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Can Clean Energy Policy Promote Environmental, Economic, and Social Sustainability?

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CAN CLEAN ENERGY POLICY PROMOTE ENVIRONMENTAL, ECONOMIC, AND SOCIAL SUSTAINABILITY?

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I. INTRODUCTION

For the past quarter of a century, federal policy support for solar, wind, and other low-carbon, renewable energy technologies has come primarily in the form of tax incentives.[1] These tax breaks consist of two distinct instruments—accelerated depreciation rates[2] and tax credits.[3] Living up to the Brandeisian ideal of states as laboratories of democracy,[4] state policymakers have shown significantly more creativity in their policy responses creating a veritable potpourri of clean energy policies.

Forty-five states and the District of Columbia have implemented net metering policies that enable utility customers with solar and other distributed generation assets to run their electricity meter backwards and be compensated for any power produced in excess of the customer's power consumption from the grid.[5] Twenty-nine states, the District of Columbia, and three United States territories have adopted renewable portfolio standards that create markets for low-carbon, renewable energy by requiring electric utilities to source a portion of their sales from

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1. *See* Mark Bolinger et al., *Preliminary Evaluation of the Section 1603 Treasury Grant Program for Renewable Power Projects in the United States*, 38 ENERGY POL'Y 6804 (2010).

2. The accelerated depreciation rates that renewable energy assets enjoy today were first established by the Tax Reform Act of 1986. *See* Tax Reform Act of 1986, Pub. L. No. 99–514, 100 Stat. 2085. Today, the federal tax code's Modified Accelerated Cost Recovery System (MACRS) classifies wind, solar, and a range of other renewable power generation assets as five-year property, allowing owners to deduct the prorated share of their investment costs from their taxable income over the course of five years. *See* 26 I.R.C. § 168(e)(3)(B).

3. Federal tax credits for renewable energy were first created for wind power by the Energy Policy Act of 1992. *See* Energy Policy Act of 1992, Pub. L. No. 102–486, 106 Stat. 2776 (1992). Today, the federal tax code distinguishes between production tax credits, 26 I.R.C. § 45, and investment tax credits, 26 I.R.C. § 48, for renewable energy technologies. *See also* Felix Mormann, *Fading into the Sunset: Solar and Wind Energy Get Five More Years of Tax Credits with a Phase-Down*, TRENDS (ABA Section of Env't, Energy & Res., Chicago, Ill.), May/June 2016, at 9–14 (discussing the latest extension and phase-out of federal tax credit support for renewables).

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

5. *See* Richard L. Revesz & Burcin Unel, *Managing the Future of the Electricity Grid: Distributed Generation and Net Metering*, 41 HARV. ENVTL. L. REV. 43, 47 (2017).

solar, wind, and other low-carbon renewables.[6] A few pioneering states, meanwhile, have begun to experiment with feed-in tariff policies that pay eligible generators above-market rates designed to cover the higher generation costs of emerging climate-friendly, energy technologies.[7]

The panoply of federal and state renewable energy policies deserves great credit for driving significant deployment of solar, wind, and other renewable energy technologies across the United States. As these technologies mature and their market share continues to grow, however, it is time to rethink the policy landscape that supports them.

Conceptually, renewable energy policies can be construed as tools to facilitate more sustainable economic development. With their potential to reduce the greenhouse gas emissions, air pollution, and water consumption required to power the United States and world economies,[8] this aspiration manifests itself most obviously in an environmental context. Indeed, early policy design appeared to focus primarily on environmental sustainability, seeking to deploy as many renewable energy facilities as possible with little, if any, concern for the costs required.[9] Sustainability,

6. *Renewable Portfolio Standard Policies*, N.C. CLEAN ENERGY TECH. CTR. (2017), http://ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2017/03/Renewable-Portfolio-Standards.pdf. Eight more states and one U.S. territory have adopted nonbinding goals for the deployment of renewables. *Id.* For a discussion of the history and political background of state renewable portfolio standards, see Barry Rabe, *Race to the Top: The Expanding Role of U.S. State Renewable Portfolio Standards*, 7 SUSTAINABLE DEV. L. & POL'Y 10 (2007); *see also* Felix Mormann, *Constitutional Challenges and Regulatory Opportunities for State Climate Policy Innovation*, 41 HARV. ENVTL. L. REV. 189, 198 (2017) (offering an overview of renewable portfolio standard design and implementation features).

