species advocates, private landowners, private parties with an economic interest in species habitat, and federal or state agencies responsible for management of the species.⁷

In order to reduce or eliminate the possibility that a species will be listed, those whose activities would be affected by listing can pledge to undertake voluntary conservation measures and enter into what are known as Candidate Conservation Agreements (CCAs) for a species.⁸ On the one hand, species advocates have expressed concern that these agreements are

2. Id. § 1531(b).
3. But see id. (only providing protection for listed species).
6. Id.
8. Id.
unenforceable and that the effectiveness of included conservation measures are almost always untested. 9 On the other hand, stakeholders with economic interests in a species’ habitat want the opportunity to implement conservation measures in the CCA and prove the effectiveness of these measures before the species is listed. 10 These circumstances have led to litigation over ESA listing decisions based on CCAs. 11

The discussion that follows will examine the impact of CCAs on the ESA listing procedure and compare existing cases that substantively discuss CCAs in this context. The analysis will (1) demonstrate that federal courts have not applied a consistent standard of review to these cases and (2) explain the incentives that drive stakeholder behavior in these types of disputes.

I. THE ENDANGERED SPECIES ACT

A. Overview

Congress enacted the ESA “to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, [and] to provide a program for [these species’] conservation.” 12 Once listed as endangered or threatened, the protections afforded a species under the Act neatly follow its stated purpose. 13 Listing triggers consideration of critical habitat, 14 restrictions on taking or otherwise harming the species, 15 agency consultation to avoid jeopardy, 16 habitat conservation planning, 17 and programs for recovery. 18 Unlisted species do not receive these protections.

9. Id.
10. Id.
13. Id.
15. Id. § 1538(a).
16. Id. § 1536.
17. Id. § 1539.
18. Id. § 1533(f).
B. Listing: Threshold of the Endangered Species Act

Threshold identification of threatened or endangered species for purposes of statutory listing functions as the nucleus of the ESA. There are only two categories: listed and unlisted species.

The ESA defines an endangered species as “any species which is in danger of extinction throughout all or a significant portion of its range” and a threatened species as one likely to become endangered “within the foreseeable future.” In the 1970s and 1980s, Congress provided five statutory factors meant to guide determinations of a species’s status as endangered or threatened. The Secretary is authorized to list a species as threatened or endangered under any of the following factors—none of which is dispositive:

(A) the present or threatened destruction, modification, or curtailment of its habitat or range;
(B) overutilization for commercial, recreational, scientific, or educational purposes;
(C) disease or predation;
(D) the inadequacy of existing regulatory mechanisms; or
(E) other natural or manmade factors affecting its continued existence.

The Secretary must make the listing decisions “solely on the basis of the best scientific and commercial data available...taking into account those efforts, if any, being made by any State...to protect such species whether by predator control, protection of habitat and food supply, or other conservation practices.” A listing decision must take into account existing conservation efforts like CCAs; however, the ESA is unclear as to how much weight these voluntary conservation measures should receive relative to the five statutory factors.

Listing of species is to occur according to a statutorily fixed timeline. When the Services receive a petition, they have three months to determine whether it contains “substantial scientific or commercial information [that

19. Id. § 1533(a).
20. Id.
21. Id. § 1532(6), (20).
22. Id. § 1533(a)(1)(A)–(E).
23. Id.
24. Id. § 1533(b)(1)(A).
25. Id. (failing to specify how the factors should be considered).
26. Id. § 1533(b)(3)(A).
indicates listing] may be warranted.” If so, the Services have at most an additional 24 months to issue a finding that the petitioned listing is either: (1) warranted, (2) not warranted, or (3) warranted but precluded by higher-priority listing decisions.

If the Secretary determines the petition contains evidence demonstrating that the listing is warranted, the Services must publish a proposed rule for the species and invite public comment. Within 12 months, the Secretary must issue a final regulation implementing either the proposed rule or a notice of its withdrawal. But if the Services solicit additional scientific data, this deadline may be extended to 18 months.

The Services recognize the non-discretionary deadlines of the ESA but must contend with practical difficulties, such as limits on agency resources and manpower that often delay the process. However, failure to meet a deadline does not relieve the Services of their duty to determine whether the petitioned species is endangered or threatened. Courts have held that the deadlines in the ESA “are designed to be an impetus to act rather than a prohibition on action after the time expires,” and thus, listing decisions cannot be challenged solely based on the interval between petition and listing.

C. Unlisted and Warranted but Precluded Species

The Secretary can determine that a species is warranted for listing but precluded by other pending proposals. Although this provides the Secretary with the ability to prioritize listing decisions, courts have emphasized that “the warranted-but-precluded determination is a safety valve for the Service,” not a separate listing category.

27. Id.
28. Id. § 1533(b)(3)(B).
30. Id. § 1533(b)(6)(A).
31. Id. § 1533(b)(6)(B)(i).
32. Lawrence Hurley, Obama Plan to Cap Funding for Endangered Species Act

33. Francesca Ortiz, Candidate Conservation Agreements as a Devolutionary Response to Extinction, 33 GA. L. REV. 413, 435 (1999).
A warranted-but-precluded finding requires a showing that “expeditious progress is being made to add qualified species to either of the lists.” The ESA also requires that the Services establish a ranking system that would identify highest priority candidate species. The Services vacillated between different methods of categorization until 1996 when the Interior introduced the listing priority number (LPN) system to classify warranted-but-precluded candidate species from Category 1 through 12. The Interior classified the species “based on the magnitude and immediacy of threats and the species’ taxonomic uniqueness” with Category 1 being the most at risk.

Warranted-but-precluded species are identified for risk of extinction but remain unlisted and receive zero statutory protections until their status is resolved. As the D.C. Circuit has reiterated, “[n]either the ESA nor the implementing regulations prohibit hunting of species prior to formal listing, including those [currently under review or] determined to be warranted-but-precluded candidates.”

D. Candidate Conservation Agreements

The uncertain legal status of a candidate species is highly relevant to stakeholders due to the possibility of future listing. Although scientific evidence typically indicates that these species are at risk of extinction, candidates are legally indistinguishable from other unlisted species. The decision whether to list a candidate species affects the interests of all stakeholders including relevant federal or state agencies, private landowners, species advocates, and private companies seeking permits to use public land.

In the 1980s, the Services began to develop a policy to promote voluntary conservation measures in advance of listing. However, promotion of these voluntary conservation measures soon began to significantly impact listing decisions made by the Services and otherwise

37. In re Endangered Species Act, 704 F.3d at 974.
41. In re Endangered Species Act, 704 F.3d at 974.
42. Id.
43. Ortiz, supra note 33, at 435.
44. See generally id. (discussing voluntary conservation measures and associated litigation from 1980 to 1999).
influence the operation of the ESA.\textsuperscript{45} Additionally, it was unclear how these conservation measures were considered by the Services and how they would affect ESA decisions, most importantly, listing.\textsuperscript{46} This led to considerable litigation, which challenged various aspects of the Services approach to these conservation measures.\textsuperscript{47} As discussed by other commentators, these cases exemplified problems associated with the Services’ consideration of voluntary conservation measures and subsequent implementation of their listing obligations.\textsuperscript{48} Thus, in the late 1990s, the Services began drafting a procedure that would provide a firm policy basis for promotion and evaluation of voluntary conservation measures under the ESA.\textsuperscript{49}

As a result, in 1999, the Services implemented a set of delineated policies for CCAs.\textsuperscript{50} These are agreements between the Services and interested parties, such as state agencies or industry associations that pledge to undertake voluntary conservation measures on behalf of a candidate species.\textsuperscript{51} CCAs are designed to prevent listing of a species that would otherwise qualify as endangered or threatened.\textsuperscript{52} If the species improves due to these conservation measures, the CCA is serving its purpose of moving the species toward recovery without formal listing under the ESA.\textsuperscript{53} However, a CCA is unenforceable and the conservation measures it contains unproven, so it is possible that continued decline will lead to future listing of the species.\textsuperscript{54}

1. Candidate Conservation Agreements with Assurances (CCAA)

For private landowners, the Services promulgated a final regulation introducing a distinct category of CCAs, Candidate Conservation Agreements with Assurances (CCAA).\textsuperscript{55} Under these agreements:

\textsuperscript{45} See id. at 470–72 (describing the changes that the policy would make to the ESA’s operations).

\textsuperscript{46} Id. at 473.

\textsuperscript{47} Id. at 474–75.

\textsuperscript{48} Id. at 476.

\textsuperscript{49} See Announcement of Final Policy for Candidate Conservation Agreements with Assurances, 64 Fed. Reg. 32,726 (June 17, 1999) (announcing the resulting agreement).

\textsuperscript{50} Id.

\textsuperscript{51} Id.

\textsuperscript{52} Id. at 32,733.

\textsuperscript{53} Id. at 32,728–29.

\textsuperscript{54} See generally id. (responding to public comments regarding issues like the discretion of parties to enter and leave a CCA and the reliability of conservation measures).

\textsuperscript{55} Id. at 32,734–35.
non-Federal property owners, who enter into [CCAAs] that commit them to implement voluntary conservation measures for proposed or candidate species, or species likely to become candidates or proposed in the near future, will receive assurances from the Services that additional conservation measures will not be required and additional land, water, or resource use restrictions will not be imposed should the species become listed [and critical habitat designated] in the future.\(^{56}\)

Landowners are thus issued § 10 incidental take permits from the Services permitting them to continue activities allowed under the terms of the CCAA even if the species is listed and their land is designated as critical habitat.\(^{57}\)

At this point, it is important to emphasize that the application of this policy functionally removes private landowners from the disputes in this analysis.\(^{58}\) Depending on the species, CCAAs could provide almost every private landowner with the ability to negotiate and then commit to voluntary conservation measures that will allow a reasonable level of security in the future of their land.\(^{59}\) Once a 90-day substantial finding comes out, private landowners have at least a year, probably longer, to execute a CCAA with the Services.\(^{60}\) The benefits of doing so are practical, even if other CCAAs with states or federal agencies are deemed inadequate and the species is listed, their agreement does not change.\(^{61}\) Thus, no private landowner or representative group is a party on either side of the litigation in the cases discussed in this analysis because a private landowner’s obligations under a CCAA do not change if a species is listed.\(^{62}\)

2. Policy for Evaluation of Conservation Efforts (PECE)

Due to the unknown success of agreed upon conservation measures, in 2003, the Services published the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE) to evaluate the legitimacy

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56. Id. at 32,733.
60. Fugate, supra note 58, at 630 n.66.
61. Id. at 630.
62. Id.
of future CCAs, CCAAs, or any other formalized agreement with stakeholder parties. At its core, the PECE “establishes two basic criteria: (1) The certainty that the conservation efforts will be implemented, and, (2) the certainty that the efforts will be effective.” This remains the guiding policy for the Services when considering voluntary conservation measures during the listing process.

To evaluate the certainty of implementation, the PECE lists nine non-exclusive criteria, such as the type of regulatory mechanisms needed for implementation and the level of funding required for the proposed conservation measures. Similarly, to evaluate the certainty of effectiveness, the PECE lists six non-exclusive criteria that not only look at the substance of conservation measures in light of threats to the species, but also look for provisions providing for monitoring progress on implementation.

In the PECE there are guidelines on how the Services will evaluate existing CCAs and monitor a species’s status in the future. The PECE lists four scenarios that would cause the Services to reconsider the status of an unlisted species currently covered by CCAs:

(1) a failure to implement the conservation effort in accordance with the implementation schedule;
(2) a failure to achieve objectives;

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64. Id. at 15,101.
65. Id.
66. Jewell, 815 F.3d at 4 n.1 (D.C. Cir. 2016). As summarized by the D.C. Circuit, to evaluate the certainty of implementation, “the Service identified nine, non-exclusive criteria: (1) ‘[t]he conservation effort, the party(ies) to the agreement or plan that will implement the effort, and the staffing, funding level, funding source, and other resources necessary to implement the effort,’ (2) the legal authority to implement the effort and the commitment to do so, (3) the status of legal procedural requirements (e.g., environmental review) that must be done to implement, (4) whether necessary authorizations—like permits—have been identified and the likelihood of obtaining them, (5) the type and level of voluntary participation needed to implement is both identified and likely to occur (including review of incentives to join the plan), (6) regulatory mechanisms needed for implementation, (7) funding requirements, (8) implementation schedule, and (9) approval by parties involved.” Id.
67. Id. (“To evaluate the effectiveness of implementation, the six non-exclusive criteria are: (1) the nature and extent of the threats to the species and the efforts designed to reduce them, (2) explicit incremental objectives for achieving those goals, (3) the steps necessary to implement the effort, (4) scientific factors that can be used to measure achievement objectives and the standard against which success will be measured, (5) provisions for monitoring progress on implementation and effectiveness, (6) how adaptive management principles will be implemented.”).
(3) a failure to modify the conservation effort to adequately address an increase in the severity of a threat or to address other new information on threats; or
(4) we receive any other new information indicating a possible change in the status of the species, then we will reevaluate the status of the species and consider whether initiating the listing process is necessary. 69

It has been more than a decade since the Services announced the PECE, but the Services have not yet reconsidered listing a species that is subject to CCAs. 70 As a result, there are no empirical examples of how the Services would approach this reevaluation of a species and its CCAs.

II. CURRENT STATUS OF CCAS: FEDERAL CASE LAW ON THREE SPECIES

While most stakeholders and species advocates would agree that CCAs are beneficial, there has been significant disagreement over, not only the content of many CCAs, but also the amount of weight the Services assign to this analysis. The three species considered in this section and their administrative histories illustrate the process of agency consideration of CCAs when making listing determinations. Decisions by stakeholders in these cases can be traced to incentives created under this existing system. Additionally, litigation surrounding these species has led to some confusion over CCAs and the appropriate standard of judicial review.

A. Slickspot Peppergrass

1. Background

In the early 1990s, slickspot peppergrass became a warranted-but-precluded candidate species but remained in this category for more than two decades. 71 During that time, the species became the subject of several CCAs. 72 In 2002, the Services proposed to list the species but withdrew the proposed rule in 2004. 73

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69. Id.
70. See id. at 15,100 (becoming effective April of 2003 and followed by no consideration of listing a species that is subject to CCAs).
72. See id. at 3,099 (discussing a CCA developed by the Idaho Governor’s Office of Species Conservation, the Idaho Department of Agriculture, the Idaho Department of Lands, the
Advocates for the species sued, and in 2005, the Idaho district court found the Services withdrawal of the proposed rule arbitrary, remanding the case to the Interior for reconsideration.\textsuperscript{74} In 2009, the Services issued a final rule that acknowledged benefits from existing CCAs but identified other significant threats that compelled their decision to list the slickspot peppergrass as threatened.\textsuperscript{75}

2. Otter v. Salazar

As a result of this listing decision, the Governor of Idaho, Butch Otter, sued the Interior.\textsuperscript{76} One plaintiff’s primary argument was that the Services “improperly discounted the significance of [ ] conservation efforts” under existing CCAs.\textsuperscript{77} The Idaho district court in \textit{Otter v. Salazar} rejected plaintiffs’ claim that existing CCAs should have been given more weight in the listing decision but ultimately decided the case on other grounds.\textsuperscript{78} This was the first federal case to substantively discuss CCAs in the context of an ESA listing decision.

Plaintiffs specifically maintained that under (b)(1)(A), the Interior had not adequately considered the CCAs, which they argued “should have been given more weight in the listing determination.”\textsuperscript{79} To support this argument, plaintiffs “note[d] that the Service relied upon the CCA as a basis for withdrawing its proposed listing in 2004 and again referenced the CCA in its 2007 notice of withdrawal.”\textsuperscript{80}

But, the court agreed with the Services that the CCAs and other “conservation efforts were given consideration in the listing determination and that, in light of recently updated information about threats to the species, the conservation efforts were found not to have adequately addressed (or [not] capable of addressing in the future) [several significant] threats.”\textsuperscript{81} The Services determined that the CCAs were providing a conservation benefit for the slickspot peppergrass, but these conservation benefits...
efforts alone were insufficient to prevent listing in light of better-understood risks to the species.\footnote{82}

As a result, the court held that “it was reasonable for the Service to conclude that the CCA’s ‘effectiveness in reducing or eliminating the most significant threats has not been demonstrated,’” and thus, it was proper to list the species as threatened.\footnote{83} The court explained that, under the relevant standard of review, the Services’ decision to list a species is “entitled to deference” provided that the scientific basis for this decision is supported by the administrative record.\footnote{84}

\subsection*{B. Dunes Sagebrush Lizard}

1. Background

The dunes sagebrush lizard (dunes lizard) inhabits ecosystems found in the Permian Basin, a geological formation on the border of Texas and New Mexico.\footnote{85} It was first identified as a possible candidate species in 1982.\footnote{86} The dunes lizard is unique to the Permian Basin—this species is found nowhere else in the world.\footnote{87}

Throughout the 1980s and 90s, the dunes lizard was classified as warranted but precluded and reclassified to lower and then to higher priority categories.\footnote{88} But, “[h]aving noted significant habitat loss in the 1980s and 1990s, the [FWS] identified the lizard in 2001 as a candidate species.”\footnote{89} The dunes lizard was formally added to the candidate list in 2001 and assigned an LPN of 2, the second highest level of threat.\footnote{90}

\footnotetext[82]{82. }\textit{Id.}
\footnotetext[83]{83. }\textit{Id.}
\footnotetext[84]{84. }\textit{Id. at 35.}
\footnotetext[89]{89. }\textit{Id. at 188.}
In 2002, species advocates petitioned for emergency listing of the species.\textsuperscript{91} Responding to the petition, the Services issued a 12-month warranted-but-precluded finding in 2004.\textsuperscript{92} Species advocates petitioned for emergency listing again in 2008, but the Services found it warranted but precluded.\textsuperscript{93} The dunes lizard has been an LPN 2 candidate for decades.\textsuperscript{94}

2. Proposal to List the Species

In 2010, FWS issued a proposed rule to list the dunes lizard as endangered “based on the immediacy, severity, and scope of the ongoing significant threats.”\textsuperscript{95} FWS proposed this rule, in part, because while habitat in New Mexico was covered by several existing CCA(A)s, there were no similar agreements for habitat in Texas.\textsuperscript{96} FWS then reopened the 60-day comment period for the listing proposal.\textsuperscript{97} Faced with a now real possibility that the dunes lizard could be listed and restrict human activities, stakeholders in Texas immediately began to work with FWS to put together their own CCAs for the species.\textsuperscript{98}

The 60-day comment period was left open until Texas developed CCAs for the dunes lizard.\textsuperscript{99} By February of 2012, Texas had finalized its CCAs.\textsuperscript{100} Within a month, FWS closed the comment period, and two months later in June of 2012, FWS withdrew the proposed rule, citing “significant ongoing and future conservation efforts.”\textsuperscript{101} Litigation ensued.

\textsuperscript{92} Jewell, 815 F.3d at 5.
\textsuperscript{94} Endangered and Threatened Wildlife and Plants; Withdrawal of the Proposed Rule to List Dunes Sagebrush Lizard, 77 Fed. Reg. 36,987 (June 19, 2012) (to be codified at 50 CFR pt. 17).\textsuperscript{95} Jewell, 70 F. Supp. 3d at 188.
\textsuperscript{96} Endangered Status for Dunes Sagebrush Lizard, 75 Fed. Reg. at 77,811.
\textsuperscript{97} Jewell, 70 F. Supp. 3d at 188.
\textsuperscript{98} Sartain, supra note 85.
\textsuperscript{99} Jewell, 70 F. Supp. 3d at 188.
\textsuperscript{100} Id.
\textsuperscript{101} Id.
3. Defenders of Wildlife v. Jewell

a. District Court Decision

Defenders of Wildlife sued the Interior after the proposal to list the dunes lizard was withdrawn.102 First, plaintiffs argued that FWS did not properly consider the cumulative impacts of the five listing factors in its withdrawal decision and analogized a prior case in the D.C. District Court where the Services’ listing analysis was found deficient for that reason.103 But, the court rejected plaintiffs’ comparison, explaining that FWS considered the various conservation agreements and that “while the FWS’s cumulative impacts analysis [was] rather terse, it [was] based on more than an unsupported conclusion, as in [the prior case].”104 Thus, the court held, “[g]iven that the FWS thoroughly assessed a wide range of conservation efforts, its withdrawal decision [was] not arbitrary and capricious.”105 Furthermore, the court held that the withdrawal decision complied with the “best available science” requirement, reasoning that FWS undertook PECE evaluations of both the state plans and otherwise “considered extensive scientific studies” of the dunes lizard.106

Plaintiffs further challenged the determination by FWS that the Texas Plan displayed the requisite levels of certainty in effectiveness and implementation in its PECE analysis.107 The court also rejected this claim, holding that FWS properly “analyzed each factor required by [ ] PECE” and thus “reasonably concluded” that the dunes lizard CAs were sufficient to avoid listing.108

b. Circuit Court Decision

Defenders of Wildlife appealed to the D.C. Circuit, claiming that the district court had erred in upholding the FWS withdrawal decision.109 As a preliminary matter, the D.C. Circuit held that appellants had waived any statutory challenge or argument that the PECE was operating to substitute or supplement the ESA listing criteria.110 Turning to the Services’

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102.  Id. at 185–86.
103.  Id. at 191.
104.  Id. at 193.
105.  Id. at 194.
106.  Id.
107.  Id. at 195.
108.  Id. at 199.
110.  Id. at 8.
consideration of the state CCAs, the D.C. Circuit reiterated that the arbitrary and capricious standard of review applied to the withdrawal decision, noting that “[s]uch review is ‘highly deferential’ and ‘presumes agency action to be valid.’” \textsuperscript{111}

Appellants’ main arguments focused on alleged deficiencies in the FWS evaluation of the Texas CCA(A)s vis-à-vis sufficient certainty of implementation and effectiveness under PECE.\textsuperscript{112} Appellants argued that the Texas CCA(A)s’ lack of an implementation schedule would permit habitat loss to continue and that there was an “absence of evidence [that] the necessary level of voluntary participation would be achieved.”\textsuperscript{113} The court disagreed and held that, although the Texas plan did not include an implementation schedule and relied on speculative future enrollment, the FWS was not unreasonable to find implementation sufficiently certain as explained in its PECE analysis.\textsuperscript{114}

Appellants also argued that the FWS PECE analysis was deficient because “the Texas plan’s limit on habitat destruction was insufficient to ensure its effectiveness in protecting the lizard . . . [and] state confidentiality laws would interfere with the Service receiving the information on enrolled properties . . . including the actual conservation measures that enrollees agreed to undertake.”\textsuperscript{115} However, the court found the FWS analysis reasonable because, among other provisions, the plan limited the habitat loss over the 30-year plan to a maximum of 7.5%, required those causing habitat loss to include mitigation measures, incorporated goals and evaluation requirements, and included enforcement provisions under terms of individual agreements for participation in the plan.\textsuperscript{116}

\textit{C. Prairie Chicken}

1. Background

The lesser prairie chicken (prairie chicken) was petitioned for listing in 1995, and in 1997, Services found the species warranted but precluded,

\begin{itemize}
  \item \textsuperscript{111} \textit{Id. at 9.}
  \item \textsuperscript{112} \textit{Jewell}, 70 F. Supp. 3d at 194.
  \item \textsuperscript{113} \textit{Jewell}, 815 F.3d at 9.
  \item \textsuperscript{114} \textit{Id. at 12.}
  \item \textsuperscript{115} \textit{Id. at 13.}
  \item \textsuperscript{116} \textit{See id. at 6 (explaining the Texas plan to guide development away from lizard habitat).}
\end{itemize}
giving it an LPN of 8. Ten years later, in 2008, the LPN was changed from 8 to 2 to reflect the gravity of the threats. Still, the prairie chicken remained a warranted-but-precluded candidate.

In 2010, WildEarth Guardians sued to compel listing. The case was consolidated with other candidate cases and was thus part of a 2011 settlement that required the Services to make final listing decisions for hundreds of species that had been warranted but precluded for an unreasonable amount of time.

Due to the imminence of the listing decision, many stakeholders, who for decades appeared uninterested in voluntary conservation efforts, now found that arrangement quite attractive as compared to the protective provisions of the ESA. Thus, in 2013, a multi-state conservation effort, known as the rangewide plan (RWP), was announced and included various CCA(A)s. However, FWS determined that while the RWP and CCAs might benefit the species, it nonetheless faced a high risk of extinction, and in 2014, FWS promulgated a final rule listing the prairie chicken as a threatened species.

2. Permian Basin Petroleum Ass’n v. Department of Interior

As a result of the listing, the Permian Basin Petroleum Association, a group representing the oil industry, sued FWS in the Western District of Texas, challenging the final rule. Using a different standard of review than other circuits, the court first held that FWS’s “PECE evaluation [was] entitled to only ‘some’ deference . . . [and] not controlling.” Applying
this standard of review, the court next held that because the “PECE itself was an unambiguous policy, weight is only given to FWS’s application of the PECE to the RWP to the extent it is persuasive.”\textsuperscript{126} The district court reinforced these positions by holding that, even under a more deferential standard of review, the listing decision was arbitrary and capricious.\textsuperscript{127}

After establishing the standard of review, the court turned to plaintiffs’ claims.\textsuperscript{128} These plaintiffs challenged FWS’s application of PECE criteria to the RWP and argued that FWS failed to “carry out the rigorous, comprehensive evaluation of conservation efforts that it committed itself to undertake.”\textsuperscript{129} The court agreed with the plaintiffs and held that, although FWS had considered each of the PECE criteria in its analysis of the RWP and CCAs, this analysis was not rigorous and the rule should be vacated.\textsuperscript{130}

The court’s analysis proceeded by individually considering each of the 15 PECE criteria for implementation and effectiveness against FWS’s provided reasoning in its analysis.\textsuperscript{131} The judge discussed the 15 PECE criteria separately in order to evaluate FWS’s reasoning under each.\textsuperscript{132} Among many deficiencies, the judge found that the FWS was required to predict future enrollment in the RWP and, thus, failed to properly apply the PECE.\textsuperscript{133}

Next, in its PECE evaluation, the FWS stated that in order to avoid listing, they must be able to show that the CCAs in the RWP contributed to the elimination of one or more threats under ESA § 4.\textsuperscript{134} The court rejected this and held that “the added requirement that the RWP eliminate or even adequately reduce a specific threat at the time of the listing was improper.”\textsuperscript{135} As a result, the court vacated the listing decision.\textsuperscript{136}

\textsuperscript{126} Id. at 725 n.9.
\textsuperscript{127} Id. at 714.
\textsuperscript{128} Id. at 707.
\textsuperscript{130} Permian Basin Petroleum Ass’n, 127 F. Supp. 3d at 708.
\textsuperscript{131} See id. at 708–24 (providing a PECE overview and explaining the requirements under PECE’s 15 criteria).
\textsuperscript{132} See id. (analyzing each PECE criteria individually with FWS’s reasoning to determine sufficiency of FWS action).
\textsuperscript{133} Id. at 714.
\textsuperscript{134} Id. at 722.
\textsuperscript{135} Id.
\textsuperscript{136} Id. at 725.
III. ANALYSIS

The administrative history of these three species illustrates important empirical realities of the listing process and exemplifies current tensions between stakeholders and the Services regarding CCAs. With the notable exception of private landowners, most stakeholders are dissatisfied with the existing legal relationship between CCAs and listing decisions.137 Still, these same stakeholders would likely acknowledge some of the practical benefits of CCAs.138 For example, other commentators have explained that because “efforts to conserve a species are often much less costly to [private and public] landowners the earlier conservation efforts begin, early protection makes sense from an economic standpoint.”139

The analysis that follows has two parts. The first part will briefly discuss conflicts among federal circuits regarding the proper standard of review for ESA listing decisions that are based on CCAs. The second part will discuss the imbalance of incentives that motivate stakeholder behavior in these types of disputes.

A. Standard of Review

The standard of review for ESA listing decisions is straightforward: a decision to list or not list a species is entitled to deference and will be upheld if it is scientifically sound.140 However, the court in Permian Basin applied a different standard of review than prior cases, which has created a split in authority.141 In Defenders, the D.C. Circuit held that these types of listing decisions are entitled to deference, provided that the Services’ final determination is based on scientific evidence and supported by the administrative record.142 That standard was also applied by the Idaho District Court in Otter v. Salazar.143 Alternatively, the Texas district court in Permian Basin held that these listing decisions are “entitled to only ‘some’ deference.”144

However, the substance of the decision in Permian Basin demonstrates problems encountered when courts attempt to apply this standard. Most

138. Id.
139. Ortiz, supra note 33, at 463.
141. Id. at 711.
importantly, this standard of review led the court to scrutinize the Services’ specific reasoning under each of the 15 PECE factors and issue individual rulings instead of considering whether the listing decision was, as a whole, scientifically sound. This also required pages of tedious analysis in the opinion. If the court had applied the proper standard of review, these problems would not have inured.

B. Imbalance of Incentives: Motivations Underlying Stakeholder Behavior

The circumstances relevant to this discussion can be simplified as follows: the Services review a petition from species advocates and, as they issue findings bringing the species closer to a likely final listing rule, those whose activities or interests would be affected begin to negotiate and draft CCAs for the purposes of avoiding this outcome. The longer the species has been under review for listing, particularly if warranted but precluded, the higher the stakes in these listing decisions.

The plaintiffs in each of the cases took positions that reflect fundamentally similar concerns. Thus, the behavior of stakeholders before a final listing decision and their corresponding litigiousness when faced with an unfavorable result can be understood as a function of an imbalance of incentives during the listing process. This imbalance has incentivized stakeholders to become disproportionately invested in the Services’ PECE analysis.

If not listed because of a CCA, species advocates must initiate the listing process from the beginning in order to change the species’ status. If listed, activities affecting species may be subject to ESA restrictions and CCA participants must similarly initiate the delisting process for any change in status. In both scenarios, the practical reality of listing or delisting species, paired with the administrative delay associated with these processes, creates a powerful incentive for stakeholders at this stage.

Potential CCA participants are incentivized to enter into agreements that will prevent listing, however, these incentives may be retroactively diminished if that species is then listed. As in Permian Basin, most CCA

145. Id. at 708.
146. See generally Idaho Farm, 58 F.3d at 1397; W. Watershed Projects, 2005 WL 2002473, at *1; Otter, 2012 WL 3257843, at *1; Jewell, 815 F.3d at 1; Jewell, 70 F. Supp. 3d at 183; Permian Basin Petroleum Ass’n, 127 F. Supp. 3d at 703 (identifying plaintiff claims).
147. See generally Idaho Farm, 58 F.3d 1392; W. Watershed Projects, 2005 WL 2002473; Otter, 2012 WL 3257843; Jewell, 815 F.3d 1; Jewell, 70 F. Supp. 3d 183; Permian Basin Petroleum Ass’n, 127 F. Supp. 3d 700 (identifying dissatisfied plaintiffs with final listing decisions and choosing litigation as a solution).
148. Ortiz, supra note 33, at 476.
149. Fugate, supra note 58, at 630.
participants have worked with the Services to enter into agreements with the express purpose of avoiding listing and are incentivized to litigate for the opportunity to prove that their conservation efforts are sufficient for this purpose.\textsuperscript{150}

On the other hand, as shown in \textit{Defenders}, species advocates are incentivized to ensure through litigation that when a CCA prevents listing, the conservation measures included are, in fact, sufficient.\textsuperscript{151} For many species, it has taken decades of regulatory reclassification to even be considered for listing, and to abandon the process based on unproven voluntary conservation efforts would undermine the ESA. Requiring species already identified as at risk but not listed due to a CCA to join the queue with newly petitioned species would arguably be inconsistent with the ESA.\textsuperscript{152} With the uncertain success of conservation measures, species advocates are incentivized to err on the side of caution and litigate.\textsuperscript{153}

For all stakeholders, it is this uncertainty with respect to future determinations of species’ status that forms the nucleus of their incentives.\textsuperscript{154} The resulting imbalance is best illustrated by the observation that, although stakeholders are obviously motivated to achieve their desired outcome, they appear equally motivated to avoid the undesired result.

