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Generating Community, Generating Justice? The production and circulation of value in community energy initiatives

¿Generando Comunidad, Generando Justicia? La producción y la circulación de valor en las iniciativas comunitarias de energía

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ABSTRACT

In this paper, we explore the potentialities and interconnections between existing and hypothetical community energy systems and the concept of generative justice. New York State's more recent official energy plan, for instance, includes provisions for community-scale microgrids, and several European nations offer significant financial support to citizens interested in building micro and intermediate-scale renewable energy systems. Such efforts and technologies appear to promise some degree of generative justice, returning much of the value generated by distributed renewable energy back to the community producing it. However, most currently conceived and implemented community energy systems recirculate value in very narrow and limited ways. Building upon an analysis of New York energy policy and on-the-ground cases, we explore community energy's potential. What kinds of value are being generated by community energy systems and for whom? How could such efforts be more generative of justice across a broad range of values, not just electrons and dollars? Through the attempt to broaden thinking not only about community energy systems but also the concept of generative justice, we connect technological and organizational configurations of community energy systems and the forms of value they have the potential to generate: including, the production of grassroots energy and organizational expertise, the capacity for local and personal autonomy in energy planning and decision-making, and the enhancement of an affective sense and embodied experience of community. Finally, we examine some of the barriers to realizing more generatively just community energy systems.

Keywords

Community energy; Generative Justice; reconstructivism; thick community.

Resumen

En este artículo exploramos las posibilidades e interconexiones entre los sistemas comunitarios de energía, existentes e hipotéticos, con el concepto de la Justicia Generativa. El plan energético del Estado de Nueva York, por ejemplo, incluye disposiciones para las microrredes eléctricas, y varios países europeos proporcionan ayuda financiera a los ciudadanos interesados en la generación distribuida de electricidad. Tales esfuerzos y tecnologías parecen ofrecer posibilidades para la promoción de la Justicia Generativa: una gran parte del valor generado se devuelve a la comunidad que lo ha producido. Sin embargo, la mayoría de los sistemas comunitarios de energía puestos en práctica generan una circulación muy limitada del valor socialmente creado. A través de un análisis de la política energética de Nueva York y de otros casos concretos, examinamos el potencial de los sistemas comunitarios de energía. ¿Qué tipo de valor generan estos sistemas de energía y para quién? ¿Pueden estos sistemas "generar justicia" de formas que vayan más allá de los dólares y los electrones? Nuestra intención en este artículo es profundizar en el conocimiento de los sistemas comunitarios de energía y la Justicia Generativa. Para ello, analizamos la relación entre el carácter técnico y organizativo de estos sistemas y los tipos de valor que pueden producir, tales como: movimientos sociales de base, difusión del conocimiento técnico entre los ciudadanos, aumento de la autonomía local y personal sobre la planificación energética, y el fortalecimiento del sentido y la experiencia comunitaria. Finalmente, discutimos algunas de las barreras para la creación de sistemas comunitarios de energía capaces de generar relaciones más justas.

Palabras clave

Energía comunitaria; Justicia Generativa; reconstructivismo; comunidad sustantiva.

Contents

1. Introduction
2. Generative Justice
3. Forms and flows of value in community energy systems
4. Conclusion: toward more generatively just community energy systems
5. References

Contenidos

1. Introducción
2. Justicia Generativa
3. Formas y fujos de valor en sistemas de energía comunal
4. Conclusión: hacia más generatividad justa en los sistemas de energía comunal
5. Referencias

1. Introduction

Energy service provision –electricity in particular– has long been regulated with a circumscribed interpretation of the public interest in mind. In the US, state public service commissions are charged with providing "safe and reliable utility service at just and reasonable rates" (New York State Public Service Commission, 2014), a mandate that can be met through a wide variety of socio-technical configurations. In each dominant model of electric service provision, including the municipal utility and investor-owned, regulated monopoly models, distributive justice is served through "rate cases," where powerful organizations periodically propose capital investments, operating budgets, and rates to recoup costs from their pools of ratepayers, often topped off by a tidy profit. These plans often include provisions to subsidize the cost of energy for vulnerable populations, although these provisions are often justly criticized for their inadequacy. However, energy systems are increasingly viewed as distributing "bads" that rival their "goods" (Beck, 1992). While the positive outputs of energy systems include the litany of modern marvels, conveniences, and quality of life increases associated with Progress, their negative outputs include greenhouse gas emissions, particulate air pollution, radioactive materials, and other environmental costs, as well as poverty and strained budgets through high fuel costs. Given these disadvantages, alternative models of energy service provision are being developed that challenge centralized energy governance frameworks that rely on the centralized distribution of goods and bads, suggesting possibilities for energy systems better compatible with more sustainable and egalitarian ways of life.