7. Early adopters of feed-in tariffs at the state level include California, Hawaii, Maine, Oregon, Rhode Island, Vermont, and Washington. *See* S.B. 32, 2009–2010 Leg., Reg. Sess. (Cal. 2008); Decisions & Orders, Docket No. 2008–0273, Haw. Pub. Util. Comm'n (Haw. 2008); S.P. 367, 126th Leg., Reg. Sess. (Me. 2013); H.B. 3039, 75th Leg., Reg. Sess. (Or. 2009), H.B. 3690, 75th Leg., Spec. Sess. (Or. 2010); H.B. 6104, 2011 Gen. Assemb., Jan. Sess. (R.I. 2011); H. 446, 2009–2010 Leg. Sess. (Vt. 2009); S.B. 5101, 59th Leg., Reg. Sess. (Wash. 2005); S.B. 6170, 61st Leg., Reg. Sess. (Wash. 2009); S.B. 6658, 61st Leg., Reg. Sess. (Wash. 2010). *See also* Mormann, *supra* note 6, at 199 (offering an overview of feed-in tariff design and implementation features). The policy's misleading name (it does not impose any tariff on electricity imports or other related activities) is thought to be a tribute to an overly literal translation of its implementation in Germany as per the 1991 Stromeinspeisungsgesetz (Electricity Feed-in Law). *See* Paul Gipe, *Frequently Asked Questions about Feed-in Tariffs, Advanced Renewable Tariffs, and Renewable Energy Payments*, WIND-WORKS.ORG (Oct. 30, 2016), https://perma.cc/S3HA-DECB.

8. *See* Felix Mormann, *Clean Energy Federalism*, 67 FLA. L. REV. 1621, 1638–41 (2015) (describing the various environmental benefits of renewable energy).

9. For an illustrative example, see Germany's 1993 "Full Cost Rates" program, which offered to cover the full cost of solar photovoltaic installations. *See Full Cost Rates (Kostendeckende Vergütung)*, INT'L ENERGY AGENCY, https://www.iea.org/policiesand measures/pams/germany/name-22073-en.php?s=dHlwZT1yZSZzdGF0dXM9T2s,&return= PG5hdiBpZD0iYnJlYWRjcnVtYiI-PGEgaHJlZj0iLyISG9tZTwvYT4gJnJhcXVvOyA8YS BocmVmPSIvcG9saWNpZXNhbmRtZWFzdXJlcy8iPlBvbGljaWVzIGFuZCB

however, comes in a variety of flavors.[10] Since the late 2000s, clean energy policies have reflected growing concern for the cost-efficiency and, hence, economic sustainability of their promotional regimes in order to mitigate the overall cost to ratepayers and taxpayers as solar, wind, and other renewables graduate from niche markets and enter the mainstream.[11]

Two and a half decades of policymaking focused primarily on environmental and economic sustainability have yielded considerable environmental and economic benefits.[12] Along the way, other policy considerations, however, such as the social sustainability of the transition to a cleaner, renewably fueled energy economy, have gone largely overlooked. As renewable energy technologies continue to gain ever-greater traction in the United States and global energy economies, the social impacts of their enabling policies become more and more salient. Already, ratepayers, taxpayers, and other stakeholders who fear being left behind by the clean energy transition question the "fairness" of today's renewable energy policies.[13] The underlying discontentment threatens to erode popular support for a key component of United States and global efforts to successfully mitigate anthropogenic climate change.[14] At the heart of this

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10. *See infra* Part III.

11. *See, e.g.*, American Recovery and Reinvestment Act of 2009, Pub. L. No. 111–5, 123 Stat. 115 (establishing the §1603 "Cash Grant" program to remedy renewable energy project financing inefficiencies flowing from the 2008/09 financial crisis); *see also* Lincoln L. Davies & Kirsten Allen, *Feed-in Tariffs in Turmoil*, 116 W. VA. L. REV. 937, 956–58 (2014) (describing repeated adjustments to the German feed-in tariff in order to prevent costs from getting out of hand).

12. *See, e.g.*, Felix Mormann et al., *A Tale of Three Markets: Comparing the Renewable Energy Experiences of California, Texas, and Germany*, 35 STAN. ENVTL. L.J. 55, 74 (2016) (discussing the job creation benefits associated with renewable energy deployment in California, Texas, and Germany); Kyle Siler-Evans et al., *Regional Variations in the Health, Environmental, and Climate Benefits of Wind and Solar Generation*, 110 PNAS 11768 (2013) (exploring the diverse environmental benefits of renewable energy).

