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## Energy democracy: Goals and policy instruments for sociotechnical transitions

 Matthew J. Burke<sup>a,\*</sup>, Jennie C. Stephens<sup>b</sup>
<sup>a</sup> Department of Natural Resource Sciences, McGill University, Québec, Canada

<sup>b</sup> School of Public Policy & Urban Affairs, Global Resilience Institute, Northeastern University, Boston, MA, USA

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### ABSTRACT

Energy democracy is an emergent social movement advancing renewable energy transitions by resisting the fossil-fuel-dominant energy agenda while reclaiming and democratically restructuring energy regimes. By integrating technological change with the potential for socioeconomic and political change, the movement links social justice and equity with energy innovation. Through a policy mix lens, this research examines the energy democracy agenda in the United States to understand how and to what extent the mix of policy instruments currently proposed among energy democracy advocates corresponds to the overarching goals of the movement. This assessment compares 22 policy instruments to 26 intended outcomes for energy democracy. The mix of policy instruments holds potential for advancing renewable energy transitions based on the combined goals of resist-reclaim-restructure, although current policies relate unevenly across the set of intended outcomes. Bolstering the energy democracy agenda will likely require developing new policies, strengthening existing policies, and integrating efforts to simultaneously resist dominant energy systems while also supporting their democratic and inclusive replacement. This research increases the visibility of the energy democracy movement and clarifies and assesses the core claims and policy instruments advanced by its advocates, contributing to policy design for renewable energy transitions and energy democracy.

### 1. Introduction

The concept of *energy democracy* is increasingly being used by grassroots activists in the United States, parts of Europe and elsewhere to call for and justify integrations of policies linking social justice and economic equity with renewable energy transitions. Energy democracy is thus both a novel concept and emergent social movement that connects energy infrastructural change with the possibilities for deep political, economic and social change. The term continues to spread throughout climate justice struggles, trade unions, academic communities, and political parties, while beginning to reach regional and national level discourse [1].

Energy democracy emerges in the context of an increasing sense of urgency regarding global anthropogenic climate change. Despite growing recognition of the inherent unsustainability and injustice of fossil fuel civilization [2], an inability to adequately reduce fossil fuel dependency persists. The issue of and need for shifting away from fossil-fuel-dominant systems toward renewable-based energy has therefore become a central theme for science, politics, and public discourse worldwide [3–8]. How the decline in fossil fuel reliance plays out is

likely to be among the most contested areas of policy and politics over the coming decades [4,9–12].

Realizing opportunities for this restructuring of sociotechnical regimes [12] requires a re-imagining of energy politics [13], an effort that energy democracy advocates intend to inspire. The energy democracy movement seeks to create opportunities for destabilizing power relations [1], reversing histories of dispossession, marginalization [14,15] and social and environmental injustices [16], and replacing monopolized fossil fuel energy systems with democratic and renewable structures [17]. Above all, energy democracy offers a set of visionary organizing principles that provide guidance for democratically restructuring the energy and electricity sectors through the processes of shifting from fossil-fuel-based systems to renewable energy systems [18,19].

Drawing from sociotechnical transition theory, the energy democracy movement represents an example of a de-alignment/re-alignment transition pathway, an ideal-type pathway for energy transition that develops in response to serious contextual pressures [20]. This transition pathway is characterized by a significant presence of actors who have lost faith in existing governing systems, the emergence of new

\* Corresponding author at: Department of Natural Resource Sciences, McGill University, Macdonald Campus, 21,111 Lakeshore Road, Ste. Anne de Bellevue, Québec H9X 3V9, Canada.  
 E-mail address: [matthew.burke2@mail.mcgill.ca](mailto:matthew.burke2@mail.mcgill.ca) (M.J. Burke).

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guiding principles, beliefs and practices, the co-existence of multiple innovations and widespread experimentation, and a shift to more local or regional-based systems and decentralized technologies and management structures [20]. Such an agenda is intentionally incongruent with the governing systems in effect in most jurisdictions, thus deliberately lacking a goodness of fit with conventional energy regimes [21]. Further, a strategy of de-alignment and re-alignment implies inherent uncertainties regarding the best path forward [20], and may lead to ineffective combinations of policy instruments that fail to achieve the desired outcomes even if adopted [22]. In such a situation, policy tradeoffs and conflicting goals are arguably inevitable [23].

Recent scholarship on sociotechnical systems change acknowledges that the urgency for transitions to sustainability requires policy mixes that combine instruments that can destabilize existing regimes while creating space for innovative alternatives, described as processes of creative destruction or disruptive innovation [24,25]. In this sense, a comprehensive agenda for energy transition demands a combination of policy instruments that simultaneously seeks to resist dominant energy systems and support their replacement. Research has not yet given sufficient attention to such comprehensive agendas for sociotechnical change, however. For example, policies for resisting or destabilizing incumbent regimes have received less attention than policies for innovation [25], and combinations of policies for simultaneous innovation and disruption have also received minimal attention [24]. By explicitly linking moves to both destabilize incumbent systems and support new alternatives, energy democracy proposes a uniquely comprehensive and potentially effective agenda for driving deep sociotechnical change [24,23]. Given its integrated social change focus, the energy democracy approach may present better prospects for achieving the renewable energy transition than more traditional energy innovation and climate mitigation efforts that are often isolated from other social issues [26,21].

This paper focuses on the energy democracy agenda in the United States and asks, how and to what extent does the set of policy instruments currently proposed among energy democracy advocates correspond to the overarching goals of the energy democracy movement? A policy mix lens offers a useful approach for drawing attention to sets of policies rather than individual policy tools, designed to achieve proposed societal outcomes [27]. A policy mix lens further provides a framework for considering specific tradeoffs and potential conflicts within and between sets of policies, and for understanding how these different policies may interact to influence the achievement of goals and intended outcomes [28,23]. Drawing from a review of both activist and academic literature on energy democracy, our aims include increasing the visibility of the energy democracy movement, clarifying and assessing the core claims and policies advanced by energy democracy advocates, and contributing to integrated policy designs for energy democracy.

In the following section, we describe our approach to assessing energy democracy goals and policies based on a review of recent sources on energy democracy. In Section 3, we present the results of the review of goals and policy instruments for energy democracy. Here we synthesize and present the core energy democracy goals and summarize specific policy instruments associated with the energy democracy agenda for renewable energy transitions. Section 4 presents the results of this assessment comparing energy democracy goals and policy instruments. In Section 5, we discuss the significance of the review and assessment in terms of the value of integrating a policy mix approach with an energy democracy agenda. This integration offers insights for understanding policy mixes in the context of urgently needed sociotechnical systems change, as well as for strengthening the energy democracy agenda. We address limitations of this research, suggesting areas for further research on the design of effective energy democracy policy mixes to advance renewable energy transitions. In Section 6, we summarize our main conclusions and their implications for scholarship and practice.

## 2. Conceptual lens and methods

In this paper, we initiate an assessment of whether and how the mix of policy instruments proposed within the energy democracy movement advances the overarching goals of the movement. To conduct this assessment, we first undertook a conceptual review of energy democracy to identify the goals and policy instruments associated with this social movement. This assessment requires some clarity on how the term energy democracy is used in practice. We then operationalized each broad energy democracy goal as a set of intended outcomes to enable a comparative assessment with each individual policy instrument.

This preliminary assessment of energy democracy policy instruments draws from a policy mix perspective, in which policy mixes are understood broadly as “complex arrangements of multiple goals and means which, in many cases, have developed incrementally over many years” ([22], p. 395). This basic definition differs from the more comprehensive policy mix concept as proposed by Rogge and Reichardt ([29], p. 24) but largely suits the purposes here by emphasizing the generalized notions of goals as desirable ends and policies as the means to achieve these ends over time. Nevertheless, we do follow Rogge and Reichardt [29] to further specify our meaning of goals and policy instruments as applied here. In this work, the term *goal* refers to the set of intended effects or outcomes of policy instruments ([29], p. 9). The term *policy instrument* refers here to the specific tool or technique used to address policy problems, including programs and measures ([29], p. 9). The units of analysis for this initial assessment include each individual policy instrument and ultimately the constituting set of energy democracy policy instruments, described as an *instrument mix* ([29], p. 3).