First among these are community renewable energy systems, which are becoming an increasingly important agenda item for energy sustainability advocates, policymakers, and industry players worldwide. Some countries, such as Germany, Denmark, and increasingly, the UK, are emerging as global leaders in this area (Lorentzen, 2005). In contrast, nascent US efforts to promote and develop community-scale renewable energy systems have been tepid. However, recent developments at the State and Federal levels, such as New York State's emerging support for community solar and community microgrid projects, and the Department of Energy's involvement in the promotion of certain models of community solar development, may signal that greater government engagement with community energy is on the horizon. In this paper, we explore the current limitations and potentialities of community energy systems to advance generative justice.

The literature examining community energy as a form of grassroots innovation suggests that even when sustainable energy advocates are given more of the policy support they seek, most are configured in ways that recirculate value in very narrow and limited ways. For example, Hess (2013) uses Bourdieussian field theory to explore the power dynamics involved in the sociotechnical transition from centralized energy planning and generation to local, distributed solar energy, and finds that growth in the adoption of distributed solar power has coincided with the marginalization of the grassroots, local ownership model foundational to the origin of the concept. Indeed, a recent study reflecting on a wide range of empirical material from a multi-year research project on community energy and grassroots innovation (Smith et al, 2015) concludes that grassroots models of community energy have begun to "attract policy attention through the development of workable solutions that have been shown to matter for prevailing energy policy discourses" (p. 429) . However, further research using a "critical niches" perspective is necessary to explore the areas of friction wherein aspects of grassroots community energy action are rejected or ignored by policymakers and intermediary organizations, such as "explorations of alternative values for developing energy in society and working on issues of community development" (p. 429). The authors recommend that research on community energy "open up discussions about how [community energy] initiatives embody new ways of thinking about and acting upon energy questions" through "an agenda that looks beyond instrumental imperatives and explores how socio-political programmes can develop that are more transformational than those currently prevailing in energy regimes" (p. 429).

In this spirit, we build upon an analysis of community energy policies in New York State as well as published case studies of community energy development to investigate community energy's potential by asking: What kinds of value are being –and could potentially be– generated by community energy systems and for whom? How could such efforts be more generative of justice across a broad range of values, not just electrons and dollars? Through an analysis that attempts to broaden thinking not only about community energy systems but also the concept of generative justice (Eglash & Garvey, 2014; Eglash, 2014), we draw connections between the technological and organizational configurations of community energy systems and the forms of value they have the potential to generate. These diverse value streams include the production of grassroots energy and organizational expertise, the capacity for local and personal autonomy in energy planning and decision-making, and the enhancement of an affective sense and embodied experience of community. Despite the rising profile of community energy as an orienting concept, it remains a niche form of energy

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services provision in a nascent phase of material and discursive development. Many proponents of community energy have sought to legitimize and rationalize it according to established, favored, and largely technocratic discursive frames, such as climate change mitigation, energy market design and consumer adoption behavior, and regional economic development. In this paper, we draw on empirical cases to provide a “reconstructivist” account (see Woodhouse, 2005), reimagining how community energy could be redesigned to contribute to outcomes that transcend instrumental logics and frames.

In the following sections, we will discuss the concept of generative justice and evaluate the leading models of community energy development according to their potential to recirculate a range of values that empower communities to engage in systems of energy service provision in more meaningful and substantial ways. We end with a discussion of what a more “generatively” just community energy system might look like as well as an exploration of the barriers to realizing that ideal.

2. Generative justice

The concept of generative justice offers a model for more fair or equitable systems of production that strongly differs from redistributive and other welfare-state approaches (Eglash & Garvey, 2014; Eglash, 2014). As noted by numerous critics, capitalist industrial firms traditionally earn profits by extracting surplus value from labor and nature[1], as well as externalizing costs to disempowered social groups or the public at large through outcomes like increased air pollution, destruction of communities, and/or widespread ecological damage. In the standard redistributive model, state ownership or tax-funded transfer payments are mobilized to (partly) correct these inequities or “market failures.” Proposals for “climate credits” or carbon taxes, as well as publicly funded remediation works, attempt to discourage damaging ways of exploiting natural resources and to return some of that surplus value back to nature through activities like carbon emission reduction and carbon “offset” projects. In each case, extracted value is funneled back to harmed localities and groups through distant and centralized state agencies. It is important to note, however, that economic inequity and ecological degradation have characterized so-called free market nations as much as

[1] We refer to an unproblematized and essentialized concept of “nature” throughout this paper in the interest of maintaining specific conceptual focus. However, future research in this domain might productively address anti-essentialist perspectives on the idea of “nature” both conceptually and empirically.