13. *See, e.g.*, Hiroko Tabuchi, *Rooftop Solar Dims Under Pressure from Utility Lobbyists*, N.Y. TIMES, July 8, 2017, https://www.nytimes.com/2017/07/08/climate/rooftop-solar-panels-tax-credits-utility-companies-lobbying.html (describing utility-led pushback against net metering and other clean energy policies); *see also* Troy A. Rule, *Solar Energy, Utilities, and Fairness*, 6 SAN DIEGO J. CLIMATE & ENERGY L. 115 (2015) (surveying the debate over the "fairness" of net metering policies).

14. *See* Framework Convention on Climate Change, *Adoption of the Paris Agreement*, U.N. Doc. FCC/CP/2015/L.9 (Dec. 12, 2015), https://perma.cc/DS9K-M28X. The Paris agreement entered into force on November 4, 2016, less than a year after its adoption, following ratification by 55 countries accounting for at least 55% of global greenhouse gas emissions, including the United States. *See Paris Accord – Status of Ratification*, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, https://perma.cc/5VEF-A8W9 (last visited Mar. 2, 2018); *see also* Carbon Pollution Emission Guidelines for Existing Stationary

debate lies the question of whether public policy support for low-carbon renewables prioritizes environmental and economic sustainability at the expense of social sustainability.

Legal scholars have only just begun to explore the social challenges posed by the transition to a low-carbon, renewables-based, energy economy.[15] What is missing from this discourse is a framework to guide the inquiry into the social sustainability of public policy support for renewable energy. This essay offers a first step toward closing that gap through a set of proxy criteria to assess the social sustainability of today's renewable energy policy landscape and to inform the development of the next generation of renewables policies—a generation that, ideally, will simultaneously promote environmental, economic, and social sustainability.

Importantly, this essay does not seek to call into question the ongoing transition toward a low-carbon, largely-renewables-based, energy economy. To be sure, reduced reliance on coal and other carbon-intensive fossil fuels engenders its own social challenges, such as in the form of jobs lost in mining, refining, and related sectors.[16] But environmental and, ultimately, economic imperatives leave little room for alternative courses of action if global warming is, indeed, to be limited to the crucial 2-degree Celsius mark.[17] The social cost of continued carbon emissions from a primarily fossil-fueled power sector is simply too large to consider business as usual with continued reliance on fossil fuels a

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Sources: Electric Utility Generating Units, 80 Fed. Reg. 64662 (Oct. 23, 2015) [hereinafter Clean Power Plan] (calling, among others, on states to replace affected fossil fuel-fired power plants with new, zero-emitting solar, wind, and other renewable energy generating capacity). As this essay is going to print, a proposed rule for the repeal of the "Clean Power Plan" is pending. *See Electric Utility Generating Units: Repealing the Clean Power Plan*, U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA), https://www.epa.gov/stationary-sources-air-pollution/electric-utility-generating-units-repealing-clean-power-plan (last updated Feb. 27, 2018).

15. *See, e.g.*, Uma Outka, *Fairness in the Low-Carbon Shift: Learning From Environmental Justice*, 82 BROOK. L. REV. 789 (2017); Shelley Welton, *Clean Electrification*, 88 U. COLO. L. REV. 571 (2017); Rule, *supra* note 13.

16. *See, e.g.*, U.S. DEP'T OF ENERGY, U.S. ENERGY AND EMPLOYMENT REPORT 20–23, 37–43 (2017) (describing the recent decline in employment in oil and gas extraction and coal mining compared to job growth in solar and other renewable energy).

17. *See, e.g.*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Summary for Policymakers*, *in* CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS 3 (Thomas F. Stocker et al. eds., 2013) (discussing the importance of limiting global warming to no more than 2 degrees Celsius in order to avoid disastrous and irreparable damage to the global ecosystem); *see also* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *Summary for Policymakers*, *in* SPECIAL REPORT ON RENEWABLE ENERGY SOURCES AND CLIMATE CHANGE MITIGATION 3, 3–26 (Ottmar Edenhofer et al. eds., 2011) (discussing the opportunities and challenges associated with the ramp-up of low-carbon, renewable energy technologies).

sustainable option in any sense of the word.[18] The goal of this essay, therefore, is not to question the "if" but rather to explore and, ideally, improve the "how" of the shift toward a less carbon-intensive, renewably-fueled, energy economy. To this end, the following three sections seek to develop a framework for testing and, ultimately, enhancing the social and, hence, overall sustainability of policies for the promotion of solar, wind, and other renewable energy technologies.