The aim then is to contribute to understanding connections between goals and policy instruments. Conceptually, we assess the *congruence* of the relationship between goals and policy instruments as a means for evaluating the predicted success or failure of these efforts for energy transition ([22], p. 395). While much of the policy mix literature focuses on coherence of goals and consistency among existing policies, this assessment centers on the congruence of a set of existing and proposed policy instruments with a broad and emerging set of goals. We emphasize that the present assessment involves energy democracy goals as intended outcomes rather than actual impacts. An empirical assessment of impacts of specific policy instruments is beyond the scope of this paper due to the recent emergence of energy democracy and the complexity of both the policy instruments and the factors influencing the realization of their goals [23]. Rather, this inquiry assumes that the large-scale sociotechnical transformation demanded by the energy democracy movement requires that the appropriate mix of policy instruments are actively and sufficiently proposed.

For the conceptual review, iterative searches were performed beginning in October 2015 using academic libraries and popular search engines publicly available in Canada and the United States. Search terms used included “energy democracy” and “energy AND democracy” and were directed at all source content, yielding an initial set of approximately thirty English-language reports, articles, websites and videos. This set of sources was expanded through November 2016 using searches of activist group websites, notifications from relevant listservs and participation in webinars, as well as inclusion of references frequently cited within source materials. These sources were coded first according to definitions of terms and concepts, findings and conclusions, and calls for further research. This process was followed by repeated topical sorting of coded material according to researcher-generated topics including origins and contextual factors, energy democracy actors, purposes and goals, guiding principles and values, core policy tools, and barriers. The sorted materials were organized within a conceptual outline that was used to guide the initial drafting of the review of energy democracy. This initial procedure to review the concept of energy democracy revealed a breadth of topical categories that inspired two supporting lines of inquiry, ultimately producing two

research papers relating to the practice and theory of energy democracy. This paper examines the goals and policy instruments of the energy democracy movement through the lens of policy mixes, while the second review explores the theoretical relationships between renewable energy systems and democratic politics more broadly [30].

For the comparative assessment of congruence of goals and instruments, the three broad energy democracy objectives of *resist*, *reclaim* and *restructure* [31,19] were used to organize a set of goals. For each of these three categories of goals, a list of intended outcomes was identified by first drawing from the review and then revisiting key sources that specifically addressed this three-pronged approach [1,32,19,33]. The aim here was to identify a set of outcomes prioritized for each goal for energy democracy, at a level of specificity that could provide a clear statement of a desired outcome without specifying quantified targets, while further remaining applicable across various jurisdictions (e.g., U.S. States). This procedure resulted in a set of 26 statements of intended outcomes. Policy instruments were similarly identified through the review resulting in a set of 22 policy instruments that advocates for energy democracy have consistently identified as meaningful for advancing this agenda, mainly in the context of the U.S. as well as the UK and EU. To facilitate the assessment, policy instruments were then organized into four categories including regulatory context, financial inclusion measures, economic institutions, and new energy system institutions (based on Duda et al. [34]). Once identified, each policy instrument was additionally summarized to provide definitions and examples in practice, drawing first from the above review and adding additional sources when clear definitions or current examples were lacking in the sources originally reviewed.

Having established the set of energy democracy policy instruments and intended outcomes, each instrument was paired and compared in a spreadsheet with each individual outcome statement. For each pairing, the aim was to assess whether the chosen instrument could reasonably be expected to contribute or not to the achievement of the specific outcome. In cases of uncertainty or ambiguity, it was assumed that an instrument could not be expected to contribute to the outcome. The comparisons were aggregated according to the three categories of energy democracy goals to consider whether and to what degree, modestly or strongly, each instrument related to the achievement of each goal. For a modest relationship to the goal, a selected instrument had to be assessed as related to at least half of the outcomes of that specific goal, whereas if an instrument was deemed relevant to at least 80% of the outcomes of a specific goal, the instrument was determined to relate strongly to the goal. Similarly, the individual outcomes were assessed according to the number of supporting policy instruments to determine the relative degree of attention given to each outcome from the set of instruments. Following Kivimaa and Kern ([24], p. 211), the objective of this exercise was to analyze how the combination of policy instruments for energy democracy may be expected to relate to and support outcomes considered to be constitutive of an energy democracy vision for renewable energy transitions, noting how the energy democracy instrument mix corresponded to combined goals of a resist-reclaim-restructure agenda.

### 3. Review of energy democracy goals and policy instruments

#### 3.1. Energy democracy goals

Our review of the energy democracy literature reveals a core political agenda that includes a set of overarching goals with specific intended outcomes. These goals inspire a portfolio of different policy proposals and policy instruments which are reviewed in the next section. Energy democracy goals include a shift to 100% renewable energy sources in ways that resist the dominant fossil-fuel energy agenda, reclaim social and public control over the energy sector, and restructure the energy sector to better support democratic processes, social justice and inclusion, and environmental sustainability.

With roots in resistance, the energy democracy movement arose from popular movements working to address climate and economic crises, resist fossil fuel expansion, and transition to renewable energy [33]. Since 2012, various groups and organizations have explicitly taken up the term energy democracy in the United States and Europe as a central theme of discourse on energy and climate change.<sup>1</sup> Within the German climate justice movement, the Lausitz Climate Camp saw a number of groups work to define the term in 2012 [1]. That same year, in the United States, Cornell University's Global Labor Institute hosted an international roundtable of unionists who used energy democracy to frame the struggle for energy transition [36], out of which emerged a new organization, Trade Unions for Energy Democracy [37]. The roots of the energy democracy movement go back further, however, and can be understood as contemporary expressions of earlier social and environmental movements within and beyond the energy sector, including grassroots anti-nuclear and peace movements in Europe and the United States and the associated interest in local, participatory and direct democracy [38]. In Germany, for example, the movement for energy transition known as the *Energiewende* is associated with the nuclear phaseout agreements in 2002, the Feed-in Tariff Act of 1980, as well as with earlier movements against the industrialization of farming [39]. Elsewhere in the world, particularly in the global south, social groups have taken up related terms such as energy justice [40] and energy sovereignty. Advocates of energy democracy wish to see these related terms become meaningful among a diverse set of actors and activists unified in their pursuit of a more equitable distribution of political and economic power and of greater social and community control of energy, as well as food, water and land [1,41].

To improve outcomes and to democratically legitimate consent, advocates and scholars argue that all of society need to participate in and engage with the processes of energy transition [42,17]. Different groups of people who hold different sets of motives and interests may make different choices regarding the distribution of benefits and risks [13,43], resulting in very different energy systems. Within an energy democracy perspective, ordinary citizens and communities would exert far greater control over energy decisions than is currently realized [36]. Indeed, the energy transition is linked to a broader project of expanding political democracy [36], where the reforms of the energy sector serve to re-inspire a politically-engaged citizenry [44] who participate as citizens before consumers [40]. Energy democracy activists therefore recognize the importance of broadening the inclusion of actors within energy politics. This aim includes finding ways to draw in historically marginalized groups, individuals and communities, including communities of color, Indigenous communities, low-income communities [1,14,33] and others who bring a fresh set of priorities and values to the debate over energy futures. Energy democracy demands that the key decisions be made not by a few large corporations but rather by communities and citizens [40]. Those communities who have been most adversely impacted by the current energy system would be prioritized to receive tangible and direct benefits from community-based energy projects (e.g., good local jobs, ownership opportunities) [15,33].

