

BOOK REVIEWS

Renewable Energy Law, by Dr. Penelope Crossley (Cambridge University Press, 2019), 269 pages, ISBN 978-1-107-18576-0. Hardcover.

With the dramatic proliferation and expansion of renewable energy production around the globe in the late 20th and early 21st centuries, the laws and policies of many nations have been modified to recognize, account for, and in many cases promote these emerging means of “doing work,” as physicists describe the role of energy in human endeavors. *Renewable Energy Law*, written by Dr. Penelope Crossley, an Australian international lawyer and association Director (The Energy Users Association of Australia), is announced as the first comprehensive international compilation and analysis of the national laws adopted to reflect the public interest in renewable energy.¹ It offers the result of the Dr. Crossley’s extraordinary effort to locate, translate where necessary, analyze, and compare the national renewable energy statutory frameworks from 113 nations. The frameworks are drawn from the 146 countries she identifies that have adopted renewable power targets, of which 138 have adopted supportive policies, with 25 apparently lacking focused statutory enactments. It adds useful material on the reasons for, the methods available to, and the potential alignment of the laws countries have or might consider adopting to support renewable energy development.

The goal of this effort is stated clearly: Dr. Crossley wants to understand whether the parallel rapid deployment of renewable energy, largely defined in most countries in a similar manner, is leading to a similarly uniform approach to how renewable energy is treated in the energy laws these countries adopt.

The author’s hypothesis is that “as renewable energy sources and technologies used around the world become commercialized and more widely adopted, renewable energy laws will also come under pressure to harmonize or converge to facilitate trade, improve information sharing, and ease administration.”² The author’s personal view is that such international harmonization would be positive not only for trade and information flow, but also would allow competitive market forces to optimize the role of renewable energy in the overall mix. She does not, however, hold the reader in suspense, acknowledging in her introduction that her exhaustive review does not suggest that the national renewable energy policies she has studied are aligning in common form and function, at least not yet. Instead they reflect a wide range of objectives and priorities, designed to serve competitive trade goals or domestic rather than broader international or global purposes.

The survey initially notes that most of the 113 countries identify the same energy production forms as “renewable,” with some interesting exceptions (Malaysia does not treat wind as renewable; Brazil and Finland exclude solar photovoltaic energy; Sweden includes peat). The author notes that valid distinctions can be drawn between energy production means that are “renewable,” “sustainable,” “carbon-free,” and “non-depletable,” and acknowledges that the basic operating distinction in policy tends to land between energy forms dependent on fossil fuel combustion versus those that do not. The trickier judgment questions relate to woody biomass, fuel cells using hydrogen derived from natural gas, and peat. Dr. Crossley acknowledges that renewable energy is not free of environmental impacts. For example, massive hydroelectric projects require permanent dedication of huge land areas for the necessary elevated storage reservoirs, which is a reason that only 77 of the 113 nations she assesses provide renewable energy incentives to large dams, while 29 explicitly disfavor them. Smaller hydro projects are more universally favored. So “renewable” does not always mean “clean” or “without major environmental impact.”

1. p. 6
2. p. 7

In addition to the results of the survey, the book presents a review of the economic rationale for government intervention in the renewable energy sector. Dr. Crossley posits that the role of government policy should be to address the market failures that could affect the emergence of renewable energy alternatives, and identifies three: (1) unpriced positive and negative externalities in the energy sector; (2) spillovers and learning effects; and (3) information asymmetries. She reviews whether government intervention is economically warranted in renewable energy, delving into the economic literature to consider how externalities could be addressed or priced through Pigovian taxation or the Coase Theorem, but concluding that “there is no single model of government intervention in the renewable energy sector that will address all of the market failures and market barriers.”³