II. COMPETING DEFINITIONS OF SUSTAINABILITY

The term "sustainability," or some derivative thereof, features prominently among the objectives of clean-energy policies.[19] Yet, many policymakers—and scholars—appear to focus overwhelmingly on the environmental and, possibly, economic dimensions of sustainability with little, if any, regard for the concept's inherent, social elements.[20] The 1992 United Nations Rio Declaration on Environment and Development, for example, calls for greater environmental protection as well as consideration of social and economic costs in order to achieve sustainable

18. *See, e.g.*, Mathew E. Hauer et al., *Millions Projected to Be at Risk From Sea-Level Rise in the Contintental United States*, 6 NATURE CLIMATE CHANGE 691, 691 (2016) (highlighting the threat of mass migration due to anthropogenic climate change); Jonathan Levy & Jack Spengler, *Health Benefits of Emissions Reductions from Older Power Plants*, RISK IN PERSP. (Harvard Ctr. For Risk Analysis, Boston, Mass.), Apr. 2001, at 1, 2–4 (reporting on the high concentration of air pollutants and adverse health impacts in the vicinity of coal and other fossil-fueled power plants); *see also* Siler-Evans et al., *supra* note 12.

19. The Energy Policy Act of 1992, for example, references the term "sustainable" no fewer than eleven times. Energy Policy Act of 1992, Pub. L. No. 102–486, 106 Stat. 2776. The California Senate Bill 1078, which established the state's original renewable portfolio standard, references "sustainable economic development" as one of the program's key aspirations. S.B. 1078, 2001–2002 Leg., Reg. Sess. (Cal. 2002). Enabling legislation for Maine's feed-in tariff opens by naming "sustainable development" as a key objective. S.P. 367, 126th Leg., Reg. Sess. (Me. 2013).

20. *See, e.g.*, Robin Kundis Craig & Melinda Harm Benson, *Replacing Sustainability*, 46 AKRON L. REV. 841 (2013); John C. Dernbach, *Sustainable Development: Now More Than Ever*, 32 ENVTL. L. REP. 10003 (2002); John C. Dernbach et al., *Sustainability as a Means of Improving Environmental Justice*, 19 J. ENVTL. & SUSTAINABILITY L. 1 (2013); Alexandra B. Klass & Sara E. Bergan, *Carbon Sequestration and Sustainability*, 44 TULSA L. REV. 237 (2008); *see also* Thomas M. Parris & Robert W. Kates, *Characterizing and Measuring Sustainable Development*, 28 ANN. REV. ENV'T & RES. 559, 560–61 (2003) (highlighting the role of equity and equal opportunity in the context of sustainable development).

development.[21] Others expressly distinguish among environmental, economic, social, and political notions of sustainability.[22]

Whatever one's preferred taxonomy, there is no universally agreed upon definition of social sustainability due to the academic community's inability to reach consensus on the constituent elements of socially sustainable development.[23] Similarly, well over five hundred projects have attempted to develop quantitative indicators of sustainable development.[24] Yet, no indicators are universally accepted, and the proposed measurement systems serve, at best, as navigational aids for the shift toward more sustainable development.[25] Rather than add to the controversy and confusion over a working definition of socially sustainable development, this essay employs a set of proxy criteria that reflect recurring, dominant themes in the pertinent literature. Combined in a cohesive framework, these criteria offer a way to assess the social sustainability of today's generation of renewable energy policies.

III. CLEAN ENERGY POLICY IN CONTEXT

Policies to promote renewable energy technologies can take a variety of forms. Economists have long suggested that pricing greenhouse gas emissions, in the form of a carbon tax[26] or cap-and-trade regime,[27] is, in theory, the single most efficient policy to mitigate climate change and promote abatement technologies such as solar, wind, and other low-carbon renewables.[28] A price on

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21. *See* U.N. Conference on Environment and Development, *Rio Declaration on Environment and Development*, U.N. Doc. A/CONF.151/26/Rev.1 (Vol. I), annex I (Aug. 12, 1992) (Principles 4 and 11).