The energy democracy movement advances a vision that includes communities powered by 100% renewable energy [18,16], with the majority of energy coming from decentralized systems [31,19,33]. Energy democracy aggressively promotes energy conservation and the functioning of ecosystems [45,31,19]. Ecological interdependence is respected and a project or policy is not to be pursued if the risks to humans and environment are high or poorly understood [33]. Energy is

<sup>1</sup> A representative sample of these groups includes Community Power Network, Local Clean Energy Alliance, Trade Unions for Energy Democracy, Institute for Local Self Reliance, Center for Social Inclusion, the Climate Justice Alliance, Rosa Luxemburg Foundation, Platform London, Switched on London, Berlin Energy Roundtable, the Alternative Information and Development Centre, Public Services International, the Emerald Cities Collaborative, and the Energy Democracy Alliance of New York [18,16,35,36].

considered a public good or commons before a commodity [1,46], requiring informed and conscientious communities that strive to conserve and protect all material resources [33]. Energy democracy further provides a new model of economic development and key elements of a new economy. Electricity represents a multi-billion-dollar industry [47]. Energy democracy works to keep these financial resources within the communities [48] by establishing a clear link between local generation and local use [49], potentially transforming poor and neglected communities into energy producers [45]. Host communities, including citizens acting as *prosumers* (in Toffler's term [50]) and energy citizens [51], are to realize substantially greater economic opportunity and benefit [45,47,15]. Energy finance builds shared ownership and community-based resources rather than facilitating wealth accumulation [46,33]. Relatedly, energy democracy aims to create green jobs and supports union leadership. Energy democracy seeks to protect workers' rights and generate secure and meaningful work. Achieving this objective requires that workers co-lead the energy transition and that jobs in the renewable energy sector be primarily unionized [18,31].

Central to an energy democracy agenda is a shift of power through democratic public and social ownership of the energy sector and a reversal of privatization and corporate control [19,33]. Energy democracy seeks to shift control over all stages of the energy sector, from production to distribution, and extending to infrastructure, finance, technology and knowledge [18] while reducing the concentration of political and economic power of the energy sector, particularly within the electricity industry [15]. While governance of renewable energy assets would favor public or community ownership and control [47], diverse forms of ownership are needed [15] that respect the political, economic and social requirements, diversity, and challenges of specific locations or communities [52,44]. Decision-making procedures would give primacy to values as expressed by local communities over conventional approaches (e.g. cost-benefit analysis) [53]. Mechanisms for widespread, meaningful, inclusive democratic participation would be ensured and receive the necessary support [16,33]. Energy policies would therefore support community-scale innovations [52] that serve to increase community capacity [34].

These broad pursuits to *resist, reclaim and restructure* energy systems

[31,19] together shape the unique approach of the energy democracy movement for achieving renewable energy transitions (Table 1). This energy democracy movement therefore offers a type of systemic and comprehensive agenda needed for renewable energy transitions. Structuring the types of democratic relationships necessary for allowing community-based decision-making authority over decentralized energy systems presents formidable and insufficiently considered challenges [49,33]. The sets of policies proposed by energy democracy advocates and scholars offer an emerging response to this challenge.

### 3.2. Policy instruments

Our review of the energy democracy literature identifies multiple policy tools having the potential to advance energy democracy goals. Here we provide a brief description of each policy measure, primarily with an orientation toward the potential for implementation within the United States context. Individually, each policy offers potential benefits and drawbacks yet collectively these policies offer the possibility to provide synergies and enhance effectiveness for achieving integrated energy democracy goals and outcomes. This section characterizes policies within four categories: regulatory context, financial inclusion measures, economic institutions, and new energy system institutions [34].

#### 3.2.1. Regulatory context

Among the four categories of policy instruments for energy democracy, policies categorized as regulatory context provide a contextual foundation for the pursuit of additional policy reforms for energy systems change.

**3.2.1.1. Statutory priority for demand reduction and distributed generation.** The energy democracy movement intends to shift toward an energy system in which the total demand for energy is reduced over time, and where distributed generation supplies a majority of the electricity supply within a 100% renewable energy system. According to Weinrub and Giancatarino, two leading voices within the U.S. energy democracy movement, demand reduction is possibly the most

**Table 1**  
Energy democracy goals and intended outcomes (based on [1,32,19,33]).

Goals for energy democracy	Intended outcomes
Resist the dominant energy agenda	<ul style="list-style-type: none"> <li>● Fossil fuels remain in the ground.</li> <li>● Expansion of fossil fuel infrastructure and development of extreme forms of energy and extraction stops.</li> <li>● Land grabbing for large-scale renewables ceases.</li> <li>● Fossil fuel subsidies end.</li> <li>● Privatization and marketization of energy sector halts.</li> <li>● Undermining of climate protection stops.</li> <li>● The most dependent on fossil fuel industries protected, especially labor.</li> <li>● Public resources shift away from fossil fuels.</li> <li>● Public legitimacy of the fossil fuel industry is reduced.</li> <li>● New social alliances are created (e.g., unions, environmental groups, municipalities).</li> </ul>
Reclaim the energy sector	<ul style="list-style-type: none"> <li>● Energy corporations democratize and localize.</li> <li>● Social/public control of energy production and consumption normalizes.</li> <li>● Parts of the energy sector that have been privatized or marketized return to public control.</li> <li>● Principles of public interest within and democratic control over publicly-owned energy companies is restored.</li> <li>● New energy companies, ownership models and financial investment systems under social and public control develop.</li> </ul>
Restructure the energy sector	<ul style="list-style-type: none"> <li>● Energy sector moves away from the profit motive.</li> <li>● Energy access and assets are shared broadly and community wealth-building is supported.</li> <li>● Energy systems are governed as a commons.</li> <li>● Community power and capacity to control energy systems strengthen.</li> <li>● Emphasis shifts from growth to wellbeing, sufficiency and environmental quality.</li> <li>● Economic and political power is decentralized and distributed.</li> <li>● Capacity for energy planning increases.</li> <li>● Geopolitics of energy supports global cooperation and peace over competition and conflict.</li> <li>● Solidarity, inclusion and open, democratic participation advances.</li> <li>● Workers, low-income communities and communities of color hold central positions within energy systems.</li> <li>● An understanding of the energy sector as interdependent within the natural environment pervades.</li> </ul>

important component of a decentralized renewable energy system [33]. Whether measuring costs monetarily or otherwise, reduced demand provides cost savings and eases the transition to renewable sources. Distributed (or on-site) generation refers to small-scale generation of electricity in distributed locations, typically involving a shortened distance between points of generation and use. Such systems often include the generating technologies such as solar photovoltaics and wind turbines, load fluctuation controls, monitoring equipment, and possibly on-site storage. Greater reliance on distributed generation can introduce increased variability into grid operations, which may require diverse strategies including improved grid management and increased transmission and storage. Distributed generation may interconnect with the grid or operate off-grid [54], and requires some right to self-generate electricity within conditions necessary for protecting public health and safety [55]. State and local governments, often through public utility commissions, may have greater expertise with the regulation of distributed generation than federal entities such as the Federal Energy Regulatory Commission [54]. Centralized systems still may serve an important role in a democratized energy system, but this system prioritizes distributed energy supply for serving an overall reduced demand.

*3.2.1.2. Net metering and virtual net metering.* Net metering and virtual (or group) net metering are widely considered as key policies for energy democracy, enabling various other inclusive community-based generation and ownership models such as shared or community solar [47,15,33]. Net metering allows owners of on-site generation systems to feed electricity back into the grid, typically selling excess power back to the utility or receiving credits. Virtual net metering programs allow people and organizations to own or share in ownership of off-site facilities. Virtual net metering broadens the sharing of benefits from renewable energy projects by allowing those lacking access to a suitable generating site to participate in sharing the output from a single facility. Most states have adopted net metering laws, while only sixteen states have adopted virtual net metering policies with varying restrictions [56].