Under the PECE, those participating in a CCA are well aware that, while voluntary conservation efforts may make listing unnecessary, “[i]n some cases, even if the parties fully implement all of the conservation efforts outlined in a particular agreement or plan, [the Services] may still need to list the species.”\textsuperscript{155} While not affecting private landowners,\textsuperscript{156} uncertainty with respect to future listing is problematic for federal land management agencies, other private participants in the CCA, and species advocates.\textsuperscript{157}

Though not yet applied by the Services, the PECE also includes guidelines on monitoring CCA implementation and factors that would cause the Services to reevaluate the status of the species, including the

\textsuperscript{150} Sartain, supra note 85.
\textsuperscript{151} Ortiz, supra note 33, at 440.
\textsuperscript{152} Id. at 474.
\textsuperscript{153} See generally Jewell, 815 F.3d 1 (litigating whether conservation measures were sufficient).
\textsuperscript{154} See generally id. (finding stakeholders actions dependent on listing decisions).
\textsuperscript{156} See id. at 15,106 (noting that participation in a CCA is voluntary and thus private landowners may not be affected). Private landowners covered by a CCAA enjoy certainty regarding future uses of their land and are covered by an incidental take permit should listing occur. Id.
\textsuperscript{157} See generally id. at 15,100 (responding to public comments concerned about the uncertainty of the future status of a species).
catch-all: “any new information.” However, while stakeholders know that existing conservation measures must be considered during any future listing or delisting decision, it is unclear how much weight they will receive.

Although stakeholders represent seemingly disparate sensibilities, these positions can nonetheless be reconciled upon consideration of their underlying motivations. This discussion means to suggest that such a reconciliation is possible and could be achieved. For example, a CCA could provide a scientific baseline: (1) based on measureable and objective criteria, (2) monitored by a third party, and (3) agreed on by the stakeholders, which would trigger listing. As a result, species advocates would be less likely to sue over CCAs they deem questionable, and CCA participants would be allowed to prove the effectiveness of their agreement.

CONCLUSION

In November of 2016, the United States Geological Survey announced the largest estimate of continuous oil deposits they had ever assessed in the United States. This untapped oil was discovered in the Permian Basin, habitat of the prairie chicken and dunes lizard. Within a few weeks, more than half a dozen new oil drilling rigs had been added in the region. Under these circumstances, the CCAs for these two species could be tested. The existence of CCAs prevented the listing of the prairie chicken and dunes lizard, but it is important to remember that parties to a CCA can abandon agreed upon conservation measures without fear of punishment. The only possible consequence is that the Services might then restart the listing process and list the species. But, the ESA does not

158. Id. at 15,104.
159. See id. at 15,101 (discussing situations in which the FWS would reevaluate the status of a species).
160. See generally id. at 15,100 (responding to public comments and stakeholder concerns generally).
162. Id.
163. Id.
164. See Endangered Species Glossary, supra note 7 (defining CCAs as voluntary agreements).
work retroactively and restricts human activities only after the species is listed.\footnote{166}

The resolution of these issues will prove a definitive factor in the future of the ESA. The resulting outcome could not be more important as affecting—perhaps determinatively—the most basic consideration under the ESA, whether to list a species. The ESA envisions a binary system where species in danger of extinction are listed and brought into the system.\footnote{167} Thus, the importance of CCAs cannot be overstated as directly affecting the fundamental threshold determination under the ESA, listing.

\footnote{166. See \textit{id.} § 1533(b)(8) (requiring the Secretary, to the extent possible, to include a brief description and evaluation of activities affecting species designation).}

\footnote{167. \textit{id.} § 1533(a).}
THE COASTAL ACT, POWER PLANTS, AND THE CASE FOR “UNDEVELOPMENT”

Molly Loughney Melius, Sarah Reiter, & Sarah Newkirk

Introduction ............................................................................................................ 593
I. Sea level rise will have major impacts on power plants and other critical coastal infrastructure. ....................................................................................... 595

The Coastal Commission lacks sufficient authority over existing infrastructure decisions in the Coastal Zone .......................................................... 597

II. Removing once-through cooling coastal power plants would have restored coastal habitat, protected marine resources, and improved energy reliability in California. ............................................................. 599

III. The Coastal Commission and coastal resources are marginalized in the Energy Commission’s coastal power plant infrastructure decisions . 601

Huntington Beach Spotlight: The Role of Sea Level Rise in Energy Commission Permitting and the Futility of Coastal Commission Input ............................................................. 604

IV. Statutory Recommendations to Increase the Coastal Commission’s Ability to Influence Removal of Existing Coastal Infrastructure ...... 606

A. Amend Coastal Act Sections 30260 and 30264 to encourage removal or relocation of large coastal infrastructure under certain conditions. ........................................................................................................ 607

B. Amend Coastal Act Section 30413 to clarify that the Coastal Commission is required to provide recommendations on all applications to the Energy Commission regarding existing energy-infrastructure expansion updates .................................................... 607

C. Amend the Warren-Alquist Act to remove its preemption of other state laws, including the Coastal Act .......................................................... 609

V. Broader Implications for Other Coastal Infrastructure ...................... 610

A. Transportation Infrastructure ........................................................................... 610

B. Wastewater Treatment Facilities ................................................................... 612

Conclusion ........................................................................................................... 613
2017] The Case for “Undevelopment” 593

INTRODUCTION

California’s natural coastal habitat is a shadow of its former self; coastal wetlands are at 10% of their historic expanse, and other habitats—beaches, bluffs, dunes, and others—are similarly reduced. Sea level rise is putting this habitat—along with communities and critical infrastructure—at risk, with sea-level-rise projections becoming more and more extreme. Given sea level rise and ongoing development pressure, California will need to remove structures—rather than build seawalls—in order to restore and conserve what remains of the state’s coastal natural habitat. Often called “strategic retreat,” the concept of moving or demolishing structures serves two purposes: it enhances public safety by creating space between buildings and the energy of the sea, and it provides space for habitat to move landward with sea level rise. Although strategic retreat—hereinafter “undevelopment”—delivers both ecological and social benefits (in the form of permanent, meaningful risk mitigation), it has not been commonly deployed.

The Coastal Act is well-equipped to restrict new development and protect current habitat in the existing coastal zone, but it is not designed to facilitate undevelopment to protect future habitat in light of sea level rise. Using the state’s efforts to phase out once-through cooling technology along the coastline as a case study, this article will examine the regulatory changes necessary to ensure the California Coastal Commission’s (Coastal Commission’s) appropriate role in decision-making related to permit renewal and continued siting of infrastructure in the coastal zone in order to facilitate the removal of formerly coastal dependent infrastructure and the protection and restoration of coastal habitat.

Coastal power plants represent an excellent—but partially missed—opportunity for undevelopment in California. State regulations phasing out “once-through cooling”\(^6\) practices used in many coastal power plants are forcing the repowering, retrofitting, or retiring of many plants.\(^7\) These once-through cooling regulations provide an opportunity for state and local governments to rethink whether power plants should be sited along the coast. Removing these power plants and replacing the generation capacity elsewhere would maintain the reliability of the power grid by reducing the vulnerability of our energy infrastructure to sea level rise and storm damage while increasing coastal habitat. However, the Coastal Commission gets only one bite at the apple—at the initial siting of the plant. As such, it does not have an adequate statutory mandate to promote plant re-siting or an effective means of coordinating with the other agencies with primary responsibility to oversee the implementation of the once-through cooling regulations.

The Coastal Commission’s authority is similarly limited with respect to decisions on existing transportation infrastructure and wastewater treatment plants in the coastal zone. And—without changes to the Coastal Act—the opportunity for undevelopment will be missed again and again. As sea level rises and increasing coastal storms threaten other coastal infrastructure in California and submerge the remaining coastal habitat, the Coastal Commission’s authority with respect to renewing siting decisions for existing infrastructure in the coastal zone should be enhanced to ensure the protection of future habitat.

This article will: (1) briefly discuss the likely impacts of sea level rise on power plants and other major coastal infrastructure; (2) illustrate how the Coastal Commission—and, by extension, the protection of coastal natural resources—is marginalized in the context of decisions regarding permit renewal and ongoing siting of existing infrastructure in the coastal zone; (3) argue that because power-plant retirement and removal maximizes public benefits in this context, the Coastal Act—and other laws related to infrastructure permitting—should be amended to give the Coastal Commission more authority to influence decisions relating to the renewal of operating licenses for power plants and other infrastructure in the Coastal Zone; (4) identify the similarities between power-plant permitting and

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6. LITTLE HOOVER COMM’N, REWIRING CALIFORNIA: INTEGRATING AGENDAS FOR ENERGY REFORM 10 (2012); see ELEC. POWER RESEARCH INST., ASSESSMENT OF ONCE-THROUGH COOLING SYSTEM IMPACTS TO CALIFORNIA COASTAL FISH AND FISHERIES 1-3 (2007) [hereinafter ASSESSMENT] (describing once-through cooling as drawing in relatively cool ocean water, using it to absorb heat, and discharging the heated water back into the ocean).

decision-making regarding other vulnerable infrastructure in the coastal zone; and (5) further argue that providing expanded Coastal Act jurisdiction over the maintenance of all existing infrastructure in the coastal zone—in particular, transportation, infrastructure, and wastewater treatment plants—is critical to any formula for sea-level-rise adaptation that maintains natural coastal habitat.

I. SEA LEVEL RISE WILL HAVE MAJOR IMPACTS ON POWER PLANTS AND OTHER CRITICAL COASTAL INFRASTRUCTURE.

Sea level is projected to rise approximately 5 to 24 inches by 2050 and 17 to 66 inches by 2100 along the California coast, posing a serious risk to critical infrastructure and current habitat.\(^8\) This change in sea surface elevation will exacerbate existing hazards and reduce the period of time over which coastal development is expected to remain relatively safe.\(^9\) Sites that might have seemed safe for 80 or 100 years might now only be stable for 40 or 50 years as the risk of coastal hazards increase over the next century.\(^10\) This poses a significant risk to California’s energy security.\(^11\)

The Pacific Institute identified 30 coastal power plants—providing nearly 15% of California’s electric generation capacity\(^12\)—that are at risk of flooding under a 2080 sea-level-rise projection.\(^13\) Many are vulnerable to a 1% annual chance flood even today.\(^14\) The potential magnitude of these impacts will place increased pressure on the “nerve center”\(^15\) of the state’s

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8. COMM. ON SEA LEVEL RISE, supra note 2, at 4–6. Recent projections on melting sea ice in the West Antarctic ice sheet would increase these numbers even further. See GRIGGS ET AL., supra note 2, at 34–36.


11. Id. at 61.


13. Id. at 9 (explaining that under medium to medium-high emissions scenarios, mean sea level along the California coast will rise to an estimated 1.4 meters (4.6 feet) by 2100, not including ice-melt contributions from the Greenland and Antarctic ice sheets, and as a result, higher sea levels and the resultant damage to coastal power plants could occur as early as 2070 or 2080); see also NAT’L OCEANIC & ATMOSPHERIC ADMIN., OAR NO. CPO-1, GLOBAL SEA LEVEL RISE SCENARIOS FOR THE UNITED STATES NATIONAL CLIMATE ASSESSMENT 3–12 (2012) (providing several scenarios for global mean sea level rise by 2100 and discussing impacts of ice-sheet loss from rising temperatures and relative effects on global sea level rise).


power grid. Damage to coastal plants from flooding, inundation, and erosion places stress on the grid by potentially increasing the need to turn on natural-gas-powered “peaker” plants, moving the state away from its renewable energy targets, or increase importation of out-of-state energy.

This vulnerability is not unique to power plants. Other types of coastal infrastructure (roads, rails, wastewater treatment plants, ports, and airports) are similarly at risk. The Pacific Institute estimated that 3,500 miles of road would be at risk of flooding with a 1.4-meter sea level rise, but even small areas of flooding can cause serious transportation disruption. There are 28 wastewater treatment plants at risk under 1.4 meters of sea level rise, and the consequences of this vulnerability are dire. Inundation of wastewater-treatment infrastructure could damage pumps and other equipment, potentially leading to the discharge of untreated sewage from coastal outfalls. In addition, higher water levels could interrupt discharge even under otherwise normal operating conditions.

Coastal natural resources are similarly vulnerable. We have already lost roughly 90% of the historic expanse of coastal wetlands in California to development and conversion to agriculture. What remains is roughly 170,000 acres of coastal wetland, which is at risk of becoming squeezed between existing hard structures and the rising sea. In the absence of intervention, roughly 70,000 acres of current wetland will be lost to sea level rise by the year 2100. However, with sea level rise, one type of land

16.  HEBERGER ET AL., supra note 12, at 1, 20, 54; LITTLE HOOVER COMM’N, supra note 6, at 10.
17.  See generally CAL. INDEP. SYS. OPERATOR, supra note 15, at 8 (explaining that, as a balancing authority, CAISO must try and match generation with energy demand and maintain the electric frequency of the grid no matter what extreme weather or natural disaster is imposed on the infrastructure and facilities supporting the grid).
18.  Brief of Amici Curiae, supra note 9, at 18–20; COMM. ON SEA LEVEL RISE, supra note 2, at ix; NAT’L OCEANIC & ATMOSPHERIC ADMIN., supra note 13, at 1.
19.  HEBERGER ET AL., supra note 12, at 54.
23.  Id.
25.  NATURAL RESOURCES AGENCY STATE OF CALIFORNIA, STATE OF THE STATE’S WETLANDS: 10 YEARS OF CHALLENGES AND PROGRESS 8 (June 2010).
can easily transition to another type. This effect is a two-sided coin; it will cause the loss of habitat referred to above, but it also offers the potential for undeveloped uplands to transition to wetland habitat as sea level rises. Thus, by 2100, 54,000 acres of currently undeveloped uplands could become new wetland. This total (157,000 acres) is still well short of the existing acreage of 173,000 acres. In other words, even if our goal is a modest one of “no net loss” of wetland habitat—as opposed to a more aggressive goal aimed at restoring something closer to the historic expanse—we will not achieve it without undevelopment.

The Coastal Commission lacks sufficient authority over existing infrastructure decisions in the Coastal Zone.

Despite the potential loss of coastal habitat in the face of sea level rise, the Coastal Commission remains ill-equipped to guide decisions relating to existing infrastructure along the coast, hampering undevelopment and protection of future coastal habitat. The California Coastal Act (Coastal Act) has been remarkably successful in achieving its original policy goals of ensuring public access to the shoreline, protecting coastal natural resources from development, and prioritizing coast-dependent uses. It was not designed, however, to empower the Coastal Commission to reconsider the wisdom of maintaining existing development as the shoreline changes over time. In fact, the Coastal Act explicitly sanctions pre-existing, nonconforming uses by exempting “existing development” from many of its regulations. As the threat of sea level rise increases, expanding the Coastal Commission’s authority over existing, non-conforming structures will be important.

In 2015, the Coastal Commission took a significant step toward illustrating how sea level rise should be integrated into local coastal programs and coastal development permit decision-making by issuing Sea...

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27. See HEBERGER ET AL., supra note 12, at 27 (providing several mechanisms for creation of new wetlands).
28. Id.
29. Bell et al., supra note 26.
31. See CAL. PUB. RES. CODE § 30001(d) (West 2016) (noting that a key finding behind the Coastal Act’s creation was “[t]hat existing developed uses, and future developments that are carefully planned and developed consistent with the policies of this division, are essential to the economic and social well-being of the people of this state and especially to working persons employed within the coastal zone”).
32. E.g., id. § 30600(e)(2) (exempting existing developments from commission review projects).
Level Rise Policy Guidance.\textsuperscript{33} It is clear from the Guidance that the Coastal Commission believes that evolving legal and technological standards—and scientific information regarding impacts to the coast associated with climate change—should drive power plants away from the coast.\textsuperscript{34} In the Guidance, the Coastal Commission calls for consideration of greater design standards for critical infrastructure like coastal power plants.\textsuperscript{35} Specifically, the Coastal Commission recommends that critical infrastructure be built to withstand a 200- or 500-year event, whereas typical coastal projects are designed to withstand a 100-year event.\textsuperscript{36} In addition, the Coastal Commission recommends applying high sea-level-rise projections and “worst case scenarios” for the siting and design of critical facilities.\textsuperscript{37} The Coastal Commission further recommends that local jurisdictions develop guidance pertaining to the managed retreat of critical infrastructure, including developing plans for managed relocation of at-risk facilities and “when to consider managed retreat rather than continue with repairs and maintenance in light of sea level rise.”\textsuperscript{38} While these recommendations are prudent, they are not binding and, therefore, may be ignored both by state agencies and by local jurisdictions when making coastal-development decisions.\textsuperscript{39} Furthermore, the Guidance as it pertains to local coastal program amendments and coastal development permits primarily informs traditional Coastal Act functions—specifically the design and permitting of new development.\textsuperscript{40}

\textsuperscript{33} The Coastal Commission reviews and approves Local Coastal Programs (LCPs) that include land use plans (LUPs) and zoning ordinances and implementation programs for the LUPs. \textit{CAL. PUB. RES. CODE} §§ 30512–13. LCPs must be consistent with—and adequate to carry out—Coastal Act policies, after which that local government becomes the lead agency for permitting most coastal development above the mean high tide line, subject to limited Coastal Commission appeal authority. \textit{Id.} § 30514(a), (b).

\textsuperscript{34} \textit{See id.} at 112 (“Changes and modifications could include the use of foundation elements that will allow for building relocations or removal of portions of a building as it is threatened or reserving space to move on-site waste treatment systems away from eroding areas or areas that will be susceptible to a rising water table or increased flooding.”).

\textsuperscript{35} \textit{CAL. COASTAL COMM’N, supra} note 10, at 82.

\textsuperscript{36} \textit{Id.} at 244.

\textsuperscript{37} \textit{Id.} at 140.

\textsuperscript{38} \textit{Id.} at 140, 175; \textit{LITTLE HOOVER COMM’N, supra} note 6, at 18.

\textsuperscript{39} \textit{CAL. COASTAL COMM’N, supra} note 10, at 5.

\textsuperscript{40} \textit{Id.} at 69.
II. REMOVING ONCE-THROUGH COOLING COASTAL POWER PLANTS WOULD HAVE RESTORED COASTAL HABITAT, PROTECTED MARINE RESOURCES, AND IMPROVED ENERGY RELIABILITY IN CALIFORNIA.

Given the Coastal Commission’s constraints in decision-making regarding existing development, undevelopment opportunities are rare. The 2010 Water Board order on once-through cooling created such an opportunity.41

Prior to the 2010 once-through cooling order, 19 electrical power plants (including two nuclear-fueled plants) collectively drew billions of gallons of marine or estuarine water every day to cool generators and then discharged the heated water back into the ocean or other body of water.42 Concerns over the environmental impacts of the increased ambient water temperature and the impingement and entrainment of millions of fish, larvae, eggs, seals, sea lions, turtles, and other creatures led California to phase out the practice of once-through cooling.43 The State Water Resources Control Board’s (SWRCB’s) 2010 regulations required these 19 plants to comply with technology-based standards to reduce the harmful effects associated with cooling water-intake structures on marine and estuarine life.44 Power-plant owners and operators had three response options to comply with the regulations: (1) no longer using once-through cooling technology, (2) reducing entrainment by 93%, or (3) shutting down.45

While response options 1 and 2 largely address the harmful marine impacts associated with once-through cooling, they do not address the safety and reliability issues associated with siting energy infrastructure (or extending the useful life of that infrastructure) in high-hazard areas in the coastal zone.46 Only option 3, retiring the plants, would both avoid marine impacts from once-through cooling (thereby satisfying the once-through cooling regulation objectives) and avoid flooding and associated energy-supply impacts that would be caused by sea level rise.47 In addition, phasing out these plants in favor of distributed solar generation and other renewable energy sources would help move California toward its renewable energy

42. Id.
43. LITTLE HOOVER COMM’N, supra note 6, at 18; SWRCB FACT SHEET, supra note 41.
44. See generally CAL. CODE REGS. tit. 23, § 2922(a) (2017) (addressing power plants’ negative impact on the environment).
45. Id.
46. SWRCB FACT SHEET, supra note 41.
47. See id. (retiring plants are the only option that guarantees full compliance).
and greenhouse-gas reduction targets, particularly because some of these once-through cooling plants are inefficient and expensive peaker plants. Thus, four independent policy objectives—maintaining the reliability of the power grid, transitioning to an energy portfolio with more renewable energy sources, protecting marine organisms from entrainment and impingement, and restoring coastal habitat—converged to support the removal of once-through cooling power plants from the coastline.

Unfortunately, however, the agencies with primary responsibility for overseeing these objectives are distinct from one another and do not have an efficient means of coordinating to ensure this outcome. The Coastal Commission, in particular, watched most of the action from the sidelines—both because the Coastal Act does not require its direct involvement and because of institutional capacity issues. Instead, without adequate Coastal Commission involvement and authority, protracted negotiations led to only five generators retiring their facilities, with most of the remainder indicating that they will repower their plants on site and no longer use once-through cooling technology.


49. See Proposed Memorandum of Agreement Between the Coastal Commission and the Energy Commission Regarding the Roles and Duties of Each During the Energy Commission’s Application for Certification (AFC) Review from Al Wanger, Deputy Dir. to Coastal Commissioners and Interested Parties (Mar. 31, 2005) [hereinafter Proposed Memorandum] (clarifying the roles of the Coastal Commission and Energy Commission to ensure efficient coordination).

50. Id.


52. Order Instituting Rulemaking to Integrate and Refine Procurement Policies and Consider Long-Term Procurement Plans, No. 13-02-2015, slip op. at 7 (Feb. 13, 2015); SWRCB FACT SHEET, supra note 41.
III. THE COASTAL COMMISSION AND COASTAL RESOURCES ARE MARGINALIZED IN THE ENERGY COMMISSION’S COASTAL POWER PLANT INFRASTRUCTURE DECISIONS.

The phased transition away from once-through cooling has triggered interplay between various state agencies that have jurisdiction over coastal power plants. While many agencies are involved in these coastal-power-plant decisions, only the Coastal Commission has the protection of coastal resources squarely within its mandate. However, as illuminated by the Huntington Beach case study below, the Coastal Commission does not have a meaningful seat at the table in the deliberations over the future of coastal once-through cooling plants.

As noted above, many plant operators have already decided whether to repower or to retire their once-through cooling plants to comply with the 2010 regulations. The fates of other plants, such as the Mandalay and Ormond Beach power plants, remain undecided. However, without stronger Coastal Act provisions, most of the state’s opportunities to undevelop by removing these plants from the coastal zone have been and will be missed.

This experience has provided many lessons for what kinds of regulatory changes are necessary to ensure that undevelopment is considered as future decisions are made regarding the maintenance or removal of existing
infrastructure. Indeed, many power plants vulnerable to sea level rise remain in the coastal zone; these plants will likely need to be modified and updated with new infrastructure and facilities, thereby triggering Coastal Energy Commission (Energy Commission) review. The Coastal Commission and the Energy Commission will thus once again come head-to-head on these issues in the near future. Amending the Warren-Alquist Act and Coastal Act will be critical to ensuring that the Coastal Commission can protect California’s iconic coastline.

The Warren-Alquist Act governs the circumstances under which power plants are licensed. The Act gives the Energy Commission the “exclusive authority” to license new power plants or repower projects with capacity greater than 50 megawatts. This means that, in the once-through cooling context, if a plant is upgraded and repowered—rather than retired—the plant operator typically needs an Energy Commission license. The Warren-Alquist Act lays out the process and the factors that the Energy Commission must consider when deciding whether to grant a license. It also provides for Coastal Commission involvement in the application process for project proposals in the coastal zone, although the Coastal Commission does not have independent permitting authority over coastal power plants within the Energy Commission’s jurisdiction.

The Energy Commission exercises its authority using two main types of review: the Notice of Intent (NOI) process and the Application for

58. HEBERGER ET AL., supra note 12, at 54.
59. CAL. PUB. RES. CODE §§ 25500.1, 25507 (West 2017).
60. Id. §§ 25500–43.
61. CAL. PUB. RES. CODE § 25543(b); CAL. ENERGY COMM’N, No. 09-AFC-4, OAKLEY GENERATING STATION: FINAL STAFF ASSESSMENT 2-2 (Mar. 1, 2011).
63. The Warren-Alquist Act also provides that in order to grant a license, the Energy Commission must certify the need for the plant and the suitability of the site of the plant, including environmental review, prior to the construction or modification of an electric generating plant. CAL. PUB. RES. CODE §§ 25502, 25519(c), 25500. In determining the suitability, the Energy Commission must also find that the project conforms with applicable laws, ordinances, regulations, and standards. Id. § 25525. “In making the determination, the commission shall consider the entire record of the proceeding, including, but not limited to, the impacts of the facility on the environment, consumer benefits, and electric system reliability.” Id. In addition, when reviewing power plant applications, the Energy Commission must consider at least one alternative site that is not in the coastal zone. Id. § 25503.
64. E.g., id. (granting Energy Commission review of projects in the coastal zone); Proposed Memorandum, supra note 49.
65. CAL. PUB. RES. CODE §§ 25500–43.
Certification (AFC) process. The Coastal Act mandates that the Coastal Commission play a role in the NOI process for power-plant facilities, outlining specific findings that the Coastal Commission must make, including the potential adverse environmental and aesthetic effects. However, due to a change in the Warren-Alquist Act, most proposed projects no longer require an NOI and now undergo only AFC review. This is problematic because it creates uncertainty regarding the Coastal Commission’s involvement in the process. However, according to the Memorandum of Agreement (Agreement) that the Coastal Commission and the Energy Commission entered into in 2005, both agencies understand the law as requiring that the Coastal Commission must participate in any AFC proceedings in the same way that the Coastal Commission is required by the Coastal Act to participate in an NOI proceeding. The Agreement states that the Coastal Commission must prepare a report on the AFC to the Energy Commission with findings related to compatibility with coastal resources, adverse aesthetic and environmental effects, mitigation opportunities, and other matters, as well as necessary measures to ensure that the project conforms with the Coastal Act.

Despite the Agreement, however, for nearly a decade, the Coastal Commission declined to participate in the Energy Commission’s AFC

66. Proposed Memorandum, supra note 49.
67. CAL. PUB. RES. CODE § 30413(d); compare Letter from Alison Dettmer, Deputy Dir., Cal. Coastal Comm’n, and Tom Luster, Senior Envtl. Scientist, Cal. Coastal Comm’n, to Coastal Comm’rs & Interested Parties 1 (July 9, 2014) (on file with journal) (relating conflicting opinions regarding interpretation of § 30413) [hereinafter Coastal Commission Letter], with Proposed Memorandum, supra note 49 (explaining that the 2005 Memorandum of Agreement between the CEC and CEC states that Section 30413(d) is intended to cover the AFC proceedings, which would make Coastal Commission participation mandatory).
68. Proposed Memorandum, supra note 49; CAL. PUB. RES. CODE § 25540.6(a) (defining which types of power plants and modifications are exempt from the NOI process); see also id. § 25102 (defining application as any request to the Energy Commission for certification of any new or modified site or related facility).
69. CAL. PUB. RES. CODE § 25519(d). The Coastal Commission may participate in the proceeding as an interested party. Id. § 25508.
70. Proposed Memorandum, supra note 49.
71. Id.; CAL. PUB. RES. CODE § 30413(d). Specifically, in an NOI review process, the Energy Commission must share a copy of the NOI with the Coastal Commission for its review and comments, and the Coastal Commission must prepare a report to the Energy Commission with necessary measures to ensure the project conforms with the Coastal Act. Id. § 25519(d) (“If the site and related facility specified in the application is proposed to be located in the coastal zone, the commission shall transmit a copy of the application to the California Coastal Commission for its review and comments.”). The Coastal Commission report must contain findings regarding compatibility with coastal resources, conflict with coastal-dependent land uses, adverse aesthetic and environmental effects, mitigation opportunities, and other matters. Id. § 30413(d). The Energy Commission’s final written decision on the project must include conditions to meet Coastal Act objectives specified by the Coastal Commission’s report unless the Energy Commission finds that conditions are infeasible or would result in greater impact on the environment. Id. § 25523(b).
review process for certain projects due to budget and capacity constraints. In recent years, the Coastal Commission has once again participated in AFC proceedings according to the terms of the MOA. An amendment to the Coastal Act clarifying the requirement for Coastal Commission participation in AFC proceedings, including a requirement that the Coastal Commission perform a more robust analysis of undevelopment as an alternative, would eliminate any uncertainty regarding this requirement.

Another potential deterrent to more robust Coastal Commission participation is that the Warren-Alquist Act gives ultimate power to the Energy Commission to actually make a final decision on the project—even over Coastal Commission’s objections—and preempts other state laws. Because the Coastal Commission’s participation in Energy Commission licensing decisions may ultimately prove futile, the Coastal Commission has little incentive to dedicate scarce resources to this issue, and coastal natural resources and sea level rise considerations likely get short shrift in coastal-power-plant decisions.

Huntington Beach Spotlight: The Role of Sea Level Rise in Energy Commission Permitting and the Futility of Coastal Commission Input

The Energy Commission-Coastal Commission interplay on siting power plants in the coastal zone is best illustrated through the Energy Commission’s final decision on the proposed Huntington Beach Energy Project, a facility proposed in 2012 to be sited within the existing footprint of an operating power plant subject to the 2010 once-through cooling policy. The proposed facility was a natural-gas-fired, combined cycle and dry-cooled electrical power-plant facility proposed in the city of Huntington Beach, Orange County.

In its final decision on the application for certification, the Energy Commission determined that the power plant was “sufficiently above [sea level rise] to ensure power plant reliability, even with expected [sea level

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72. Coastal Commission Letter, supra note 67; E-mail from Tom Luster, supra note 53 (noting that the Coastal Commission waived involvement in Energy Commission review due to budget and workload issues for a period of time).
73. CAL. PUB. RES. CODE § 25500. The Energy Commission ultimately has the final say on project decisions and can license a project if the CEC determines that “the proposed coastal site has . . . greater relative merit . . . than available alternative sites and related facilities for an applicant’s service area which have been determined to be acceptable.” Id. § 30264.
74. Id. §§ 25500–43; CAL. ENERGY COMM’N HEARING OFFICE, supra note 55, at 2-1, 2-8; E-mail from Tom Luster, supra note 53 (noting that in the last 10 years, the Coastal Commission has been involved in Energy Commission review for Huntington Beach, El Segundo, Morro Bay, and a few others).
75. CAL. ENERGY COMM’N HEARING OFFICE, supra note 55, at 1-1.
rise],” despite that the project was to be located in an area of increased risk of flooding due to sea level rise.76 The Energy Commission rejected the Coastal Commission’s recommendation that the power-plant owner submit proof of protection from a 500-year flood event,77 reasoning that the 2013 Draft State of California Sea-Level Rise Guidance Document 78 recommendation calling for analysis of the 500-year flood event was not a binding law or regulation.79

Second, the Energy Commission did not consider alternative sites outside the coastal zone.80 In particular, the Energy Commission did not consider whether the proposed facility’s dry-cooled technology constituted “coastal-dependent development” and as such, needed to be located in the coastal zone.81 Instead, the Energy Commission relied on Coastal Act policy “that prefers on-site expansion of existing power plants to development of new power plants in undeveloped areas of the Coastal Zone.” 82 The Energy Commission quoted the definition for “coastal-dependent development or use”83 from the Coastal Act but never addressed whether the Huntington Beach Energy Project proposed technology that, while better for the marine environment than once-through cooling, would depend on access to the sea as required by the definition.84

76. Id. at 5.2-27. The Energy Commission reasoned that: (1) the site is higher than the surrounding areas, which provide additional buffering capacity against coastal inundation, and (2) even if the minimum separation between the site and the surrounding floodplain is reduced from four to two feet due to rising seas, there would still be a level of flood protection. Id. at 5.2-15.

77. Id. at 5.2-23 to -24.


79. CAL. ENERGY COMM’N HEARING OFFICE, supra note 55, at 5.2-24; CALIFORNIA GUIDANCE DOCUMENT, supra note 78; see also E-mail from Tom Luster, supra note 53 (“[O]ur 30413(d) review focuses on identifying the conditions needed for a power plant to comply with Coastal Act and LCP policies, so the SLR policy, unless adopted in the Act or in an LCP, would be considered guidance. That said, the CEC is likely to evaluate projects for conformity to other similar state-level sea level rise guidance, such as that developed by the Natural Resources Agency and the Ocean Protection Council.”).

80. CAL. PUB. RES. CODE §§ 25507–08 (West 2017); CAL. ENERGY COMM’N HEARING OFFICE, supra note 55, at 8-1 to -19.

81. CAL. ENERGY COMM’N HEARING OFFICE, supra note 55, at 8-1 to -19.

82. Id. at 6.1-14.

83. CAL. PUB. RES. CODE § 30101 (“‘Coastal-dependent development or use’ means any development or use which requires a site on, or adjacent to, the sea to be able to function at all.”).