22. *See, e.g.*, G. Assefa & B. Frostell, *Social Sustainability and Social Acceptance in Technology Assessment: A Case Study of Energy Technologies*, 29 TECH. SOCIETY 63, 64 (2007).

23. *Id.* at 65.

24. Parris & Kates, *supra* note 20, at 559 ("Despite the persistent definitional ambiguities associated with sustainable development, much work (over 500 efforts) has been devoted to developing quantitative indicators of sustainable development.").

25. *See* Assefa & Frostell, *supra* note 22, at 65.

26. *See, e.g.*, Gilbert E. Metcalf & David Weisbach, *The Design of a Carbon Tax*, 33 HARV. ENVTL. L. REV. 499 (2009).

27. *See, e.g.*, Ann E. Carlson, *Designing Effective Climate Policy: Cap-and-Trade and Complimentary Policies*, 49 HARV. J. ON LEGIS. 207 (2012).

28. *See, e.g.*, NICHOLAS STERN, THE ECONOMICS OF CLIMATE CHANGE: THE STERN REVIEW 35, 348 (Cambridge Univ. Press 2007); Dominique Finon, *Pros and Cons of Alternative Policies Aimed at Promoting Renewables, in* 12 EIB PAPERS: AN EFFICIENT, SUSTAINABLE AND SECURE SUPPLY OF ENERGY FOR EUROPE MEETING THE CHALLENGE 110, 112 (Armin Riess ed., 2007); Adam B. Jaffe et al., *A Tale of Two Market Failures: Technology and Environmental Policy*, 54 ECOLOGICAL ECON. 164, 165, 169 (2005); Atanas Kolev & Armin Riess, *Environmental and Technology Externalities: Policy and Investment*

greenhouse gas emissions would require producers to internalize the cost of their emissions, thereby penalizing pollution and encouraging abatement. Over time, this direct, static effect would be complemented by an indirect, dynamic effect of encouraging the refinement of existing and development of new abatement technologies.[29] From an efficiency perspective, a tax on greenhouse gas emissions or a cap-and-trade scheme would incur lower opportunity costs than direct public policy support for these technologies.[30]

Notwithstanding its theoretical appeal, the adoption of a nationwide or, better yet, global policy regime that accurately prices the societal cost of greenhouse gas emissions is politically unlikely in the near- to medium-term.[31] Accordingly, this essay focuses its social sustainability inquiry on policies directly aimed at the large-scale deployment of solar, wind, and other renewables, such as renewable portfolio standards, feed-in tariffs, net energy metering, and tax incentives for renewable energy generators.

IV. PROXY CRITERIA TO ASSESS THE SOCIAL SUSTAINABILITY OF CLEAN ENERGY POLICIES

Sustainability, in general, and social sustainability, in particular, have proven themselves as elusive concepts. The multitude of normative judgments underlying both concepts has yielded a multitude of competing definitions. Rather than add yet another working definition, this essay draws on the existing literature to distill from it three somewhat interrelated criteria that most sustainability scholars seem to accept as proxy indicators for socially sustainable development. Application of these criteria to different renewable energy policies can shed light on their respective impact on the social sustainability of the transition to a low-carbon, renewably powered energy economy. Just as the environmental and economic sustainability of a renewable energy policy is best judged based on the specifics of

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Implications, *in* 12 EIB PAPERS: AN EFFICIENT, SUSTAINABLE AND SECURE SUPPLY OF ENERGY FOR EUROPE MEETING THE CHALLENGE 134, 140 (Armin Riess ed., 2007).

29. *See* Kolev & Riess, *supra* note 28, at 137 (discussing the impact of environmental policy on technological change).

30. Felix Mormann, *Requirements for a Renewables Revolution*, 38 ECOLOGY L. Q. 903, 929 (2011).

31. For issues related to the political economy of emission pricing, see *id.* at 930–32. For evidence of the failed campaigns for a federal cap-and-trade regime, see S. 1733, 111th Cong. (2009); H.R. 2454, 111th Cong. (2009). *See also* Gary Lucas, Jr., *Voter Psychology and the Carbon Tax*, 90 TEMPLE L. REV. 1 (2017) (describing behavioral challenges and opportunities for carbon taxation).

its design and implementation, so is its social sustainability most accurately assessed against the background of a specific implementation, as opposed to an abstract treatise. To illustrate, the following framework of proposed criteria will be complemented by their sample application to one of today's clean energy policies.