Dr. Crossley offers a treatment of the special character of the electricity sector as it relates to the use and development of renewable energy. Because most renewable energy technologies provide their useful output in the form of electricity, this analysis could have been much more extensive and served as the lense through which most of the analysis was viewed. As an energy form that is essential for modern economies, electricity is always the product of the use of primary energy and is generally delivered for consumption through a monopoly system regulated by government, and thus compels at least an indirect governmental interest if renewable energy is a significant primary source. But the variation in available domestic primary fuels, and in security and safety concerns about relying on them, causes electricity production preferences to vary widely among nations, with concomitant effects on their renewable energy ambitions. The intrinsic political exposure of the electricity industry is also reflected in the pricing of electricity and thus the tolerance for the costs of various sources. It matters a great deal whether the costs of externalities such as carbon pollution are accounted for when renewable and non-renewable generation sources are competing to provide power.

One could argue that some of the author’s concerns have already been addressed in some energy markets. Dr. Crossley notes that without the adoption of “smart grid” technologies allowing customers to face real-time prices reflecting real-time costs, consumer demand will continue offering coincident peaks and valleys driven not by price, but by weather, living patterns, and preferences, forcing the electricity supply industry to deal with all the resulting variation. Given the natural variation of supply from some major renewable sources such as wind and solar energy, this compounds the management challenge for utilities and presents a negative economic factor for those renewables. Recent experience, at least in the United States and Europe, has significantly increased the percentage of renewable energy that electricity grids can manage while maintaining high power quality and frequency, even in the absence of market-clearing retail prices. She also notes that the typical concentration of electricity generation in a limited number of enterprises has limited the potential competition from new renewable entrants in many countries. Recent years, however, have seen a dramatic broadening in some markets of supply-side competition among electricity producers, including a myriad of independent renewable-energy companies, but also independent power producers using natural gas, or those deriving power from industrial processes, who are able to bargain competitively with utilities and often to sell power directly to consumers in a competitive retail market. Utilities clearly may shrink functionally to regulated wires-only monopolies in some markets, with energy sales subject to competitive market forces, and some ancillary services potentially competitive as well.

Oddly, the book does not appear to address a key economic feature of major renewable energy production technologies, such as wind, solar, and hydroelectricity: the fact that their variable marginal operating cost is effectively zero, putting them at a compelling market advantage versus all generators that must pay for fuel purchases or expert staff on hand. They will accept any market price above zero (or even below, if subsidies are available), and serve all available demand, recovering what they can against their sunk capital costs. This puts huge stress on other generators who

must recover operating costs, even if they have load-following advantages that are important to reliability, and has become a major factor in regulatory and legislative decision-making concerning renewable energy.

Dr. Crossley reviews the prior literature on the legislative purposes for renewable energy legislation, taking issue based on her own survey with those papers that suggested a high degree of international harmony. Instead, she dedicates almost twenty percent of her book to an analysis where she identifies twenty-eight different categories of legislative objectives, weights them, ranks them in importance in the individual countries' statutory schemes, and discusses each of them and the countries prioritizing them.⁴ While this analysis might strike one as unduly quantitative for such a subjective evaluation of legislative intent (as the author acknowledges, most national statutes identify at least five of the twenty-eight), it serves to underline not only the many public policy purposes the development of renewable energy has been dedicated to serve, but the commitment of many nations to achieve those purposes through the means of expanding domestic renewable energy resources.

The book also presents a catalog of policy measures that could be used to support renewable energy, such as feed-in tariffs, portfolio standards, net metering, rebates, tax credits, direct subsidies, public benefit funds, etc., and discusses the pros and cons of each, offering national examples. It then considers multinational approaches and options for achieving greater policy harmony for the benefit of trans-boundary renewable energy development with case studies. The concluding chapter is an essay on what has gone before, summarizing the author's unique personal perspective on this rapidly emerging and major global contribution to energy production and the national laws that frame and prompt its growth.