*3.2.1.3. Renewable energy standards.* A Renewable Energy Standard or Renewable Portfolio Standard (RES/RPS) requires that utilities supply a targeted proportion of electricity from renewable sources by a specified point in time, typically within decades [57]. By attaching a set-aside for distributed generation, the RPS can additionally stipulate that a portion of the renewable electricity be generated through these distributed technologies as described above. In the United States, RPS programs have typically been adopted at the state level but the federal government could also adopt a national standard [34]. Efforts to comply with RPS obligations may have contributed to more than half of new renewable energy generation since 2000 [58]. RPS programs help to ensure that renewables replace fossil fuel use rather than simply adding new capacity. RPS policies have also shown a redistributive effect, shifting benefits through shifts in employment from fossil fuel to renewable energy sectors. Currently, RPS programs have been adopted in 29 states and Washington, D.C., while an increase in RPS-driven demand is anticipated [58].

*3.2.1.4. Participatory energy planning and deliberation.* Participatory energy planning processes offer the opportunity for communities to become educated and engaged on key issues, creating precedents and capacities for long-term, meaningful public participation in energy system decision-making [34]. Public participation is widely acknowledged as an important means for bringing forward perspectives other than those of incumbents with vested interests in the status quo, potentially shifting the political and institutional context within which decisions about future energy choices are made [59]. However, current efforts tend to focus on individual projects and technologies and involve relatively minor levels of engagement rather

than building the capacity for deeper participation [13,60]. Weaker levels of participation, for example, as end users or simple proponents or opponents to a siting decision, fail to support the context needed for democratizing the energy system. Energy democracy requires levels of engagement that guarantee sustained participation and citizen control [61] as ensured through ownership, for example. A community renewable project should involve the community at the earliest stages [53,45]. Participation also includes education and technical assistance [45]. Deliberative democratic practices can be used to improve the quality of engagement and help participants develop opinions informed by relevant facts, expert information, and multiple perspectives [62]. Energy governance structures are highly context specific and the ideal procedures for participatory community engagement vary dramatically across communities in different locations. Therefore, the design of planning processes and participation, including ownership models, benefits from negotiation with and within specific communities [63], and are likely to require time and experience to improve practices.

*3.2.1.5. Community choice aggregation.* Community Choice (Energy) Aggregation (CCA) programs allow communities to choose the source of electricity supply. A CCA functions by designating a public agency such as a municipality, county or other jurisdictions as the aggregator, to procure electricity on behalf of ratepayers, for example, through targeted purchasing or through local renewable energy development, while the utility continues to deliver electricity and services [36,33]. CCA programs thus enable community control over purchasing of electricity, increasing democratic oversight and involvement while avoiding or facilitating deliberation over the option for full municipalization [34]. Following California's energy crisis of 2001, widely attributed to abuse of utility monopoly power, the state adopted legislation allowing CCA programs. Cities and counties were granted the authority to procure electrical power for their residents, established through local ordinance and designed as opt-out programs [64]. Currently eight CCA programs have formed statewide, with four more anticipated and as many as 20 in planning stages. In addition to concerns with cost and local control, CCA programs have been shown to enable deployment of renewable energy, allowing communities to achieve renewable energy goals and facilitating the adoption of a more ambitious statewide RPS of 50% renewable power by 2030 [65–67].

*3.2.1.6. Community benefit agreements.* Community benefit agreements (CBAs) are legal measures designed to distribute the benefits of projects or programs among a community. For renewable energy projects, CBAs are typically set up as contractual agreements between large developers and communities hosting a project that specify required tangible benefits to the communities. CBAs can be required for projects that receive some form of public support such as subsidies or tax reductions or through state or local programs that promote renewable energy. Various benefits may be specified in CBAs including standards for wages or union jobs, local hiring, shared community and minority ownership, rights of participation and public engagement, environmental restoration, greenhouse gas emissions reduction strategies or direct payments made to communities or the state [68,34]. States or community-based organizations can set the standards for approved contractors and enforce agreements [34]. Because of their versatility, CBAs are ideally negotiated between a coalition of community groups and the developer to emphasize local needs. When properly negotiated, CBAs can lower transactions costs by reducing conflicts, improve participation in public processes, and protect taxpayers [69]. While CBAs are widely implemented for large-scale developments in the United States, their use for renewable energy projects remains limited. Meanwhile, the UK has seen a significant number of CBA policies specifically adopted for renewables, primarily wind energy projects.

### 3.2.2. Financial inclusion measures

In addition to the regulatory context, financial inclusion measures provide financial opportunities and monetary incentives for broadening and advancing energy systems change.

**3.2.2.1. Feed-in tariffs.** One of the most popular approaches to supporting decentralized and democratized renewable energy systems worldwide is a feed-in tariff (FIT), typically established through utility contracts [52,36]. Rather than a subsidy, FITs typically set a long-term guaranteed minimum fixed price for the purchase of generated renewable energy (i.e., fixed-price payment models), although premium-price models, which tie payments to market prices, are also common [70]. Community-scale electricity producers can then compete with large-scale power producers and receive financial benefit from renewable energy generation [39,36]. While FITs have been adopted globally (with Germany's FIT being highly influential) and have been shown to be one of the most effective instruments for advancing renewable energy and creating jobs, they do require good policy design, for example, appropriate and transparent pricing schemes [71]. On their own, FITs have been found to be regressive, placing more financial burden on lower income households while providing more benefit to upper incomes who account for most of the installations [72]. Experiments with FIT payment models are ongoing, and include introducing payment caps to keep payments from rising significantly as in Spain [70], while more recently model variants based on auctions have gained popularity. The municipally-owned utility serving Gainesville, Florida was the first in the U.S. to adopt a solar FIT in 2009, and currently six U.S. states use FITs or related policies, including California, Hawaii, Maine, Oregon, Vermont, and Washington [73].

**3.2.2.2. Green subsidies.** Green energy subsidies include various grants and funding mechanisms implementable across levels of government that direct resources to targeted communities for specific needs. Energy efficiency and weatherization programs target what many consider the most cost-effective first steps for supporting a renewable energy system. Low-income renewable energy grants provide direct funding to people who typically cannot afford renewable energy systems, including low-income households and multifamily affordable housing developments, to partially or fully offset the costs installation. Grants for financial or technical assistance to community-based organizations such as places of worship or childcare and senior centers can raise the visibility and sense of inclusiveness of renewable energy projects, building trust and encouraging greater community awareness and involvement. Although green subsidies are politically unstable and not necessarily innovative, they nonetheless remain useful to an energy democracy policy mix [34]. Numerous examples of green subsidies have been deployed across the U.S., including the Department of Energy Weatherization Assistance Program, which since 1976 has provided locally-administered grants for energy efficiency improvements for more than seven million low-income families [74].

**3.2.2.3. On-bill financing and repayment programs.** On-bill financing and on-bill repayment or recovery programs are mechanisms that allow low-income households lacking the upfront capital or access to credit needed for renewable energy installations to purchase and finance these systems through payments made on their utility bills [34]. Depending on the program, public sector entities may also be able to take advantage of on-bill programs to finance renewable energy projects. Typically, either the utility or a third party will incur the upfront costs, and the savings or credits are paired with the repayments on the same bill. Similarly, for Property Assessed Clean Energy (PACE) programs, the local government serves as the lender to homeowners who repay through their property taxes. On-bill programs work best with a supportive utility that targets billing neutrality, and when the repayment obligation stays with the meter rather than the customer if the system is sold [74]. In cooperation with New York utilities, New

York State implemented an on-bill program in 2012 through the New York State Energy Research and Development Authority, while additionally targeting low- to moderate-income communities through its Green Jobs – Green New York program [75].