A. Access and Availability

The first criterion hones in on access and availability. With equal opportunity a staple of the social sustainability literature,[32] socially sustainable renewable energy policies should offer the broadest possible access to related benefits. In this context, widespread access and availability should not be limited to the environmental benefits associated with clean, low-carbon renewables. Climate science suggests that the heat-trapping effect of greenhouse gases in the atmosphere manifests itself worldwide, regardless of whether these gases are emitted in New York or New Delhi.[33] Conversely, benefits from climate change mitigation through greenhouse gas emission reductions from solar and wind energy that displaces carbon-intensive, fossil-fueled energy accrue to the world at large.[34] Accordingly, any effective, renewable energy policy naturally delivers environmental benefits that are widely accessible and available.

The question of access and availability is much less straightforward, however, when it comes to economic benefits. Renewable energy policies are expected to leverage trillions of dollars[35] for clean energy investment. The allocation and distribution of this massive amount of capital will inevitably impact the income and wealth distribution among the affected citizenry. What portion of a state's population can participate in its feed-in tariff program? How many taxpayers are in a position to benefit from federal tax

32. *See, e.g.*, Parris & Kates, *supra* note 20, at 561 (noting the importance of equal opportunity for the taxonomy of sustainable development); Assefa & Frostell, *supra* note 22, at 65 (highlighting the role of "fairness in distribution and opportunity" for socially sustainable systems).

33. *See, e.g.*, Massachusetts v. Envtl. Prot. Agency, 549 U.S. 497, 523–24 (2007) (acknowledging that the warming effect of greenhouse gas emissions manifests itself globally regardless of their point of origin, but rejecting the EPA's argument that, therefore, regulation of domestic greenhouse gas emissions would be ineffective due to projected increases in greenhouse gas emissions from China, India, and other developing nations).

34. Other environmental benefits associated with substituting renewable energy generation for fossil-fueled power generation, such as air quality improvements and water conservation, accrue at a more local scale. *See* Mormann, *supra* note 8, at 1638–41 (describing the local environmental benefits associated with renewable energy).

35. *See, e.g.*, INT'L ENERGY AGENCY, WORLD ENERGY OUTLOOK 2016, 21 (Robert Priddle ed., 2016) ("An increasing slice of the roughly $1.8 trillion of investment each year in the energy sector has been attracted to clean energy . . . .").

credits for renewables? The answers to these questions describe the general public's ability to participate in, and benefit from, the economic opportunities of renewable energy policy with obvious implications for distributional equity and, hence, social sustainability.

Federal tax credits, for example, score poorly in terms of access and availability, because they create economic opportunities only for a small group of banks, financial firms, and highly profitable corporations.[36] Most others lack the quintessential requirement to benefit from federal tax breaks—a tax bill that is high enough to offset and thereby reap the full and immediate benefits of tax credits.[37] Not all barriers to access are similarly obvious. Feed-in tariffs, for instance, are frequently praised for the wide array of economic opportunities they create.[38] Yet, participation in Oregon's feed-in tariff program skews toward highly educated dual-income households that own single-family homes worth over $300,000,[39] suggesting that both financial and educational barriers may prevent more widespread access to the program's economic benefits.[40]

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36. Historically, fewer than two dozen highly profitable and sophisticated entities—mostly large banks, insurance companies, and other financial firms—have been willing and able to support renewable energy projects through their tax equity investments. *See Reassessing Renewable Energy Subsidies: Issue Brief*, BIPARTISAN POL'Y CTR., (Bipartisan Pol'y Ctr., Washington, D.C.), Mar. 22, 2011, at 9–11.

37. *See, e.g.*, Felix Mormann, *Beyond Tax Credits: Smarter Tax Policy for a Cleaner, More Democratic Energy Future*, 31 YALE J. ON REG. 303 (2014) (offering a critique of the exclusivity of tax credits and the resulting inefficiencies); *Renewable Energy Project Finance in the U.S.: 2010-2013 Overview and Future Outlook*, GREENTECH MEDIA (Mar. 15, 2012, 1:00 PM), https://www.greentechmedia.com/events/webinar/renewable-energy-project-finance-in-the-u.s.-2010-2013-overview-and-future-#gs.nw7w_t0; BIPARTISAN POL'Y CTR., *supra* note 36, at 9; Bolinger et al., *supra* note 1, at 6804; *see also* STEVE CORNELI, U.S. PARTNERSHIP FOR RENEWABLE ENERGY FINANCE, CLEAN ENERGY AND TAX REFORM: HOW TAX POLICY CAN HELP RENEWABLE ENERGY CONTRIBUTE TO ECONOMIC GROWTH, ENERGY SECURITY AND A BALANCED BUDGET 13 (2012); JOHN P. HARPER ET AL., U.S. DEP'T OF ENERGY, WIND PROJECT FINANCING STRUCTURES: A REVIEW & COMPARATIVE ANALYSIS (2007) (noting that only a handful of large developers are able to make use of the federal tax credits).