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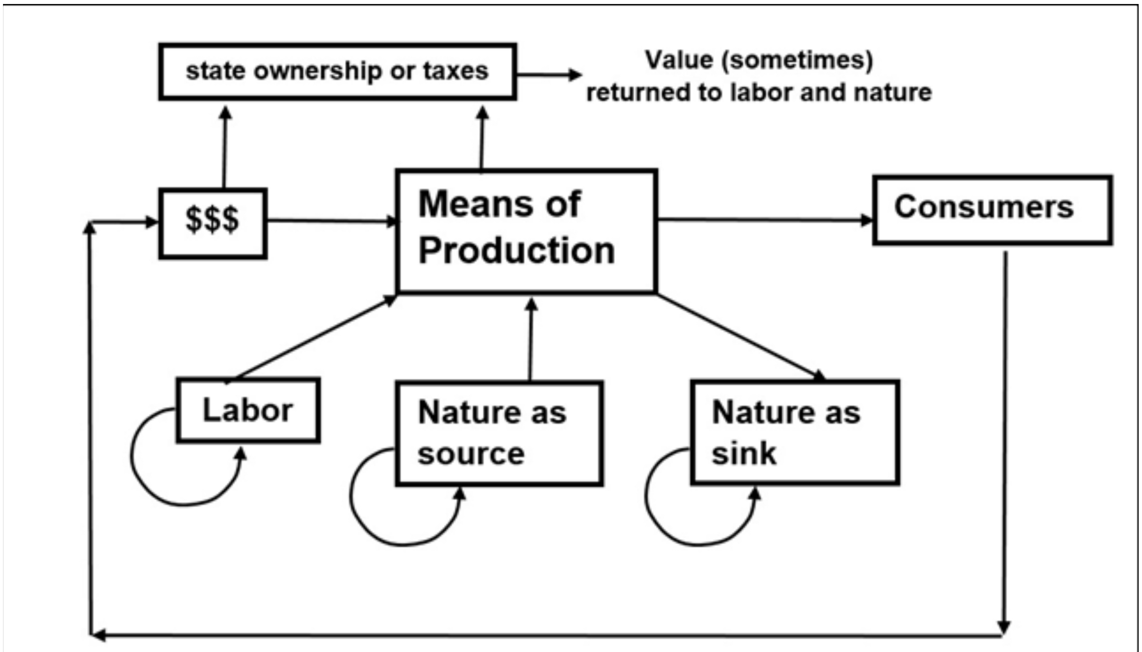
centrally-planned state-socialist countries (e.g., the USSR). Such a result suggests that distributive approaches on both ends of the political spectrum have been limited.

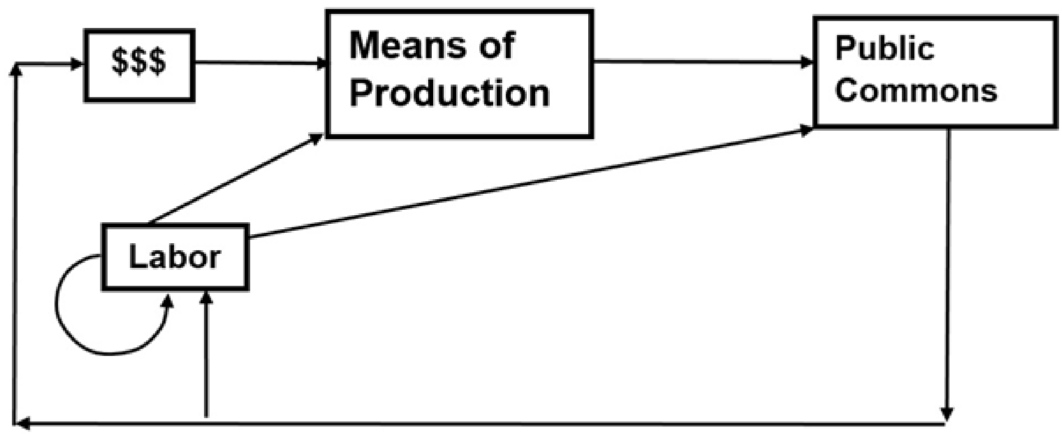
FIGURE 1: NON OR WEAKLY GENERATIVELY JUST VALUE FLOWS UNDER CAPITALISM OR STATE COMMUNISM



Source: Eglash & Garvey, 2014.