**3.2.2.4. Revolving loan funds.** Revolving loan funds establish a long-term source of credit for renewable energy system installations rather than one-time subsidies. When loans are repaid, all or a portion of the repayment is used to sustain and grow the fund for additional projects. The loan fund can be administered through community-based financial institutions such as a green public service bank or through other entities of state and local governments, and can be linked to technical assistance and additional supporting resources [34,74]. Government-sponsored loan funds typically offer lower interest rates and/or more flexible terms than commercial capital markets, with terms ending within 10 years, and can also be used to leverage private investment. More than 30 U.S. states have implemented revolving loan fund programs for energy efficiency and renewable energy projects [74]. Created by the Iowa Legislature in 1996 and managed by the Iowa Energy Center, the Alternate Energy Revolving Loan Program provides zero-interest loans for various technologies including solar, biomass, small hydro and small and large wind turbine facilities for up to half of the cost of the project [76].

**3.2.2.5. Public bonds.** The use of public bonds as a financial energy democracy policy approach is worth mentioning although they are discussed only minimally among energy democracy advocates [33]. We include public bonds in this review due to their widespread use by state and local governments in the United States, the common requirement for voter approval, and the recent adoption of the use of federally-subsidized tax credit bonds. Governments, public utilities and community members may consider debt-financing of renewable energy projects as a worthwhile approach to control of energy supplies given that costs of these technologies tend to drop over time and the operation costs are low. Municipal bonds are one such financing tool that has been used successfully for financing large-scale infrastructural projects for over a century. The large municipal bond market accounts for \$3.7 trillion of U.S. municipal debt, with individuals accounting for the majority of investments as bonds are typically tax exempt [77]. Administered by the U.S. Internal Revenue Service, Clean Renewable Energy Bonds are issued by electric cooperatives and government entities to bondholders who receive federal tax credits rather than the typical bond interest [74]. The City of Burlington, Vermont issued a \$12 million, 20-year bond with 79% voter approval allowing its municipally-owned electric utility to purchase a 7.4 MW hydroelectric facility in 2014, which in addition to earlier acquisitions and contracts, currently allows the city to cover the equivalent of 100% of its electricity use with renewable energy [78].

**3.2.2.6. Carbon tax-and-invest.** A carbon tax is a fee for the use of fossil fuels implemented in proportion to the content of carbon within the fuel source. Based on the polluter-pays principle, a carbon tax is intended to create a financial incentive for the reduction of carbon dioxide emissions while generating needed public revenues [79]. A carbon tax may be implemented at any level of government that has taxation authority, and is facilitated by the presence of these tax collection mechanisms. Ideally such taxes would be assessed as far upstream as possible in the fossil fuel supply chain, for example, on the extractive or wholesale industries. To overcome political resistance while also realizing emissions reductions, a carbon tax is thought best to be introduced at lower rates with a clear commitment to steadily and predictably increasing the rate to a point adequate for reducing fossil fuel consumption. Fuel suppliers and processors can be expected to pass along the cost of the tax to the extent that fuel markets allow [80]. Carbon pricing has been criticized for its regressive quality, as lower

income households spend a higher proportion of their income on energy, and thus will be impacted to a greater extent than wealthier households. This issue can be addressed through a variety of mechanisms, for example, by dedicating the revenues to public investments such as education, healthcare, energy efficiency and community renewable energy, by issuing dividend payments to tax payers, or by integrating within the carbon tax policy additional tax shifts to achieve revenue neutrality for vulnerable groups. British Columbia's revenue-neutral carbon tax, despite not directly targeting public investments, has nonetheless proven effective for driving local investment in renewables and energy efficiency at the local level. As a flexible instrument, policymakers have the option to use these revenues for public investments as the tax rate increases over time [34,81]. The states of Washington, Massachusetts, Vermont and New York have all demonstrated some interest in getting carbon tax proposals on the political agenda.

**3.2.2.7. Cap-and-dividend.** A cap on fossil fuel use or greenhouse gas emissions sets a specified reduction target that decreases over time. The emissions allowances are auctioned, yet unlike cap-and-trade, cap-and-dividend ensures that fees collected are shared widely and transparently, for example, returning revenues as guaranteed basic income on a per capita basis or as a targeted green subsidy. Thus, the policy treats the atmosphere as a commons, with members of the public as shared owners [34,82]. If distributed on a per capita basis, those people with greater emissions reductions stand to gain. Dividend payments can therefore counter the regressive impacts of carbon reductions on lower income groups and make them progressive, even in cases when public entities retain some portion of the revenue. Cap-and-dividend policies can be developed based on existing cap-and-trade initiatives in the United States [82]. Following a period of considerable interest across various states including California, cap-based systems appear to have lost prominence as carbon tax proposals have gained renewed attention. Cap-and-dividend may again become politically popular if suspicions regarding trading schemes increase, or if a carbon tax fails to achieve the necessary emissions reductions sustain the needed political constituency.

**3.2.2.8. Cooperative financing.** Cooperative financing is an umbrella term for various financing innovations such a crowdfunding or direct public offerings that pool funds from a potentially large number of individual and community investors. Crowdfunding campaigns for example have been promoted as a means to democratize energy as well as finance [83]. In many cases, payback or discounts are offered rather than returns on investment due to limitations of securities laws. Specific terms must be designed to allow smaller non-institutional investors to participate or to direct the benefits of such projects toward serving the public good or communities in need. Operating as a Benefit (B-) Corporation, Mosaic is among the largest such lending platforms in the United States, having raised millions for solar electricity projects, although less emphasis has been placed on the crowdfunding platform recently. Funds are loaned to third-party investors who own the project and repay investors through payments made for the electricity generated by the project [84].

### 3.2.3. Economic institutions

This category of policy instruments provides a set of reforms that seek to provide community economic development opportunities and create new socioeconomic institutions.

**3.2.3.1. Community energy.** Various models of community or publicly-owned and operated utilities exist, including the more than 2,000 public power systems serving approximately 15% of electricity customers in the United States [85]. Community renewable energy programs, also known as shared solar, shared wind and solar gardens, represent an innovative grassroots model that allows people who do not

own homes, who cannot individually afford the investment of renewable energy systems, or who do not have sufficient resources, to pool their resources with other community members. Members purchase or lease a share of a renewable system developed in the local community and receive the benefits of the energy that is produced by their share. The member's share of the electricity generated by the project is credited to their electricity bill. The renewable energy facility achieves greater economies of scale than with single family installations [34,86]. The state of Colorado requires that solar gardens allocate a minimum of 5% of each shared solar array to low-income subscribers [86], although this proportion could be increased to improve accessibility to renewables.

**3.2.3.2. Renewable energy cooperatives.** Non-profit consumer-owned electric cooperatives, including distribution cooperatives and generation and transmission cooperatives, provide renewable energy or related services to consumer-members. In the United States, more than 800 electric cooperatives provide electricity from various sources to roughly 42 million people [87]. Worker-owned cooperatives provide employment and financial benefits of ownership to worker-owners in addition to various renewable energy services to customers [88]. Like cooperatives worldwide, electric cooperatives operate according to a set of seven cooperative principles, including democratic control by members and cooperation among cooperatives [88,87]. The Energy Solidarity Cooperative, based in Oakland, California, presents a hybrid model, cooperatively owned by workers, consumers and community investors, and builds cooperatively-owned solar energy projects and political educational programs with groups in communities of color and low-income communities [88]. Evergreen Energy Solutions provides solar electric installations and energy efficiency, weatherization and remodeling services as part of the group of Evergreen Cooperatives of Cleveland, which was started in 2008 by various city institutions and municipal government to create livable wage employment in low income neighborhoods in Cleveland, Ohio [89]. Emerging more recently, prosumer-to-prosumer models support cooperative renewable energy management and ownership among clusters of prosumers operating on an islanded microgrid, increasing the reliability and usage of the local power system [90].