38. *See* Felix Mormann, *Enhancing the Investor Appeal of Renewable Energy*, 42 ENVTL. L. 681, 714–17 (2012) (describing the wide range of investment opportunities provided by feed-in tariffs).

39. *See* OREGON PUBLIC UTILITY COMMISSION, INVESTIGATION INTO THE EFFECTIVENESS OF SOLAR PROGRAMS IN OREGON 29, 30 (2014).

40. Some have suggested that the subscription process may also prevent more widespread participation in Oregon's feed-in tariff program. *See* Public Utility Commission of Oregon, Comment and Discussion on Solar Photovoltaic (Feb. 11, 2011) (Statement of Dave Sullivan on Pilot Solar Incentive Program), http://edocs.puc.state.or.us/efdocs/HAC/um1505hac131725.pdf.

B. Allocation of Cost

The second criterion focuses on the allocation of costs. Policymakers across the globe and in the United States[41] seek to promote solar, wind, and other renewables using either price- or quantity-based policies.[42] Price-based policies, such as feed-in tariffs or tax credits, offer eligible generators above-market rates for their electricity designed to cover costs, and allow for reasonable returns on investment.[43] Quantity-based policies, such as renewable portfolio standards and tender regimes, create markets and demand for clean energy, leaving the price determination to the market's invisible hand.[44] Whatever their methodological approach, these policy mechanisms incur costs required to bridge the gap between incumbent fossil fuel technologies and emerging low-carbon, renewable energy technologies.

How these costs are allocated among constituents directly affects a renewable energy policy's distributional equity and social sustainability. Is the cost of tax credits spread across all taxpayers? Do all ratepayers pitch in to reimburse the electric utility for its expenses to meet the renewable portfolio standard's sourcing requirement? And how does the method and breadth of cost allocation compare to the first criterion—access and availability of economic benefits and opportunities?

Germany's feed-in tariff offers an illustrative example of the important role that cost allocation plays in shaping a policy's social sustainability. Critics of Germany's *Energiewende*[45] decry that "German families are being hit by rapidly increasing electricity

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41. *See supra* Part II.

42. *See* INT'L ENERGY AGENCY, DEPLOYING RENEWABLES: PRINCIPLES FOR EFFECTIVE POLICIES 92–93 (Ian Torrens ed., 2008) (laying out the distinction between quantity-based and price-based renewable energy policies). For recent scholarship suggesting closer integration of both policies, see Felix Mormann, *Re-Allocating Risk: The Case for Closer Integration of Price- and Quantity-Based Support Policies for Clean Energy*, 27 ELECTRICITY J. 9 (2014).

43. *See, e.g.*, Pierre Bull et al., *Designing Feed-in Tariff Policies to Scale Clean Distributed Generation in the U.S.*, 24 THE ELECTRICITY J. 52 (2011); Reinhard Haas et al., *A Historical Review of Promotion Strategies for Electricity from Renewable Energy Sources in E.U. Countries*, 15 RENEWABLE & SUSTAINABLE ENERGY REV. 1003 (2011).

44. *See, e.g.*, Ryan Wiser et al., *The Experience with Renewable Portfolio Standards in the United States*, 20 THE ELECTRICITY J. 8 (2007); Trent Berry & Mark Jaccard, *The Renewable Portfolio Standard: Design Considerations and an Implementation Survey*, 29 ENERGY POL'Y 263 (2001).

45. For an introduction to Germany's ambitious energy policy, sometimes translated as "energy transition," see *Germany's New Energy Policy: Heading Towards 2050 with Secure, Affordable and Environmentally Sound Energy*, SPECIAL BROCHURE: SPOTLIGHT ON ECON. POL'Y (Fed. Ministry of Econ. & Tech., Berlin, Germany), April 2012.

rates."[46] These concerns are likely prompted by the fact that Germany exempts well over 2,000 electricity-intensive industrial customers, such as large-scale chemical, steel, and paper industries, from part, if not all, of the feed-in tariff levy.[47] When those who consume the most electricity contribute the least—if anything—to funding policies to decarbonize the local energy economy, social sustainability suffers.