The generative justice model, in contrast, proposes "closing the loop." That is, value generated by labor and/or nature are to be governed by the people and recirculated within the systems doing the producing, rather than redistributed by a centralized state. By allowing values to be circulated, as opposed to simply extracted, generative capacity is built at the roots or from the "bottom-up" to a greater extent. Eglash and Garvey (2014) offer up the Open Source movement as well as the self-organized, decentralized irrigation systems used by Balinese farmers for centuries as exemplary cases. In both instances, generated values produced by members of a community are largely circulated and enjoyed within that same community. Open Source participants create new code and hardware designs that are freely enjoyed by other members. The collaboration of small-scale Balinese rice farmers in their intricate irrigation system produces values in the form of reduced pests and improved yields that all participating farmers enjoy more or less equitably.

FIGURE 2: A SCHEMATIC OF GENERATIVELY JUST VALUE CIRCULATION



Source: Eglash & Garvey, 2014.

The currently dominant, highly centralized energy generation and distribution network, in comparison, is not generatively just. Large conglomerates oversee the production of value through the application of labor and exploitation of nature as a source and sink, distributing some portion of that value to individual homes and commercial and industrial consumers as electrical flows and reaping the surplus values as profit (in exchange for meeting mandated standards of safety, cost, and reliability, adopted "in the public interest"). Utilities are highly regulated, and the billing regimes regulators approve include state-approved profit margins, as well as surcharges levied for "public benefit." Some of this surplus profit and surcharge revenue is redistributed to consumers, in the form of mandated efficiency and other targeted incentive programs, to nature, through mandated renewable energy standards and remediation of extraction sites, as well as occasionally to workers to the extent that their taxes contribute to social safety nets.

Focusing too narrowly on the values of electrons and dollars, however, distracts from the broader range of values currently not being generated and recirculated within communities. The concept of "value generation" permits consideration of a wide diversity of "goods"

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created by both people and nature, including forms of value beyond economic benefit and energy services, such as ecological health and environmental harm reduction, the cultivation of expertise, enhancements to community resilience and self-determination capacity, and other affective or communitarian values. Epistemological values (i.e., expertise), for instance, can be generated within and circulated through “communities of practice” (Lave & Wenger, 1991), but is more often distributed via formal lectures and networks of textbooks and journals that allow particular actors (e.g., private publishers) to control and limit circulation in order to extract surplus value. Technological societies distribute a whole range of valued things apart from material or monetary resources, increasingly in ways not much different from that of centralized and bureaucratic energy utilities. These could be generated and recirculated within communities to a greater extent.

Consider online networks. For all the capabilities afforded by online social networks for individual “prosumers” (Ritzer, Dean, & Jurgenson, 2012) to proliferate and consume self-generated content notwithstanding, much of the circulation of material and digital goods on and via the Internet remains under centralized control. Facebook, for example, mediates users’ access to online forms of social connection with friends and loved ones (see Figure 1). One can view Facebook as a mediator of the sense of social connection *vis-à-vis* online communicative action and social networking, a social value nevertheless generated primarily via users’ own online labor. From this labor Facebook gleans personal data and thus advertising revenue. Again, Facebook itself does not generate this social value but exists as a controlling intermediary between users and the products of their social labor. Users, for their part, either conform or leave. Facebook strongly dictates how users interact and generate value, partly via the legislative power of code (Lessig, 2006). The structure of Facebook prevents users from substantively controlling this circulation of value within their communities: All value generation must first pass through Facebook’s algorithms and networks. A similar pattern of value generation and distribution more or less holds for other centrally controlled digital networks, owned by economic elites, aimed at producing economic values through the “disruption” of existing employment structures, such as Uber, TaskRabbit, or Airbnb. Even though value generation *vis-à-vis* online networks is often highly decentralized and treated as a commons, much of the distribution and routing of this value is shaped by and ultimately under the control of centralized intermediaries that extract surplus value from this control.