84. CAL. ENERGY COMM’N HEARING OFFICE, supra note 55, at 6.1-13 to -14. The Energy Commission stated that the Huntington Beach Energy Project “proposed inside the existing boundaries of the HBGIS site[] is consistent with the Coastal Act policy that prefers on-site expansion of existing power plants to development of new power plants in undeveloped areas of the Coastal Zone.” Id. at 6.1-14.
This case study illustrates some of the shortcomings of the Energy Commission-Coastal Commission interplay on power-plant siting. First, the Energy Commission can reject the Coastal Commission’s recommendations, as the Energy Commission did with respect to the 500-year flood analysis at Huntington Beach.\textsuperscript{85} Second, although the Coastal Act itself sets up a preference for on-site expansion rather than new development in the coastal zone, it does not consider the third alternative—development OUTSIDE the coastal zone—because this alternative typically does not trigger Coastal Commission authority. Factually, power generation is no longer dependent on coastal siting, but its legal status may still reflect the outdated once-through-cooling technology that ties this infrastructure to the shore.\textsuperscript{86}

IV. STATUTORY RECOMMENDATIONS TO INCREASE THE COASTAL COMMISSION’S ABILITY TO INFLUENCE REMOVAL OF EXISTING COASTAL INFRASTRUCTURE

The Coastal Commission—and, by extension, the protection of coastal natural resources—is marginalized in the policy context in which power-plant decisions are made today. Because power-plant retirement and removal maximizes public benefits—maintaining the reliability of the power grid, transitioning to an energy portfolio with more renewable energy sources, protecting marine organisms from entrainment and impingement, and restoring coastal habitat—the Coastal Act and the Warren-Alquist Act should be amended to give the Coastal Commission more authority to influence decisions relating to the renewal of operating licenses for power plants in the Coastal Zone.\textsuperscript{87}

\textsuperscript{85} Id. at 1-1, 5.2-23 to -24. The Coastal Commission’s participation is often not well-coordinated with the Energy Commission; the Energy Commission noted that the Coastal Commission’s report came too late in the process and that “the staffs of the Coastal Commission and the Energy Commission do not appear to have coordinated their analysis of the HBEP as is anticipated by the [Agreement].” Id. at 6.1-12 to -13.

\textsuperscript{86} As Section 30101 of the Coastal Act clarifies, only uses that MUST be sited along the coast to function are deemed coastal-dependent. CAL. PUB. RES. CODE § 30101. Because these former once-through cooling plants could repower to use dry-cooling technology—which does not require access to a waterbody—they no longer qualify as coastal dependent uses. See id. (defining coastal-dependent uses as ones that requires the sea to operate).

\textsuperscript{87} CAL. PUB. RES. CODE §§ 25500–43, 30000–900; SWRCB FACT SHEET, supra note 41; see also JASKE ET AL., supra note 62, at 1, 3, A-1 (analyzing reliability concerns regarding retirement of once-through cooling facilities in draft joint staff agency paper).
A. Amend Coastal Act Sections 30260 and 30264 to encourage removal or relocation of large coastal infrastructure under certain conditions.

Section 30260 provides: “Coastal-dependent industrial facilities shall be encouraged to locate or expand within existing sites and shall be permitted reasonable long-term growth where consistent with this division.”

This is effectively a thumb on the scale in favor of rebuilding and updating energy infrastructure on the same footprint on which it was originally built. When the Coastal Act was passed in 1976, it made sense to encourage major energy infrastructure to remain where it is on habitat that is already disturbed, rather than encouraging its location elsewhere. Indeed, in some contexts, it continues to make sense. However, dry-cooled—and even potentially closed-cycle wet-cooled—power generation is no longer a coastal dependent use, and it should no longer receive the priority that coastal-dependent uses receive under the Coastal Act. This provision should be modified to clarify this.

In addition, Section 30264 provides: “[N]ew or expanded thermal electric generating plants may be constructed in the coastal zone if the proposed coastal site has been determined by the [Energy] Commission to have greater relative merit pursuant to the provisions of Section 25516.1 than available alternative sites.” This section should be modified to require an explicit consideration of inland relocation for decisions on expansion of existing facilities.

B. Amend Coastal Act Section 30413 to clarify that the Coastal Commission is required to provide recommendations on all applications to the Energy Commission regarding existing energy-infrastructure expansion updates.

As noted above, Section 30413 requires:

(d) Whenever the State Energy Resources Conservation and Development Commission exercises its siting authority and undertakes proceedings pursuant to the provisions of Chapter 6 (commencing with Section 25500) of Division 15 with respect to

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88. CAL. PUB. RES. CODE § 30260.
90. Id.
91. CAL. PUB. RES. CODE § 30255 (“[C]oastal-dependent developments shall have priority over other developments on or near the shoreline.”).
92. Id. § 30264.
any thermal powerplant or transmission line to be located, in whole or in part, within the coastal zone, the commission shall participate in those proceedings and shall receive from the State Energy Resources Conservation and Development Commission any notice of intention to file an application for certification of a site and related facilities within the coastal zone.

(e) The commission may, at its discretion, participate fully in other proceedings conducted by the State Energy Resources Conservation and Development Commission pursuant to its powerplant siting authority.

According to both commissions and the terms of the 2005 Memorandum of Agreement, subsection (d) applies any time the Energy Commission exercises its siting authority, which includes the AFC process. However, because the timing provisions of Section 30413(d) are tied solely to the NOI process and Section 30413(e) is ambiguous about which proceedings it pertain to, confusion persists. Amending Coastal Act Section 30413 to remove any ambiguity that it also applies to the AFC process will ensure that the Coastal Commission participates fully in this process.

Moreover, a subsection should be added to this provision to require that the location of future coastal habitat, given sea level rise and coastal-inundation projections, be considered in any decisions to upgrade existing infrastructure. Proposed Section 30413(d)(4) would read:

(d) . . . The commission’s report shall contain a consideration of, and findings regarding, all of the following: . . .

(4) The potential adverse environmental effects on fish and wildlife and their habitats, including projected future locations of coastal habitat, given sea level rise.

93. Id. § 30413.
94. Id.; Proposed Memorandum, supra note 49.
95. CAL. PUB. RES. CODE § 30413.
96. Cf. CAL. PUB. RES. CODE § 30413 (comparing the proposed language with the language in the current statute). “The potential adverse environmental effects on fish and wildlife and their habitats.” Id.
This clause will help ensure that facility removal will be among the options considered when deciding whether to retrofit and expand existing infrastructure or retire it.

C. Amend the Warren-Alquist Act to remove its preemption of other state laws, including the Coastal Act.

Section 25500 of the Warren-Alquist Act states:

§ 25500. Authority; necessity of certification

In accordance with the provisions of this division, the commission shall have the exclusive power to certify all sites and related facilities in the state, whether a new site and related facility or a change or addition to an existing facility. The issuance of a certificate by the commission shall be in lieu of any permit, certificate, or similar document required by any state, local or regional agency, or federal agency to the extent permitted by federal law, for such use of the site and related facilities, and shall supersede any applicable statute, ordinance, or regulation of any state, local, or regional agency, or federal agency to the extent permitted by federal law.97

This strongly preemptive language creates—at best—a serious question about the impact of Coastal Commission participation in energy siting decisions.98 Paired with the limited staff capacity to develop recommendations regarding these power plants, it is hard to blame the Coastal Commission for declining to participate. Indeed, the Huntington Beach case study above amply demonstrates the shortcomings of this unbalanced interagency process. Section 25500 should add the following:

Notwithstanding the above, the commission shall implement the recommendations of the California Coastal Commission, submitted under Section 30413 of the Coastal Act, when making determinations for facilities in the Coastal Zone.99

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97. Id. § 25500.
99. Cf. CAL. PUB. RES. CODE § 25500 (comparing the proposed language with the language in the current statute). “In accordance with the provisions of this division, the commission shall have the exclusive power to certify all sites and related facilities in the state, whether a new site
V. BROADER IMPLICATIONS FOR OTHER COASTAL INFRASTRUCTURE

Expanded Coastal Act jurisdiction over the maintenance of all existing infrastructure—not just power plants—in the coastal zone is critical to any formula for sea-level-rise adaptation that maintains the remaining natural coastal habitat. The two examples provided below on transportation infrastructure and wastewater treatment plants illustrate how and why the Coastal Act should be amended to give the Coastal Commission a stronger voice in the process of ongoing permitting and maintenance of existing infrastructure. Only by doing this will the needs of coastal natural resources be adequately represented—now and into the future.

A. Transportation Infrastructure

The risk of coastal roadway flooding is anticipated to increase considerably with sea level rise.\textsuperscript{100} Indeed, an estimated 3,500 miles of road would be at risk of flooding with a 1.4-meter sea level rise.\textsuperscript{101} Despite this risk, however, the Coastal Commission has little influence over the California Department of Transportation (Caltrans) decisions to extend the longevity of roads in hazardous coastal areas.

Under Section 30610 of the Coastal Act, no coastal development permit is typically required for maintenance and repairs:

Notwithstanding any other provision of this division, no coastal development permit shall be required pursuant to this chapter for the following types of development and in the following areas: . . .

(d) Repair or maintenance activities that do not result in an addition to, or enlargement or expansion of, the object of those repair or maintenance activities; provided, however, that if the commission determines that certain extraordinary methods of repair and maintenance involve a risk of substantial adverse environmental impact, it shall, by regulation, require that a permit be obtained pursuant to this chapter.\textsuperscript{102}

\textsuperscript{100} HEBERGER ET AL., supra note 12, at 54.
\textsuperscript{101} Id. at 62.
\textsuperscript{102} CAL. PUB. RES. CODE § 30610(d).
Most roadway, bridge, and other transportation infrastructure upkeep and updates are included under the umbrella of repair and maintenance activities that do not require a coastal development permit.103

A coastal development permit is only required if the Caltrans maintenance activities: (1) enlarge the road or other transportation infrastructure, or (2) are “extraordinary methods of repair and maintenance” that are likely to cause substantial environmental impact, as detailed in Section 13252 of the Coastal Commission regulations.104 These “extraordinary” repairs and maintenance that require a permit are generally limited to shoreline armoring repairs, dredging, or repair or maintenance activities undertaken within an environmentally sensitive habitat area.105 Thus, Caltrans has nearly limitless discretion to extend the useful life of roadways in the coastal zone by investing taxpayer money to maintain and update the roads—even where it would be more prudent to relocate or elevate those roadways considering sea level rise.106

Ultimately, as with power plants, the Coastal Commission’s review authority is largely limited to new or expanded transportation infrastructure in the coastal zone: the Coastal Act makes no provision for subsequent review of most Caltrans decisions relating to aging or at-risk transportation infrastructure.107 To remedy this, Section 30610 of the Coastal Act and Section 13252 of the Coastal Commission regulations should be amended to

103. See CAL. COASTAL COMM’N, REPAIR, MAINTENANCE AND UTILITY HOOK-UP EXCLUSIONS FROM PERMIT REQUIREMENTS (1978). According to the 1978 document issued by the Coastal Commission (as explicitly recognized in Section 13252(a)(3)(B) of the Coastal Act regulations): no permit is required for repair and maintenance of existing public roads including landscaping, signalization, lighting, signing, resurfacing, installation, or expansion of retaining walls, safety barriers, railings and other comparable development within the existing right-of-way as specified below. Id. Maintenance activities are generally those necessary to preserve the highway facility as it was constructed, including: construction of temporary detours, removal of slides and slip cuts, restoration and repair of drainage appurtenances, slope protection devices, installation of minor drainage facilities for preservation of the roadway or adjacent properties, restoration, repair and modifying for public safety bridges and other highway structures, restoring pavement and base to original condition by replacement, resurfacing, or pavement grooving. Id. A permit is required for excavation or disposal of fill outside of the roadway prism. Id.


105. CAL. CODE REGS. tit. 14, § 13252(a). Indeed, even for these activities listed in § 13252, if the Commission determines that no substantial environmental impact is likely, it can waive the coastal development permit requirement. Id. § 13252(e).

106. Caltrans has shown increasing awareness of the need to consider highway realignment in the face of sea level rise and coastal erosion. Piedras Blancas Realignment Project, CAL. DEP’T TRANS., http://dot.ca.gov/dist05/projects/slo1_piedras/index.htm [https://perma.cc/6GNC-PS36] (last visited June 7, 2017). Construction is underway on a realignment project on the Pacific Coast Highway from Point Piedras Blancas to Arroyo De La Cruz Bridge near San Simeon in San Luis, Obispo County. Id.

107. CAL. PUB. RES. CODE § 30610(d).
expand the types of repair and maintenance activities for which a coastal
development permit is required. Specifically, for roads, bridges, etc. that are
estimated to be at risk according to the state’s near and medium-term sea-
level-rise projections, Caltrans should be required to get a coastal
development permit from the Coastal Commission for any cumulatively
significant repair and maintenance activity. 108 Enabling Coastal
Commission review in these circumstances will create greater opportunities
to consider the relocation of this infrastructure.

B. Wastewater Treatment Facilities

The consequences of inundation or flooding at the 28 wastewater
treatment facilities located within the 1.4-meter sea-level-rise inundation
zone include the discharge of untreated sewage from coastal outfalls, which
would have devastating impacts on marine life and coastal recreation. 109
The Coastal Commission has the responsibility to review applications for
the development or significant expansion of a wastewater treatment facility
for consistency with several specific criteria. Specifically:

(c) Any [wastewater treatment] development within the coastal
zone or outside the coastal zone which provides service to any area
within the coastal zone that constitutes a treatment work shall be
reviewed by the commission and any permit it issues, if any, shall
be determinative only with respect to the following aspects of the
development:

(1) The siting and visual appearance of treatment works
within the coastal zone.
(2) The geographic limits of service areas within the
coastal zone which are to be served by particular treatment
works and the timing of the use of capacity of treatment
works for those service areas to allow for phasing of
development and use of facilities consistent with this
division.
(3) Development projections which determine the sizing of
treatment works for providing service within the coastal
zone. 110

108. Id. § 30600(e)(2) (exempting emergency projects on existing highways from
commission control).
110. Id. § 30412.
However, the Coastal Act clearly reserves primary permitting authority for the State Water Resources Control Board and Regional Water Quality Control Boards and makes Coastal Commission jurisdiction subordinate to these agencies’ regulation.111 Thus, the permitting scheme established for water treatment facilities is similar to the power-plant scheme in that it only includes the Coastal Commission as a junior player in a decision that is largely in the hands of another agency. Further, as with power plants, the Coastal Commission’s review authority is limited to new or expanded facilities; there is no provision for subsequent review of the siting of aging or at-risk infrastructure in coordination with the water boards’ review of water quality permit conditions (or otherwise).112 In sum, as sea level rises and threatens wastewater treatment facilities, there will be little opportunity to consider the removal of these facilities unless the regulatory scheme is amended in a manner similar to what is recommended above for power plants.

CONCLUSION

The Coastal Commission must be empowered to steward the coast through the difficult years ahead. Amending the Coastal Act and related statutes to increase the Coastal Commission’s authority over decisions related to existing infrastructure will enable the Coastal Commission to help the state avoid ongoing investment in coastal infrastructure that is both risky and inconsistent with natural habitat resilience. Right now, momentum for undevelopment is building as sea-level-rise adaptation planning ramps up in coastal jurisdictions throughout the state. By implementing the recommendations in this article, the legislature can capitalize on this momentum and encourage more sustainable and fiscally responsible infrastructure decision-making. Positing undevelopment as a suitable response option for addressing sea level rise and related coastal hazards will be critical to not only preserving California’s iconic coastline, but also to ensuring that the state’s critical energy, transportation, and water-treatment infrastructure remain out of harm’s way and functional.

111. Id. § 30412(b) (“Except as specifically provided in this subdivision, the decisions of the State Water Resources Control Board relative to the construction of treatment works shall be final and binding upon the commission.”).

112. See id. § 30610(d) (limiting commission review to new or expanded projects).
EXILED BY EMISSIONS—CLIMATE CHANGE RELATED DISPLACEMENT AND MIGRATION IN INTERNATIONAL LAW: GAPS IN GLOBAL GOVERNANCE AND THE ROLE OF THE UN CLIMATE CONVENTION

Rina Kuusipalo

Introduction ........................................................................................................................................ 615
I. Legal Conceptualization of Climate Migration ........................................................................... 618
   A. Definition in International Law .............................................................................................. 618
   B. Science, Causality, and Inequality ......................................................................................... 621
   C. Legal Characteristics and the Basis of Responsibilities ....................................................... 623
II. Global Governance: From Legal Gaps to Pluralism ................................................................. 627
   A. Fragmentation and Pluralism in International Law .............................................................. 628
   B. International Refugee and Human Rights Law ..................................................................... 629
   C. Examples from National Law ............................................................................................... 631
   D. Internal Displacement in International Law ......................................................................... 632
   E. Locating the Function of International Environmental and Climate Law .......................... 634
III. The Role of the UN Framework Convention on Climate Change........................................... 635
   A. The UNFCCC in the Global Governance of Climate-Induced Migration .......................... 636
   B. Common but Differentiated Responsibilities ....................................................................... 637
   C. Effect of the 2015 Paris Agreement ..................................................................................... 639
   D. Aspects of the UNFCCC: Finance, Adaptation, and Loss and Damage .............................. 641
   E. Possible Governance Options Under the UNFCCC: Responsibilities and Assistance ........ 643
Conclusion ........................................................................................................................................ 646
INTRODUCTION

“To invent the . . . ship . . . is to invent the shipwreck.”¹

“Climate change is even one [of] the root causes of a new migration phenomenon. Climate refugees will become a new challenge – if we do not act swiftly.”²

International law gives reasonable hope for the remedying of transboundary harm and the governance of global warming alike. Yet, law transforms usually over long time periods, which can pose difficulties for international law relating to novel, multifaceted phenomena, such as the rapid changing of the planet’s climate and the human displacement and migration resulting from it. Migration induced by climate change presents a unique legal challenge both because of the losses associated with displacement, as well as the complexity of the phenomenon, which fits poorly into most existing legal frameworks. Partly, this is because relevant scientific awareness on climate change has only relatively recently entered legal discourse.³ Furthermore, law relating to climate-induced migration transcends not only national boundaries but also the silo of any single legal or governance regime. The issue is capable of triggering international environmental, human rights, humanitarian, criminal, and refugee law—as well as tort, land, and property law, inter alia. The latent urgency of climate-induced displacement and migration and the global response necessary to address these phenomena in a coordinated and equitable manner nonetheless make further development of international law on the topic vital.

This article concerns international law and global governance pertaining to the assistance of people displaced or prompted to migrate due to the effects of climate change on their environments, lives, and livelihoods. I do not attempt to cover all aspects of international law relating to climate-induced migration, and I concentrate mostly on possible international mechanisms for assistance. More precisely, my focus is on aspects of international environmental law (IEL), in particular, the sub-field of international law of climate change, largely embodied by the 1992

United Nations Framework Convention on Climate Change (UNFCCC or Climate Convention) as a global governance institution and source of international law on climate change.\footnote[4]{United Nations Framework Convention on Climate Change, May 9, 1992, S. TREATY Doc No. 102-38, 1771 U.N.T.S. 107 [hereinafter UNFCCC].} I aim to demonstrate that IEL and the UNFCCC might present a viable, albeit partial, \textit{lex specialis} solution to gaps in the governance of climate-induced migration. International climate law, as it “has been shaped greatly by the political struggles between the North and the South,” affords a distinctive forum for the articulation of obligations around the fact that poor states and vulnerable communities suffer the most from climate change, while the wealthiest states and highest-emitting entities have historically been its main cause.\footnote[5]{Benjamin J. Richardson et al., \textit{Introduction to Climate Law and Developing Countries} 1, 7–8 (Benjamin J. Richardson et al. eds., 2009).} As a result of these inequalities, this field of law has come to embody principles of equity, differentiated responsibilities, and assistance mechanisms that provide potential for international obligations regarding climate-induced migration. To respond adequately to how those displaced can best access assistance, I do not confine myself only to IEL but also explore aspects of the wider legal-governance landscape to seek out interconnections through examining international refugee law, human rights law, internal displacement guidelines, and certain national and regional examples. Given the exceptionally multidisciplinary nature of climate-induced migration, it is within this wider tapestry of law and governance that possible solutions under IEL and the UNFCCC should fit.

A fundamental problem at the heart of seeking to protect climatically-displaced people is that international refugee law does not presently include them as legally defined “refugees”—and generally rights give rise to remedies \textit{(ubi jus ibi remedium)}.\footnote[6]{Walter Kälin, \textit{Changing Climate, Moving People: Distinguishing Voluntary and Forced Movement of People}, in \textit{Changing Climate, Moving People: Framing Migration, Displacement and Planned Relocation} 38, 40 (2013).} The basic protections of human rights are, in principle, applicable to all people without distinction—but jurisdictional barriers likely hinder effectiveness in this context.\footnote[7]{G.A. Res. 217 (III) A, Universal Declaration of Human Rights, art. 2 (Dec. 10, 1948).} However, regarding remedies, burden sharing and assistance reflecting the principle of common but differentiated responsibilities (CBDR) under the UNFCCC could in theory pertain to all people suffering harm from climate change. The formidable body of principles, instruments, and obligations under the UNFCCC, even if providing mainly soft-law remediation, is made more meaningful by the Convention’s virtually universal state participation—the
UNFCCC has 197 parties.\textsuperscript{8} Other international agreements, such as the 1992 Rio Declaration on Environment and Development, whose negotiation gave birth to the UNFCCC, and those concluded under the UNFCCC framework—including the 1997 Kyoto Protocol and its successor treaty,\textsuperscript{9} the new 2015 Paris Agreement, which creates a task force on displacement related to the adverse impacts of climate change\textsuperscript{10}—give further legal weight and political prominence to the UNFCCC’s global governance mandate.\textsuperscript{11}

This article rests on the view that international law and governance provide a forum for cooperation crucial to avoiding the tragedy of the global commons. Climate change, at its core involving transboundary harm in the form of historically accumulated greenhouse-gas (GHG) emissions, makes governance necessary on the global scale. Furthermore, the “delocalised effect . . . between emission source and ‘victim’” of climate-change effects creates an international chain of causality and responsibility whose defining characteristic is the very lack of proximity between those responsible and those harmed.\textsuperscript{12} The inequality between the high-emitting states largely responsible for climate change and the already-vulnerable states mostly suffering the effects thereof is indeed an inequality within which “lies the ethical dilemma of climate change.”\textsuperscript{13} Unless (and even if) addressed imminently, climate-induced displacement is projected to spill over into large-scale, cross-border migration that could, if ungoverned,

\begin{itemize}
  \item \textsuperscript{9} UNFCCC -- 20 Years of Effort and Achievement, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, http://unfccc.int/timeline/ [https://perma.cc/CZ7Q-82W3] (last visited Mar. 3, 2017).
  \item \textsuperscript{12} Jutta Brunnee et al., Overview of Legal Issues Relevant to Climate Change, in CLIMATE CHANGE LIABILITY: TRANSNATIONAL LAW AND PRACTICE 23, 27 (Richard Lord et al. eds., 2012).
  \item \textsuperscript{13} Sumudu Atapattu, Climate Change, Differentiated Responsibilities and State Responsibility, in CLIMATE LAW AND DEVELOPING COUNTRIES 37, 39 (quoting Jonathan A. Patz et al., Climate Change and Global Health: Quantifying a Growing Ethical Crisis, 4 ECOHEALTH 397, 398 (2007)).
\end{itemize}
But even in its current localized form, responsibility and harm fall on global actors in a differential manner that fundamentally transcends national boundaries—and to this dilemma, international law should respond sooner rather than later.

I. LEGAL CONCEPTUALIZATION OF CLIMATE MIGRATION

“[A]n increasing incidence and changing intensity of extreme weather events due to climate change will lead directly to the risk of increased levels of displacement.”

To understand the legal-governance response needed, it is first necessary to conceptualize the scientific and legal character of climate-induced migration. Science and law are inextricably linked in this context toward establishing causality and defining the problem to a legally satisfactory degree of accuracy. Despite the dearth of legal protection on climate migration, there is virtual consensus among scientists that climate change is significantly increasing human displacement. As climate change gives rise to more frequent and extreme droughts, floods, storms, earthquakes, sea level rise, salt water intrusion, glacial melting, and other rapid and slow-onset events, it tends to cause “temporary and eventually permanent human displacement”—first inducing internal displacement within countries before trickling over into regional, cross-border, and ultimately cross-continental migration.

A. Definition in International Law

The projected numbers of those displaced by climate change by year 2050 range from 200 million to 1 billion—200 million is the most cited figure, proposed by the Stern Review and Oxford Professor Norman Myers. But, climate-induced displacement is already underway; natural disasters, the majority of which were considered climate-related, displaced

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17. Poh Poh Wong et al., Coastal Systems and Low-Lying Areas, in CLIMATE CHANGE 2014: IMPACTS, ADAPTATION, AND VULNERABILITY 361, 393 (Christopher B. Field et al. eds., 2014).
up to 184.4 million people between 2008 and 2014, with 19.3 million displaced in 2014 alone, mostly within countries. The Intergovernmental Panel on Climate Change (IPCC) projects that in low-lying areas alone, “[w]ithout adaptation, hundreds of millions of people . . . will be displaced due to land loss by year 2100; the majority of those affected are from East, Southeast, and South Asia.” Furthermore, IPCC predictions rest on the hypothesis that countries will considerably mitigate their GHG emissions, but if instead the “business-as-usual” emissions scenario proceeds, climate-induced sea level rise alone could submerge “land currently home to 470 to 760 million people globally.” However, remaining under the UNFCCC-mandated threshold-limit of 2°C of global temperature rise would displace (only) 130 million people in this manner. Successful emissions mitigation is thus inextricably tied to how many people will be displaced. I will later elaborate on why, despite these stark numbers, climate-induced migrants remain largely invisible in international law.

To generate international law on an issue, the issue must be capable of legal definition. However, definition on this issue is made difficult partially due to the diverse ways in which climate change can cause displacement. Some possible ways are delineated by former UN Representative on the Human Rights of Internally Displaced Persons, Walter Kälin, as: (1) intensified sudden-onset natural disasters, e.g., storms; (2) slow-onset effects on livelihoods, e.g., chronic drought; (3) regions becoming uninhabitable or incapable of supporting livelihoods, e.g., submerging island states; (4) regions designated environmental high-risk zones; and (5) conflict stemming from resource-scarcity fueled by climate change. Climatic displacement caused in these ways usually transforms from temporary to permanent displacement due to the exacerbated frequency or intensity of a climatic event (e.g., declining agriculture due to temperature extremes) or the irreversibility of the climatic event (e.g., sea-level submersion).

Generating legal terminology is likewise challenging because there is no agreed definition of climate-induced migration. In this context, the
The earliest and most-cited definition of “environmental refugees” was coined by Essam El-Hinnawi in 1985 as “people who have been forced to leave their traditional habitat, temporarily or permanently, because of a marked environmental disruption (natural and/or triggered by people) that jeopardized their existence and/or seriously affected the quality of their life.”

Climate change, as such an “environmental disruption ... triggered by people,” can generally be included as an environmental cause of migration; although, environmental migration is a broader, even prehistoric phenomenon, exacerbated by climate change to an unprecedented degree.

Myers expanded El-Hinnawi’s definition to include those migrating because they “can no longer gain a secure livelihood in their homelands” due to environmental reasons intertwined with poverty and demographic pressures.

Nevertheless, the UN Refugee Agency (UNHCR), which has the mandate to legally delineate “refugees”—while acknowledging the influence of environmental and climatic factors on patterns of forced migration—does not recognize “environmental refugees” as legally defined refugees. Any type of environmental movement is thus more legally accurately described as “displacement” or “migration.” Moreover, the term refugee in reference to climatically displaced people can be partially inappropriate given that climate-induced movement is still largely non-cross-border movement—even though it involves a similar sense of exile, with the displaced having “abandoned their homelands on a semi-permanent if not permanent basis, with little hope of a foreseeable return.”

While the term refugee then connotes a narrower legal meaning, displacement and migration are more flexible, interchangeable terms—migration may be a more general term while displacement may better capture forced or internal movement, but both displacement and migration can ultimately denote internal, as well as cross-border, movement. As for those displaced specifically by climate change, the Research Handbook on Climate Change Adaptation Law proposes the term climatically displaced

27. Myers, supra note 18.
29. Myers, supra note 18.
persons (CDPs), which espouses previous definitions of environmental movement while focusing on climate change as a sub-category.\(^{31}\) Some, nonetheless, advocate for the term climate refugee to acknowledge that “climate change is a form of persecution against the most vulnerable” and could come to be recognized as such.\(^ {32}\) While it may be theoretically preferable to then use the term refugee, it is difficult to maintain in the legal context given the lack of actual legal basis—I accordingly use the terms CDP or climate-induced migrant.

Finally, there are some diverging views as to whether climate-induced migration is a negative phenomenon to be prevented or whether it can be a positive adaptation strategy in response to climate-change effects that should be facilitated; I submit it can be both. CDPs may not desire to migrate in the sense that most attest they would “return to their original residence and rebuild as soon as practical,” given that exile involves not only economic loss but also loss of community, identity, cultural heritage, and sense of place (termed non-economic loss and damage under the UNFCCC).\(^ {33}\) Nevertheless, the irreversibility of climatic events may render moving, either internally or cross-border, the soundest coping strategy. Global governance, in turn, will be crucial “in determining the degree to which migration is a form of adaptation[] or an indicator of a failure to adapt” and, to this end, should involve a variety of options for threatened communities.\(^ {34}\)

**B. Science, Causality, and Inequality**

Climate change is scientifically complex, which makes its legal attributes difficult to discern and unusually reliant on scientific evidence. Nonetheless, causality between the effects of climate change and increased levels of human displacement is virtually undisputed in climate science—as is the fact that climate change bears its worst effects on poor countries and vulnerable populations.\(^ {35}\) The IPCC has deemed that currently, humanity is

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33. Adger et al., supra note 15, at 758, 767.
entering a phase of dangerous global warming, the limiting of which requires “substantial and sustained reductions” in GHG emissions.\textsuperscript{36} Already in 1990, the IPCC warned that “[m]igration and resettlement may be the most threatening short-term effects of climate change.”\textsuperscript{37} In its most recent 2014 report, the IPCC reaffirmed that “an increasing incidence and changing intensity of extreme weather events due to climate change will lead directly to the risk of increased levels of displacement.”\textsuperscript{38} The IPCC’s analysis further demonstrates that climate change will increase human displacement in ways direly affect poor communities and countries:

Populations that lack the resources for planned migration experience higher exposure to extreme weather events, particularly in developing countries with low income. . . [C]limate-change impacts are projected to slow down economic growth, make poverty reduction more difficult, further erode food security, and prolong existing and create new poverty traps, the latter particularly in urban areas and emerging hotspots of hunger.\textsuperscript{39}

In this context, “the biggest increase in migration comes from productive agricultural areas that support a large labor force,” a characteristic of many developing economies.\textsuperscript{40} There can also be an inverse correlation between vulnerability and mobility; according to the IPCC, those “most exposed and vulnerable to the impacts of climate change” tend to have “the least capability to migrate” in a planned manner.\textsuperscript{41} While migration may be an inevitable adaptation strategy, when unguided and unassisted, it tends to constitute “an emergency response that creates conditions of debt and increased vulnerability.”\textsuperscript{42} Governance could, thus, facilitate planned, legal relocation instead of emergency displacement that fuels further risk. Climate change thus affects human mobility both directly and indirectly. When combined with other economic, social, and political instabilities, climate change can indirectly displace people as “a threat multiplier[,] which exacerbates pre-existing vulnerabilities,” such as fueling displacement in areas already affected by

\begin{footnotes}
\item[36] Id. at 16.
\item[37] \textit{Intergovernmental Panel on Climate Change Working Group II, Climate Change: The IPCC Impacts Assessment} 5-9 (W.J. McG. Tegart et al. eds., 1990).
\item[38] Adger et al., \textit{supra} note 15, at 767.
\item[40] Adger et al., \textit{supra} note 15, at 769.
\item[41] Id. at 767.
\item[42] Id.
\end{footnotes}
poverty or conflict.\textsuperscript{43} For instance, many agree that the war in Syria was partly sparked by the worst drought in the country’s history between 2006 and 2011, likely linked to climate change.\textsuperscript{44} Thus, climate change “could, if migration and resettlement [resulting from it] are poorly managed, lead to local and regional instability.”\textsuperscript{45} However, the framing of climate change as a security threat may be more reflective of “the preoccupations of the ‘developed’ world,” focused on the supposed threat of immigration instead of the needs of those displaced.\textsuperscript{46}

\textit{C. Legal Characteristics and the Basis of Responsibilities}

What perhaps most distinguishes climate change from other environmental causes driving migration in history is its scientifically established anthropogenic or manmade causality. Anthropogenic causation means that it is possible to attribute causal responsibility to states that have emitted the most GHGs, significantly causing global warming, the effects of which harm and displace people.\textsuperscript{47} The evolution of international climate law, alongside growing scientific evidence, has created conditions in which attributing not only causal but also legal responsibility for emissions seems increasingly possible, though challenges remain.\textsuperscript{48} The fact that legal systems are largely devised to address harm confined within borders does “not translate easily to transboundary problems such as climate change, where the benefits and the costs are not all incurred by the same polity.”\textsuperscript{49} Climate displacement is characterized by its globally disparate cause-effect-harm nexus, where those harmed most by the effects are generally not those causing the harm.\textsuperscript{50} While refugees often face persecution enacted by their

\textsuperscript{43}. JANE MCADAM, CLIMATE CHANGE, FORCED MIGRATION, AND INTERNATIONAL LAW 267 (2012).
\textsuperscript{44}. Henry Fountain, Researchers Link Syrian Conflict to a Drought Made Worse by Climate Change, N.Y. TIMES, Mar. 3, 2015, at A13.
\textsuperscript{45}. LUKAS RÜTTINGER, ET AL., A NEW CLIMATE FOR PEACE: TAKING ACTION ON CLIMATE AND FRAGILITY RISKS, at ix (Meaghan Parker ed., 2015).
\textsuperscript{46}. David Hodgkinson et al., \textit{The Hour When the Ship Comes in:} A Convention for Persons Displaced by Climate Change, 36 MONASH U. L. REV. 69, 83 (2010).
\textsuperscript{47}. Paris Agreement on Climate Change, art. 2(1), Dec. 12, 2015, T.I.A.S. No. 16-1104 [hereinafter Paris Agreement].
\textsuperscript{49}. John H. Knox, \textit{Human Rights Principles and Climate Change,} in OXFORD HANDBOOK OF INTERNATIONAL CLIMATE CHANGE LAW 213, 226 (Cinnamon P. Cariarne et al. eds., 2016), [hereinafter Human Rights Principles and Climate Change].
\textsuperscript{50}. See Justin Worland, \textit{How Climate Change Unfairly Burdens Poorer Countries,} TIME (Feb. 5, 2016), \url{http://time.com/4209510/climate-change-poor-countries/} [https://perma.cc/WF82-9S4U] (stating that more than half of the highest emitting countries are some of the least vulnerable and the lowest emitting countries are highly vulnerable to negative effects of climate change).
own state, in reverse, CDPs are typically forced to move due to the actions (emissions) of states other than their own, whereby the “persecutor” of CDPs, if there were one, could be described as the aggregate of industrialized states that failed to mitigate their emissions. Yet, regarding specific causation by a single state, it is “doubtful . . . that an individual would be able to hold a particular State responsible for harm caused by climate change” because, on “a strict legal perspective,” that particular state’s emissions would need to be “proven to be the specific cause of a particular climate-related impact,” which science can only demonstrate for states in the aggregate.