C. Program Externalities

The third criterion explores program externalities. Policies to promote the large-scale deployment of renewable energy inevitably create winners and losers.[48] Solar, wind, and other renewables tend to be obvious winners under these regimes while coal and other displaced fossil-fueled power plants tend to find themselves on the losing side of the policy divide. In addition to such intentional and transparent value judgments, renewable energy policies can impose other, less obvious, and often unintended burdens on third parties. The involuntary nature of such program externalities suggests that they may not actually advance the cause of renewable energy, but, instead, unnecessarily harm the social sustainability of clean energy policies.

Federal tax incentives offer an illustrative example of a clean energy policy's externalities. Wind power generators only earn production tax credits for electricity they generate *and* feed into the grid for sale to a third party.[49] The latter requirement has wreaked havoc on wholesale electricity markets. In cases of low demand, network operators were historically able to signal to power plants that they should decrease their output, or ramp down, by gradually reducing the offer price near or, in some cases, to zero. With no fuel costs and a production tax credit tied to power production and sales, wind generators have a strong incentive to continue to produce and feed power into the grid unless and until

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46. Melissa Eddy & Stanley Reed, *Germany's Effort at Clean Energy Proves Complex*, N.Y. TIMES, Sept. 19, 2013, https://www.nytimes.com/2013/09/19/world/europe/germanys-effort-at-clean-energy-proves-complex.html.

47. *See* BDEW, ERNEUERBARE ENERGIEN UND DAS EEG: ZAHLEN, FAKTEN, GRAFIKEN 51 (2014) https://www.bdew.de/internet.nsf/id/bdew-publikation-erneuerbare-energien-und-das-eeg-zahlen-fakten-grafiken-2014-de/$file/Energie-Info_Erneuerbare%20Energien%20und%20das%20EEG%202014_korr%2027.02.2014_final.pdf; *see also* Mormann et al., *supra* note 12 (placing Germany's electricity cost in international and macroeconomic context).

48. *See, e.g.*, Zachary Liscow & Quentin Karpilow, *Innovation Snowballing and Climate Law*, 95 WASH. U. L. REV. 387 (2017) (describing the well-established narrative of public policy support for renewable energy technologies picking winners and losers).

49. *See* 26 U.S.C. § 45(a) (2012).

prices go so far below zero that they eat up all of their tax credits. As a result, where network operators used to send a zero-price signal, they now have to use a negative-price signal to achieve the same effect.[50] These negative-price signals impose harsh burdens on generators without tax credits, such as coal power plants who take longer than others to ramp down and, ultimately pay a penalty in the amount of negative pricing required to persuade wind generators and other recipients of production tax credits that they should reduce their output to maintain the electric grid's delicate balance.

V. CONCLUSION

Federal and, especially, state policymakers deserve great credit for helping move solar, wind, and other renewables out of the lab and into the marketplace. As these technologies graduate from niche markets into the mainstream, their enabling policy landscape warrants rethinking. Back when solar cells produced barely enough electricity to power a pocket calculator, it made good sense to focus on their enormous potential to advance environmental sustainability and promote them at all cost. With policymakers seeking to solidify their commitment to a clean energy future and to secure reelection, it came as no surprise that economic sustainability soon took over as the defining element of renewable energy policies. The time has come to complete the clean energy policy puzzle by honoring the social dimension of sustainability. The framework of proxy criteria proposed in this essay is intended to help policymakers and scholars alike as they assess the social implications of today's policy landscape and consider improvements for the next generation of clean energy policies—a generation that, hopefully, will simultaneously promote environmental, economic, and social sustainability.

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50. *See, e.g.*, FRANK HUNTOWSKI ET AL., NORTHBRIDGE GROUP STUDY, NEGATIVE ELECTRICITY PRICES AND THE PRODUCTION TAX CREDIT: WHY WIND PRODUCERS CAN PAY US TO TAKE THEIR POWER – AND WHY THAT IS A BAD THING 12 & fig.8 (2012) ("[N]egative prices are most prevalent when wind output is highest relative to overall demand, such as during the overnight hours in the spring and fall months when wind output is high but demand is relatively low and less power is needed.").