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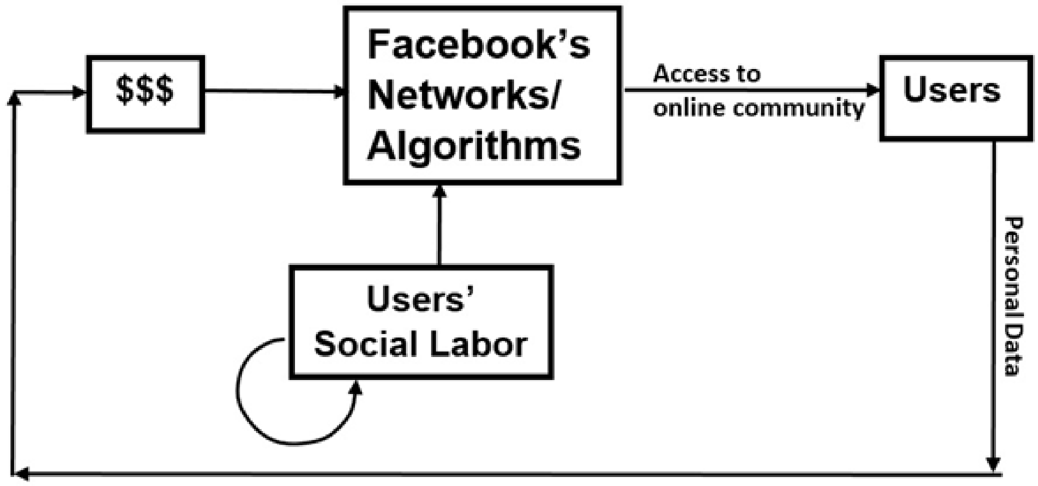
Figure 3: Facebook's non-generatively just production and circulation of social value



Source: Own production.

A similar level of centralized control over value circulation is visible in many non-digital organizational technologies. For instance, evangelical megachurches arguably sustain themselves on the skimming of value out of the psychological or symbolic sense of community contrived via mass spectacle and/or forms of pseudosincerity (Freie, 1998). Television networks profit, in part, through similar simulations of sincerity and connection, which evoke a sense of belonging through viewers' development of "parasocial" relationships with programs and characters –despite the lack of relational reciprocity (Beniger, 1987; Derrick, Gabriel, & Hugenberg, 2009). Consider the substantial efforts producers of shows like American Idol expend in order to symbolically frame viewers as active participants within a collective. Similarly, large and bureaucratic representative governments can be seen as mining value in the form of a sense of political community and/or agency through a process of public opinion polling and registering votes, distributing it back to citizens in the form of policy ostensibly reflecting the "will of the people." In each of these cases, some value is extracted or mediated by a large-scale, intermediary institution or infrastructure, even in cases where value generation is or appears to be decentralized. These intermediaries then redistribute some semblance of that value back to citizens. These values, as much as energy, could instead be retained and governed to a greater extent by communities that produce them.

3. Forms and flows of value in community energy systems

For most of the 20th century, ownership and operation of electricity generation equipment has largely been limited to large organizations with access to financial capital, and later, individual homes living “off the grid.” State policies requiring public utilities to purchase renewable energy produced by small, distributed systems were adopted in the 1980s, in the wake of the energy crises of the 1970s. Since that time, the vast majority of renewable energy installations in the US have been grid-connected to take advantage of net metering policies. As grid connectivity has become the norm, the cost of photovoltaic solar panels –hereafter shortened to “solar photovoltaics,” or simply abbreviated as “solar PV”– has fallen, the solar installation industry has matured, and system resilience has become a policy priority (St. John, 2014), the next frontier of “retail” energy has moved to community-scale energy systems.

A range of actors, from grassroots environmental organizations to large “cleantech” firms and many in between, have called for policymakers to provide greater support for community energy. As mentioned above, the definition of community energy is difficult to pin down, but the three specific models that appear most frequently in energy industry, policymaking, and advocacy accounts are 1) collective solar PV purchasing campaigns; 2) shared renewable energy installations; and 3) microgrids.

The first, often referred to as the “Solarize” model, involves a limited-time campaign, usually run by local officials, advocacy groups, or civil society organizations, during which rooftop solar installations are offered to customers at a discount. Solarize organizers set an installation goal, prepare and issue a request for proposals, and select a solar installation contractor on the basis of criteria such as system price (often treated as the most important), system quality, experience and, if desired, other community benefits, such as offering apprenticeships to local residents or meeting a wage standard. The organizers then carry out their campaign –which is usually run at the neighborhood level, with organizers tabling at local events and holding information sessions at libraries– to create local interest and convert interest to installations. Solarize initiatives are usually structured in such a way that the price for all participants is reduced once a certain participation goal is met. The profile of the Solarize model has risen as local officials in a number of states publishing case studies in coordination with the US Department of Energy’s Sunshot Initiative, which has released a report in support of the model (Myers, Hart, & Hofmeyer, 2012; Irvine, Sawyer, & Grove, 2011). Solarize programs routinely exceed their installation goals, and a typical campaign often results in a locality increasing its total PV installations by over 100 percent. The Solarize model uses grassroots mobilization to promote the diffusion of a well-established socio-technical configuration--privately owned, onsite PV –with the enthusiastic support of policymakers and the solar industry.