A better approach to establishing responsibility and remedy may indeed be to focus on the “wider responsibility of the North,” accounted for “through fair burden-sharing agreements or respective contributions” focused on the states largely responsible in the aggregate. The UN Special Rapporteur on human rights and the environment, John Knox, considers such an approach possible: “the difficulty of tracing causal chains is not necessarily in itself an insuperable barrier to . . . an allocation [of legal responsibility], at least at an aggregate level,” because scientists can already establish causation between aggregate state emissions, climate change, and effects. Even if climate science cannot (yet) establish whether State X’s specific emissions caused the climatic event Y that displaced community Z, science is capable of establishing that “human influence on climate substantially increased the probability of” even a “single weather event” Y that displaces community Z. In turn, human influence on the climate can be shown to stem, in the aggregate, disproportionately from developed countries responsible for most emissions and resulting harm as established in IEL. In the preamble to the UNFCCC, parties recognize both the manmade nature of climate change (“human activities have been substantially increasing the atmospheric concentrations of greenhouse

51. Jane McAdam, Refusing ‘Refuge’ in the Pacific: (De)Constructing Climate-Induced Displacement in International Law, in MIGRATION AND CLIMATE CHANGE 102, 116 (Etienne Piguet et al. eds., 2011).
53. KÄLIN & SCHREPFER, supra note 52, at 10.
54. Human Rights Principles and Climate Change, supra note 49, at 225 n.20
56. Atapattu, supra note 13, at 40.
gases”) as well as the differential contributions and responsibility of states for those GHG emissions:

Noting that the largest share of historical and current global emissions of greenhouse gases has originated in developed countries, that per capita emissions in developing countries are still relatively low and that the share of global emissions originating in developing countries will grow to meet their social and development needs.57

This actualization of social and development needs mentioned in the preamble reflects the principle of the “right to development” of poor countries, whose industrial development inevitably requires mitigation of disproportionate emissions by high-emitting countries to make ecological space for others.58 The differential responsibility of states for climate change was operationalized inter alia as greater emissions-reduction targets for developed countries under the Kyoto Protocol to the UNFCCC.59

The causal contributions of states to GHG emissions are indeed wildly disparate and disproportionate. A recent Oxfam report on global inequality relating to GHG emissions illustrates just how deep this “extreme carbon inequality” is: “The poorest half of the global population are responsible for only around 10% of global emissions yet live overwhelmingly in the countries most vulnerable to climate change – while the richest 10% of people in the world are responsible for around 50% of global emissions.”60 Data on historical carbon dioxide (CO₂) (the main GHG) emissions indicates that based on emissions between 1850 and 2011, Europe and the United States alone have “released around half the CO₂ ever emitted.”61 These facts remain relevant to climate effects today, such as displacement, because “CO₂ has a long-term effect and there is a significant time lag between emission and its effect.” 62 Yet, even from an ahistorical perspective, developing country per-capita emissions are still radically smaller than those of developed-country residents: India, one of the largest

57.  UNFCCC, supra note 4, at pmbl.
58.  Id.
62.  Brunnée et al., supra note 12, at 27.
developing country emitters, still only emits about 1.6 tons of carbon per capita, compared to the United States at 24.0 tons per capita. An International Bar Association (IBA) report further notes that 63% of historical emissions can be attributed to a mere 90 entities, public and private, which could help identify those entities liable for harm caused under the polluter pays principle of IEL. When responsibility for emissions leading to climate change is therefore considered in the aggregate, “even if all states contribute to climate change [as] joint violators” of sorts, Knox contends that it is clear that “some states are far more culpable” and it is possible “to allocate responsibility accordingly” to the major emitters, namely the United States and the European Union (EU) (potentially China, under an ahistorical perspective).

Customary IEL might also function as a basis for responsibility. The iconic Trail Smelter arbitration laid down the customary international law no-harm rule of state responsibility for transboundary harm, crystallized in the 1992 Rio Declaration as state responsibility “to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.” Trail Smelter established that causation of transboundary harm can be demonstrated by “probable and inferential” evidence showing “the extent of the damages,” even where “the result [is] only approximate.” Demonstrating probable causation could be, therefore, enough in customary IEL to find a link between a violation (emissions contributing to climate change) and harm suffered as a result of the violation (climate-induced forced displacement). Evidence on causality appears to meet the threshold of probability on aggregate causality, because IPCC projections, based on all published research worldwide, describe, for instance, displacement due to climate change as “medium evidence, high agreement”—implying likelihood, if not certainty. Similarly, given that the standard of proof required to establish a “well-founded fear of persecution” in refugee law

68. IPCC SYNTHESIS REPORT, supra note 35, at 16.
can be even “less than a 50 per cent chance,” Law Professor Jane McAdam has argued that rather than requiring absolute certainty on causality, it should analogically be legally sufficient to show that climate-change effects caused by the emissions of an aggregate of states was a probable cause of displacement. ⁶⁹

Finally, IEL tends to adopt a broad notion of responsibility that need not be strictly legal, but per environmental law scholars Philippe Sands and Jacqueline Peel, can connote “common responsibility” and “shared obligations” of states for the global commons, such as the atmosphere, termed the “common concern of humankind” in the Climate Convention. ⁷⁰ Additionally, in IEL, liability does not refer merely to a breach of a legal obligation but denotes a “unique concept” including “both the primary obligation to prevent . . . and the obligation to make reparations.” ⁷¹ Therefore, in international climate law, the use of liability should be understood “in a broader sense than litigation . . . which may fall short of enforceable legal liability” but, nonetheless, can involve responsibility to act, refrain, and compensate. ⁷² Given the current stage of evolution of international climate law and the focus on aggregate state responsibility, it is perhaps global governance rather than courts that is more capable of working with these broad soft-law notions of responsibility and liability toward facilitating the protection and assistance needed.

II. GLOBAL GOVERNANCE: FROM LEGAL GAPS TO PLURALISM

“International law will need to operate within an area where the demands of coherence and reasonable pluralism will point in different directions.” ⁷³

This chapter aims to examine the fragments of international law and governance that pertain to climate migration as well as the patent legal gaps in this context—gaps that are gradually being noted by governments and international institutions alike. For instance, a number of governments recently founded the Nansen Initiative on disaster-induced displacement

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⁷² Brunnée et al., *supra* note 12, at 23.

explicitly in response to the perceived “serious legal gap . . . with regard to cross-border movements in the context of disasters and the effects of climate change.”

Given this apparent vacuum, it must be asked what (if anything) are the relevant institutions, whose mandate we might expect to include building solutions to climate-induced migration, doing to respond and how might they proceed and cooperate. Given the lack of agreed definition and the multi-faceted nature of climate-induced migration, there may be a need for multiple, global governance approaches.

A. Fragmentation and Pluralism in International Law

Climate migration can evoke multiple separate realms of international law, of which I limit my focus to international refugee, human rights, and environmental law as well as certain domestic examples and internal displacement guidelines. My query prioritizes assistance, which I view as more imminently achievable within existing legal architecture than within theoretical proposals for wholly new institutions that I leave largely unexplored here. Despite projects such as the Nansen Initiative, there is no single institution with a satisfactory mandate over climate-induced migration. Rather, each regime appears to cover a certain lex specialis aspect. Though a fragmented governance landscape may seem ineffective, multi-institutional governance can be acceptable when the question becomes “how the expertise of . . . relevant organizations can be most effectively utilized and integrated.”

Such rifts between governance regimes are well described by the concept of fragmentation of international law, as elaborated in the International Law Commission (ILC) report on the topic, finalized by International Law Professor Martti Koskenniemi. In general, fragmentation manifests as separations between different types of lex specialis—for example, the World Trade Organization (WTO) concluded that whatever the status of the IEL-based precautionary principle is “under international environmental law,” it has “not become binding” in trade

75. MCADAM, supra note 43, at 215.
76. See Katrina Miriam Wyman, Responses to Climate Migration, 37 HARV. ENVTL. REV. 167, 185 n.101 (2013) [hereinafter Responses to Climate Migration] (providing an outline of other theoretical proposals).
77. See WENTZ & BURGER, supra note 16, at 6 (noting that current international agencies and organizations only address some aspects of climate-induced migration).
78. MCADAM, supra note 43, at 213.
79. See generally Int’l Law Comm’n, supra note 73, ¶ 491 (emphasizing the need for coherent international law, despite its fragmentation).
Exiled by Emissions

2017]

law—suggesting separate regimes may be governed by separate rules.\textsuperscript{80} Nonetheless, such fragmentation need not decapitate the coherence of international law if fragmentation is accommodated under “reasonable pluralism,” where deviations in rules function to “reflect the differing pursuits and preferences that actors in a pluralistic (global) society have,” rendering it even “pointless to insist on formal unity.”\textsuperscript{81} The multidisciplinary complexity of climate-induced migration may mean that each regime—human rights, environmental, refugee law, etc.—is capable of addressing different socially valuable aims. For these reasons, IEL might be uniquely tailored to addressing those aspects of climate-induced migration that deal with the \textit{lex specialis} characteristic of IEL, such as differentiated responsibilities between states. Moreover, international law already involves disparate political ambitions, particularly along the North-South divide—and in this “world of plural sovereignties,” pluralism has always been “a constitutive value of the system.”\textsuperscript{82} To preserve the coherence of international law while accommodating pluralism, it is nonetheless essential to give “increasing attention . . . to the collision of norms and regimes.”\textsuperscript{83} Accordingly, while embracing reasonable pluralism, I occasionally touch on how the legal regimes can overlap and complement each other.

B. International Refugee and Human Rights Law

The principal international law on refugees is contained in the 1951 UN Refugee Convention.\textsuperscript{84} Article 1 of the Refugee Convention states that the term refugee applies to someone “outside the country of his nationality” whose movement is “owing to well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion.”\textsuperscript{85} The principle of non-refoulment (Article 33(1)), in turn, prohibits states from returning a refugee to a country where he or she has reason to fear such persecution.\textsuperscript{86} However, the Article 1 definition has not been interpreted to lend itself to environmental/climatic reasons for movement, and the UN Refugee Agency has indicated that there currently is little likelihood of including environmental or climatic events

\begin{itemize}
\item \textsuperscript{80} \textit{Id.} ¶ 55 (internal quotations omitted).
\item \textsuperscript{81} \textit{Id.} ¶ 16.
\item \textsuperscript{82} \textit{Id.} ¶ 491.
\item \textsuperscript{83} \textit{Id.} ¶ 493.
\item \textsuperscript{84} Convention Relating to the Status of Refugees, July 28, 1951, 360 U.N.T.S. 117 [hereinafter Refugee Convention].
\item \textsuperscript{85} \textit{Id.} at art. 1(A)(2).
\item \textsuperscript{86} \textit{Id.} at art. 33(1).
\end{itemize}
under the Convention—the Agency fears that opening re-negotiation in the current political climate could dilute even existing protections. The requirement to be outside one’s country further means that international refugee law mainly protects those who have undertaken cross-border movement—a limitation regarding the largely internal nature of current climate-related movement. It may be possible that refugee law could currently apply in rare cases where people cross borders partly or indirectly due to climatic reasons (e.g., climate events combining with conflict). When people do cross borders for environmental reasons, they would likely refer to persecution instead of environmental reasons because most legal systems grant refugee status for persecution. Indeed, until the Convention is potentially extended to cover environmental reasons, it seems more practical for making a stronger legal case to emphasize traditional persecution reasons contained in Article 1 rather than the presence of environmental/climatic reasons.

International human rights law, in turn, upholds basic protections for the rights of all people, including migrants regardless of reason for movement. According to a Human Rights Council Resolution, the effects of climate change engage multiple existing human rights, including rights to life, health, adequate housing, adequate food, self-determination, and safe drinking water and sanitation. One challenge is that many of these rights, relevant to climate-induced displacement, are socioeconomic rights—relating to the loss of sustenance, abode, food, and deteriorating health and living conditions—which are often given less emphasis in western legal systems fixated on political rights. Overall, there have been few cases in human rights bodies even concerning climate change, although many claims have been brought in relation to environmental harm more generally—notably Budayeva and Others v. Russia, where the European Court of Human Rights (ECtHR) found a violation of the right to life based on the state’s failure to protect against an environmental threat. One climate-change claim was launched by the Inuit in the Inter-American Commission on Human Rights against the United States on its responsibilities as a major GHG emitter, but the case yielded no formal

88. See LOUISE OLSSON, ENVIRONMENTAL MIGRANTS IN INTERNATIONAL LAW: AN ASSESSMENT OF PROTECTION GAPS AND SOLUTIONS 1, 11 (2015) (discussing how environmental migrants do not easily fit into any international protection regimes and therefore have less protection compared to one claiming persecution).
89. Universal Declaration of Human Rights, supra note 7.
decision largely due to its prospective nature. Jurisdictional limitations similarly confine the effectiveness of human rights in relation to climate change, and individuals rely “first and foremost on their own States for . . . protection.” Thus, human rights law may be most effective when states take domestic legal actions on climate-related matters—actions that may be judicially reviewed in domestic courts on human rights grounds. These and other human rights questions relating to climate migration are thoroughly explored by McAdam.

C. Examples from National Law

Domestic laws present fragmented examples of a possible emerging trend toward broader protection for environmentally induced migration. National refugee laws, mirroring the 1951 Convention, generally do not include environmental causes as warranting refugee status or permanent residency. The handful of laws that do include environmental causes are fairly recent legislation and often untested in case law. Finland and Sweden are the only countries with comprehensive domestic legal provisions protecting environmental refugees, providing a potential template for others to follow. Finland and Sweden have similar 2009 legislation protecting those who cannot return “because of an environmental disaster.” In the Americas, disparate examples exist. Cuba’s immigration legislation, the only one of its nature in the region, includes as refugees those who flee due to a “cataclysm or other natural phenomena”; however, the UNHCR is unaware of practical applications thus far. The United States grants temporary protection to those unable to return due to, inter alia, an environmental disaster through the bilateral

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93. OHCHR, supra note 52, ¶ 72.
94. Id.
95. See generally McAdam, supra note 43 (analyzing the normative gap in international legal protections for climate-induced migration).
97. Id.
98. Id.
99. Aliens Act (Act No. 301/2004), § 88a(1) (Fin.).
100. 4 ch. 2a § Act amending the Aliens Act (2005:716) (Svensk författnings-samling [SFS] 2009:1542) (Swed.).
Temporary Protected Status (TPS) legislation. The United States Attorney General can designate countries under TPS where he finds “an earthquake, flood, drought, epidemic, or other environmental disaster in the state resulting in a substantial, but temporary, disruption of living conditions” and where the foreign state is temporarily unable to handle return. The law has been used to grant temporary protection, for example, to those displaced by the 2010 Haiti earthquake. New Zealand has no explicit legislation on the matter, yet it recently encountered the first climate-refugee claims for residency on the basis of climate-induced displacement. The 2015 case of Ioane Teitiota centered on the argument that the consequences of climate-induced sea level rise in Kiribati constituted a form of persecution that qualified Teitiota’s family as refugees under the 1951 Convention. The New Zealand Supreme Court, however, held that the 1951 Convention did not presently protect on climatic grounds, though it might in the future. By contrast, in 2014, a Tuvaluan family gained residency on the grounds that they would be severely affected by climate change if returned; although, the Tribunal’s rationale was stringent, requiring “exceptional circumstances of a humanitarian nature” (there, illness from seawater-infiltrated drinking water) and rendering return “unjust and unduly harsh.” The precedent of the case may be limited by applying the rule of family life rights because the children were born in New Zealand.

D. Internal Displacement in International Law

International law concerning internally displaced persons (IDPs) is a system separate from refugee law, providing mainly soft-law, non-binding guidelines. It is governed by the 1998 UN Guiding Principles on Internal Displacement, which deem national authorities responsible for protecting people within their borders from forced displacement. The Principles

103. Id.
106. Id. at [5] n.5, [13].
108. Id. at [31].
could accommodate CDPs as IDPs include those forced to flee “natural or human made disasters.” The Principles purport to not create new legal obligations but function as a restatement of humanitarian obligations and “the human rights of all persons on their territory” whether displaced or not. Only about 20 countries have incorporated the Principles into law with mixed effectiveness. The Principles emphasize domestic responsibilities of origin states but are less articulate concerning high-emitting countries’ international responsibilities to those displaced in other origin countries, offering little to countries with few resources to uphold provisions. Further, international law tends to construe state responsibility as proportional to its available resources, meaning that poor countries cannot be obliged to assist beyond their available resources.

Regionally, there may be new international law concerning people internally displaced by climate effects. The African Union’s (AU) 2009 Kampala Convention presents a formidable regional legal solution as the first treaty on displacement, recognizing climate change as triggering protection obligations. Partly modeled on the UN Guiding Principles, the Kampala Convention explicitly protects those displaced due to climate change. As of 2016, the Convention had been ratified by 25 AU member states. The UN Special Rapporteur on the human rights of IDPs praised it as forward looking in its integration of climate displacement, also noting its focus on “sovereignty as responsibility.” This emphasis on sovereign responsibility means that responsibility rests on the shoulders of the AU origin states—so, while IDPs can have robust protection in AU member states with ample resources, many AU member states may, in reality, be too resource constrained to assist beyond minimal protection. Furthermore,

110. Id. at annex ¶ 2.
111. The American Society of International Law, Incorporating the Guiding Principles on Internal Displacement into Domestic Law: Issues and Challenges, 41 STUD. TRANSNAT’L LEGAL POL’Y 1, 2–3 (Walter Kälin et al. eds., 2010).
112. Id. at 4.
115. MCADAM, supra note 43, at 99 n.2.
African states are hardly responsible for causing climate change and displacement thereof.

E. Locating the Function of International Environmental and Climate Law

As indicated, most migration triggered by climate change is presently characterized by its confinement within national borders.\textsuperscript{119} In the future, movement is set to become more cross-border and to increasingly engage refugee law. Present governance responses should not focus exclusively on future cross-border scenarios and rights in that context. Such an approach could be overtly North-centric, depicting displacement as an issue only once cross-border migration reaches developed countries and not while it is still mostly confined within Global South borders.\textsuperscript{120} Because disaster- and climate-related displacement already affects millions in the South, assistance particularly to origin states is already needed.\textsuperscript{121} This is also because, while climate change can amplify cross-border migration, it may render cross-border migration less available to some. In circumstances of poverty, climate change can trap populations within climatic hotspots—populations that can be “just as important a policy concern as those who do migrate” across borders.\textsuperscript{122} To prevent such entrapment in intolerable environments, NYU Law Professor Katrina Wyman proposes “expand[ing] ways for people to move \textit{ex ante} . . . before conditions deteriorate” to “reduce the extent of subsequent forced displacement.”\textsuperscript{123} McAdam similarly advocates the international facilitation of “pre-emptive and staggered” planned migration options “with dignity.”\textsuperscript{124}

International provisions of assistance are equally important to countries and communities to cope with displacement as the facilitation of dignified migration. Such assistance should be governed globally because those responsible for climate change and associated harm “are found beyond the

\textsuperscript{120} Khalid Koser, \textit{Climate Change and International Displacement: Challenges to the Normative Framework}, in \textit{Migration and Climate Change} 289, 293 (Piguet et al. eds., 2011).
\textsuperscript{121} See Aminul Hoque, \textit{Climate-Induced Migrants Need Dignified Recognition Under a New Protocol}, in \textit{Organizational Perspectives on Environmental Migration} 167, 171 (Kerstin Rosenow-Williams & François Gemenne eds., 2016) (citing Bangladesh as an example of a country that is already heavily impacted by climate-induced migration and will need additional assistance from international organizations).
\textsuperscript{123} \textit{Responses to Climate Migration}, supra note 76, at 205.
\textsuperscript{124} McAdam, supra note 69, at 10, 22.
Along these lines, Wyman identifies two main gaps in international law on climate-related migration: a lack of refugee rights (the rights gap) and a lack of practical assistance available to recompense and facilitate dignified migration (the funding gap). Regarding the rights gap, the role of IEL—particularly the UNFCCC—is important in raising awareness for the potential creation of legal rights for climate refugees; institutionally, these legal rights would be most effectively accommodated under general refugee law to appreciate the multi-causality of most migrations and not to single out climatic reasons as uniquely deserving reasons for movement.

As such, the more relevant role for international environmental and climate law may be to address the funding gap, considering that the UNFCCC institutionally already encompasses redistributive architecture to channel funds and other assistance to help communities most affected by climate change to adapt, build resilience, and potentially receive remedy on loss and damage. Indeed, while the UNFCCC may not have the “operational capacity to oversee the issue of movement itself,” McAdam considers it crucial for “responsibility-sharing and financing of migration and other mobility strategies as a form of adaptation.” Further, given the present precarious position of refugee and human rights law in the North, it may also be politically practical to explore assistance through international climate law.

III. THE ROLE OF THE UN FRAMEWORK CONVENTION ON CLIMATE CHANGE

“. . . a more encompassing global order, which is a source not only of powers and rights, but also of obligations.”

The “relatively small body” of international law on climate change is comprised of three treaties, the UNFCCC, the Kyoto Protocol, and the 2015 Paris Agreement, as well as customary international law and general principles of law as they apply to climate-related issues. The UNFCCC’s

125. Lars Thomann, Environmental Migration, in ORGANIZATIONAL PERSPECTIVES ON ENVIRONMENTAL MIGRATION 21, 25 (Kerstin Rosenow-Williams & François Gemenne eds., 2016).
126. Responses to Climate Migration, supra note 76, at 177, 181.
130. IBA REPORT, supra note 64, at 44.
chief objective, per Article 2, is mitigation or the “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system,” while enabling “economic development to proceed in a sustainable manner.” 131 Prevention and mitigation are perhaps preferable to remediation, but climate change is already irreversibly underway; thus, provisions under the UNFCCC increasingly extend far beyond mitigation to different forms of assistance and remedy. With long-standing frameworks on adaptation and finance and a growing emphasis on loss and damage by the Conference of the Parties (COP) to the Convention, the UNFCCC could provide effective avenues to assist vulnerable, economically-constrained communities and countries by expanding its global burden-sharing architecture to climate migration.132

A. The UNFCCC in the Global Governance of Climate-Induced Migration

The UNFCCC first incorporated climate-induced migration into its agenda in 2010 under the Cancun Adaptation Framework, whose Article 14(f) called for parties to take “[m]easures to enhance understanding, coordination and cooperation with regard to climate induced displacement, migration, and planned relocation” while “taking into account their common but differentiated responsibilities.”133 By bringing climate-induced displacement under adaptation, the paragraph theoretically rendered migration a possible form of adaptation. The 2012 UNFCCC Doha Decision similarly recognized climate-induced migration but located it under the loss and damage (L&D) mechanism, encouraging “understanding of and expertise on loss and damage” and including “[h]ow impacts of climate change are affecting patterns of migration, displacement and human mobility.”134 The 2015 Paris Agreement strengthens the UNFCCC mandate to tackle the issue under L&D: paragraph 50 of the Paris Decision (guiding section of the text) requests the Executive Committee of the Warsaw International Mechanism on Loss and Damage (WIM) “to establish . . . a

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131. UNFCCC, supra note 4, at art. 2.
task force . . . to develop recommendations for integrated approaches to avert, minimize and address displacement related to the adverse impacts of climate change.”\textsuperscript{135} The preamble of the Paris Agreement additionally states that parties “should, when taking action to address climate change, respect, promote and consider their respective obligations on . . . migrants,” \textit{inter alia}.\textsuperscript{136}

The effectiveness of the Climate Convention, its accompanying instruments, and widely attended annual COPs is enlarged by its virtually universal membership of 197 parties, including the EU as a regional organization.\textsuperscript{137} The assumption of responsibility by “industrialised countries of the North . . . for reducing global GHG emissions, as well as furnishing the financial and technological resources to enable the South to develop sustainably,” reflected CBDR and secured the Convention’s overwhelmingly wide ratification, especially by developing countries.\textsuperscript{138} The Climate Convention encourages “the widest participation” of states and civil societies.\textsuperscript{139} For instance, it may be used to assist representatives from poor countries and communities to participate in the COPs, involving not just the sovereign interests of the most powerful states but also the interests of those most affected.\textsuperscript{140} This is reflective of Cambridge Law Professor Eyal Benvenisti’s notion of global governance “that minimizes the systemic democratic failures that inhere in the sovereign-based system,” providing “opportunities for individuals and communities to exert effective influence on policy-making that affects them,” beyond national boundaries.\textsuperscript{141}

\textbf{B. Common but Differentiated Responsibilities}

The UNFCCC contains some substantial IEL principles that could potentially be employed beyond their conventional uses toward obligations concerning climate-induced migration. The most important principle is perhaps CBDR. It appears as Principle 7 of the 1992 Rio Declaration under which “States have common but differentiated responsibilities” and developed countries acknowledge the special “responsibility that they bear” due to their specific “contributions to global environmental degradation” and “the technologies and financial resources they command.”\textsuperscript{142} Adopting

\begin{thebibliography}{99}
\bibitem{135} Paris Agreement, \textit{supra} note 47, ¶ 50.
\bibitem{136} \textit{Id.} at prohl.
\bibitem{137} \textit{Status of Ratification of the Convention, supra} note 8.
\bibitem{138} Richardson et al., \textit{supra} note 5, at 7–8.
\bibitem{139} UNFCCC, \textit{supra} note 4, at art. 4.
\bibitem{140} \textit{Id.}
\bibitem{141} \textit{BENVENISTI, supra} note 129, at 125.
\bibitem{142} \textit{Rio Declaration, supra} note 66, at prin. 7.
\end{thebibliography}
CBDR as Article 3(1) rendered the UNFCCC a more robust IEL principle, under which “Parties should protect the climate system . . . on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities.” Article 3(1) also requires that “the developed country Parties should take the lead in combating climate change and the adverse effects thereof.” Contentious North-South debates produced CBDR’s adoption; therefore, the CBDR presents merely a “watered-down” version of the legal responsibility for historic harm for which the developing companies advocated. Notwithstanding, CBDR’s adoption was the first time in history that states agreed to recognize their differential contributions for causing climate change “and thus, their differential obligation to pay for the remediation and mitigation” thereof. Law Professor Lavanya Rajamani argues that, while differentiated responsibilities may challenge sovereign equality as a general tenet of international law, CBDR, as lex specialis derogat legi generali, is the very “exercise of equal sovereignties in a world of unequal states that results in unequal rights and duties,” due to colonial, economic, and ecological plunder wrought by imbalanced exercises of sovereignty. Some further claim that the underdevelopment of the “Third World” during colonialism and the accompanying plunder of natural resources “for the benefit of the imperialist Powers” generated a responsibility on those former powers for current ecological inequalities, such as climate change. Even if the developed countries tend to adopt a less historic, more capacity-based rationale, state parties to the UNFCCC have, nonetheless, agreed to “grant special treatment to others” under CBDR. Indeed, some legal scholars consider CBDR “of sufficient legal weight” for “the elaboration of future obligations” and “new kinds of solidarity duties” relevant in considering applications to potential burden-sharing obligations on climate-induced displacement.

Taking existing operationalization under the UNFCCC as a model, CBDR has provided for differentiated obligations between developed

143. UNFCCC, supra note 4, at art. 3(1).
144. Id.
146. DAG HAMMARSKJÖLD FOUND., DEVELOPMENT DIALOGUE: NO FUTURE WITHOUT JUSTICE 24 (2012).
149. RAJAMANI, supra note 147, at 2.
countries (Annex I) and developing countries (Non-Annex I), with additional special treatment given to the Least Developed Countries (LDCs). Notably, Article 4(4) of the UNFCCC obliges developed countries to “assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects.” Sands and Peel remark that while the “novel provision” of Article 4(4) “is not a formal expression of liability under the principles of state responsibility,” it is nonetheless “an admission of responsibility with financial consequences,” perhaps constituting soft-law liability. Likewise, under Article 4(3), developed countries “shall provide new and additional financial resources to meet the agreed full costs incurred by developing country Parties,” which “shall take into account . . . appropriate burden sharing.” Thus, if climate migration is interpreted as an adverse effect under Article 4(4), in accordance with CBDR and greater developed-country obligations, Article 4 obligations could potentially extend to financial assistance on climate-induced migration.