**3.2.3.3. Remunicipalization.** The widespread privatization of municipally-owned public assets since the 1980s, especially water, sewage and electricity systems, now confronts the prospect of remunicipalization as municipalities worldwide and especially in Europe and Latin America, re-purchase privatized companies, cancel or decline to renew private contracts and establish new municipal projects. Remunicipalization is typically motivated by dissatisfaction with the outcomes of privatization, desire for greater transparency and accountability, and an interest to achieve better environmental and labor standards [91]. Activists and scholars agree that public ownership provides no guarantee of improved outcomes; however, voices from the energy democracy movement assert that public sector models, including the "public works" approach of the last century and contemporary experimentation within the public sector, are key to energy democracy [41,57]. Recognizing potential and historic flaws of public ownership, advocates realize that remunicipalization, as a decentralized form of collective action, must be grounded in economic democracy and public participation and must allow a wide variety of models of public ownership as relevant to particular locations [92]. Diverse public ownership models exist that may be explored during remunicipalization, including hybrid cooperatives, joint private-public companies and public-to-public partnerships. Through a 2011 voter ballot initiative, the City of Boulder, Colorado formally launched a process of remunicipalization that continues today, as part of the city's broader effort to achieve 100% clean energy by 2050 while providing a replicable model for local authority over energy infrastructure investment decisions [93]. The City recently received

approval from the Colorado Public Utilities Commission for the schedule of transfer of assets, and intends to begin operations in 2017 [94].

**3.2.3.4. Green public service banks.** Green public service banks and related community development financial institutions are designed to target community-based renewable energy projects and supporting initiatives while offering greater accountability to local communities for decisions over public financing [57,33]. Financing from globally mobile capital often remains disconnected and disembedded from local communities [46]. Non-profit public service banks on the other hand not only provide loans to support place-based projects and organizations, but the decisions regarding these investments are made with and through the communities. Green public service banks can be legally required to provide inexpensive, accessible credit to cooperatives and other community-based projects [46]. These approaches to financing can then stimulate additional circulation locally and regionally, known as a multiplier effect [95]. The Connecticut Green Bank was established by the Connecticut Legislature in 2011. As the nation's first full-scale green bank, the bank is now widely viewed as a leader in the clean energy finance and green bank movement in the United States. The green bank draws together both public and private funds to support investment in renewable energy and energy efficiency projects while creating employment opportunities in Connecticut [96,34].

### 3.2.4. New energy system institutions

The fourth category of energy democracy policy instruments includes those instruments that support or facilitate institutional reforms within the energy sector.

**3.2.4.1. Energy investment districts.** Known by various terms including Just Transition Zones, Energy Investment Districts or Energy Improvement Districts (EIDs), these policies provide economic development models that target specific geographic zones such as economically depressed communities or locations suffering environmental injustices such as toxic pollution [33]. The designation of an EID provides the means to combine public bonds or other funding sources with a focused commitment to assisting underserved communities [34]. For example, the EID model championed by the Center for Social Inclusion (CSI) specifically seeks to target marginalized low-income communities and communities of color for renewable energy projects. A community-based organization can convene community members, some of whom may serve on an associated energy trust and local council, to identify, select and implement projects within a district, using democratic planning and decision-making processes [97]. Various related models exist, for example, in Ohio, Connecticut and Arkansas, allowing communities to apply for designation of energy investment districts that then typically allows property owners within the district to participate in PACE programs [98,97]. To increase the benefits beyond property owners and target specific communities, as in the CSI model, would require improvements to the design of EID policy, including criteria for community designation and commitment to participatory processes [97].

**3.2.4.2. Microgrids and democratized grid management.** Energy democracy advocates increasingly view centralized grid management, favoring large utilities, as a key barrier to democratizing renewable electricity sectors and thus the microgrid and democratized models of grid management are widely recognized as critical sites of contest for energy democracy. Grid management that allows fair access for any potential provider is seen as the “structural center of a democratized electricity system” ([47], p. 39). In this model, independent grid managers would ensure equal access to the grid, coordinating resources from decentralized renewable generation under distributed ownership [34,99]. The microgrid, which connects and integrates multiple forms of distributed renewable generation capacity, storage,

transmission facilities, and interconnected loads and smart devices within clearly defined electrical boundaries, would be owned and managed locally by members of the microgrid community [34,100,101]. Microgrids are flexible and adaptable, vary in size to match levels of demand, potentially reduce the need for long distance transmission and distribution capacity and the land required, and offer the possibility for operation in both grid-connected or disconnected islanded mode to increase grid resilience [54,100]. Model standards for microgrids are needed that among other objectives serve to ensure grid access and fair pricing [54]. Coordinated by the nonprofit Clean Coalition in collaboration with Pacific Gas & Electric, the Hunters Point Community Microgrid Project is intended to support higher levels of local renewables and provide economic, energy, and environmental benefits such as local employment and reductions of greenhouse gas emissions for the Bayview and Hunters Point areas of San Francisco [102]. Hawai'i is also seen as a leader in the deployment of renewable energy and microgrid technologies [100].

**3.2.4.3. Energy regions.** Energy regions and related institutions, including regional energy districts, transmission corridor districts, regional transmission agencies, and cooperative energy networks, all seek to broaden the scale of renewable energy planning and supply from the local to the regional scale. These new governing arrangements assemble and coordinate localized initiatives and projects into regional networks, thereby encouraging transition at the regime level while attempting to respect the autonomy of local energy initiatives [103,48]. An example is the scaling up of local energy cooperatives into regional networks organized around cooperative principles [48]. Working in communities in Southern Vermont and Massachusetts, Co-op Power has organized a regional network of six Community Energy Cooperatives [104]. Energy regions such as those working in the Netherlands differ from existing models such as the independent system operators set up in the United States, governed instead by democratic and decentralized processes. Revenues, finances, and technical knowledge systems are also cooperatively managed to support renewable energy projects [48]. Austria has been developing a model of energy regions since the early 1990s that uses participatory processes for envisioning energy futures and determining pathways and targets [34,103]. A Transmission Corridor District is a specific model intended to coordinate decision making and planning of property owners and other stakeholders regarding the development of local-to-regional transmission corridors [105].

**3.2.4.4. Sustainable energy utilities.** A Sustainable Energy Utility (SEU) is an independent and financially self-sufficient entity formed to coordinate and deliver comprehensive energy efficiency, conservation and renewable energy services. Operating as a community utility, the SEU model can be organized by communities of almost any scale (towns, cities, or regions) to gain governing authority over their energy future [51]. The model has been developed in part due to the recognition that conventional utilities are organized for provision of energy supplies through commodity sales rather than self-generation and energy use reduction services. Unlike many energy services or energy efficiency utilities, SEUs serve all community members and target all sectors and fuel types [106]. Modeled as a nonprofit clearinghouse under publicly-accountable third-party management, an SEU streamlines energy service delivery by serving as the point-of-contact for all energy service needs, including energy efficiency and conservation as well as renewable energy self-generation, connecting residents and institutions at the municipal or state-level to information, technical and financial resources and subsidies for energy efficiency and renewable energy generation and involving end users in the development of the energy system [34,106]. Initially funded through public bonds, SEUs seek self-sufficient financing through revenue generated activities and the authority to access a range of funding

sources [106]. More ambitiously, an SEU aims to change the energy economy, redirecting energy systems away from commodity-based energy and towards decentralized commons-based sustainability based on genuine needs, and directly involving the community in decision-making [49]. Created in 2007 by the state of Delaware, the Delaware Sustainable Energy Utility is the first SEU of its kind to be established in the United States, and is being replicated in several other communities around the world [107].

**4. Comparing energy democracy policy instruments with goals of the movement**

The results of the review indicate an intention to advance a broad political program centered around a shift to 100% renewable energy sources by resisting the dominant corporate energy agenda, reclaiming social and public control over the energy sector, and restructuring the energy sector to better support democratic processes, social justice and environmental sustainability. These three broad goals inspire a set of 26 intended outcomes that shape an energy democracy agenda (Table 1). Sources concerned with advocating this agenda have emphasized a set of at least 22 policy instruments currently under implementation in the United States as well as the EU and UK. This policy instrument mix includes regulatory, financial and institutional reforms.