The second model, shared renewables, remains less common, despite increasing interest among some policymakers and advocates. Most shared renewable systems in the US are large solar PV arrays, due to greater flexibility in siting and permitting, as well as a decreased likelihood of public opposition when compared to wind development (Coughlin et al., 2012). Shared solar development has not seen the same widespread growth of the Solarize model; this relatively slow growth is generally attributed to the increased complexity it demands. Indeed, because of their larger size and novel ownership structure, shared systems have to navigate the murky waters of incorporation, siting, and permitting in a way that private, Solarize installations do not. Shared systems, however, offer the possibility of energy generation ownership to a much wider public. Participation in Solarize projects is limited to those who own property that receives adequate sunlight and who (most likely) do not anticipate moving or replacing their roof any time soon. Shared systems would be accessible to everyone else: renters, property owners not meeting the criteria above, and anyone who simply does not want to site energy generating equipment on or adjacent to his or her home. Interestingly, shared solar is not often promoted through grassroots mobilization strategies, perhaps because the socio-technical configuration of shared solar is not yet well-aligned with existing energy governance regimes, resulting in barriers to adoption.

The third model of community energy, microgrids, are exactly as they sound: energy systems designed to provide heat and power for a localized area and operate in conjunction with or isolated from larger energy infrastructures as conditions dictate (Bourgeois et al., 2015). From the perspective of the larger electricity grid, microgrids act as a single unit, either importing or exporting electricity. Microgrids operate at a higher order of complexity than shared solar systems because they 1) can involve both heating and electricity, often produced through district heating and cogeneration; and 2) involve aligning generation capacity and system load. As would be expected given this level of complexity, microgrids are the least common model of community energy: At the time of this writing, no community owned microgrids are in operation in the US[2].

[2] The limited number of existing microgrids in the US are most commonly associated with a single large institution or campus. For the purposes of this paper, we are interested in community energy systems as they apply to heterogeneous, yet geographically contiguous assembleges. Although examples exist, community owned and operated

Each of these models of community energy holds the potential to generate multiple forms of value beyond the standard paradigm of dollars flowing to individual, private consumers. Community energy systems could help to generate multiple forms of value, ranging from economic, environmental, and resiliency values, to more novel forms, such as the establishment of thick community, local expertise, and capacities for community governance, experimentation, and the enactment of social and environmental values.

3.1. Economic value

Communities stand to realize significant economic benefit from the development of local energy systems. Marnay et al. (2008) rightly point to distribution and transmission costs as significant components of the total cost of delivered energy noting that wholesale-to-retail increases regularly reach 100 to 200. This is likely also the case in the United States and other nations. Community energy systems may be designed and operated minimize these losses. Additional gains could be realized through the construction of neighborhood scale microgrids. Because they serve small geographical areas, heat losses in microgrids can be redirected through cogeneration technologies into a neighborhood or district heating and cooling system, further improving efficiencies. To the extent that produced energy exceeds local needs, communities could also produce revenues for themselves by selling surpluses to neighboring communities or the larger grid[3]. As regulatory regimes and tariff structures governing electricity distribution evolve to incentivize increased system-wide efficiency, community microgrids may also afford owners and operators the ability to earn revenue by reducing demand on the larger grid at times when regional usage is at its peak.

To be generatively just individual and community scale energy technologies need to do more than merely provide economic benefits to users. What matters is how those benefits are created, circulated, and controlled. As noted above, while arrangements modeled after

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microgrids remain a global rarity, as well. A small number of highly-publicized cases exist in Germany, such as the village of Wildpoldsried (Guevara-Stone, 2014). Community-owned microgrids are also being developed in areas of limited energy access, such as rural Kenya (Gollwitzer, 2014). Because the attributes of microgrids are heavily dependent on local characteristics and regional energy governance regimes, a detailed account and analysis of these individual cases is beyond the scope of this paper, which aims to develop an overarching conceptual framework for generatively just community energy systems. As microgrids proliferate, such empirical analysis will be an important area of inquiry.

[3] For example, the German village of Wildpoldsried generates over 200 percent of its own needs through community-owned wind turbines and cogeneration plants (Allen, 2011).

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distributive conceptions of justice often do return value back to labor (e.g., welfare), the circulation of those values is under state/market control. In generatively just arrangements produce an economic commons, which is governed to a substantial degree by community members themselves.