C. Effect of the 2015 Paris Agreement

The Paris Agreement, adopted at the UNFCCC COP21 summit in December 2015, opened for signing on April 22, 2016, and exceeded any “historical record for first-day signatures to an international agreement.” Though the Agreement appears more legally flexible than the Kyoto Protocol, it singularly reaffirms CBDR in Article 2(2), integrating differentiation in a subtler, bottom-up manner. As Cambridge Law Professor Jorge Víñuales suggests, the Agreement’s social function is perhaps less to “bind States [than] to influence the levers of human behaviour.” References to legal liability per se are limited following United States resistance, as former U.S. Secretary of State John Kerry stated, “framing it in a way that doesn’t create a legal remedy because

152. UNFCCC, supra note 4, at art. 4(4).
153. SANDS ET AL., supra note 70, at 734.
154. UNFCCC, supra note 4, at art. 4(3).
156. Paris Agreement, supra note 47, at art. 2(2).
Congress [would] never buy into” that.\(^\text{158}\) The language from the COP21 decision adopting the Agreement thus states that Article 8 on L&D does not specifically “provide a basis for any liability or compensation,” though the legal weight of this part remains to be tested.\(^\text{159}\)

Displacement and migration were contentious negotiation items leading up to the Paris Agreement.\(^\text{160}\) An earlier draft of the Agreement included a proposal to set up a specific “climate change displacement coordination facility” under L&D “to help coordinate efforts to address climate change induced displacement, migration and planned relocation.”\(^\text{161}\) The first draft advocated a similar facility that would have “[a]ssist[ed] in providing organized migration and planned relocation” and “[e]stablish[ed] procedures for coordinating compensation measures”—the compensation suggestion was notably removed.\(^\text{162}\) These proposals originated with the LDCs, supported by the G77 and China.\(^\text{163}\) Some experts suggest that the proposed coordination facility could have included a mechanism to “pay countries to accept migrants,” particularly low-income countries already accepting “more than their fair share of displaced persons” while “taking into account their historical GHG emissions.”\(^\text{164}\)

With the new bottom-up approach, states define their own Nationally Determined Contributions (NDCs), anchored to the Paris Agreement, that outline national (for EU, regional) climate plans.\(^\text{165}\) Almost one-fifth of the


\(^{159}\) Paris Agreement, supra note 47, ¶ 52; see also JULIA KREIENKAMP & LISA VANHALA, GLOBAL GOVERNANCE INSTITUTE POLICY BRIEF: CLIMATE CHANGE LOSS AND DAMAGE 7 (2017), https://www.ucl.ac.uk/global-governance/downloads/policybriefs/policy-brief-loss-and-damage [https://perma.cc/CA5X-MW6L] (“Although the language used in Paragraph 52 is unambiguous, its inclusion in the Paris Decision – not the Agreement – means that it does not have the same binding effect and it could theoretically be challenged in future negotiations. In addition, Paragraph 52 does not exclude compensation in a context beyond Article 8 (e.g. litigation in a national court).”).

\(^{160}\) Sewell Chan, Paris Accord Considers Climate Change as Factor in Mass Migration, N.Y. TIMES, Dec. 12, 2015, at A16.

\(^{161}\) ADP Contact Group, Draft Agreement and Draft Decision on Workstreams 1 and 2 of Ad Hoc Working Group on the Durban Platform for Enhanced Action, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE art. 5 (Dec. 4, 2015), https://unfccc.int/files/bodies/application/pdf/ adp_bridging_proposal_04dec@1000.pdf [https://perma.cc/7AQ6-RWBQ].


\(^{164}\) WENTZ & BURGER, supra note 16, at 9.

\(^{165}\) Paris Agreement, supra note 47, at art. 3–4.
submitted Intended NDCs (INDCs) (mainly from Asia-Pacific, Africa, and Latin America) reference human mobility, such as preventing climate-induced displacement and migration, as adaptation.\textsuperscript{166} Kiribati’s INDC seeks to address “conflict and stress due to loss of property and land[] and forced migration” caused by sea level rise.\textsuperscript{167} Togo’s INDC projects a “exode rural massif” (massive rural exodus); Egypt’s addresses internal climate-induced migration; India’s prepares for evacuation due to climate-disaster risk; and Haiti’s calls for planned relocation.\textsuperscript{168} Viñuales suggests that NDCs “may qualify under international law as both a binding unilateral act and as a ‘subsequent agreement,’” giving them potential future legal weight.\textsuperscript{169}

\textbf{D. Aspects of the UNFCCC: Finance, Adaptation, and Loss and Damage}

The UNFCCC establishes a general obligation to assist developing countries, and the Paris Agreement affirms that developed states “shall provide financial resources to assist developing country Parties.”\textsuperscript{170} Article 11 of the UNFCCC entrusts the UNFCCC Financial Mechanism to the Global Environment Facility (GEF), Special Climate Change Fund (SCCF), Least Developed Countries Fund (LDCF), Adaptation Fund (AF), and Green Climate Fund (GCF).\textsuperscript{171} Given the broad mandates of these climate funds, according to Wyman, their boards may already possess authority to establish “a ‘substructure’ or ‘facility’ [to] provide the first dedicated multilateral source of funding for climate migration.”\textsuperscript{172} Using the above funds instead of other institutional sources to assist climate migrants would not be insignificant. The UNFCCC-governed funds are products of extensive negotiations with wide South participation and are often viewed as representing not traditional aid but “restitution and compensation for damages inflicted by those countries most responsible for . . . greenhouse


\footnotesize{\textsuperscript{167} REPUBLIC OF KIRIBATI, INTENDED NATIONALLY DETERMINED CONTRIBUTION 16 (2015), http://www4.unfccc.int/submissions/INDC/Published%20Documents/Kiribati/1/INDC_KIRIBATI1.pdf [https://perma.cc/6UEF-94Z8].}

\footnotesize{\textsuperscript{168} INT’L ORG. FOR MIGRATION, MIGRATION IN THE INTENDED NATIONALLY DETERMINED CONTRIBUTIONS (INDCS) AND NATIONALLY DETERMINED CONTRIBUTIONS (NDCs) 5–7 (2016).}

\footnotesize{\textsuperscript{169} Viñuales, supra note 157, § 3.2.1.}

\footnotesize{\textsuperscript{170} UNFCCC, supra note 4, at art. 4; Paris Agreement, supra note 47, at art. 9.}

\footnotesize{\textsuperscript{171} Climate Finance, supra note 127.}

\footnotesize{\textsuperscript{172} Responses to Climate Migration, supra note 76, at 185.}
gases.” Therefore, the use of “non-climate funds” on climate displacement might be “regarded as undermining the idea that developed countries have special obligations due to their responsibility.” Additionally, because developing countries “have little control over the governance of” traditional international funds, they may prefer climate funds “over which developing countries have greater institutional control.” However, financing of the funds has been “grossly inadequate,” leading to calls for mobilizing additional private finance; although, public finance will likely remain crucial for adaptation—the funding of which historically has been less popular than mitigation.

The impacts of climate change that can no longer be mitigated and affect communities are addressed under the adaptation framework, which helps develop and assist national measures to enhance climate-change resilience, for instance, via diversification of crops in drought-areas. National Adaptation Programmes of Action (NAPAs), in which developing countries identify priority adaptation needs, tend to recognize the possibility of climatic “large-scale migration.” often proposing “adaptation strategies to reduce pressure to migrate” or “planned relocation of individuals as an adaptive strategy.” Given that Cancun’s paragraph 14(f) on migration recognized “migration as a form of adaptation,” there is potential “that international adaptation funding may be directed towards preventing displacement and developing relocation and migration schemes.” The IBA report likewise recommends using UNFCCC LDCF’s financing for “domestic migration adaptation programmes,” given that “[f]unding to help developing countries resettle people internally is greatly needed.”

While the mitigation and adaptation sections concern stages in preventing harm, L&D, though still vaguely defined, involves addressing actualized harm through disaster response and, potentially, reparation. The UNFCCC defines L&D as “the actual and/or potential manifestation of impacts associated with climate change in developing countries that negatively affect human and natural systems.” Loss involves “negative

174. Responses to Climate Migration, supra note 76, at 215.
175. Id.
176. Richardson et al., supra note 173, at 250.
177. Koko Warner et al., National Adaptation Plans and Human Mobility, 49 FORCED
MIGRATION REV. 8, 8 (2015).
179. IBA Report, supra note 64, at 173.
180. Víuñales, supra note 157, § 3.2.3.
impacts in relation to which reparation or restoration is impossible,” while
damage involves those on which it is still possible.182 The Paris Agreement
strengthens the UNFCCC 2013 WIM by granting permanent legal footing to
L&D in Article 8.183 This was a victory for developing countries because
L&D is a key negotiating demand, particularly for the Alliance of Small
Island States (AOSIS), and an avenue toward potential compensation.184
The WIM’s Action Area 6 on migration is mandated to conduct research on
“migration and displacement based on projected climate and non-climate
related impacts in vulnerable populations.”185 As the WIM and the newly
created Task Force on Displacement under its auspices proceeds further,
communities could potentially seek assistance under the Task Force’s broad
mandate, which allows it to develop recommendations on averting,
minimizing, and addressing climate-related displacement.186

E. Possible Governance Options under the UNFCCC: Responsibilities and
Assistance

It has been demonstrated that the UNFCCC is capable of functioning as
a global burden-sharing framework with assistance mechanisms and funds
that operationalize responsibilities, guided by adaptation and, increasingly,
L&D. But, the UNFCCC is not a traditional aid institution—duties are
rooted in CBDR and emissions. My approach to possible governance
options under the UNFCCC falls somewhere in between McAdam’s
consideration of human rights and others’ focus on climate liability. Global
governance should conceptualize assistance as soft-law rights, including
affected communities’ and countries’ rights to assistance and development.

[https://perma.cc/2UGF-YSWU].
182. Id.
183. Paris Agreement, supra note 47, at art. 8.
184. Lillian Yamamoto & Miguel Esteban, Atoll Island States and
185. Executive Committee of the Warsaw International Mechanism for Loss and Damage
Associated with Climate Change Impacts, UNFCCC, Rep. of Work Completed at First Meeting,
¶¶ 21(a), 22, 23, Doc. No. FCCC/SB/2015/3 (Nov. 17, 2015),
http:// unfccc.int/resource/docs/2015/sb/eng/03.pdf [https://perma.cc/Q59A-LNAG].
186. Executive Committee of the Warsaw International Mechanism for Loss and Damage
Associated with Climate Change Impacts, UNFCCC, Rep. of the Executive Committee of the Warsaw
International Mechanism for Loss and Damage Associated with Climate Change Impacts, Doc. No.
[https://perma.cc/N3M2-U8CP]; see also Task Force on Displacement, UNITED NATIONS FRAMEWORK
CONVENTION ON CLIMATE CHANGE, http:// unfccc.int/adaptation/groups_committees/loss_and_damage_executive_committee/items/9978.php
[https://perma.cc/7QG2-4HDD] (last visited May 15, 2017). The Task Force on Displacement is set to
have its first meeting May 18-19, 2017, in Bonn, Germany.
Global governance should also conceptualize responsibilities as soft-law liability, including CBDR, compliance, and assistance obligations. Along this responsibilities-assistance nexus, there could be many possibilities for expanding the UNFCCC architecture to purposefully assist climate-induced migrants, some of which I explore here.

Multiple legal scholars have envisioned a multilateral fund with obligations in line with CBDR that makes international payments to assist CDPs directly and the low-income countries hosting them indirectly.\(^{187}\) Yale Professor Frank Biermann and Professor Ingrid Boas advocate for a climate-induced migration protocol and fund as *sui generis* additions to the UNFCCC based on “collective rights for local populations”—reflecting community-based rights in contrast to individualistic rights.\(^{188}\) Reflecting CBDR, this fund would provide assistance under the “Principle of International Burden-sharing,” with the premise that “industrialized countries bear most of the moral responsibility” to compensate for resettlement while giving “countries equal clout” in decision-making.\(^{189}\) Taking a distributive-justice approach, Wyman similarly supports “monetary transfers . . . to offset the costs of” displacement and a temporary non-refoulment right enabling “citizens of developing countries to remain in developed countries as long as they could not safely return for climate-related reasons.”\(^{190}\)

Harvard Professor Mathias Risse has proposed a collective earth-ownership rationale, where peoples’ rights to self-preservation override states’ rights to exclude, leading to open-border obligations.\(^{191}\) Wyman suggests an allocation of CDPs based on this collective-earth ownership, focusing on a country’s resources as a metric (GDP, GDP per capita, and land per capita).\(^{192}\) Based on her metrics, the highest percentage of climate refugees would be allocated to the United States at 11.2%.\(^{193}\) Considering that developing countries currently host up to 86% of the world’s refugees, allocating CDPs to developed countries on almost any basis—whether rooted in historical responsibility, capabilities and resources, or a


\(^{189}\) Id. at 76.

\(^{190}\) *Responses to Climate Migration*, supra note 76, at 194–95.


\(^{193}\) Id. at 463.
combination—would be highly useful. Alternatively or additionally, the UNFCCC could provision climate-fund assistance to those poor countries hosting many CDPs toward infrastructure development. Even though there is uncertainty about how NDC emission goals will function legally under the Paris Agreement, it may be possible to integrate responsibility for CDPs into obligations and mechanisms. More generally, in IEL, it is typical that “regimes provide for . . . compensatory mechanisms” supported by those “responsible in a broader sense as receivers of benefits from the dangerous activity.” For instance, liability for harm from oil pollution is addressed through a compensation fund financed by oil-importers, whose responsibility is derived from their role as beneficiary customers while reflecting “solidarity between states.” Applying this logic to climate change, it might be possible to attribute responsibility to high-emitting states that benefitted from industrial growth in the aggregate, for harm such as forced climate displacement.

While “[f]ew would dispute that regulation is a more appropriate response to climate change than litigation,” it may be useful to consider the role of climate litigation in complementing governance. Generally, awards granted in the IEL context can inform compensatory assistance in the climate sphere. These include the approximately $300 million awarded to Marshall Islanders due to United States nuclear testing on the islands, which involved payment for past and future loss, restoration of a safe and productive state, and $34 million specifically for “hardship as a result of relocation.” Though related to nuclear harm, the content of this award illustrates the possibilities of what climate-displacement compensation could include: future loss, restoration, and relocation. Climate compensation could also be claimed not only from states but also from high-emitting private entities. For example, in Kivalina v. ExxonMobil Corp., the Inupiat Kivalina claimants facing imminent displacement requested monetary damages from 19 fossil-fuel companies to assist with relocation. In relation to non-economic loss from exile, the Nuclear Tests

195. Cf. Atapattu, supra note 13, at 54 (suggesting that “special funding mechanisms” could be used to compensate victims of climate change).
196. LOUKA, supra note 71, at 448.
197. Id. at 455.
198. Brunée et al., supra note 12, at 36.
199. SANDS ET AL., supra note 70, at 720.
200. Id.
Cases involved compensation for non-economic harm, describing them as “all the more real for being incapable of precise evaluation.”

Soft-law climate governance and responsibilities and hard-law climate liability and litigation could function complementarily in seeking remedy and assistance for CDPs. According to distributive justice, the primary UNFCCC governance framework functions to establish norms and assistance, while remedial-justice liability provides a residual “second layer,” allowing corrective action toward compensating victims to complement gaps and failures in primary governance. Global governance provides a reliable, systemic solution to assisting communities affected by climate displacement, while litigation is likely to be ad hoc, “only help[ing] a few victims and not provid[ing] compensation in [the] structural manner” that governance can.

CONCLUSION

I have argued that, pending climate refugee recognition in international law, coupled with growing human rights and domestic law, IEL institutions might be able to distribute responsibilities and obligations, as well as provide financial and other assistance when faced with climate-related displacement and migration. Alongside other regimes, global climate governance’s complementary role can involve early-stage adaptation assistance and preempt forced displacement as much as possible. But, climate change is so far along that engaging later-stage L&D and compensation seems inevitable. Thus, the UNFCCC burden-sharing mechanisms could provide useful, later-stage assistance for communities’ planned relocation and rebuilding, incorporating fair burden-sharing between high-emitting states and victim states. In any case, confronting the multi-fold challenge of environmental displacement needs a plurality of regimes. While it is traditionally a state’s domestic responsibility to protect those within its borders, it seems morally valid to assert climate-induced displacement as a globally inequitable phenomenon also calls for “shared state responsibilities” in the vein of CBDR. Expanding states’ obligations to assist with climate-induced migration would hardly be utopian—it would mirror existing ideas of international justice found in many principles, agreements, and judicial opinions making up international law. For

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203. Angela Williams, Promoting Justice Within the International Legal System, in CLIMATE LAW AND DEVELOPING COUNTRIES 84 (Benjamin J. Richardson ed., 2009).
204. Faure, supra note 48, at 139.
205. IBA REPORT, supra note 64, at 180.
instance, Judge Weeramantry, in his separate opinion for the *Gabčíkovo-Nagymaros Project* case, wrote about the need to develop *erga omnes* obligations beyond individual state self-interest in light of the “great ecological questions now surfacing.”

Similarly, Rio Principle 13 proclaimed that “[s]tates shall develop national law [and] international law” regarding liability and compensation for victims of environmental harm and “for adverse effects of environmental damage caused by activities within their jurisdiction or control to areas beyond their jurisdiction.”

In light of the intersectional challenges and grave potential for human harm presented by complex environmental issues, such as climate-change-related displacement and migration, the urgency to evolve international law on these issues cannot be understated.

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HEAT UP THOSE LEFTOVERS, NOT THE PLANET: HOW COMBATTING FOOD WASTE CAN AFFECT CLIMATE CHANGE

Bonnie L. Smith

Introduction......................................................................................................................... 648
I. Background....................................................................................................................... 650
   A. Food Waste Generally ............................................................................................... 650
      1. Broad Environmental Impacts of Food Waste ...................................................... 650
      2. What is food waste? .............................................................................................. 651
      3. Where Food Waste Occurs ................................................................................. 652
   B. Food Waste: A Topic of National and International Concern ...................... 653
   C. Food Donation as a Solution to Reducing Food Waste ............................ 654
      1. Virtues of Food Donation ...................................................................................... 654
      2. Why Food Donation Is Not More Common ....................................................... 655
II. Two-Pronged Food Waste Reduction Plan ...................................................... 656
   A. The Bill Emerson Good Samaritan Food Donation Act .......................... 656
   B. Uniform Date Labeling ......................................................................................... 659
Conclusion .......................................................................................................................... 664

INTRODUCTION

Every year Americans punt enough food to fill 730 football stadiums.1 Imagine 730 football stadiums brimming with rotting food. The stench is unbearable, the air laden with methane gas. Eventually, all the organic matter breaks down into compost, and the methane gas clears. The methane moves into the atmosphere, where it has 21 times the climate-affecting

capabilities as carbon dioxide. Food waste accounts for over 20% of methane emissions. Methane accounts for 10% of anthropogenic, or human-caused, greenhouse-gas emissions in the United States. Unfortunately, much of the food that is discarded in the United States is still suitable for human consumption. Each year, while Americans waste 730 football stadiums full of food, 17.4 million homes nationwide are food insecure.

Food waste is a jumbo-sized problem that has grown around 50% since 1974. My family, like many others in the United States, encouraged me as a child to join the “clean plate club” and always finish my meals so I would not waste good food. Growing up, my Great Depression-era grandmother never failed to save even a spoonful of leftover food to reheat and eat later. How has this food-saving mentality eroded so drastically on the consumer level? Why do producers and retailers throw away perfectly edible food when it could be donated? Society knows that waste negatively impacts the environment, but how can we break these bad, wasteful habits that contribute to the United States’s waste problem?

This note will examine how expanding our federal framework for food donation and date labeling will help reduce food waste, which accounts for 7% of climate-affecting greenhouse-gas emissions. This note proposes a two-pronged approach for reducing food waste. Specifically, it advocates: (1) amending the Bill Emerson Act to designate it as the official minimum national liability scheme for food donation and (2) creating a uniform, federal date-labeling policy to reduce consumer confusion over expiration dates. This approach will not only positively affect the environment but also food-insecure families in the United States that could benefit from charity food donations.

3. Id.
4. Id.
5. See generally id. ¶ 5 n.4 (discussing the amount of food wasted in the United States, and how that food could be used for those in need).
6. ALISHA COLEMAN-JENSEN ET AL., HOUSEHOLD FOOD SECURITY IN THE UNITED STATES IN 2015, at 6 (2016).
The note will begin by providing background information that generally describes the problem of food waste, defines food waste, and introduces current problems associated with it. The background will also explain why food waste in the United States is an important topic in both national and international contexts. Finally, the analysis section will explain the reasoning behind, and feasibility of, each prong of the proposed two-pronged approach for reducing food waste on the federal level. The federal government should take the lead in providing solutions to the problem of food waste. Simply sitting back and watching discarded food pile up in landfills while global temperature rise increasingly threatens the planet is no longer an option.

I. BACKGROUND

A. Food Waste Generally

1. Broad Environmental Impacts of Food Waste

Approximately one quarter of food produced in the United States for human consumption is lost or wasted each year.9 Once discarded, excess food is almost never recovered.10 Ninety-eight percent of discarded food ends up in landfills.11 There, the food decomposes and releases methane gas into the atmosphere.12 In fact, food waste accounts for 7% of greenhouse-gas emissions around the world, with each ton of wasted food producing 3.8 tons of greenhouse-gas emissions.13

In addition to food waste causing large quantities of methane gas to enter the atmosphere, food waste also negatively impacts the environment; water, land, energy, and labor capital resources are expended to grow, produce, and transport food that feeds no one.14 Harvesting, processing, shipping, refrigerating, storing food, and applying fertilizers and pesticides...
require large amounts of fossil fuels. When consumers, farmers, or businesses have excess food, they often discard it in the trash, which eventually goes to landfills.

2. What is food waste?

The United States Department of Agriculture (USDA) defines food waste as a “component of food loss [that] occurs when an edible item goes unconsumed, such as food discarded by retailers due to undesirable color or blemishes and plate waste discarded by consumers.” Food loss consists of all “edible food, postharvest, that is available for human consumption but is not consumed for any reason.” Food loss more broadly refers to the wasting of food products, and it occurs for a variety of reasons, such as “cooking loss and natural shrinkage (e.g., moisture loss); loss from mold, pests, or inadequate climate control; and plate waste.” This note focuses on how the USDA defines food waste, and thus, primarily focuses on the waste of perfectly edible food.

The Environmental Protection Agency (EPA) categorizes food waste as a type of municipal solid waste. Municipal solid waste accounts for various common, household items that are thrown away as trash. Municipal solid waste “does not include industrial, hazardous, or construction waste.” Municipal solid waste, which includes food waste, comes from residential, commercial, and institutional sources. In 2012, the United States’s total municipal-solid-waste generation was 251 million tons. Organic materials comprised the largest percentage of that waste; food waste accounted for the largest percentage of organic materials at 28%. Although recycling and composting recovered 87 million tons of the
total municipal solid waste, only 2% of the recovered waste was food waste.  

3. Where Food Waste Occurs

“Food waste occurs at three levels: the primary production level, the retail level, and the consumer level.”  

On each level, food waste exists for various reasons. On the production level, farmers often overplant their fields knowing that certain crops will have “cosmetic imperfections” that will render them unsellable to consumers. Sometimes, they overplant in the event of a difficult growing season with low yields. At the end of the growing season, farmers may decide that harvesting the crops is too expensive. In such cases, farmers may leave entire fields of ripe produce in the field to rot. Even if farmers would like to donate their produce to food banks, sometimes the time, labor, and resources required to harvest and transport the food make it economically infeasible to do so.

On the retail level, farmers, manufacturers, schools, plants, and restaurants might be reluctant to donate excess food to local shelters or food banks because of the costs involved, because they fear liability, or both. On the consumer level, waste includes “losses for food consumed at home and away from home (e.g., restaurants and fast food outlets) by consumers and foodservice establishments.” Causes of consumer-level waste include: “improper handling or storage, failing to use before the item ‘goes bad,’ consumers confusing ‘best by’ / ‘use by’ / ‘sell by’ with an expiration date, excessive [food] portions, plate waste, consumer tastes, and food appearance.” ”

Creating federal solutions that address the food-waste problem on all production levels could be a means of ultimately reducing greenhouse-gas emissions in the United States. Such efforts would help curb the amount of

26. Id.
27. Haley, supra note 2, ¶ 6.
29. Id.
30. Id. at 106–07.
31. Id. at 107.
32. Id.
33. Id.
35. Haley, supra note 2, ¶ 6 (internal quotations omitted).
36. Id.
37. Id.
food in landfills that ultimately emits harmful climate-affecting greenhouse gases into the atmosphere. In doing so, the United States government could take steps to address climate change.

**B. Food Waste: A Topic of National and International Concern**

The United States has an international obligation to reduce climate-affecting greenhouse-gas emissions. As a signatory of the United Nations Framework Convention on Climate Change (UNFCCC) and of the newly adopted Paris Agreement, the United States has committed to help “strengthen the global response to the threat of climate change.” As a party to the Paris Agreement, the United States “shall prepare, communicate and maintain successive nationally determined contributions that it intends to achieve” to help work toward “[h]olding the increase in the global average temperature to well below 2 °C above pre-industrial levels.”

The United States is the second largest emitter of climate-affecting greenhouse gases, so its reduction of greenhouse-gas emissions will be imperative to meeting the Paris Agreement’s 2°C target. The United States committed to reducing greenhouse-gas emissions 26–28% by 2025 by submitting its Intended Nationally Determined Contributions (INDC) to the United Nations prior to the climate-change negotiations at the 21st meeting of the Conference of the Parties (COP21). To meet its greenhouse-gas emissions-reduction target by 2025, the United States will need to make various changes.

One way to meet its target is to drastically reduce the amount of food waste that ends up in landfills. The United States did not include food-waste reduction as part of its INDC mitigation pledge; however, reducing

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39. Paris Agreement, supra note 38, at art. 2.1(a), 4.2.


42. See id. (reporting the various actions the United States plans to undertake to reach its carbon emissions goal).
food waste would be a viable means of helping reach its emissions-reduction target.\footnote{See id. (illustrating that the pledge includes no mention of food waste).}

In addition to international obligations, the EPA and USDA recently announced a national goal of reducing United States food waste 50% by 2030.\footnote{USDA Press Release, \textit{supra} note 9.} The United States can simultaneously work toward meeting these goals by reducing food waste in landfills, which will consequently reduce greenhouse-gas emissions. The United States should do this by encouraging food donations and establishing a federal date-labeling policy.

\textit{C. Food Donation as a Solution to Reducing Food Waste}

1. Virtues of Food Donation

The EPA created a “food-recovery hierarchy” to communicate preferable means of decreasing excess food and food waste.\footnote{\textit{ENVTL. PROT. AGENCY, U.S. DEP’T OF AGRIC., WASTE NOT, WANT NOT: FEEDING THE HUNGRY AND REDUCING SOLID WASTE THROUGH FOOD RECOVERY} 1 (1999) [hereinafter \text{WASTE NOTE, WANT NOT}].} In the food-recovery hierarchy, the EPA recognizes the importance of food donation.\footnote{Id.} Rather than sending excess food to landfills, the EPA advocates “recovering food to feed hungry people, providing food to livestock farmers or zoos, recycling food for industrial purposes, and composting food to improve soil fertility.”\footnote{Id.} The United States has a large network of food-donation centers that accept edible food that would likely otherwise go to landfills.\footnote{Donated Food, \textit{U.S. ENVTL. PROTECTION AGENCY, http://www2.epa.gov/recycle/food-donation} [https://perma.cc/L3JS-N5L5] (last visited Mar. 31, 2017).} For this reason, food-donation centers have the potential to play a role in reducing climate-affecting greenhouse-gas emissions. Food-donation centers also provide the humanitarian benefit of helping feed food-insecure populations.

Food pantries, food banks, and food-rescue programs across the nation accept excess foods that are nonperishable or unspoiled and perishable.\footnote{Id.} After accepting the food, these organizations sort and redistribute it to people in need.\footnote{Id.} Food banks distribute the food in a variety of ways. They often distribute the food through emergency food-assistance agencies, which then send the food to soup kitchens, youth or senior centers, shelters,
and pantries. Food-rescue programs take food to agencies and charities and also accept food directly from donors. Even when foods are not fit for human consumption, some food-donation centers can still find meaningful uses for the food. Typically, this type of food can either be composted or donated for animal feed and then donated to small producers. Donated food that is unwholesome or inedible can be made into compost, which improves soil conditions by adding organic material and nutrients back into the soil. Donated compost can go to local farmers and reduce their fertilizer use.

2. Why Food Donation Is Not More Common

Despite the virtues of food donation, much of the food that is suitable for donation is wasted every year at every stage of production. Unfortunately, donating food is often prohibitively difficult and expensive for many businesses, nonprofits, and consumers. Many small farms and businesses would like to donate food but lack the funds to gather, store, and transport food to donation centers. Such potential donors also lack the "time and energy, which results in forgone opportunity costs."

Many businesses also fear liability risks for foodborne illnesses connected with donated food. The Centers for Disease Control and Prevention estimates that 48 million cases of foodborne illness occur annually in the United States. Foodborne illnesses annually cause 128,000 hospitalizations and 3,000 deaths. Moreover, food distributors and sellers face severe consequences for providing the source of an illness.

For example, an outbreak of E. Coli in 1992 cost Taco Bell over $98 million in settlement costs from resulting claims. A recent outbreak of E.
Coli, linked to at least 40 Chipotle restaurants in Washington and Oregon, has left more than three-dozen people sick.\(^{63}\) At least three people have already commenced lawsuits; one woman is seeking $75,000 of damages.\(^{64}\) This outbreak has the potential to cost Chipotle millions of dollars in settlement costs.\(^{65}\) Nevertheless, “as of 2013, there have been no lawsuits concerning liability of donated food.”\(^{66}\)

Donating excess food to recovery organizations ensures that the food goes to food-insecure individuals or families, animals (once converted to feed), or small producers (in the form of compost) and is a means of cutting down on the amount of food in landfills. Food donation has the potential to reduce harmful greenhouse-gas emissions while at the same time helping hungry United States citizens. Taking action at the federal level to remove liability fears and financial constraints will encourage food donation and help reduce greenhouse-gas emissions with climate-affecting capabilities.

II. TWO-PRONGED FOOD WASTE REDUCTION PLAN

This note proposes to tackle the food-waste problem in the United States by: (1) amending the Bill Emerson Act to explicitly deem it the minimum national liability scheme for food donation and (2) creating a uniform federal date-labeling policy to reduce consumer confusion. Adopting these measures has the potential to reduce climate-affecting greenhouse-gas emissions and, at the same time, provide wholesome food to food-insecure United States citizens.

A. The Bill Emerson Good Samaritan Food Donation Act

Congress passed the Bill Emerson Good Samaritan Food Donation Act (Bill Emerson Act) in 1996.\(^{67}\) Representative Bill Emerson was a Republican member of the United States House of Representatives from Missouri.\(^{68}\) Throughout his career, Representative Emerson worked “to


\(^{64}\) Id.


\(^{66}\) Kalashian, supra note 12, at 109.

\(^{67}\) Bill Emerson Good Samaritan Food Donation Act, 42 U.S.C. § 1791 (2012).

advance anti-hunger initiatives” and “reduce administrative rules that make food assistance to hungry Americans inaccessible.” Representative Emerson “worked very hard to have [the Bill Emerson Act] actively considered during the 104th Congress.”

The purpose of the Bill Emerson Act was to encourage food recovery and gleaning efforts by providing a federal law to reduce potential donor liability. Section (b)(5) of the Bill Emerson Act defines a gleaner as “a person who harvests for free distribution to the needy, or for donation to a nonprofit organization for ultimate distribution to the needy, an agricultural crop that has been donated by the owner.”

The Bill Emerson Act removes civil and criminal liability for “persons” or “gleaners” who in “good faith” donate “apparently wholesome food” or “apparently fit grocery product[s] . . . to a nonprofit organization for ultimate distribution to needy individuals.” A product is “apparently wholesome” if the “food meets all quality and labeling standards imposed by Federal, State, and local laws and regulations even though the food may not be readily marketable due to appearance, age, freshness, grade, size, surplus, or other conditions.” The civil and criminal liability waiver does not apply when the donated food causes injury or death due to the donor’s act of “gross negligence or intentional misconduct.” Symbolically, the Bill Emerson Act also demonstrates congressional willingness to address the problem of food waste.

Unfortunately, since Congress enacted the Bill Emerson Act, food waste has actually increased in the United States. Many businesses in the retail food industry are unfamiliar with the Bill Emerson Act and its protections from liability. Confusion as to whether the Bill Emerson Act actually preempts state laws also hinders intrastate businesses from donating food. This confusion arises because the Bill Emerson Act contains no explicit preemption language, and all 50 states have Good

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69. Id.
72. Id.
73. Id. § 1791(c)(1).
74. Id. § 1791(b)(2).
75. Id. § 1791(c)(3).
76. BUZBY ET AL., supra note 17, at 22 n.14.
77. Haley, supra note 2, ¶ 4.
78. See David L. Morenoff, Lost Food and Liability: The Good Samaritan Food Donation Law Story, 57 FOOD & DRUG L.J. 107, 107–08, 128 (2002) (explaining that although the Good Samaritan food-donation laws seek to alleviate potential food donors’ fears, food donors still do not know whether to follow state or federal law).
Samaritan food-donation laws. Thus, many businesses do not know whether to apply federal or state law. Even if state law applies, it is not always clear which state law in the “patchwork” of state Good Samaritan food-donation laws applies. State laws vary widely, making it even more difficult for producers, distributors, and retailers with contacts in multiple states to know which standard applies. The laws vary in liability vocabulary and as to whether the risk elimination applies to only civil or criminal liability or both. Naturally, many businesses are wary of committing a benevolent act when they are not sure whether they might be held liable and, if so, to what extent.