In the final chapter, Dr. Crossley addresses the question of whether the current international hodge-podge of statutory renewable energy intents and methods is likely to change: will future expansion of renewable energy promote greater integration and similarity of policy over time or not? The statutory frameworks reflect the variety of national motivations for the adoption of renewable energy policy in the first place—climate change mitigation, criteria pollution control, desire for secure domestic energy production, diminished payments for imported energy, workforce training, electrification of remote areas, rural development, and others. One could add meeting the lower capital costs of distributed energy resources versus central resources or avoidance of ongoing operating costs. It seems unlikely that the statutory policies will harmonize unless the legislative purposes also do. While the renewable technologies themselves might be indistinguishable from country to country, so far the motivations for supporting and installing them are likely to remain significantly different, with parallel differences in the structure and operation of national laws. But Dr. Crossley hopes that the merits of greater market efficiency, information sharing, and cost reduction will gradually drive national policies into congruence.

The breadth of this survey effort unfortunately, but understandably, appears to have limited its depth. For example, although there are in U.S. law numerous federal statutes affecting renewable energy (involving competition, regulation, environmental quality, research and development, tax benefits, federal purchase policy, etc.), the book cites only two: the Public Utility Regulatory Policies Act of 1978, and the Energy Policy Act of 2005. However, the Energy Independence and Security Act of 2007. However, the American Recovery and Readjustment Act of 2009 (the Obama stimulus bill) both included major support for renewable energy. While other earlier policy enactments, along with regular taxation and appropriation bills and the activities they encouraged and funded, cannot truly be omitted in any assessment of the national statutory structure relating to renewable energy development in the United States. In addition to missing some statutes that deal directly with renewable energy promotion, research, and competition, the book omits critical but indirect impacts on renewable energy from laws principally dealing with intellectual property, international trade and

dumping, air quality, wildlife protection, noise pollution, land use and zoning, capital equipment depreciation, and others. It might almost be equally easy to identify those U.S. federal statutes that have absolutely no impact on the development of renewable energy as to comprehensively identify and assess those that do.

In the U.S. and other countries, moreover, there are a host of state and local laws that bear strongly on the use of renewable energy. Twenty-nine U.S. states have adopted Renewable Energy Portfolio standards setting a minimum requirement for delivered renewable power. As in the U.S. and other nations, local regions, states, and municipalities have their own laws governing the regulation of electric utilities, the inescapable means of delivering renewable energy to retail customers and thereby affecting its availability and economic viability. Many states and municipalities also offer tax advantages for renewable energy installations. Focusing merely on national policies therefore does not cover all the necessary ground. But the U.S. is certainly among the countries with the most complexity in its federal system and laws, while the principal value of the book is indeed its global focus and information from the many countries one normally might not think of when considering the spread of renewable energy use. On balance, *Renewable Energy Law* is a significant contribution to the available literature on the scope of the renewable energy enterprise and how it relates to the governments of the world. It can be a valuable resource for companies and advocates seeking to identify fertile ground for their products or clean-energy goals. While it might be seen as slow to appreciate the speed of change in some electricity markets, or may fail to encompass all the key elements of law in each nation in its effort to cover all nations, it is a fundamental and apparently unique resource for those wanting to understand where and how statutory constructs both constrain and encourage renewable energy around the globe.

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Double Jeopardy: Combating Nuclear Terror and Climate Change, by Daniel Poneman (MIT Press, 2019). 288 pages, ISBN: 9780262037303.

Nuclear power has been seriously considered a bridge in the transition out of fossil fuels and into a renewable energy future. However, the threat of nuclear terrorism has caused many to resist and seek to phase out existing facilities rather than embracing its potential. In this provocative volume, Daniel Poneman, former United States Deputy Secretary of Energy, argues that nuclear power can give us a double dividend. Not only can it be a champion in our near term fight against carbon based climate change, but it can also replace baseload fossil fuels while reducing the risks of nuclear terrorism. He posits the key to these dividends by outlining thirteen recommendations for the US to follow in leading a global initiative toward advancing nuclear generation. Until grid level electric storage becomes a viable option to support renewables, the path to emission-free electricity still requires a stable base of generation. Coal and natural gas have traditionally been viewed as the baseload fuels, but Poneman discusses why nuclear energy is better positioned to replace fossil fuels and create a seamless transition to an emission-free generation environment.