The first two community energy models, however, do not constitute a substantially generatively just system for recirculating economic value. For instance, Solarize initiatives permit groups of citizens to negotiate group rates for the purchase and installation of rooftop solar. Yet, once the panels are installed, economic benefits accrue solely to the individual energy consumer selling their excess electrons to the local utility, which in turn decides where to send them. Generation and circulation is not collective or communal in a substantive sense. Shared renewable systems, whether through a cooperative or crowdsourced investment model, such as that utilized by the Clean Energy Collective (CEC) in Louisville, Colorado, still frame participants as individuated investors and benefits again accrue individually rather than collectively. For Solarize, collective economic arrangements only exists until the PV panels are installed; for the CEC, participants are bound together weakly. Although participants collectively "own" pieces of CEC's large-scale PV installations, they function as individual consumers paying a private energy corporation to build and maintain an off-site solar panel, rather than citizens collectively building and governing a resource.

These arrangements are similar to Facebook, or other networked platforms like TaskRabbit or Fivver. Although there are enhanced opportunities for individuals to realize a personal economic benefit, recirculation of value is controlled by those owning the larger network and/or designing the system. Consider Hawaiian Electric Co.'s virtual moratorium on connecting new rooftop solar installations to its grid and other utilities' proposals for charging renewable energy-equipped homes additional monthly grid fees (Chediak, Martin, & Wells, 2013). Residents' abilities to generate value through electricity production remains highly constrained within a grid where the utility enjoys a privileged position regarding distribution decisions.

The third model, islandable microgrids, seems more promising with regard to achieving a more generatively just recirculation of economic values *vis-à-vis* community energy because it would permit a greater degree of independence from the economic dictates of large utility companies. That is, by technologically separating themselves from the larger grid, communities would circulate generated energy within their own infrastructural commons, governing the use of the resource as they see fit. Electricity would be sold collectively rather than individually to the larger grid, opening up the possibility of recirculating revenue in ways that could enhance the capacity of the community to generate economic value via energy (e.g., funding weatherization efforts or expanding production capacity).

Moreover, models such as Solarize or the CEC rely upon participants' individual wealth, thus excluding those of lower economic means. This is because they are built upon an individual investor model wherein only those with sufficient funds to purchase a share can participate, regardless of the fact that the vast majority of US citizens –including those with low incomes– devote considerable economic resources to utility bills on a monthly basis. This limits the generative justice of these efforts in that only the more affluent have the ability to participate in energy generation and circulation; those without the means to invest are effectively barred from such forms of participation and equity generation.

Alternative institutional designs, such as Energy Investment Districts (EIDs) (Center for Social Inclusion, 2014), can be permitted by the authority to levy fees or taxes according to a variety of models, potentially including socioeconomically progressive provisions that would enhance the inclusivity of community energy efforts. EIDs or comparable institutional structures also have the capacity to receive state, federal, or philanthropic funding for clean energy transitions that would have previously been channeled to larger bureaucratic organizations or directly to individuals as incentives. Such entities could become institutional intermediaries, ensuring that both financial inputs and returns are administered and reinvested for collective benefit. Such an organizational design could provide additional economic benefits to a given community by supporting the local economy and creating just and meaningful employment and livelihood opportunities. Most importantly, this institutional form could be applied to any technical manifestation: rooftop solar, shared renewables, and microgrids.

3.2. Environmental value

Each model of community energy described above carries the significant benefit of potentially displacing carbon and/or particulate emissions simply by virtue of the renewable technologies used. However, calculating exactly how many tons of emissions are avoided depends on a number of factors, such as the technical specifications of the system, assumptions made about the fuel(s) being displaced, and assumptions about patterns of energy demand before and after the community energy system is built.

There is a widespread assumption among energy policymakers that a watt of renewable energy carries more or less the same amount of environmental value after taking into account the specific technology, its generation profile in relation to peak demand, and the equipment's location with regard to the larger grid architecture (i.e. does its existence make the difference between building and firing up a new "peaker" plant?). However, the effects of community ownership of, investment in, and engagement with energy systems on "behavioral" dimensions of energy use are not yet well understood and may be substantial. It stands to reason that the greater the scale of community energy engagement and infrastructural responsiveness, the greater the potential for demand to be reduced through local energy governance and community goal setting, thus reducing emissions even further. Conversely, it is also possible that some background conditions, organizational structures, and infrastructural designs might result in greater rebound effects if energy users feel that they have delegated environmental responsibility to "clean" generation equipment. Indeed, some critical observers contend that achieving the goal of greater sustainability is unlikely to be found in simply switching to "green energy" but rather in seeking to dramatically lower energy and resource consumption in daily living (Zehner, 2012).