Amending the Bill Emerson Act to include a preemption clause deeming the Act to be the minimum national standard for food-donation liability would help reduce the confusion surrounding food donations. Although the Bill Emerson Act is silent on preemption, the legislative history implies that Congress intended for the federal law to preempt state law.

Prior to the Bill Emerson Act, Congress adopted a Model Good Samaritan Food Donation Act (Model Act) in 1990. The Model Act was largely ineffective because it was not legally binding and only one state chose to adopt it. Because the Model Act did not have a large impact on food donation, Missouri Representative Pat Danner introduced H.R. 2248, the future Bill Emerson Act, which gave the Model Act a legally binding effect. Representatives during House debate expressed Congress’s intent for H.R. 2248 to “relieve concerns over liability . . . that deter companies and individuals from donating as freely as they would like.” A Senator in a Senate debate also found “[l]iability concerns [to be] the overriding reason why unsalable, but otherwise wholesome, food is destroyed rather than donated to charity.”

Recognizing the difficulty of adhering to 51 different liability schemes, President Clinton signed the Bill Emerson Act into effect on October 1,

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79. Id.
80. Id. at 128.
81. See id. at 120 (discussing potential food donors’ hesitation to donate food because of the 50 different state laws).
82. Id. at 116, 120.
83. Id. at 116–17.
84. Haley, supra note 2, ¶ 36.
85. Id. ¶ 29.
86. Id.
87. Id.
1996. He acknowledged that “[a]lthough many States have enacted their own ‘Good Samaritan’ laws to support food recovery and donation efforts, many businesses have advised that these varying State statutes hinder food donations.” The Bill Emerson Act’s legislative history indicates that Congress intended the Act to preempt state laws concerning food-donation liability. Nevertheless, creating an express preemption clause within the Bill Emerson Act would remove all doubts to wary businesses that fear liability.

The Bill Emerson Act, the current federal statute pertaining to food donation liability, would be more effective and better tailored to meet its purpose of encouraging excess food donation if amended to include a preemption clause, making it the minimum national standard for food donation liability. Amending the Bill Emerson Act would allow Congress to help combat the negative, climate-changing effects of food waste.

B. Uniform Date Labeling

The Waste and Resources Action Programme conducted a study in the United Kingdom and discovered “that one-fifth of food thrown out by households was incorrectly perceived as being out of date due to confusing labels.” In the United States, misinterpreting date labels on food products is also a major cause of waste. The confusion surrounding the date labels arises because date labels that say “use-by,” “sell-by,” or “best-before” are not specific or targeted toward consumers. They give consumers the impression that the date listed is an expiration date, when often it is not. As a result, people and food-donation centers throw away perfectly edible food because they incorrectly believe it is bad or unsafe to eat.

The problem of inconsistent and confusing date labeling is due to the federal government’s lack of a comprehensive framework that would

90. Id. ¶ 31.
91. Id. (quoting Presidential Statement on Signing H.R. 2428, 32 WEEKLY COMP. PRES. DOC. 1943 (Oct. 7, 1996)).
92. Id. ¶ 36.
95. Id.
96. Id.
97. Id.
98. Id.
establish standard laws or regulations for the date labels of food products. This lack of federal oversight gives the states the ability to regulate date labels on food. But, states do so in a patchwork of ways that is confusing for businesses and consumers. Some states do not regulate date labels at all.

Retailers and consumers often throw away food that could be eaten or sold because they incorrectly believe the food is unsafe. Discarding food that is safe for human consumption “results in economic losses and inefficiencies for food producers, manufacturers, distributors, and retailers, as well as substantial challenges for anti-hunger organizations and others who seek to utilize food that otherwise may be wasted.”

Date labeling became a common practice in the United States during the 20th century due to consumers’ interest in information on food freshness. Between 1973 and 1975, congressional bills mandating date labeling never became laws that would create a federal date-labeling framework. Now, over 40 years later, there is still no federal framework to regulate date labels on food products. Thus, states are not preempted from passing their own date-labeling laws. The states instead decide how they will label their food. Forty-one states have adopted varying date-labeling protocols. Often date labels are meant to convey information to the retailer, not the consumer. The labels typically help retailers with logistics for shelving and storage. Yet, consumers do not realize this and throw out food while it is still safe to eat. Establishing a date-labeling system on the federal level for food products would help reduce food waste in the United States.

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100.  Id. at 12.
101.  Id. at 3, 12.
102.  Kalashian, supra note 12, at 111.
103.  LEIB ET AL., supra note 99.
105.  Kalashian, supra note 12, at 111.
106.  Id.
107.  See id. at 111–12 (providing context that the labels today are as vague as they were in 1975).
108.  Id. at 111.
111.  Id.
States by promoting greater food safety knowledge.\textsuperscript{113} Creating an efficient, uniform federal system would generally reduce discarded food while helping spur edible food donations.\textsuperscript{114}

Congress has the authority to regulate date labels under the Commerce Clause, which allows Congress to control products sold in interstate commerce.\textsuperscript{115} Congress has delegated authority to the Food and Drug Administration (FDA) and the USDA regarding the “adulteration or misbranding of any food.”\textsuperscript{116} The Food, Drug, and Cosmetic Act (FDCA) gives the FDA the authority to regulate “false or misleading” food product labels in order to prevent consumer confusion.\textsuperscript{117} Viewing date labels as misleading affords the USDA and FDA the power to regulate food labels.\textsuperscript{118}

Under the FDCA, a label can be found to be misleading if it makes deceptive statements or omits material information to the consumer.\textsuperscript{119} Courts apply the reasonable-consumer test to determine whether labels are misleading under the Act.\textsuperscript{120} Although this law is meant to apply to individual manufacturers, “the intent behind the elements of the mislabeling law, preventing consumers from being misled by food labels, explains why” establishing a uniform labeling regime is important to consumers’ understanding of the food products they buy.\textsuperscript{121}

Although courts typically apply the reasonable-consumer test “when a consumer brings legal action against a manufacturer of food products,” applying the policy behind the test to the United States’s inconsistent date-labeling system for food products reveals that the current date-labeling system is misleading.\textsuperscript{122} This misleading system contributes to the problem of food waste. Date-labeling reform is important to addressing food waste. The FDCA allows such reform “to avoid the same kind of harms for which the underlying misleading label laws were created to prevent.”\textsuperscript{123}

The reasonable-consumer test questions whether a reasonable consumer would be misled into buying a product due to false and misleading statements.\textsuperscript{124} Specifically, the test asks three questions: (1) whether the label contains a false statement; (2) “whether a reasonable consumer [i]
likely to be deceived by the offending statements”; and (3) whether the consumer has suffered sufficient injury to have standing to bring the claim.125

The first element of the reasonable-consumer test is met because “[f]alse labels, in the traditional sense, have the same effect as the current confusing date labels.”126 They both give the consumer an imprecise view of the product.127 The plaintiffs in Gitson v. Trader Joe’s Co. alleged that the defendant grocery chain violated the FDCA by “illegally list[ing] evaporated cane juice as an ingredient,” instead of sugar on a yogurt container.128 To determine whether the label would likely deceive reasonable customers with false statements, the United States District Court of the Northern District of California applied the reasonable-consumer test.129 One of the issues the court addressed was whether the label stated the sugar content of the product.130

The court found that defendant Trader Joe’s did not mislead reasonable customers because evaporated cane juice is a form of sugar.131 Furthermore, the Nutrition Facts section of the yogurt product clearly indicated the amount of “sugars” per serving.132 Hence, there was no false statement to mislead a reasonable consumer into buying the product. The court explained that a label expressly explaining the sugar content of evaporated cane juice in a visible, specially designated area on the packaging is not deceptive to a reasonable customer.133 Furthermore, Trader Joe’s did not advertise the product to be sugar-free or no-sugar-added.134 Unlike the evaporated cane juice in Gitson, date labeling is misleading to reasonable consumers.135 The mere indication of a date with no express explanation of its meaning creates an imprecise and confusing message for consumers looking for safe products. The mixed messages from these labels deceive many consumers into believing that perfectly edible food is in fact dangerous to consume. Because consumers so incorrectly interpret the labels, the content can effectively be considered as a false statement.

127. Id.
129. Id. at *6.
130. Id. at *8.
131. Id. at *9.
132. Id. at *8.
133. Id.
134. Id.
135. Kalashian, supra note 12, at 104.
The second element of the reasonable-consumer test is met because confusing date labels on packaging are likely to deceive reasonable consumers; they must rely on “arbitrary dates of food products, with no opportunity to find clarification elsewhere on the label.”

In *Williams v. Gerber Products Co.*, the Ninth Circuit explained that the aggrieved party “must show that members of the public are likely to be deceived,” and that the law prohibits “not only advertising which is false, but also advertising which[] although true, is either actually misleading or which has a capacity, likelihood or tendency to deceive or confuse the public.”

The product in question in *Williams* was called “Fruit Juice Snacks,” and pictures of different fruits appeared on the package. A statement claiming that the product was made with “fruit juice and other all natural ingredients” also appeared on the package. The package labeling misled the appellant into thinking she was actually buying snacks with real fruit and fruit juice, but in reality, the snacks contained no fruit at all. The Ninth Circuit found that reasonable consumers should not “be expected to look beyond misleading representations on the front of the box to discover the truth from the ingredient list in small print on the side of the box.”

The court explained that “reasonable consumers expect that the ingredient list contains more detailed information about the product that confirms other representations on the packaging.”

Applying the court’s reasoning in *Williams* to date labeling, consumers should not have to take additional efforts to better understand confusing or misleading terminology. Unlike in *Williams*, however, consumers reading date labels “have even less information available to them.” With no other sources of information, consumers are, therefore, more likely to find date labels deceptive or misleading.

The third element of the reasonable-consumer test is met because confusing date labeling causes economic harm—sufficient to allow standing—to consumers who unnecessarily throw away food and buy more

136. *Id.* at 118.
138. *Id.* (quoting *Kasky v. Nike, Inc.*, 45 P.3d 243 (Cal. 2002)).
139. *Id.* at 939.
140. *Id.*
141. *Id.*
142. *Id.*
143. *Id.* at 936.
144. *See id.* (determining that a product should not confuse a consumer with its packaging).
of the same product. Economic injury is one way of meeting the injury-in-fact requirement of standing. Arroyo v. Chattem, Inc. involved Dexatrim weight loss supplements advertised as a safe way to lose weight, but which actually contained a harmful mineral. The plaintiff claimed she would not have purchased the weight loss supplements had she known that it contained a dangerous ingredient. The court determined that the plaintiff satisfied the standing requirements due to the plaintiff’s economic injury. Similarly, consumers who read a misleading date-label on a food product are likely to face economic injuries for losses incurred due to throwing away perfectly good food.

The federal government should create a new and uniform date-labeling system for food products that consumers and food-donation centers can easily understand. Various changes will be needed to incentivize consumers and food-donation centers to modify their food-discarding habits. Such changes could include: removing the sell-by date from customers’ vision so that they are not confused with safety dates; removing dates from nonperishable items; establishing a clear, uniform-labeling vocabulary system; and adding freeze-by dates on products to encourage preserving food for longer periods.

CONCLUSION

Food waste is a dire problem in the United States that negatively affects the environment. Unfortunately, this problem is only getting worse. Increasing food donation is important because it helps reduce methane emissions by saving discarded food from landfills. Food donation also provides food-insecure families and individuals greater access to wholesome food. Increasing food donation on a nation-wide level will be important to the United States in reducing climate-affecting greenhouse-gas emissions caused by food waste.

The United States should address the problem of food waste and encourage food donation in two ways: (1) amending the Bill Emerson Act

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146. Id. at 120.
149. Id. at 1076.
150. Id.
151. Kalashian, supra note 12, at 121.
153. Waste Not, Want Not, supra note 45, at 5.
to explicitly make it the minimum national liability scheme for food donation and (2) creating a uniform federal date-labeling policy to reduce consumer confusion. This two-pronged plan will help the United States reduce climate-affecting greenhouse-gas emissions by encouraging food donation and streamlining food-recovery policies.
A BILLION GRAINS OF TRUTH: DISTRIBUTIONAL IMPACTS OF HOUSEHOLD-LEVEL CLIMATE CHANGE TAX SUBSIDIES IN THE UNITED STATES

Lynsey Gaudioso*

Introduction .................................................................................................................. 667
I. Literature Review ................................................................................................. 670
II. Structure matters. ............................................................................................... 672
III. Why We Should Care About the Structure of Renewable-Energy, Energy-Efficiency, and Alternative-Vehicle Tax Incentives .......... 677
   A. Energy-Efficiency and Renewable-Energy Tax Incentives....................... 682
      1. Tax Deductions and Exemptions .............................................................. 682
      2. Tax Credits .............................................................................................. 685
      3. Property Tax Incentives ......................................................................... 691
   B. Alternative-Vehicle and -Fuel Tax Incentives ......................................... 693
      Tax Credits .................................................................................................... 693
V. Reforming Subsidies to Reach Low- and Middle-Income Families.... 698
   A. Refundability and Carry-Forward Provisions: Ensuring All Families Have Access to the Same Amount in Credits ....................... 698
   B. Combatting Principal–Agent Issues in the Landlord–Tenant Context .................................................................................. 702
   C. Alleviating High Upfront Costs of Renewable-Energy Systems and Alternative Vehicles .............................................................. 703

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We know that the climate activists will fight for subsidies and supports for the booming clean energy and energy conservation markets. But will they insist that these new industries be accessible beyond the eco-elite—creating jobs and wealth-building opportunities for low-income people and people of color?

- Van Jones, 2007

INTRODUCTION

As Van Jones presciently observed in 2007, over the past decade, climate activists fought for support for the clean-energy and energy-conservation markets. Today, federal and state governments spend billions of dollars each year on renewable-energy, energy-efficiency, and alternative-vehicle tax incentives designed to encourage our transition to a low-carbon future. Yet, how these tax incentives are structured has important distributional implications. Who can access these incentives? Are these incentives limited to wealthy elites? Or, are they equally accessible to all income groups?

As Van Jones alluded to in 2007, critics have long characterized environmentalism as a movement by and for wealthy, white communities. This article adds grains of truth to critics’ piles. By analyzing the structure of every federal and state renewable-energy, energy-efficiency, and alternative-vehicle tax incentive in the United States—123 tax incentives in total—this article illustrates how United States climate-change tax

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2. Id.
4. See, e.g., Darryl Fears, Within Mainstream Environmentalist Groups, Diversity Is Lacking, WASH. POST (Mar. 24, 2013), https://www.washingtonpost.com/national/health-science/within-mainstream-environmentalist-groups-diversity-is-lacking/2013/03/24/c42664dc-9235-11e2-9cfd-36d6c9b5d7ad_story.html?utm_term=.3bf738638fd7[https://perma.cc/DF5X-8CH8] (interviewing experts and minority members of the nation’s largest environmental groups who state that the movement has taken too long to engage with minority communities and has a reputation for being wealthy and white).
5. I refer to these three collectively as “climate change” or “climate” tax incentives.
incentives favor wealthy households. This article goes on to argue that federal and state governments should reform current tax subsidies to refundable tax credits or other more progressive forms to better include all households in our efforts to achieve a clean-energy future. Doing so would increase the cost-effectiveness and economic efficiency of current climate-change tax subsidy programs, bring more people into the environmental movement, strengthen public support for other climate policies, and lessen income-inequality effects.

Tax policy matters. Over the past century, tax law has become the site of major social- and economic-policy decisions in the United States. The United States, more than almost any other country, tends to regulate private conduct through the tax code. The United States enacts regulatory policy through the tax code by offering incentives to buy certain products, donate to certain organizations, and engage in certain behaviors. Housing policy, anti-poverty initiatives, healthcare decisions, philanthropic activity, pension policy, and business activities are all regulated through the tax code. As one scholar put it, “presidents and the Congress have come to use tax breaks the way my mother used chicken soup—as a cure-all for any ill American society faces.”

Climate and energy policy is no exception. In the wake of congressional gridlock, failure on the Waxman-Markey Bill, and the continuing dearth of broad, vocal support for comprehensive climate

8. See, e.g., I.R.C. § 30(a) (providing a tax incentive for electric vehicles); I.R.C. § 2522(a) (providing a tax deduction for charitable donations); I.R.C. § 36(a) (providing a tax credit for first time homebuyers).
9. These subject areas are regulated through programs like the Home Mortgage Interest Deduction; the Earned Income Tax Credit; medical expense deductions and Flex spending accounts; the charitable deduction; Social Security and lower tax rates for capital gains. See generally Credits & Deductions, INTERNAL REVENUE SERV., https://www.irs.gov/credits-deductions [https://perma.cc/BNU2-D8WK] (last updated Mar. 13, 2017) (describing tax credits and deductions available to individuals and businesses).
legislation, Congress turned to the tax code to implement climate policy. Instead of putting a price on carbon through a carbon tax or a cap-and-trade program to correct for externalities—the widely preferred policy option among economists—Congress and many state governments focused on subsidizing low-carbon alternatives. As a result, over the past decade, tax expenditures subsidizing the deployment of clean energy, energy efficiency, and alternative vehicles have skyrocketed. In 2013 alone, the federal government spent more than $1.8 billion on renewable-energy systems, energy-efficiency measures, and alternative-fuel vehicle purchases via tax expenditures. Many state governments have followed suit, offering their own renewable-energy, energy-efficiency, and alternative-vehicle tax incentives.

However, not all tax incentives are created equal: the structure of climate-change tax incentives matters. Many incentives have regressive distributional consequences based on their structure: they preferentially accrue to the affluent and not the poor. Deductions and exclusions grant larger benefits to wealthier individuals in higher marginal tax brackets. Non-refundable tax credits only allow individuals with positive tax liability

12. David Driesen, Putting a Price on Carbon: The Metaphor, 44 ENVT. L. 695, 697 (2014); Elia Pales, Government Subsidies in Green Energy Are Investment In Our Future, HILL (Sept. 3, 2015), http://thehill.com/blogs/congress-blog/energy-environment/252580-government-subsidies-in-green-energy-are-investment-in [https://perma.cc/4VET-X4PZ]. Even before Congress was as gridlocked as it is today, Congress turned to the tax code. GRAETZ, supra note 10, at 187. As Michael Graetz argues, “Since the 1970s, U.S. policy has been to subsidize the production and consumption of fuels we would like to encourage rather than to tax the use of fuels that we want to discourage.” Id.

13. GRAETZ, supra note 10, at 187. According to the Energy Information Administration, after taking inflation into account, federal energy subsidies more than doubled between 1999 and 2007 from $8.2 billion to $16.6 billion with the share of renewable-energy subsidies increasing from 17% to 29% of the total during this time period. Id. Energy subsidies provided in the form of tax breaks more than tripled during this same eight-year time period. Id. An additional $37 billion in energy tax breaks was added in 2008 and 2010. Id. The American Recovery and Reinvestment Act of 2009 (the “stimulus bill”) further increased these subsidies, bringing the total to approximately $100 billion available in renewable-energy and energy-efficiency tax subsidies and other incentives by 2010. Id.

14. Id.


to take advantage of them, excluding many low-income earners. Other tax incentives favor owners over renters. Because of these structural elements, many tax incentives favor the wealthy.

Yet, despite the tax code’s importance within climate and energy policy in the United States, very little has been written about the distributional impacts of United States climate-change tax policy. Only two papers have examined this issue in any depth, but they focused solely on a few federal tax programs from an economics, rather than a legal, lens.

This article tackles the distributional question head on, examining three categories of climate-related tax subsidies—renewable-energy, energy-efficiency, and alternative-vehicle and fuel tax subsidies—for potential structure-related distributional effects. Part I describes the existing literature on the distributional impacts of United States climate-change tax subsidies. Part II explains why the structure of tax subsidies matters from a social-justice perspective. Part III argues why this structure matters in the climate-change context in particular. Part IV analyzes the structure of every federal- and state-level tax subsidy in the United States, focusing on who benefits from these subsidies. Finally, Part V discusses how we can reform existing subsidies to better reach low- and middle-income families, drawing on best practices from existing state programs.

I. LITERATURE REVIEW

Despite the prominence of tax subsidies in the climate-policy arena and the known distributional impacts of tax incentives in other contexts, few have analyzed the distributional effects of climate-change tax subsidies in particular. Scholars have paid attention to clean-energy tax subsidies individually (especially their comparative advantages and disadvantages over other policy options) as well as the distributional consequences of

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20. See Neveu & Sherlock, supra note 18, at 63 (discussing tax credits for residential energy efficiency); Borenstein & Davis, supra note 19, at 1–2 (discussing distributional effects on households of clean-energy credits).

21. Because corporate tax incentives have a less direct distributional impact, this article examines only individual tax subsidies.

22. See, e.g., GRAETZ, supra note 10, at 188 (stating that there is significant variation in the amounts of energy subsidies relative to the fossil-fuel savings achieved); Hunt Allcott & Michael Greenstone, Is There an Energy Efficiency Gap?, J. ECON. PERSP., Winter 2012, at 3, 12; Severin
other policy levers, namely a price on carbon or increased gas taxes. However, the distributional impacts of federal and state climate-change tax subsidies have largely been ignored in the literature.

Only two articles have described the distributional effects of climate-tax policy in any detail. Borenstein and Davis analyzed federal tax-return data to examine the socioeconomic characteristics of recipients of four major federal tax credits: (1) the Nonbusiness Energy Property Credit, (2) the Residential Energy Efficient Property Credit, (3) the Alternative Motor Vehicle Credit, and (4) the Qualified Plug-In Electric Drive Motor Vehicle Credit. Borenstein and Davis found that government tax expenditures for these programs primarily accrued to higher-income households. Of the $18 billion in federal income tax expenditures on these credits from 2006 to 2012, households in the bottom 60% of incomes only received about 10% of all credits, while households in the top 20% received 60% of all credits. 

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25. Id. at 3 (stating that the Nonbusiness Energy Property Credit is a credit for homeowners who weatherize or make energy-efficiency improvements to their homes).

26. Id. at 5 (stating that the Residential Energy Efficient Property Credit is a credit “for homeowners who install residential solar panels, solar water heating systems, and fuel cells”).

27. Id. at 7 (stating that the Alternative Motor Vehicle Credit goes toward the purchase of certain qualified hybrids and other alternative-fuel vehicles).

28. Id. at 8 (stating that the Qualified Plug-In Electric Drive Motor Vehicle Credit is a credit toward the purchase of electric and plug-in hybrid vehicles).

29. Id. at 1 (“Overall, the bottom three income quintiles have received about 10% of all credits, while the top quintile has received about 60% [of all credits].”).

30. Id.
Neveu and Sherlock employed a similar method. They examined federal tax returns for the 2006 and 2007 tax years for two credits: the Nonbusiness Energy Property Credit and the Residential Energy Efficient Property Credit. Similar to Borenstein and Davis, Neveu and Sherlock found that higher-income taxpayers claimed the majority of these credits. More specifically, they found that although only “40 percent of tax returns were filed by those with incomes above $50,000, 84 percent of the value of total credits claimed” in 2006 and 2007 went to these individuals. In addition, they found that the average amount of tax credits claimed increased with income.

Both sets of findings confirm that select federal, household-level climate tax credits raise distributive-justice concerns. However, both studies are limited in two respects. First, other than mentioning non-refundability, neither paper examines why the structure of these subsidies results in distributional consequences. Second, both studies are narrow in scope, examining a total of four federal tax credits. The studies do not examine the full range of federal, household-level climate tax subsidies, and they entirely neglect the state. This article aims to fill both gaps.

II. STRUCTURE MATTERS.

The structure of a tax subsidy determines which families can realistically take advantage of that subsidy. By structuring subsidies in certain ways, governments can target and advantage certain families over others. In particular, three key structural aspects of tax subsidies can result
in distributional consequences: (1) whether tax incentives are structured as deductions and exclusions or as credits; (2) whether credits are refundable or can be carried forward; and (3) eligibility rules for the tax incentive.

First, whether tax incentives take the form of deductions and exclusions or credits can cause subsidies to differ across income classes. Deductions and exclusions are more regressive because they grant larger benefits to wealthier individuals in higher marginal tax brackets. For example, a $500 tax deduction for energy-efficiency expenditures could be worth $75 to a family that makes $25,000 per year and $165 to a family that makes $250,000 per year. The same $500 tax deduction results in a larger grant to high-income families. In contrast, credits are more progressive because households in different tax brackets receive the same amount of money. For example, a $500 tax credit is worth the same amount—$500—to households that make $25,000 or $250,000 per year (assuming both families have at least $500 in tax liability). Therefore, structuring renewable-energy, energy-efficiency, and alternative-vehicle tax subsidies as deductions and exemptions, rather than credits, will grant greater benefits to higher-income groups.

Although more progressive than deductions and exclusions, tax credits can also be regressive at times. Non-refundable tax credits only allow individuals with positive tax liability to take advantage of them, excluding many low- and middle-income earners entirely or partially. For example, assume a government offers a $10,000 non-refundable tax credit for households that purchase electric vehicles. Assume further that a household makes $25,000 per year and has a tax liability of $1,000. If the household purchases an electric vehicle for $20,000, the household can only claim the...

37. Borenstein & Davis, supra note 19, at 13–15 (showing that 90% of homeowners in the fifth quintile own their home).
38. I assume a marginal tax rate of 15%.
39. I assume a marginal tax rate of 33%. This example ignores issues related to the standard deduction. See, e.g., Dorothy A. Brown, Shades of the American Dream, 87 Wash. U. L. Rev. 329, 334 (2009) (discussing ways in which the standard deduction plays a role in the housing tax policy setting).
credit up to the full amount of their tax liability, in this case $1,000.\textsuperscript{42} In contrast, a household making $400,000 per year with a higher tax liability would be able to claim the full $10,000 credit. Therefore, the same $10,000 tax credit is worth $1,000 to the low-income household and $10,000 to the high-income household. In other words, the low-income household would end up spending $19,000 on the exact same car that the high-income household bought for $10,000. In practice, non-refundable tax credits mean that higher-income families can take greater advantage of tax credits than low- and middle-income families.

Refundability provisions mitigate this issue. Refundable credits allow families to take full advantage of the credits regardless of income.\textsuperscript{43} For example in the above scenario, if the credit is refundable, both families would receive the full $10,000 credit, either in the form of reduced tax liability or a refund for excess credits above their liability. Thus, both families would pay the same amount ($10,000) for the same car. In addition, a refundable credit would provide the same cash payment to households who owe no income tax.

Carry-forward provisions also help ensure that low- and middle-income families can take advantage of a larger amount in credits.\textsuperscript{44} Carry-forward provisions allow families to carry forward any unused tax credits to subsequent tax years. For example in the above scenario, the low-income household could carry forward the excess $9,000 in tax credits for use in later tax years. Assuming that the household continues to have $1,000 in tax liability each year, the family could apply $1,000 in tax credits in year two, $1,000 in year three, and so on. The family could thus receive the full $10,000 credit over ten years instead of one. However, refundable credits are still preferable to carry-forward provisions for a number of reasons. For one, many tax credits with carry-forward provisions include a limit on the number of years that the credit can be carried forward. For example, a carry-forward credit with a three-year cap would only allow the low-income family to receive $3,000 in credits ($1,000 per year for three years)—more than the $1,000 in the scenario above but less than the full $10,000 credit amount. In addition, carry-forward structures grant greater benefits to high-income earners due to upfront costs and the time advantage of money.

\textsuperscript{42} See Neveu & Sherlock, supra note 18, at 63 (stating that taxpayers must have positive tax liability in order to benefit from non-refundable tax credits); see also Borenstein & Davis, supra note 19, at 22 (explaining that a “taxpayer with $500 of tax liability cannot claim $1000 in credits”).

\textsuperscript{43} INST. ON TAXATION & ECON. POLICY, WHO PAYS?: A DISTRIBUTIONAL ANALYSIS OF THE TAX SYSTEMS IN ALL 50 STATES 10 (5th ed. 2015), http://www.itep.org/pdf/whopaysreport.pdf [https://perma.cc/CY64-HZDR].

\textsuperscript{44} See Neveu & Sherlock, supra note 18, at 64 (suggesting that carry-forward provisions address inequity).
Finally, eligibility restrictions may exclude many low- and middle-income households. Categories of eligibility define which households may receive a tax subsidy. Many tax incentives favor owners over renters, excluding, by default, low-income households that lack the upfront capital necessary to purchase various goods or services. For example, tax subsidies targeted at homeowners by nature exclude a large percentage of low-income and minority households because higher proportions of both these populations tend to rent rather than own homes. Approximately 50% of low-income and minority households in the United States rent rather than own their home. In contrast, close to 90% of households in the top 25% of incomes own their home. Furthermore, the overall number of people who rent is growing, with renters becoming increasingly concentrated at lower-income levels. These trends have important implications for climate tax subsidies. Renewable-energy and energy-efficiency tax subsidies targeted at homeowners alone may fail to reach a growing segment of the population, in particular, low-income and minority households.

Leasing versus ownership also affects the adoption of alternative vehicles and renewable-energy systems. Although leasing versus ownership rates for cars do not break down as readily by class as they do in the homeownership context, low-income households do tend to own older,

48. Id. (explaining that renters as a whole are likely to have lower incomes than homeowners across all age groups, with the median income of renters about half that of same-aged owners); see also Brown, supra note 39, at 340 (discussing home-ownership rates by income).
49. Id.
50. Joint Ctr. for Hous. Studies of Harvard Univ., supra note 47, at 17 ("From 1990 to 2010, households with incomes below the national median accounted for 84 percent of the growth in renters, while higher-income households drove virtually all of the growth in owners. Fully 60 percent of the increase in renters came from households in the bottom income quartile alone. By 2010, approximately 70 percent of renter households had incomes below the national median and more than 40 percent had incomes in the bottom quartile.").
51. Various city-level and social differences in homeownership rates also exist. Id. at 16 (explaining that single-parent households are more likely to rent rather than buy, as are households in high-cost housing markets, such as New York City, Los Angeles, San Diego, and Honolulu, where few affordable options exist).
52. Borenstein & Davis, supra note 19, at 12.
less fuel-efficient, higher-polluting, and higher-cost cars. This situation makes it especially important from a climate perspective for these individuals to transition to low-carbon vehicles. However, hybrid and electric vehicles come with high upfront costs. The same holds true for renewable-energy systems. Many renewable-energy systems require upfront costs in the thousands of dollars. Leasing fuel-efficient cars and renewable-energy systems can allow low- and middle-income families to transition to these alternatives in an affordable manner. Therefore, tax-subsidy programs that exclude these categories may have distributional implications.

Structure affects distribution. Deductions, exemptions, and non-refundable tax credits grant more money to high-income earners, while limited categories of eligibility exclude many low-income families. In practice, these structural policy choices mean that many tax subsidies advantage the wealthy over the poor. Only a narrow category of subsidies—refundable tax credits with broad categories of eligibility—do not fit this profile. Refundable tax credits with broad categories of eligibility are the only type of tax subsidy that grant families equal assistance regardless of income. The following section discusses why we should strive for this form of tax subsidy in the climate context.

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57. For example, many credits are simply unavailable to people without the means to purchase the subsidized items. See, e.g., 2016 Federal Tax Credits, ENERGYSTAR, https://www.energystar.gov/about/2016_federal_tax_credits [https://perma.cc/JF3J-7T8T] (last visited Mar. 11, 2017) (listing 2016 tax credits available for the purchase of qualifying, energy-efficient home appliances).


59. Id.
III. WHY WE SHOULD CARE ABOUT THE STRUCTURE OF RENEWABLE-ENERGY, ENERGY-EFFICIENCY, AND ALTERNATIVE-VEHICLE TAX INCENTIVES

We should care how governments structure climate-change tax subsidies for four main reasons. First, it may be more cost-effective for climate-change tax subsidies to target low- and middle-income households rather than high-income earners. Second, providing larger climate-change tax subsidies to high-income families may be economically inefficient. Third, equitable access to climate-change tax incentives may build greater political support for other climate programs. Finally, regressive climate tax subsidies may exacerbate existing income inequality.