Wind and solar have grown considerably in terms of installed capacity as the global push toward renewables has helped drive technological improvements. The volatility of electricity production remains a challenge for solar and wind generation as both are unpredictable during storms or time of day. Until grid level electrical storage becomes economically efficient, construction of coal and natural gas power plants will continue despite the associated high carbon costs. The third alternative for baseload generation is nuclear power, which unlike coal or natural gas is considered emission-free. Poneman revisits several historical attempts by the US government to embrace

nuclear energy starting with the domination of global enrichment in the 1970s, and utilizes these concepts in forming his list of recommendations outlining how the expansion of renewables needs to include a renewed focus on nuclear energy.

The recommendations provided in the book cover ideas ranging from expanding existing nuclear electricity research efforts, to overcoming the international challenges of balancing a growing nuclear energy industry. The list begins with an evaluation of the misalignment of carbon tax policies and the overly complex nuclear regulatory environment, both of which historically have driven nuclear plant construction costs to over ten times that of comparable natural gas facilities. Government and international programs are next on the list with a recommendation to expand long-term government funded research and establish global nuclear industry best practices. A detailed discussion of existing government and international programs provides a useful reference for understanding how the current political landscape developed and what challenges need to be overcome. The scientific and financial recommendations cover advanced-generation reactors and creative loan guarantee programs, which complement existing technology and financing programs established across the nuclear energy industry.

The remaining recommendations focus on challenges derived from advances in nuclear technology and how such improvements lower the level of sophistication required for construction of nuclear weapons and use of radioactive material by terrorist organizations. An extensive discussion provides a history of nuclear terrorism and its evolution into the concept of “radiological terrorism”, involving radioactive contamination attacks carried out through the release of material in confined spaces or across city blocks instead of the traditional atomic mushroom cloud. Poneman suggests establishing a global nuclear fuel service initiative to consolidate enrichment activities among a select number of countries to minimize rogue governments utilizing enrichment for weapons instead of electrical generation. The final two recommendations include the aggressive and broad challenge of eliminating a nuclear North Korea, and ideas on managing the aging US nuclear weapons infrastructure.

Descriptions of new and smaller modular reactors built underground or Gen IV reactors capable of utilizing existing plant waste fuel does little to overcome the NIMBY (not in my backyard) challenge of convincing society to embrace the adoption and construction of nuclear generation plants. Poneman evades a detailed discussion on the locational challenges inherent in expanding nuclear energy, which is unfortunate as the book highlights several promising technological advances capable of providing dispersed nuclear baseload generation across the electric grid to better support growth of renewable generation.

Several references are also made to the expansive government subsidies available to the energy industry in the form of tax credits or grants. Numerous existing government funded initiatives are discussed, which have advanced the nuclear energy industry over the past few decades, and Poneman does recommend continued financial support and expansion of government involvement in the nuclear energy industry. Two private funding coalitions are briefly described, but the book lacks further discussion on ways to expand these private capital sources. Poneman also begins a discussion on how the energy sector is one of the lowest in terms of percent of revenue invested in research and development, but fails to continue the discussion and dismisses further analysis with a suggestion that the free market is not efficient at allocating resources to promote the public good or invest in basic science.

Poneman’s argument for nuclear energy as the leading option for stable and emission-free generation is supported with thirteen recommendations to consider independently or as a combined roadmap. The suggestions start with revisiting carbon taxes, moving to improve research and economics, and overlays ideas to combat the growth of radiological terrorism. Some suggestions are more questionable than others, such as containing North Korea, but the book presents several diverse options to further the discussion shaping the industry. Although the recommendations lack deep technical detail, Poneman provides helpful historical perspectives on each suggestion and

builds to the current level of policy and regulatory debate. The book offers both industry experts and general policymakers several key suggestions for embracing nuclear energy as the bridge to renewables while mitigating the risk of nuclear terrorism.

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