The results of the assessment comparing the policy instruments to the energy democracy goals are summarized in Table 2. We find that the mix of instruments proposed for energy democracy has the potential to contribute to the advancement of renewable energy transitions based on the combined agenda of resist-reclaim-restructure. While recognizing that the number of instruments per goal is less relevant than the influence of the instruments in practice [24], we note that as a group, the policy instrument mix gives more attention to the goal of reclaiming the energy sector and less attention to the goal of resisting

**Table 2**  
Comparing policy instruments and goals for energy democracy.

Policy instruments	Goals		
	Resist	Reclaim	Restructure
Regulatory context			
Statutory demand reductions and distributed generation	**		•
Net metering and virtual net metering		•	
Renewable energy standards	•		
Participatory energy planning and deliberation		•	•
Community choice aggregation		•	
Community benefit agreements			•
Financial inclusion measures			
Feed-in tariffs		•	
Green subsidies		•	
On-bill financing and repayment programs		•	
Revolving loan funds		•	•
Public bonds		**	•
Carbon tax-and-invest	•	•	
Cap-and-dividend	•	•	•
Cooperative financing		•	•
Economic institutions			
Community energy		**	**
Renewable energy cooperatives		**	**
Remunicipalization		**	•
Green public service banks	•	•	•
New energy system institutions			
Energy investment districts		•	•
Microgrids and democratized grid management		**	•
Energy regions		•	•
Sustainable energy utilities	•	•	**

Note. •policy instrument relates modestly to goal. \*\*policy instrument relates strongly to goal.

dominant energy regimes. Policy instruments typically correspond to one or two goals rather than all three, and often only modestly rather than strongly. Several specific instruments relate across all three goals: cap-and-dividend, green public service banks, and sustainable energy utilities. Each of the four categories of instruments relate across the three energy democracy goals at least to some degree, and institutional reforms tend to relate more strongly to goals for reclaiming and restructuring.

Unpacking the specific outcome statements within each of the three energy democracy goals, we find that the set of energy democracy policy instruments included in this review are more likely to contribute to some outcomes while other intended outcomes have limited supporting policies. For the goal of resisting the dominant energy agenda, policy instruments clustered around the outcome of “New social alliances are created” with minimal connection to the outcome of “Land grabbing for large-scale renewables ceases.” For the goal of reclaiming the energy sector, the outcome of “Social/public control of energy production and consumption normalizes” most frequently connected to the policy instruments while “Energy corporations democratize and localize” had the fewest connections. And for restructuring the energy sector, the outcome of “Economic and political power is decentralized and distributed” received the most attention among the policy instruments and “Geopolitics of energy supports global cooperation and peace over competition and conflict” received the least.

Across all three goals, the outcomes most addressed by energy democracy policy instruments include the following:

- Economic and political power is decentralized and distributed.
- New social alliances are created (e.g., unions, environmental groups, municipalities).
- Social/public control of energy production and consumption normalizes.
- Energy access and assets are shared broadly and community wealth-building is supported.
- New energy companies, ownership models and financial investment systems under social and public control develop.
- Community power and capacity to control energy systems strengthen.

Conversely, the outcomes least addressed across all energy democracy goals include:

- Land grabbing for large-scale renewables ceases.
- Expansion of fossil fuel infrastructure and development of extreme forms of energy and extraction stops.
- Fossil fuel subsidies end.
- Geopolitics of energy supports global cooperation and peace over competition and conflict.
- Fossil fuels remain in the ground.
- Energy corporations democratize and localize.
- An understanding of the energy sector as interdependent within the natural environment pervades.
- Undermining of climate protection stops.
- Public legitimacy of the fossil fuel industry is reduced.

Overall, this assessment finds that the energy democracy policy instrument mix provides policies to address all three goals but relates unevenly across the specific intended outcomes. A small set of instruments relate across all three goals and none relate strongly across the three goals. More attention is given to the goals and outcomes for reclaiming and restructuring the energy sector, and less attention is given to the goal and outcomes for resisting the dominant fossil-fuel-based energy agenda.

## 5. Discussion: implications, lessons and next steps

### 5.1. Implications for energy democracy

This review and assessment characterizes the emerging energy democracy social movement in terms of goals and outcomes and their corresponding policy instruments. Energy democracy initiatives in practice may be effectively identified not only, or even necessarily, by the use of the concept (i.e., some energy democracy initiatives may not employ the term explicitly), but by their commitment to three broad goals to resist the dominant energy agenda and reclaim and restructure the energy sector, while pursuing high levels of renewable energy deployment. The priority outcomes defining an energy democracy agenda include: decentralizing and distributing economic and political power; creating new alliances of social groups; normalizing the social and public control of energy production and consumption; strengthening the power and capacity for communities to control energy systems; and developing new organizations, ownership models and financial investment systems under such control.

Several policy instruments appear to constitute the core policy instruments [29] for energy democracy. This assessment suggests two ways to identify core policy instruments: those instruments simultaneously corresponding to each of the three goals, and those instruments that strongly relate to any of the three goals. As such, core instruments currently include: statutory demand reductions and distributed generation; public bond instruments; cap-and-dividends; and a set of economic and new energy system institutional reforms including community energy, renewable energy cooperatives, remunicipalization, green public service banks, microgrids and democratized grid management, and sustainable energy utilities. Other instruments can be considered as complementary to this set of core instruments [29].

The large-scale transformation demanded by the energy democracy movement, however, appears likely to require strengthening of existing policy instruments as well as the development or adoption of other policy instruments beyond those described here. In line with this assessment, strengthening existing instruments could involve finding ways to better relate a given instrument to a broadened set of intended outcomes, thereby shifting from a modest to a strong relationship to the associated energy democracy goal. A meaningful example might be the improvement of capacity for participatory planning and deliberation within the public sector and among unions, low-income communities and communities of color. The necessity to innovate policy instruments is also likely, especially to enhance the effectiveness of efforts to resist incumbent regimes. More direct instruments may be developed or brought into the core set of policies to address additional outcomes, for example, regulating the fossil fuel trade, eliminating fossil fuel subsidies or democratizing energy companies in the private sector through employee-ownership options or joint public-private enterprises.

### 5.2. Value of a policy mix approach

Thinking in terms of policy mixes [29] opens opportunities for supporting an energy democracy agenda by improving design and evaluation of policy instrument mixes. The policy mix lens emphasizes the necessity for advocates, communities, and other decision makers to give attention to combinations of instruments and the ways they may or may not correspond with the desired outcomes. Recognizing gaps and insufficiencies within the mix of instruments and systematically assessing the implications for each goal and intended outcome suggests ways to innovate and strengthen the energy democracy mix as a step toward developing a more effective instrument mix.

The policy mix lens also urges greater consideration of potential tradeoffs among policy instruments [23]. Temporal tradeoffs among different energy democracy policy instruments intended to address the three different overarching goals represent one kind of important tradeoff, i.e., some policy instruments emphasize more immediate effects

while others are designed for more long-term system change. Given a growing sense of urgency in responding to climate change, the push to resist expansion of fossil fuel extraction may need to take precedence and deserve more immediate action, whereas achieving outcomes for reclaiming the energy sector may extend over many years to decades. Restructuring the energy sector may extend over many decades and longer. Presently it also appears that the goal of reclaiming the energy sector takes priority with regard to supporting policy instruments. This situation may reflect differences among members of the energy democracy movement, suggesting an additional potential tradeoff between the emphasis given to each of the goals. Reclaiming energy systems may have broader appeal in the U.S. context, at least initially, because the rationale aligns more readily with prominent political rhetoric of independence, local control and economic advantage. Given the need for pursuing all three energy democracy goals simultaneously, this assessment supports the view that at some point tensions within the movement will need to be addressed [108].

A policy mix approach also urges consideration of how goals of energy democracy may be temporally extended for periods following implementation of the resist-reclaim-restructure agenda. The notion of an *energy commons* [109,51,110,101] opens the possibility for energy democracy goals that extend over greater periods of time. Energy commons reconceptualizes energy as a common pool resource rather than a commodity, owned and managed by communities deploying systems of rules for energy production and consumption [110].