Government tax subsidies for renewable energy, energy efficiency, and alternative vehicles can serve multiple goals. First, clean-energy and vehicle tax subsidies aim to correct market failures and encourage consumers to invest in renewable-energy, energy-efficiency, and alternative-vehicle technologies to achieve more widespread deployment. In line with this goal, some have argued that renewable-energy, energy-efficiency, and alternative-vehicle tax subsidies should target high-income earners. Because high-income earners can be motivated by smaller subsidy amounts, governments should actively target high-income earners to bring more people on board for less public dollars spent—or so the argument goes. We should “pursue energy goals as cost-effectively as possible, without regard to distribution.”

However, this theory fails to account for a number of factors specific to the climate context. First, renewable-energy and energy-efficiency improvements often pay for themselves in the form of lower energy costs. On average, solar panels pay for themselves within 7 to 15 years. Energy-efficiency improvements have an average 20% to 30% return on

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61. See, e.g., Schizer, supra note 16, at 44–46 (stating that, even when provided with subsidies, low- and middle-income households are still likely to choose cheaper, conventional vehicles and that alternative-vehicle subsidies offer environmental and national-security benefits for all, not simply private benefits to the vehicle driver).

62. In addition, the positive externalities associated with clean-energy technology adoption (e.g., reduced greenhouse-gas emissions) are the same regardless of who adopts the technology.


investment.\textsuperscript{65} Alternative vehicles, such as hybrid and electric cars, cost less in fuel and maintenance in the long term and, consequently, may have lower lifecycle costs than internal combustion engine vehicles.\textsuperscript{66}

As a result, one of the largest market failures in the clean-energy and alternative-vehicle context may be consumer-credit constraints.\textsuperscript{67} If individuals cannot afford the high upfront costs of these technologies, they will not invest.\textsuperscript{68} Accordingly, the most cost-effective response to this market failure may be to target credit-constrained consumers: low- and middle-income families.\textsuperscript{69} High-income earners can afford to invest the upfront costs and reap the long-term cost savings.\textsuperscript{70} Given the cost-saving potential, high-income families may choose to invest in renewable energy, energy efficiency, and alternative vehicles regardless of the subsidy offered.\textsuperscript{71} Therefore, to the extent that current climate-change subsidies target high-income earners only, they may not reach their maximum cost-effectiveness potential.

Second, providing a larger tax incentive to high-income households may be economically inefficient. As three scholars argue, “providing a larger incentive to higher-income households is economically inefficient unless policymakers have specific knowledge that such households are

\begin{itemize}
  \item \textsuperscript{65} Michael B. Gerrard, The Law of Clean Energy: Efficiency and Renewables 7 (2011).
  \item \textsuperscript{67} Crandall-Hollick & Sherlock, supra note 33, at 6.
  \item \textsuperscript{68} See INT’L RENEWABLE ENERGY AGENCY, supra note 55, at 3 (suggesting that investment in alternative energy developed slowly due to initial high costs).
  \item \textsuperscript{69} Julian Spector, Where America’s Poor Pay the Most for Electricity, CITYLAB (Apr. 14, 2016), http://www.citylab.com/housing/2016/04/electricity-bills-by-city-low-income-costs/478155/ [https://perma.cc/6BF4-WUSZ] (explaining how new efficiency upgrades require high upfront costs that put them out of reach for lower income families).
  \item \textsuperscript{70} See, e.g., The Real Costs of Owning a Hybrid, EDMUNDS (Sept. 9, 2013), https://www.edmunds.com/fuel-economy/the-real-costs-of-owning-a-hybrid.html [https://perma.cc/BX22-PZTE] (discussing the higher cost of hybrid vehicles generally and noting that “about a third of the hybrid models in the market in 2013 will earn back their price premiums in five years or less through fuel savings alone”).
  \item \textsuperscript{71} If high-income earners are not making these investments, consumer information asymmetries may be at play—namely consumers may not know that these are cost-saving investments. In this case, public dollars may be best spent educating the public.
\end{itemize}
more responsive to the incentive or that their engaging in the behavior generates larger social benefits.”

Neither of these exceptions likely applies in the climate-change tax incentive context. As the scholars go on to argue, “a tax incentive provision correcting for positive externalities”—like climate-change tax incentives—“should apply uniformly across the income distribution” to minimize distortions and improve economic efficiency. Tax forms that apply uniformly across income groups, such as refundable tax credits, may reduce deadweight loss, increase economic efficiency, and provide a “more even and widespread motivation for socially valued behavior,” like transitioning to low-carbon energy and vehicle options.

Third, subsidies can help build political support for other short- and long-term climate goals. The environmental movement has a history as a high-income and predominantly white movement. Past waves of the environmental movement have largely ignored poor and minority communities, ultimately hindering the movement’s ability to achieve short- and long-term goals. Environmentalists need to change this dynamic. Putting aside the equity and moral considerations inherent in this dynamic, environmentalists need to build a broader coalition and political support for climate initiatives. In the short term, broader political support will help prevent the movement from being out-maneuvered politically. In the long term, the movement needs broader political support to succeed. Any successful long-term climate strategy will require the United States to fundamentally restructure its economy, its cities, and its people’s lifestyles. As one author observed, this change “is the work of tens of millions, not hundreds of thousands.” To the extent that tax subsidies target and support high-income earners only, they will miss the mark. We need government investments to target a diverse group of families—or at the very least ensure that all families have equal access to subsidies if they desire. This

72. Batchelder et al., supra note 41, at 24.
73. Id. at 27–28. Batchelder, Goldberg, and Orszag also argue that uniform refundable tax credits “further enhance economic efficiency by smoothing household income shocks and macroeconomic fluctuations.” Id. at 24.
74. Id.
75. Jones, supra note 1.
76. Id. (“California provides a cautionary tale; voters there rejected a 2006 ballot measure to fund clean energy research. A small excise tax on the state’s oil extraction would have produced a huge fund, propelling California into the global lead in renewable energy. But the same message that wooed Silicon Valley and Hollywood elites flopped among regular voters. Clean energy proponents ran abstract ads about ‘energy independence’ and the bright eco-future. But big oil spoke directly to pocketbook issues, running ads that warned (falsely) that the tax would send gas prices through the roof. On that basis, an NAACP leader and others joined the opposition. And the measure’s original sky-high support plummeted.”).
77. Id.
78. Id.
investment, in turn, could bring new families into the movement and broaden support for other non-tax clean-energy and climate initiatives.

Finally, regressive clean-energy and vehicle tax subsidies exacerbate existing income inequalities and raise equity concerns. Clean-energy and vehicle tax incentives allow families to transition to these technologies in a cost-effective manner. This transition, in turn, generates environmental and national-security benefits for everyone as well as private benefits to individuals in the form of reduced energy costs. These savings are substantial. The cost savings from going solar alone can reach thousands each year. Low- and middle-income families could use these added dollars. Low-income families spend a higher percentage of their income meeting their energy needs. If clean-energy and vehicle tax subsidies preferentially accrue to high-income earners, the subsidies will exacerbate existing income inequalities. In contrast, if governments make tax subsidies available to all families—or target low-income families specifically—governments will put more money back in the pockets of families who need it most.

In 2007, activist Van Jones argued that the clean-energy investment wave of the present had the opportunity to unite environmentalists and struggling communities to achieve a new green economy. Tax subsidies are a significant part of that wave. If climate subsidies target high-income families only, they will miss this opportunity.

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79. Id.
80. See, e.g., Questions About Going Solar, supra note 56 (stating that the average homeowner saves over $1,000 each year by installing solar panels); see also Zachary Shahan, How Much Are Solar Panels? Wrong Question Ask How Much Solar Panels Can Save You, CLEAN TECHNICA (Feb. 3, 2014), http://cleantechnica.com/2014/02/03/much-can-solar-panels-save/[https://perma.cc/GSX3-6JHA] (demonstrating that over a 20-year period, average savings are as high as $64,769, which breaks down to $3,238 in savings per year); see also JIM KENNERLY & AUTUMN PROUDLOVE, N.C. CLEAN ENERGY TECH. CTR., GOING SOLAR IN AMERICA: RANKING SOLAR’S VALUE TO CONSUMERS IN AMERICA’S LARGEST CITIES 10 (n.d.), https://nccleantech.ncsu.edu/wp-content/uploads/Going-Solar-in-America-Ranking-Solars-Value-to-Customers_FINAL.pdf [https://perma.cc/2QV8-SSNJ] (stating that solar customers save up to $187 per month in the first year).
81. See, e.g., Diana Hernández & Stephen Bird, Energy Burden and the Need for Integrated Low-Income Housing and Energy Policy, POVERTY PUB. POL’Y, Nov. 2010, at 5, 7 (stating that low income and very poor households spend upwards of 10% and 20% of their total household income, respectively, on energy, compared to 5% or less for middle- and upper-income households).
82. Jones, supra note 1.
IV. ANALYZING CURRENT FEDERAL AND STATE, HOUSEHOLD-LEVEL RENEWABLE-ENERGY, ENERGY-EFFICIENCY, AND ALTERNATIVE-VEHICLE AND -FUEL TAX SUBSIDIES

This section analyzes current federal and state renewable-energy, energy-efficiency, and alternative-vehicle and -fuel tax subsidies. I used two Department of Energy databases to catalog all federal and state household-level tax incentives: the Database of State Incentives for Renewables & Efficiency (DSIRE) and the Alternative Fuels Data Center. DSIRE collects information on all state and federal renewable-energy and energy-efficiency initiatives. I used this database to catalog every federal and state, household-level renewable-energy and energy-efficiency tax credit, deduction, exemption, and property tax incentive currently available in the United States: 94 tax incentives total. The Alternative Fuels Data Center provides comparable information for federal and state alternative-vehicle and -fuel initiatives. I used the Alternative Fuels Data Center to catalog every federal and state, household-level alternative-vehicle or -fuel tax credit, deduction, and exemption currently available in the United States: 29 incentives total.

This section analyzes all the state and federal programs identified for certain key distributional criteria. This section is divided into two subsections: (1) energy-efficiency and renewable-energy tax incentives and (2) alternative-vehicle and -fuel tax incentives. Each subsection analyzes the respective programs for the following distributional characteristics: (1) the types of tax incentives available, in particular, whether the incentives


85. See generally DSIRE, supra note 83 (providing a searchable database of state renewable energy incentives).

86. Tables 1–2 detail renewable-energy and energy-efficiency tax deductions and exemptions. Tables 3–5 detail renewable-energy and energy-efficiency tax credits. Section IV(A)(3) details renewable-energy and energy-efficiency property tax incentives. For each of these tables, I filtered by the relevant category (e.g., “personal tax deduction and exemption,” “personal tax credit,” or “property tax incentive”) and limited the applicable sector to “residential” to capture household-level incentives.

take the form of credits or deductions/exemptions; (2) provisions for excess credits (i.e., refundability and carry-forward provisions); and (3) categories of eligibility, specifically whether renters and lessees of homes, renewable-energy systems, and cars qualify as well as owners. As discussed in Part II, each of these characteristics—the type of program, provisions for excess credits, and categories of eligibility—can result in progressive or regressive distribution of climate tax incentive dollars.  

Where possible, I rate each tax credit based on these structural elements to come up with an aggregate measure of progressivity. This measure is of course not a definitive quantitative ranking. Nevertheless, it presents a useful way to compare various incentives. In addition, where possible, I discuss the amount of money flowing through each subsidy program. Unfortunately, many states do not release this information, so monetary data for the state level is limited.  

Despite these limitations, the overall data indicates that state programs are more progressive than their federal counterparts.

A. Energy-Efficiency and Renewable-Energy Tax Incentives

Eighteen states, the federal government, and Puerto Rico currently offer a renewable-energy or energy-efficiency tax deduction or credit. States offer 29 of these incentives, the federal government offers 3, and Puerto Rico offers 1. Approximately 30% of the incentives take the form of deductions or exemptions (ten deductions/exemptions total) and 70% take the form of tax credits (23 credits total).

1. Tax Deductions and Exemptions

Governments currently offer ten renewable-energy or energy-efficiency deductions and exemptions. The federal government offers one exemption. Six different states and one territory offer the remaining nine deductions. Five deductions cover renewable energy, and five cover energy-efficiency improvements.

89. See supra Part II.
90. See generally DSIRE, supra note 83 (listing state tax incentive information).
91. See generally infra Tables 1–6 (detailing and ranking state and federal tax incentive programs according to progressivity).
92. See infra Tables 1–5.
93. Id.
94. Id.; see also DSIRE, supra note 83 (listing 10 different personal tax deduction programs and 39 different personal tax credit programs).
Table 1. Federal and State Renewable-Energy Tax Deductions

<table>
<thead>
<tr>
<th>Entity</th>
<th>Program Title</th>
<th>Home Renters Eligible</th>
<th>Monetary Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>Wood-Burning Heating System Deduction</td>
<td>Yes</td>
<td>Maximum Incentive: None</td>
</tr>
<tr>
<td>Arizona</td>
<td>Qualifying Wood Stove Deduction</td>
<td>Yes</td>
<td>Maximum Incentive: $500</td>
</tr>
<tr>
<td>Idaho</td>
<td>Residential Alternative Energy Tax Deduction</td>
<td>Unclear(^{96})</td>
<td>Maximum Incentive: $5,000 per year; $20,000 total</td>
</tr>
<tr>
<td>Indiana</td>
<td>Income Tax Deduction for Solar-Powered Roof Vents or Fans</td>
<td>Yes</td>
<td>Maximum Incentive: $1,000</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>Tax Deduction for Solar Energy Systems</td>
<td>Yes</td>
<td>Maximum Incentive: $1,500</td>
</tr>
</tbody>
</table>

\(^{95}\) The information included in Tables 1–2 is based on the Department of Energy’s Database of State Incentives for Renewables & Efficiency, filtered to only include the Program Types “Personal Tax Deduction” and “Personal Tax Exemption” and the “Residential” sector.

\(^{96}\) Email from Scott Pugrud, Attorney/Program Manager, Idaho Governor’s Office of Energy Res., to author (Apr. 22, 2016).
Table 2. Federal and State Energy-Efficiency Tax Deductions

<table>
<thead>
<tr>
<th>Entity</th>
<th>Program Title</th>
<th>Home Renters Eligible</th>
<th>Monetary Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>Residential Energy Conservation Subsidy Exclusion&lt;sup&gt;97&lt;/sup&gt;</td>
<td>Yes</td>
<td>Maximum Incentive: None</td>
</tr>
<tr>
<td>Idaho</td>
<td>Income Tax Deduction for Energy-Efficiency Upgrades</td>
<td>Unclear (primary residence only)&lt;sup&gt;98&lt;/sup&gt;</td>
<td>Maximum Incentive: None</td>
</tr>
<tr>
<td>Indiana</td>
<td>Income Tax Deduction for the Installation of Building Insulation</td>
<td>Yes</td>
<td>Maximum Incentive: $1,000</td>
</tr>
<tr>
<td>Missouri</td>
<td>Tax Deduction for Home Energy Audits and Energy-Efficiency Improvements</td>
<td>No</td>
<td>Maximum Incentive: $1,000 per year for individual taxpayers; $2,000 per year for married taxpayers filing jointly</td>
</tr>
<tr>
<td>Virginia</td>
<td>Income Tax Deduction for Energy-Efficient Products&lt;sup&gt;99&lt;/sup&gt;</td>
<td>Yes</td>
<td>Maximum Incentive: $500</td>
</tr>
</tbody>
</table>

From a distributional perspective, the deductions that states and the federal government offer are inclusive in terms of eligibility categories. Six state deductions and the federal exemption clearly include home renters.<sup>100</sup> In addition, from a big-picture perspective, rather than offer deductions, many states and the federal government choose to focus the bulk of their climate-tax-subsidy dollars in the form of credits.<sup>101</sup> For example, the federal tax exemption simply excludes all energy conservation subsidies...

97. The federal program focuses on energy conservation but may include renewable components. As DSIRE notes: “The term ‘energy conservation measure’ includes installations or modifications primarily designed to reduce consumption of electricity or natural gas, or to improve the management of energy demand . . . . The definition of ‘energy conservation measure’ implies that utility rebates for residential solar-thermal projects and photovoltaic (PV) systems may be non-taxable. However, the IRS has not ruled definitively on this issue.” Residential Energy Conservation Subsidy Exclusion (Personal), DSIRE N.C. CLEAN ENERGY TECH. CTR. (May 26, 2016), http://programs.dsireusa.org/system/program/detail/666 [https://perma.cc/6EMY-8TKU].
98. Email from Scott Pugrud, supra note 96.
99. This deduction also applies to fuel cells. Income Tax Deduction for Energy-Efficient Products, DSIRE N.C. CLEAN ENERGY TECH. CTR. (Nov. 7, 2014), http://programs.dsireusa.org/system/program/detail/4362 [https://perma.cc/FLL4-7SMP].
100. See supra Tables 1–2.
101. Compare supra Tables 1–2 (listing federal and state renewable-energy and energy-efficiency deductions), with infra Tables 3–5 (listing federal and state renewable-energy and energy-efficiency credits).
provided to customers by public utilities. Rather, the bulk of federal tax incentives take the form of tax credits as discussed in the following subsection. Of the six state deductions, two states also offer tax credits. Overall, only four states offer renewable-energy and/or energy-efficiency tax deductions alone.

2. Tax Credits

Fourteen states and the federal government offer 23 household-level renewable-energy and energy-efficiency tax credits collectively, with states responsible for 21 of these credits and the federal government responsible for 2. The states that offer these credits vary both in geographic location and political ideology, including Arizona, Hawaii, Iowa, Louisiana, Massachusetts, Maryland, Montana, Nebraska, New Mexico, New York, Oregon, South Carolina, Utah, and Virginia. Of the 23 credits, the majority focus on renewable energy with 17 renewable-energy credits, 4 energy-efficiency credits, and 2 credits that cover both renewable-energy and energy-efficiency measures. The credits offered differ greatly in both amount and structure. I rate the credits according to the following progressivity point system: three points for refundable credits, two points for credits that can be carried forward for five years or more, one point for credits that can be carried forward for less than five years, one point for credits that allow tenants to qualify, and one point for credits that apply to leased renewable-energy systems, yielding a maximum five points possible for renewable-energy and four points possible for energy-efficiency. This measure is of course not a definitive quantitative ranking. Nevertheless, it presents a useful way to

103. See infra Tables 3–5.
104. Compare supra Tables 1–2 (listing federal and state renewable-energy and energy-efficiency deductions), with infra Tables 3–5 (listing federal and state renewable-energy and energy-efficiency credits).
105. See supra Tables 1–2; see infra Tables 3–5.
106. See infra Tables 3–5 (showing that many of these credits are available to businesses as well as households).
107. Id.; DSIRE, supra note 83.
108. See id. (listing whether the program is focused on renewable energy credits, energy efficiency credits, or both renewable-energy and energy-efficiency credits).
109. See infra Tables 3–5 (detailing the amount and structure of credits offered).
110. I should note that the federal government and some states have matching corporate tax credits that allow the lessor of solar systems to qualify for the credit. For example, companies such as Solar City receive a tax credit from the federal government when they install leased systems. This setup allows these companies to lower the rental costs for the lessee. Therefore, the individual rating system for leased systems may not capture the full picture.
compare various incentives. I code subsidies with a score of 0–1 as more regressive (red); scores of 2–3 as mixed (yellow); and scores of 4–5 as progressive (green). The following three charts summarize the programs. Where possible, I include monetary data in the last column.

Table 3. Federal and State Renewable-Energy Tax Credits

<table>
<thead>
<tr>
<th>Entity</th>
<th>Program Title</th>
<th>Rating</th>
<th>Carryover</th>
<th>Refundable</th>
<th>Home Renters/Rented Systems</th>
<th>Monetary Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>Residential Renewable Energy Tax Credit</td>
<td>1</td>
<td>Yes (up to one year)</td>
<td>No</td>
<td>No (Homes) No (Systems)</td>
<td>Maximum Incentive: No maximum credit for solar-electric systems, solar water heaters, wind turbines, or geothermal heat pumps. For fuel cells, there is a maximum credit of $500 per 0.5 kW. Budget: No maximum budget. In 2010, 2011, and 2012, the federal government spent $754 million, $921 million, and $818 million respectively on this program.</td>
</tr>
<tr>
<td>Arizona</td>
<td>Residential Solar &amp; Wind Energy Systems Credit</td>
<td>3</td>
<td>Yes (up to five years)</td>
<td>No</td>
<td>Yes (Homes) No (Systems)</td>
<td>Maximum Incentive: $1,000 maximum credit per residence. Budget: No maximum budget.</td>
</tr>
</tbody>
</table>

111. The information included in Tables 3–5 is based on the Department of Energy’s Database of State Incentives for Renewables & Efficiency, filtered to only include the Program Type “Personal Tax Credit” and the “Residential” sector.
112. Borenstein & Davis, supra note 19, at 10.
<table>
<thead>
<tr>
<th>State</th>
<th>Renewable Energy Technologies Income Tax Credit</th>
<th>3</th>
<th>Yes (until exhausted)</th>
<th>Yes, under certain conditions(^{113})</th>
<th>No (Homes) (^{114}) No (Systems)</th>
<th>Maximum Incentive: Varies by technology and property type.(^{115}) Budget: No maximum budget.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hawaii</td>
<td>Geothermal Heat Pump Tax Credit</td>
<td>2</td>
<td>Yes (up to ten years)</td>
<td>No</td>
<td>No (Homes) (^{116}) N/A (Systems)</td>
<td>Maximum Incentive: None Budget: No maximum budget.</td>
</tr>
<tr>
<td>Iowa</td>
<td>Solar Energy Systems Tax Credit</td>
<td>2</td>
<td>Yes (up to ten years)</td>
<td>No</td>
<td>No (Homes) (^{116}) No (Systems)</td>
<td>Maximum Incentive: $5,000 maximum credit per residence. Budget: $5 million cumulative limit per year (both personal and corporate) with a minimum of $1 million reserved for residential solar installations. Credits granted on a first-come, first-served basis.</td>
</tr>
<tr>
<td>Iowa</td>
<td>Tax Credit for Solar Energy Systems on Residential Property</td>
<td>4</td>
<td>No</td>
<td>Yes</td>
<td>No (Homes) (^{117}) Yes (Systems)</td>
<td>Maximum Incentive: $10,000 per customer-owned system and $7,600 per leased system. One installed system per residence. Budget: $10 million limit for FY2016 and FY2017; $5 million limit for FY2018. Credit granted on a first-come, first-served basis.</td>
</tr>
<tr>
<td>Louisiana</td>
<td>Residential Renewable Energy Income Tax Credit</td>
<td>3</td>
<td>Yes (up to three years)</td>
<td>No</td>
<td>Yes (Homes) (^{117}) Yes (Systems)</td>
<td>Maximum Incentive: $1,000 Budget: No maximum budget.</td>
</tr>
</tbody>
</table>

113. HAW. REV. STAT § 235-12.5 (2016). A new provision was added to the tax credits in June of 2009 under SB 464. Id. This legislation, effective July 1, 2009, allows the tax credit to be refundable under certain conditions. Id. For solar energy systems, all taxpayer can elect to reduce the eligible credit amount by 30%, and if this reduced amount exceeds the amount of income taxes to be paid by the taxpayer, the excess credit will be refunded to the taxpayer. Id. For taxpayers whose entire income is exempt or whose adjusted gross income is $20,000 or less (or $40,000 or less if filing jointly), these taxpayers may elect to receive any excess credit for any renewable energy technology systems as a refund. Id.

114. The company that leases the system would receive the credits. Telephone Interview with Haw. Dep’t of Taxation (Apr. 22, 2016).

115. For example, for photovoltaic and solar space heating systems, there is a limit of $5,000 for older single-family residential properties, $2,250 for new single-family residential properties, and $350 per unit for multi-family residential properties.

116. Technically, leased systems qualify, but only one individual can claim the credit. Because the solar-leasing company would own the system, the company would claim the credit over the lessee; this is similar to the federal credit. Telephone Interview with Jennifer, Iowa Dep’t of Revenue (Apr. 22, 2016).

<table>
<thead>
<tr>
<th>State</th>
<th>Credit Description</th>
<th>Eligible</th>
<th>Expired</th>
<th>Incentive</th>
<th>Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maryland</td>
<td>Bio-Heating Oil Tax Credit</td>
<td>0</td>
<td>No</td>
<td>N/A (Homes) N/A (Systems)</td>
<td>Maximum Incentive: $500 per year. Budget: No maximum budget.</td>
</tr>
<tr>
<td>Montana</td>
<td>Residential Alternative Energy System Tax Credit</td>
<td>2</td>
<td>Yes (up to four years)</td>
<td>No</td>
<td>Yes (Homes) No (Systems)</td>
</tr>
<tr>
<td>Montana</td>
<td>Residential Geothermal Systems Credit</td>
<td>3</td>
<td>Yes (up to seven years)</td>
<td>No</td>
<td>Yes (Homes) N/A (Systems)</td>
</tr>
<tr>
<td>Nebraska</td>
<td>Renewable Energy Tax Credit</td>
<td>0</td>
<td>No</td>
<td>Unclear (Homes) No (Systems)</td>
<td>Maximum Incentive: None Budget: $50,000</td>
</tr>
<tr>
<td>New Mexico</td>
<td>Solar Market Development Tax Credit</td>
<td>2</td>
<td>Yes (up to ten years)</td>
<td>No</td>
<td>No (Homes) N/A (Systems)</td>
</tr>
<tr>
<td>New Mexico</td>
<td>Geothermal Heat Pump Tax Credit</td>
<td>2</td>
<td>Yes (up to ten years)</td>
<td>No</td>
<td>No (Homes) N/A (Systems)</td>
</tr>
<tr>
<td>New York</td>
<td>Residential Solar Tax Credit</td>
<td>3</td>
<td>Yes (up to five years)</td>
<td>No</td>
<td>No (Homes) Yes (Systems)</td>
</tr>
<tr>
<td>New York</td>
<td>Refundable Clean Heating Fuel Tax Credit</td>
<td>3</td>
<td>No</td>
<td>Yes</td>
<td>N/A (Homes) N/A (Systems)</td>
</tr>
<tr>
<td>South Carolina</td>
<td>Solar Energy and Small Hydropower Tax Credit</td>
<td>2</td>
<td>Yes (up to ten years)</td>
<td>No</td>
<td>No (Homes) No (Systems)</td>
</tr>
</tbody>
</table>

118. For all three Montana tax credits, the credit applies to the person who made the investment regardless of renter/owner status. Telephone Interview with Kathy Montgomery, Mont. Dep’t of Envtl. Quality (Apr. 22, 2016). In addition, Kathy mentioned that Montana currently does not have any companies that lease solar systems. *Id.*
<table>
<thead>
<tr>
<th>Entity</th>
<th>Program Title</th>
<th>Rating</th>
<th>Carryover</th>
<th>Refundable</th>
<th>Home Renters/ Rented Systems</th>
<th>Monetary Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>Residential Energy Efficiency Tax Credit</td>
<td>0</td>
<td>No</td>
<td>No</td>
<td>No (Homes) N/A (Systems)</td>
<td>Maximum Incentive: For purchases made from 2011 to 2016, the credit is limited to $500. Budget: No maximum budget. In 2011 and 2012, the federal government spent $755 million and $449 million respectively on this program.119</td>
</tr>
<tr>
<td>Montana</td>
<td>Energy Conservation Installation Credit</td>
<td>1</td>
<td>No</td>
<td>No</td>
<td>Yes (Homes) N/A (Systems)</td>
<td>Maximum Incentive: $500 per individual and up to $1,000 for a married couple filing jointly. Budget: No maximum budget.</td>
</tr>
<tr>
<td>South Carolina</td>
<td>Energy Efficient Manufactured Homes Incentive Tax Credit</td>
<td>0</td>
<td>No</td>
<td>No</td>
<td>No (Homes) N/A (Systems)</td>
<td>Maximum Incentive: $750 Budget: No maximum budget.</td>
</tr>
</tbody>
</table>

119. Borenstein & Davis, supra note 19, at 10.
Virginia Department of Public Utilities: Energy Conservation Credits

<table>
<thead>
<tr>
<th>Entity</th>
<th>Program Title</th>
<th>Rating</th>
<th>Carryover</th>
<th>Refundable</th>
<th>Home Renters/Rented Systems</th>
<th>Monetary Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Mexico</td>
<td>Sustainable Building Tax Credit</td>
<td>2</td>
<td>Yes (up to seven years)</td>
<td>No</td>
<td>No (Homes) N/A (Systems)</td>
<td>Maximum Incentive: Varies Budget: $4 million annually through 2016; $3.375 million annually through 2026.</td>
</tr>
<tr>
<td>Oregon</td>
<td>Residential Energy Tax Credit</td>
<td>4</td>
<td>Yes (up to five years)</td>
<td>No</td>
<td>Yes (Homes) Yes (Systems)</td>
<td>Maximum Incentive: $750 to $6,000 based on technology. Budget: No maximum budget.</td>
</tr>
</tbody>
</table>

The 2 federal credits scored as some of the most regressive of the 23 total credits. The federal credits do not apply to rental housing, neither credit is refundable, and only one credit can be carried forward and even then, only up to one year.\(^\text{120}\) In contrast, three state credits are refundable and two-thirds of the state provisions (14 total) allow excess credits to carry over.\(^\text{121}\) Most of these credits can be carried forward for five years or more.\(^\text{122}\) Overall, the state credits are more progressive than the federal credits in this area.

\(^\text{120}\) See supra Tables 3–5 (indicating that both federal credits do not apply to rental housing, are non-refundable, and only one credit can be carried forward for up to one year).

\(^\text{121}\) See supra Tables 3–5 (showing which states provide refundable energy tax credits); see also DSIRE, supra note 83 (providing data on state and federal tax incentives).

\(^\text{122}\) See supra Tables 3–5 (showing that of the 14 state tax credits listed that allow carryover, 11 may be carried forward for five or more years).
The regressivity of federal programs may be particularly concerning if significant monetary scale differences exist between federal and state programs. In 2013, for example, the two federal programs were responsible for over $1.6 billion in expenditures—equivalent to approximately $5 per person in the United States. In contrast, 6 of the 21 state programs have budgetary caps ranging from $50,000 per year to $10 million per year. Per capita expenditure estimates for these programs range from $0.02 per person in Nebraska to $2.15 per person in Louisiana and $5.27 per person in New Mexico. The remaining 15 state programs do not include any budgetary limits. Unfortunately, these state governments do not release information about how much they actually spend on the tax credits, making monetary comparison to the federal programs difficult.

3. Property Tax Incentives

Many states also offer a variety of renewable-energy and energy-efficiency property tax incentives. Currently, 32 states (and local governments within those states), Washington, D.C., Puerto Rico, and the

123. See INDIVIDUAL INCOME TAX RETURNS 2013, supra note 3, at 142 (showing that residential energy credits alone exceeded $1.6 billion).
125. See supra Tables 3–5.
126. Nebraska has a budgetary cap of $50,000 and a population of 1.882 million. See supra Table 3 (indicating Nebraska’s budgetary cap of $50,000); see also QuickFacts: Nebraska, U.S. CENSUS BUREAU, http://www.census.gov/quickfacts/chart/AGE295213/31 [https://perma.cc/6CBY-VLQK] (last visited Mar. 11, 2017) (illustrating Nebraska has a population of just over 1.9 million).
129. See supra Tables 3–5; see also DSIRE, supra note 83.
130. I attempted to get this information from several states, including New York. However, New York and other states do not collect this tax expenditure information.
131. State and local governments levy property taxes. Therefore, there are not any comparable federal incentives. It should be noted that, by definition, someone must own property to qualify for these incentives. Therefore, renters are by definition excluded.
132. The states include Alaska, Arizona, California, Colorado, Connecticut, Florida, Hawaii, Iowa, Illinois, Indiana, Kansas, Louisiana, Massachusetts, Maryland, Minnesota, Missouri, Montana, North Carolina, North Dakota, New Hampshire, New Jersey, New Mexico, Nevada, New York, Ohio, Rhode Island, South Dakota, Tennessee, Texas, Virginia, Vermont, and Wisconsin. Many of the enactment dates are much earlier for these property tax incentives. See generally DSIRE, supra note 83 (listing renewable-energy and energy-efficiency property tax incentives by state).
Virgin Islands offer at least 61 renewable-energy and energy-efficiency property tax incentives. The majority of the property tax incentives focus on renewable-energy: 46 incentives cover renewable energy, 2 focus exclusively on energy efficiency, and 13 cover both renewable energy and energy efficiency.