The knowledge gained from the growing body of research on the management of common pool resources is relevant for considering renewable energy and energy system transitions from the perspective of energy commons [110,101]. Ostrom's work on long-enduring resource regimes [111] draws from empirical research completed over many decades to distill the set of practices used successfully by collective users of common pool resources (typically at the local and regional scale). These experiences could inspire the addition of the goal of *endure* and/or *restore* to those of resist-reclaim-restructure. Corresponding policy instruments might involve mechanisms for building trust among communities, procedures for clearly defining boundaries of energy commons, systems for monitoring levels of use and production and resolving conflicts, new ways of scaling up systems of governance, and so on [111]. Research for energy commons could draw from scholarship on socio-ecological-technical systems (SETS) [112–115]. In the context of renewable energy transitions the SETS framework may further benefit policy mix scholarship by broadening the scope of relevant elements and interactions and thus better accounting for non-technological elements of transitions as well as broader contextual factors influencing these interacting systems.

### 5.3. Policy mixes and renewable energy transitions

Energy democracy in turn offers insights on policy mixes in the context of renewable energy transitions. In view of the claim that ideal policy mixes for transitions would include instruments (and other policy mix elements) for both creating innovations and destabilizing currently dominant regimes [24], the energy democracy agenda appears to exemplify and extend this ideal. From this perspective, instruments designed to resist the dominant energy agenda provide a potentially destabilizing function, while the instruments intended to reclaim and restructure the energy sector offer the means for innovation. The resist-reclaim-restructure agenda of energy democracy seems to provide an approach for both creative destruction and disruptive innovation.

The resist-reclaim-restructure goals also complicate these notions in the context of renewable energy transition. These ideas of innovation have typically emphasized technological innovations as advanced through market mechanisms and elite agents of change. Conversely, the outcomes for reclaiming and restructuring the energy sector, while including technological innovation (i.e., the adoption of renewable

energy technologies), place significant emphasis on non-technological, social structural innovations as advanced through public and social arenas involving a broadened set of change agents including communities, social movements, unions and energy citizens. Additionally, to reclaim and restructure existing systems requires re-engagement with existing social structures as well as innovation. In this way, reclaim and restructure differs from creative destruction by offering an agenda for replacing rather than solely adding to or layering upon [116] current regimes.

Similarly, the concept of resistance does not necessarily relate to the concepts of destruction or destabilization. Drawing from historical social movements, resistance may be better understood as defense against forces of creative destruction. Although both resistance and destabilization may share similar approaches such as delegitimization of existing regimes, the outcomes involved with resistance as identified here place much more emphasis on the cessation of action as a means for sociotechnical change rather than action itself. In an historical context, the energy democracy movement may be understood as a contemporary expression of efforts to protect communities and energy commons from the presently destabilizing forces of the market [117]. This view holds resistance as a form of *re*-stabilization in the face of historical trends of creative destruction rather than destabilization as such. We therefore remain cautious about overstating the similarities between notions of creative destruction and the resist-reclaim-restructure agenda of energy democracy.

Energy democracy may then offer a fresh approach to advancing a timely transition to renewable energy, by combining efforts and strategies to end fossil fuel energy systems with those to democratically and inclusively advance renewable energy systems. To focus solely on one part of this interconnected agenda may lead to missed opportunities for synergies and ultimately less effective strategies. The movement building to be done therefore requires that more direct connections be made between, for example, anti-fracking protests, divestment initiatives, First Nations protectors, and related resistance movements with community solar projects, remunicipalization efforts, renewable energy co-ops and so on. Simultaneous attention needs to be given to the integration of all three goals, their associated outcomes, and corresponding policy instruments.

#### 5.4. Limitations and future work

While generating important insights, we recognize limitations of this research. The assessment depends upon the process of the review to establish outcome statements and policy instruments. The outcomes were compiled from various sources and may in some cases hold less relevance for an energy democracy agenda or to current interpretations of this agenda. An additional limitation of our approach is the potential redundancy of outcomes as well as the choice of groupings of outcomes within each energy democracy goal; this redundancy and organization may skew the results. We also recognize that the energy democracy movement is not necessarily unified across all actors adopting the term; differences in framing and emphasis exist within the energy democracy movement [108]. Our articulation and categorization of intended outcomes could be refined and adjusted because we do not expect the emergence of a singular energy democracy agenda or set of goals. Rather, we acknowledge a diversity of approaches within the energy democracy, as appropriate for different locations and communities.

For the instrument mix, we expect that the set of policy instruments may have underrepresented instruments for resistance. For example, policies to divest from fossil fuel companies or policies banning hydraulic fracturing did not show up through the review, although we would expect that these and other instruments would be viewed supportively within the energy democracy movement. This omission may reflect both a limitation of the review as well as a shortcoming of the current instrument mix. Also, the emphasis here on congruence among goals and instruments does not address consistency or effectiveness of

policy instruments in practice. Other elements of an energy democracy policy mix also deserve attention (e.g., targets, plans).

Determining the degree to which any single instrument corresponds to a specific outcome requires a more robust method of assessment than the preliminary approach developed here. Future research could aim to develop an index to be used to assess the strength of relationships with greater specificity, drawing from third-party assessments and expert opinion to compare outcomes to instruments. Also, assessing whether a given instrument could reasonably be expected to influence the achievement of an outcome requires making an assumption regarding whether a reform could be expected to either add to or replace the existing regime. This problem is fundamental to much of the efforts to advance renewable energy systems, and in fact few instruments offer any clear mechanisms to avoid being solely additive. The assumption that replacement would not occur may have led to an underestimation of the potential for the energy democracy movement. Empirical work on the capacity for individual policy instruments to replace rather than add to existing energy systems would be valuable in this regard.

Additional work is needed to more precisely characterize what energy democracy looks like in practice. More attention is needed to understand the application and effectiveness of various instrument mixes for energy democracy within specific communities and across regions. Future research could build on this work through direct engagement with energy democracy advocates, practitioners and organizations. The resist-reclaim-restructure framing and the outcomes and instruments identified through this review may be used to guide the identification of energy democracy initiatives through a typology of this emerging social movement (Tables 1 and 2). These tools for research could then support improved ex-ante design and evaluation and examination of their effectiveness in practice, and offer a basis for participatory policy development and visioning. The three broad goals of the energy democracy movement and their associated outcomes thus provide the basis for an evaluative framework for energy planning and policy, serving to guide the selection and implementation of specific policy instruments.

## 6. Conclusions

The transition from fossil-fuel-dominated energy systems to more renewable-based energy opens an opportunity for shifting technologies as well shifting social and political dynamics through democratic realignment of these sociotechnical systems. Energy democracy provides a set of goals and policy instruments for resisting the dominant energy regime while reclaiming and democratically restructuring energy systems, sectors and institutions. In the United States and elsewhere, groups advancing energy democracy and related visions for renewable energy transitions may be recognized by their support for a set of core and complementary policy instruments and intended outcomes that promote the three overarching energy democracy goals of resist, reclaim and restructure. Resistance here may be understood not simply as destabilization but as a form of *re*-stabilization of community well-being and protection of energy commons following an extended period of creative destruction. This combined energy democracy agenda offers a comprehensive approach and a valuable framing to characterize current and future practical actions for renewable energy transitions.

A policy mix approach to understanding connections among combinations of goals and policy instruments offers insights for improving energy policy design and evaluation. No single policy instrument can advance the energy democracy agenda in isolation; rather, a combination of policy instruments is required. Bolstering the energy democracy agenda will likely require development of new policy instruments, strengthening of existing policy instruments in relation to the intended outcomes of the movement, and more directly linking efforts to end fossil fuel reliance and advance renewable energy. The research presented here offers a foundation for increasing the visibility of the energy democracy movement and clarifying and assessing the core claims and

policy instruments advanced by its advocates, contributing to policy design for renewable energy transitions and energy democracy.

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