Of the 46 renewable-energy incentives, an additional majority of the incentives either create a statewide property tax exemption for renewable-energy systems or authorize local governments to pass ordinances that do the same. In other words, for property tax assessment purposes, renewable-energy systems add no value to the property. Overall, 41 incentives—two-thirds of the total incentives available—establish some form of renewable-energy property tax exemption. Many of the energy-efficiency measures also take the form of property tax exemptions for energy conservation devices or energy-efficient buildings (often defined according to national or state standards, such as the Leadership in Energy and Environmental Design standard).

A few states and local governments offer a renewable-energy or energy-efficiency property tax abatement or property tax credit instead of, or in addition to, a property tax exemption. For example, New York City allows taxpayers to deduct installation costs of a solar photovoltaic system from their real property taxes. Maryland, on the other hand, offers local renewable-energy and energy-efficiency property tax credits—the only state to do so.

From a distributional perspective, the structure of these property tax programs matters less because governments frequently fix property tax rates to fair-market value of the property rather than income. More significantly, however, these subsidies only apply to owners and therefore, may be a significant grant of taxpayer dollars to wealthier individuals. Unfortunately, I was unable to find any information regarding the amount of money flowing through these programs and which families benefit most. Future research is needed in this area.

133. Id.
134. Renewable energy property owners can take advantage of these tax exemptions for varying lengths of time, ranging from five years or less to indefinitely.
137. See DSIRE, supra note 83 (use the filters to select Maryland and property tax incentive). Many of these credits can be carried forward.
B. Alternative-Vehicle and -Fuel Tax Incentives

Fifteen states, the federal government, and Washington, D.C., currently offer 29 alternative-vehicle and -fuel tax incentives. The federal government offers 3 incentives, state governments offer 24 incentives, and Washington, D.C., offers 2 incentives. From a structural perspective, half of the incentives (14 total) take the form of an income tax credit—a slightly lower proportion than in the renewable-energy and energy-efficiency context.

Twelve of the remaining 15 incentives take the form of a tax exemption (e.g., for excise tax, sales tax, use tax, and gas tax, among others). For example, Washington exempts natural gas used as a transportation fuel from state and local sales, use, and public utility taxes. The final three incentives take some other format (e.g., a reduced license tax, reduced sales tax, and reduced fuel tax), which apply equally across income groups. Because the tax exemptions and reduced taxes involve more minor dollar amounts and no large structural choices, the next subsection will primarily focus on vehicle tax credits.

Tax Credits

The majority of the tax credits available apply toward the purchase or lease of an alternative-fuel vehicle or conversion of an existing vehicle to an alternative-fuel vehicle. Eleven of the 14 tax credits apply toward the purchase, lease, or conversion price of an alternative-fuel vehicle, including all 3 federal tax credits. Several of these credits also apply to the purchase and installation of charging equipment. Two additional credits

138. The states include Arizona (three incentives), California, Colorado (two incentives), Indiana, Louisiana, Maryland (two incentives), Montana, New Jersey (two incentives), Oklahoma (three incentives), Oregon, Rhode Island, South Carolina, South Dakota, Utah (two incentives), Washington (two incentives), West Virginia, and Wisconsin (two incentives). See infra Table 6 (listing vehicle tax incentives).
139. Id.; see also DSIRE, supra note 83 (providing data on state tax incentives).
140. See infra Table 6 (describing federal and state vehicle tax incentives).
141. Id.
143. WASH. REV. CODE §§ 82.08.809, 82.12.809 (2016).
144. See infra Table 6 (indicating that Arizona has a reduced license tax, New Jersey has a reduced sales tax, and Utah has a reduced fuel tax).
145. See infra Table 6 (characterizing 12 state vehicle incentives as tax credits).
146. See infra Table 6 (detailing programs in Arizona, Louisiana, Maryland, and Washington, D.C., that provide for purchase or installation of charging equipment).
offered by Arizona and Maryland apply solely toward the installation of electric-vehicle equipment.\textsuperscript{147} The remaining credit—offered by Maryland—applies against the excise tax (up to $3,000) for plug-in electric vehicles.\textsuperscript{148}

Similar to Part IV(A)(2), I rate the credits according to the following progressivity point system: three points for refundable credits, two points for credits that can be carried forward for five years or more, one point for credits that can be carried forward for less than five years, and one point for credits that apply to leased cars, yielding a maximum four points possible. I code subsidies with a score of 0 as regressive (red); scores of 1–2 as mixed (yellow); and scores of 3–4 as progressive (green). As before, this measure is of course not a definitive quantitative ranking. However, it presents a useful way to compare various incentives. The following chart summarizes the programs. Where possible, I include monetary data in the last column.

Table 6. Federal and State Vehicle and Fuel Tax Incentives\textsuperscript{149}

<table>
<thead>
<tr>
<th>Entity</th>
<th>Title</th>
<th>Rating</th>
<th>Carryover</th>
<th>Refundable</th>
<th>Car Renters Eligible</th>
<th>Monetary Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>Qualified Two-Wheeled Plug-In Electric Drive Motor Vehicle Credit</td>
<td>0</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Maximum Incentive: $2,500 Budget: No maximum budget. In 2012 and 2013, the federal government spent $4.8 million and $760,000 respectively on this program.\textsuperscript{150}</td>
</tr>
<tr>
<td>United States</td>
<td>Fuel Cell Motor Vehicle Credit</td>
<td>0</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Maximum Incentive: $8,000 Budget: No maximum budget. In 2011, 2012,</td>
</tr>
</tbody>
</table>


\textsuperscript{149} The information included in Table 6 is based on data from the Alternative Fuels Data Center. See supra text accompanying note 88 (for information on methodology).

\textsuperscript{150} Borenstein & Davis, supra note 19, at 10–11; INDIVIDUAL INCOME TAX RETURNS 2013, supra note 3.
and 2013, the federal government spent $14 million, $20 million, and $12.5 million on this program respectively.151

<table>
<thead>
<tr>
<th>State</th>
<th>Program Description</th>
<th>Year</th>
<th>Non-Residential Credit</th>
<th>Residential Credit</th>
<th>Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>Qualified Plug-In Electric Drive Motor Vehicle Credit</td>
<td>0</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Arizona</td>
<td>Residential Electric Vehicle Supply Equipment Credit</td>
<td>1</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Colorado</td>
<td>Alternative Fuel, Advanced Vehicle, &amp; Idle Reduction Technology Credit</td>
<td>4</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Louisiana</td>
<td>Alternative Fuel Vehicle &amp; Fueling Infrastructure Credit</td>
<td>3</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Maryland</td>
<td>Electric Vehicle Supply Equipment</td>
<td>0</td>
<td>No</td>
<td>No</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Maximum Incentive: $7,500
Budget: No maximum budget but phased out after 200,000 purchases per manufacturer. In 2011, 2012, and 2013, the federal government spent $76 million, $139 million, and $231 million on this program respectively.152

Maximum Incentive: $75
Budget: No maximum budget.

Maximum Incentive: Varies based on category, vehicle weight, and tax year. Budget: Annual credit caps for each technology type and vehicle weight class, and for cumulative annual credits.

Maximum Incentive: No limit on conversion; limit of $1,500 for new cars. Budget: No maximum budget.

Maximum Incentive: $400 ($900 for rebate system).153

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151. Id.
152. Id.
<table>
<thead>
<tr>
<th>State</th>
<th>Credit</th>
<th>Credits</th>
<th>Ret.</th>
<th>Yes</th>
<th>Budget:</th>
<th>Maximum Incentive:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maryland</td>
<td>Plug-In Electric Vehicle Credit</td>
<td>4</td>
<td>No</td>
<td>Yes</td>
<td>$600,000 per year.</td>
<td>$3,000</td>
</tr>
<tr>
<td>Montana</td>
<td>Alternative Fuel Vehicle Conversion Credit</td>
<td>0</td>
<td>No</td>
<td>No</td>
<td>No maximum budget.</td>
<td>$500</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>Alternative Fuel Vehicle Credit</td>
<td>2</td>
<td>Yes</td>
<td>No</td>
<td>No maximum budget.</td>
<td>No limit in certain circumstances; $1,500 limit in others.</td>
</tr>
<tr>
<td>South Carolina</td>
<td>Plug-In Hybrid Electric Vehicle Credit</td>
<td>3</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>$2,000 per year, available on a first-come, first-served basis.</td>
</tr>
<tr>
<td>Utah</td>
<td>Alternative Fuel &amp; Fuel-Efficient Vehicle Credit</td>
<td>1</td>
<td>No</td>
<td>Yes</td>
<td>Maximum Incentive: $1,000 for plug-in hybrids; $1,500 for electric, natural gas and propane vehicles; $2,500 for vehicles conversions. Budget: No maximum budget.</td>
<td></td>
</tr>
<tr>
<td>Washington, D.C.</td>
<td>Alternative Fuel Vehicle &amp; Infrastructure Credit</td>
<td>2</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>$19,000 for vehicle; $1,000 for charging equipment. Budget: No maximum budget.</td>
</tr>
<tr>
<td>West Virginia</td>
<td>Alternative Fuel Vehicle Credit</td>
<td>1</td>
<td>Yes</td>
<td>No</td>
<td>No maximum budget.</td>
<td></td>
</tr>
</tbody>
</table>

This program was changed to a rebate system in 2014. *Id.* For systems purchased on or after July 1, 2014, the Electric Vehicle Supply Equipment Rebate Program applies instead. *Id.* This rebate program is more generous than the credit program. *Id.* The rebate is worth 50% of the purchase and installation cost up to $900. *Id.*
As in the renewable-energy and energy-efficiency context, state programs appear to be more progressive than their federal counterparts. Many of the state-level tax credits have more inclusive categories of eligibility. Six of the state credits apply to both owners and lessees. In contrast, all three federal credits exclude lessees of vehicles. Many of the state tax credits also include excess credit provisions. Four state credits include carryover provisions, three state credits are refundable, and one government immediately returns tax credits to taxpayers in the form of a check. In contrast, taxpayers cannot carry forward or refund credits for any of the federal programs—all of the credits must be used in the year of purchase to offset tax liability or not at all.

Again, the regressivity of federal programs may be particularly concerning if significant monetary scale differences exist between federal and state programs. In 2012, for example, the federal government spent over $163.8 million on the above three vehicle tax credit programs—equivalent to approximately $0.52 per person in the United States. At the state level, 3 of the 11 state programs have budgetary caps. For example, South Carolina capped their program at $200,000 per year, equivalent to a per capita expenditure of $0.04. The remaining state programs do not include any budgetary limits. Similar to the renewable-energy and energy-efficiency context, information as to how much governments actually spend on the tax credits in these states is not available, making comparison to the federal programs difficult.

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154. See supra Table 6.
155. Id.
156. Id. (indicating that Oklahoma, South Carolina, Washington, D.C., and West Virginia have carryover provisions; that Colorado, Louisiana, and Maryland have refundable credits; and that Maryland returns tax credits in the form of a check).
157. See supra Table 6.
158. Borenstein & Davis, supra note 19, at 10.
159. The population of the United States was approximately 316.5 million in 2013. U.S. and World Population Clock, supra note 124.
160. See supra Table 6 (outlining budgetary caps associated with state vehicle tax incentives); see also DSIRE, supra note 83 (providing data on state and federal tax incentives).
162. Again, I attempted to collect this information from several states; however, it was unavailable.
V. REFORMING SUBSIDIES TO REACH LOW- AND MIDDLE-INCOME FAMILIES

As indicated in Part IV, many current tax subsidies—in particular, federal tax subsidies—include regressive structures. Data from the Internal Revenue Service indicate that regressive structures result in distributional consequences.163 For example, from 2006 to 2012, the top 40% of households received over 90% of all federal tax credit dollars for the federal renewable-energy, energy-efficiency, and alternative-vehicle subsidies discussed above.164 Regressive subsidies may not achieve their full potential in terms of impact, efficiency, and cost-effectiveness. Federal and state governments should reform regressive subsidies to improve the cost-effectiveness and efficiency of the programs, garner broader political support, and assuage income inequality concerns under existing structures.

This section proposes several ways to achieve these goals. Because governments cannot reform the structure of deductions and property tax incentives other than by switching to a new format entirely (i.e., a credits structure), this section focuses solely on how governments can reform existing tax credits.165 In particular, the section examines three major issues currently preventing low- and middle-income families from taking advantage of existing credits: (1) non-refundability of credits; (2) principal–agent issues in the landlord–tenant context; and (3) high upfront costs of renewable-energy systems, energy-efficiency improvements, and alternative-fuel vehicles. Several state programs incorporate innovative solutions to these issues. This section highlights best practices from state programs and discusses alternate ways governments can combat these three obstacles.

A. Refundability and Carry-Forward Provisions: Ensuring All Families Have Access to the Same Amount in Credits

Non-refundable tax credits exclude many low- and middle-income families. In 2012, for example, 36% of taxpayers166 had no positive tax

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163. See INDIVIDUAL INCOME TAX RETURNS 2013, supra note 3, at 29–31 (illustrating the distribution of returns based on income).
164. The top 20% of households received 60% of the credit dollars. Borenstein & Davis, supra note 19, at 1.
166. Overall, 51.8 million out of 144.9 million tax returns had no tax liability. Borenstein & Davis, supra note 19, at 24; see also Neveu & Sherlock, supra note 18, at 63 (noting that an estimated 46% of households had no income tax liability in 2011).
liability.\textsuperscript{167} Among those with less than $20,000 in adjusted gross income, approximately 85\% had no tax liability.\textsuperscript{168} Many other taxpayers had limited positive tax liability.\textsuperscript{169} These statistics indicate that over a third of taxpayers cannot take advantage of any of the federal renewable-energy, energy-efficiency, and alternative-vehicle tax credits due to structural limitations. Many more taxpayers can only claim partial credit. Many of these same taxpayers also would not be able to take advantage of the various state credits.\textsuperscript{170}

Several state credits offer models for how governments can reform existing climate-change tax credits to ensure that all families can take advantage of the credits, regardless of income.\textsuperscript{171} Louisiana and Hawaii offer models in the renewable-energy and energy-efficiency context. Louisiana’s Tax Credit for Solar Energy Systems on Residential Property, for example, includes a standard refundability provision.\textsuperscript{172} This provision states that the government will refund any excess credits—up to the full incentive amount of $10,000 for customer-owned systems and $7,600 for leased systems—that exceed the taxpayer’s liability for that year.\textsuperscript{173}

Hawaii offers an example of an alternative, tiered model. Under Hawaii’s Renewable Energy Technologies Income Tax Credit, the government refunds excess credits under certain conditions.\textsuperscript{174} For individuals whose income is tax-exempt or with an adjusted gross income of $20,000 or less ($40,000 or less for married couples filing jointly), the taxpayer can elect to either receive excess credits as a refund or carry

\begin{itemize}
\item \textsuperscript{167} Borenstein & Davis, supra note 19, at 24.
\item \textsuperscript{168} Id.
\item \textsuperscript{169} Id.
\item \textsuperscript{170} Only three state renewable-energy and energy-efficiency credits are refundable; however, two-thirds of the state credits can be carried forward.
\item \textsuperscript{171} As one author commented, there is no “coherent economic argument for making these credits non-refundable. From an efficiency perspective, there is nothing fundamentally different between filers with positive and negative tax liability, and from a distributional perspective, restricting the credits to exclude taxpayers without tax liability decreases both horizontal and vertical equity.” Borenstein & Davis, supra note 19, at 25; see also Batchelder et al., supra note 41, at 50 (arguing that all tax incentives should be refundable tax credits). By way of comparison, many other federal tax credits are refundable, such as the Earned Income Tax Credit, Making Work Pay Credit, Child Tax Credit, and the First-Time Home Buyer Credit. Borenstein & Davis, supra note 19, at 20. All of these have lower concentration indexes, indicating a more equitable distribution of the credits. Id.
\item \textsuperscript{172} See supra Table 3 (indicating that Louisiana offers a refundability provision for residential solar energy systems).
\item \textsuperscript{174} See Solar and Wind Energy Credit (Personal), DSIRE N.C. \textit{CLEAN} ENERGY TECH. CTR., http://programs.dsireusa.org/system/program/detail/50 [https://perma.cc/G4AP-H5BP] (describing the conditions under which Hawaii will refund).
\end{itemize}
forward the credits until they are exhausted.\footnote{175}{Haw. Rev. Stat. \S 235-12.5 (2016).} For all other taxpayers who do not meet these criteria, the taxpayer can elect to reduce the eligible credit amount by 30\%, and if this amount still exceeds the taxpayer’s tax liability for that year, the government will refund excess credits to the taxpayer.\footnote{176}{Id.} Alternatively, the taxpayer can elect to retain the full credit amount and carry forward any excess credits until the credits are exhausted.\footnote{177}{See Solar and Wind Energy Credit (Personal), supra note 174 (offering an overview of solar- and wind-energy credit programs).}

In the alternative-vehicle context, Colorado, Louisiana, and Maryland provide models for reform. Colorado and Louisiana include standard refundability provisions: all excess credits will be refunded to the taxpayer.\footnote{178}{See supra Table 6 (indicating that Colorado and Louisiana offer standard refundability provisions for alternative fuel vehicles).} Maryland takes refundability one step further by offering a rebate-like tax credit program.\footnote{179}{See supra Table 6.} One downside to the tax credit model is that families must wait until the following year when they file taxes to receive the credit. For cash-constrained families, this waiting period may pose an obstacle to adoption. To counteract family credit constraints, Maryland’s Plug-In Electric Vehicle Tax Credit allows taxpayers to submit an application and receive their credit immediately in the form of a check from the state.\footnote{180}{See supra text accompanying notes 87–88 (describing Maryland’s laws and incentives for alternative vehicles).} While a tax credit in name, this program functions more like a rebate program.

The additional budgetary costs that refundable tax credits impose on federal and state governments may act as a potential barrier to reform. Although equity and efficiency considerations counsel against this worry, again, state programs offer models for how to minimize additional budgetary costs and/or better target subsidies to only capture individuals who would not make the technology transition without the tax subsidy.

To minimize budget costs, Colorado sets annual budget limits. Colorado offers a tiered alternative-vehicle tax credit based on the type of vehicle, the vehicle weight, and the tax year.\footnote{181}{Alternative Fuel Tax Credit, U.S. Dep’t Energy, http://www.afdc.energy.gov/laws/11704 [https://perma.cc/GD5E-2KEX] (last visited Apr. 16, 2017).} Colorado sets annual credit caps for each technology type and vehicle weight class as well as for cumulative annual credits.\footnote{182}{Colo. Dep’t of Revenue, Income 67: Innovative Motor Vehicle Credit for Tax Years 2015-2016, at 1–2 (2017), https://www.colorado.gov/pacific/sites/default/files/Income67.pdf [https://perma.cc/K6SA-PQB2].} In addition, to reduce costs further, the government subtracts all federal credits, grants, and rebates from the

\begin{footnotesize}
\begin{itemize}
\item 176. Id.
\item 177. See Solar and Wind Energy Credit (Personal), supra note 174 (offering an overview of solar- and wind-energy credit programs).
\item 178. See supra Table 6 (indicating that Colorado and Louisiana offer standard refundability provisions for alternative fuel vehicles).
\item 179. See supra Table 6.
\item 180. See supra text accompanying notes 87–88 (describing Maryland’s laws and incentives for alternative vehicles).
\end{itemize}
\end{footnotesize}
vehicle cost before applying the relevant percentage calculation to determine the appropriate state credit award.\(^{183}\)

In the rebate context, California regulators recently limited rebates for the purchase or lease of hybrid or electric vehicles to individuals who earn less than $250,000 or couples who earn less than $500,000.\(^ {184}\) This change simultaneously reduces the program’s budget costs and increases the cost-effectiveness of the program.\(^ {185}\) The California Air Resources Board may add additional eligibility caps based on income and may raise subsidy amounts for low- and moderate-income consumers.\(^ {186}\)

Similar income caps and tiered credit amounts could be introduced for tax credits.\(^ {187}\) For example, in the alternative vehicle context, tax credits could incorporate tiered categories of incentives and phase-out levels, such as the following:

<table>
<thead>
<tr>
<th>Income Category</th>
<th>Own or Lease Car</th>
<th>Credit Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0-$20,000</td>
<td>Own</td>
<td>75% of the incremental cost</td>
</tr>
<tr>
<td>$20,000-$50,000</td>
<td>Own</td>
<td>50% of the incremental cost</td>
</tr>
<tr>
<td>$50,000-$100,000</td>
<td>Own</td>
<td>25% of the incremental cost</td>
</tr>
</tbody>
</table>

\(^{183}\) See supra text accompanying notes 87–88 (indicating that taxpayers in Colorado must subtract credits, grants, or rebates from the MSRP of an alternative vehicle before applying the relevant percentage calculation). Another option in the alternative-vehicle context is for tax credits to target incremental costs only. For example, Louisiana’s Alternative Fuel Vehicle and Fueling Infrastructure Tax Credit offers taxpayers a choice of credit options: a taxpayer may either claim an income tax credit worth 36% of the cost of converting a vehicle to operate on alternative fuel, a tax credit worth 36% of “the incremental cost” of purchasing an alternative-fuel vehicle, or a tax credit worth 7.2% of the total cost of the motor vehicle, up to $1,500. LA. STAT. ANN. § 47:6035 (2015) (indicating that purchasers of alternative vehicles in Louisiana have two tax credit options).

\(^{184}\) Patrick McGreevy, California Limits Hybrid Rebates to Households Earning Less Than $500,000, L.A. TIMES (Aug. 23, 2015, 5:56 PM), http://www.latimes.com/local/politics/la-me-pol-electric-cars-20150824-story.html [https://perma.cc/GTX3-WPA6]. California was responding to the fact that high-income earners have received the majority of the subsidies so far. Id. As of August 2015, the program had provided $242 million in rebates to 114,702 people. Id. A survey of 15,432 rebate recipients found that as of May 2015, 6% had incomes of $500,000 or more, 28% had incomes of $200,000–$499,000, 43% had incomes of $100,000–$199,000, and only 23% had incomes below $99,000. Id. By way of comparison, the average household income in California is $60,000. Id. Approximately 15% of those surveyed said they bought a Tesla with a starting price of $75,000 before rebates. Id. As Michelle Kinman, an advocate for Environment California, summarized that “[t]here are a good number of people for whom the rebates were not the driver of that purchase. They would have made the purchase without the rebates.” Id.

\(^{185}\) Although the change may shift some buyers away from buying electric vehicles on the margin, overall, it will ensure limited public dollars go to those who need them most. Id.

\(^{186}\) Id.

\(^{187}\) Notably, the federal government already includes similar income caps for other tax credit programs, such as the Earned Income Tax Credit. See Earned Income Tax Credit (EITC), INTERNAL REVENUE SERV., https://www.irs.gov/credits-deductions/individuals/earned-income-tax-credit [https://perma.cc/Z3ZE-SP89] (last visited Mar. 3, 2017) (describing how the EITC benefits low-to moderate-income taxpayers).
<table>
<thead>
<tr>
<th>Income Range</th>
<th>Option</th>
<th>Credit Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>$100,000-$500,000</td>
<td>Own</td>
<td>10% of the incremental cost</td>
</tr>
<tr>
<td>$0-$20,000</td>
<td>Lease</td>
<td>$100 per year for three years</td>
</tr>
<tr>
<td>$20,000-$50,000</td>
<td>Lease</td>
<td>$75 per year for three years</td>
</tr>
<tr>
<td>$50,000-$100,000</td>
<td>Lease</td>
<td>$50 per year for three years</td>
</tr>
<tr>
<td>$100,000-$500,000</td>
<td>Lease</td>
<td>$25 per year for three years</td>
</tr>
</tbody>
</table>

High-income families may be incentivized by lower credit amounts. The above tiered tax credit structure reflects this possibility, offering higher credit amounts for lower-income groups. In turn, this model would also limit government expenditures to the incentives needed to encourage the technology transition.

In addition to or instead of tiered tax credit categories, tax credits could also incorporate differing sunset provisions based on the number of people who use the subsidy by income group. For example, credits could expire for individuals in the $100,000 to $500,000 income category after 10,000 people claim the credit but expire after 190,000 people claim the credit in the $99,000 or below income category. This program design would cap tax expenditures while also guaranteeing that governments distribute subsidy dollars across income categories.

**B. Combatting Principal–Agent Issues in the Landlord–Tenant Context**

Principal–agent problems often cause landlords to underinvest in renewable-energy and energy-efficiency measures. Landlords have no reason to invest in clean-energy or energy-reduction measures because renters often pay for their own utilities. These split incentives make it

188. Schizer, supra note 16, at 30. Alternatively, as Schizer argues, tax credits could be offered based on the vehicle’s miles per gallon. Id. A similar tiered tax credit structure could be created with higher credits offered for more fuel-efficient vehicles (e.g., 60+ mpg) and for lower-income groups. Id.


difficult for governments to encourage adoption of renewable-energy systems and energy-efficiency measures in rental housing. However, “excluding this sector altogether misses a large share of the housing stock and makes [renewable-energy and energy-efficiency tax] credits less equitable.”

Several states address this issue by expanding eligibility categories. For example, Oregon’s Residential Energy Tax Credit is available to both homeowners and renters. Any taxpayer who invests in qualified heating, energy-efficiency or renewable-energy systems may claim the credit.

To match landlord–tenant split incentives, governments could also offer split tax credits. For example, for a purchased solar system, the federal government could offer a one-time $50 tax credit to the current renter in addition to the current 30% credit available to the landlord as owner of the home. For a leased solar system, the government could offer a split tax credit, with the renter and landlord each receiving part of the credit (assuming the renter pays for electricity). These split credits could encourage both parties to pressure the other to switch to renewable-energy systems.

C. Alleviating High Upfront Costs of Renewable-Energy Systems and Alternative Vehicles

Many renewable-energy systems and alternative vehicles come with high initial costs. These initial costs can act as a barrier to adoption among low- and middle-income households. Expanding credits to include leased renewable-energy systems and leased alternative vehicles can lower initial investment costs, leading to more widespread deployment of renewable-energy systems and low-carbon cars. For example, buying a solar system from Solar City can cost upwards of $7,400 (before credits) for their smallest system. In contrast, leasing one of their solar systems...
costs $0 down plus low monthly payments.\textsuperscript{198} Leasing is also cheaper and increasingly common for alternative vehicles.\textsuperscript{199} A 2012 survey of 3,800 households with a new plug-in hybrid or all-electric vehicle found that 29\% of households leased their vehicle.\textsuperscript{200} Incorporating leased renewable-energy systems and vehicles into tax credits can encourage individuals who cannot afford the high upfront purchase costs of these technologies to make the transition.

States offer several models for how governments can incorporate leased systems into tax credits. Louisiana and New York provide examples in the renewable-energy and energy-efficiency space. Louisiana’s credit applies to both customer-owned solar photovoltaic systems and leased systems.\textsuperscript{201} For customer-owned solar systems, taxpayers can claim a credit worth the lesser of $2.00 per watt, 50\% of the cost of purchase and installation, or $10,000.\textsuperscript{202} For leased solar photovoltaic systems, taxpayers can claim $2.00 per watt up to $4,560.\textsuperscript{203} For New York’s Residential Solar Tax Credit, taxpayers may claim a credit of 25\% for the cost of a purchased or leased solar-electric and/or solar-thermal system.\textsuperscript{204} For leased systems, taxpayers may claim the credit toward the amount of the lease or power-purchase agreement payments made during each year for up to 15 years.\textsuperscript{205} The lease or power-purchase agreement must be at least ten years in length.\textsuperscript{206}

\textsuperscript{198} Id. Instead, customers lease the system at a set rate or sign a 20-year power purchase agreement. \textit{Id.} Under the power purchase agreement option, lessees pay Solar City monthly for the amount of energy they use, often at a reduced rate per kWh. \textit{Id.} For example, a customer in New Haven who currently pays $0.207 per kWh could pay $0.165 per kWh after leasing an 8-panel solar system from Solar City. \textit{Id.} Solar City receives a 30\% federal tax credit through the corporate income tax. \textit{Id.} This federal tax credit, in part, allows Solar City to lease systems at reduced rates. \textit{Id.}


\textsuperscript{200} Tal & Nicholas, supra note 54, at 1, 8.


\textsuperscript{202} \textit{Tax Credit for Solar Energy Systems on Residential Property (Personal)}, supra note 173.

\textsuperscript{203} Id.


\textsuperscript{205} Id.

\textsuperscript{206} Id.
Utah offers an example in the alternative vehicle context. Utah offers an income tax credit of 35% of the vehicle purchase price (up to $1,500) for the purchase of a new electric, natural-gas, or propane vehicle.\textsuperscript{207} Leased electric, natural-gas, and propane vehicles are also eligible for the tax credit (up to $1,500) on a prorated basis.\textsuperscript{208} Additionally, Utah offers a $1,000 income tax credit for the purchase or lease (prorated) of a plug-in hybrid electric vehicle.\textsuperscript{209} Programs such as these allow families to get around high initial costs of renewable-energy systems and alternative vehicles, likely leading to more widespread deployment of these technologies.

\textbf{D. Non-Tax Alternatives}

Instead of—or in addition to\textsuperscript{210}—modifying existing energy tax incentives, governments could replace tax programs with non-tax policies, such as grant, rebate, and loan programs.\textsuperscript{211} Grant and rebate programs provide money faster, mitigating some of the upfront cost issues, and do not require families to navigate the complexities of the tax code.\textsuperscript{212}

An initial review of the DSIRE database indicates that a number of states have already adopted various alternative-funding mechanisms. States and the federal government currently offer (or at one time offered) 26 residential grant programs, 157 residential loan programs, 44 residential property assessed clean energy financing programs, and 847 residential

\begin{itemize}
\item \textsuperscript{207} UTAH CODE ANN. § 59-10-1009(2)(a)-(b) (LexisNexis 2016).
\item \textsuperscript{208} Id. § 59-10-1009(2)(d)(ii).
\item \textsuperscript{210} Many tax incentives will likely be around for the foreseeable future. Although there are sunset provisions built into many of the tax incentives, Congress—and state governments—tends to renew many of these incentives as needed.
\item \textsuperscript{211} As of July 2014, Maryland moved from a tax credit to a rebate program for their electric vehicle supply equipment subsidy. \textit{See supra} Table 6. As another example, the California Bureau of Automotive Repair’s Consumer Assistance Program pays low-income owners (225% of federal poverty level) of certain high-emission vehicles $1,500 to retire their vehicle early from operation. \textit{Consumer Assistance Program}, CAL. BUREAU AUTOMOTIVE REPAIRS, http://www.smgcheck.ca.gov/consumer/Consumer_Assistance_Program/index.html [https://perma.cc/XWSV-M6EX] (last visited May 2, 2017).
\item \textsuperscript{212} \textit{See generally} Severin Borenstein, \textit{Private Net Benefits of Residential Solar PV: The Role of Electricity Tariffs, Tax Incentives and Rebates} (Energy Inst. at Haas, Working Paper No. 259, 2015), https://ei.haas.berkeley.edu/research/papers/WP259.pdf [https://perma.cc/2VA4-BE4F] (indicating that residential solar is becoming more accessible due to lease and rebate programs). However, grants and rebates may come with additional budgetary costs, such as increased administrative costs.
\end{itemize}
rebate programs for renewable energy and/or energy efficiency. A thorough analysis of these programs and other alternative funding arrangements is outside the scope of this article; however, non-tax alternatives are an important area for future research.

CONCLUSION

Policymakers use the tax code as a vehicle for advancing their values and achieving their strategic aims. In the climate-change context, the federal government’s values and objectives ring loud and clear: support the deployment of renewable-energy systems, energy-efficiency measures, and alternative vehicles among high-income families only. Yet, many state governments offer rays of hope for an alternative tax subsidy universe in which progressive climate-change tax subsidies are available to all families, regardless of income. The federal government and various state governments with more regressive subsidies should follow suit and reform their current climate-change subsidies to more progressive structures. Doing so would improve the cost-effectiveness and efficiency of existing programs, build broader political support for climate-change policies in the future, and assuage income inequality concerns. Until then, these governments will continue to add grains of truth to critics’ piles—over a billion grains of truth each year.