Finally, microgrid development and customer "aggregation" strategies may allow a community to act collectively to reduce the emissions of the grid as a whole by reducing peak electricity demand or helping to accommodate intermittency of renewable electricity generation. For example, time of use pricing utilizes a rate structure designed to signal and incentivize shifting electricity use to "off-peak" periods when the energy mix on the grid is cleaner. Other energy system innovations (WattTime, 2016) allow users to automatically adjust their electricity usage in relation to moment-to-moment changes in the environmental impacts of grid generation. It is feasible to envision a community-owned microgrid that aims to import clean power from and export clean power to the grid as much as possible by shifting usage patterns through changes to everyday practices and the adoption and deployment of energy storage technologies.

3.3. Community resilience

In the context of energy, resilience most commonly denotes the ability of systems to remain in operation by adapting to adverse conditions (NYS 2100 Commission, 2013). The clear advantage of community energy systems –if they are designed with "islanding" capabilities– relative to centralized grids is their ability to maintain a supply of power in the event of extreme weather events or other shocks to the centralized system. But there are other dimensions of resilience associated with community energy systems as well. The economic benefits of community energy provide local economic support in times of economic volatility and austerity, potentially insulating communities somewhat from the booms and busts of the global economy. This insulation may provide communities with the resources to preserve other traditional livelihoods or desirable attributes that might otherwise have eroded in the face of pressures to pursue other forms of development.

3.4. Thick community

Alternative energy infrastructures also promise the development and circulation of social values like the sense and practice of communal belonging. However, efforts and writings on community energy too frequently discuss or employ small to intermediate-scale energy systems without a clear sense of what makes them communitarian. Simply serving a limited population or geographical area makes such systems communal in only the thinnest sense of the word, given that strongly coherent or thick forms of community have traditionally entailed frequent interactions among dense and multi-stranded webs of social bonds as well as practices of mutual aid and social support (Calhoun, 1980; Putnam, 2000). In contrast, thick communities support intimate and emotionally rich forms talking among members, the construction of a symbolic or psychological sense of community in addition to institutions of economic and political interdependence (McMillan & Chavis, 1986; Ostrom, 1990; Locke, 1998; Proctor, 2005).

Generating communitarian social values necessitates doing more than just shrinking the scale of energy infrastructures. Solarize initiatives, for instance, may succeed in drawing residents into practices of talk and mutual aid during the initial outreach effort, but leave little reason or opportunity for residents to interact once the solar panels are erected. Of course, some Solarize campaigns designate “Solar Ambassadors,” who continue their involvement in grassroots community energy campaigns, but such organizational activity is directed more toward the circulation of economic and environmental value rather than community *per se*. Shared renewable systems via cooperative purchasing or leasing agreements, such as CEC, on the other hand, may never actually foster substantive social engagement among participants.

A more significant generation of community as a value would require leveraging community energy infrastructure to foster greater social bonding and exchange. Equipment for a community-scale microgrid has to be placed somewhere; where and how it is placed would have significant implications for the practice of community. Energy initiatives would better generate and circulate thick community as a value by placing the physical infrastructure and meters for tracking electricity usage in a collectively owned building that doubled as a neighborhood pub or café, a "third place" centering local social activity (Oldenburg, 1999). Such local scale energy infrastructures would provide locals a place to relax and gossip, generating and recirculating social connection and a sense of community as much as electrons. Going further, excess heat from electricity generation equipment, transformers and other hardware could be used to supply heating and cooling, via cogeneration technologies, to that building, incentivizing social congregation on uncomfortably cold or hot days. Doing so would help steer community energy away from merely offering monetary or environmental benefits but also enabling and encouraging the affective and embodied experience of local togetherness and interaction as a generated value.

Other aspects of realizing thick community are related to economic value and expertise. For instance, if community energy endeavors are so well-funded that all labor can be outsourced to distant contractors, an opportunity for fostering practices of mutual aid has been lost. A community energy system strongly generative of communitarian value would promote "energy barn-raisings" in which neighbors would collectively assist one another in the construction of local energy systems. Such acts of mutual aid, of course, already occur to a small degree. Energy Barn Raisers in Worcester, Massachusetts, gather to weatherize an entire home in a day, and residents of Plymouth, New Hampshire, help their neighbors install rooftop solar panels. Community energy initiatives serious about the generation of communitarian value would be designed to ensure that such practices of mutual aid reliably repeat themselves.

3.5. Expertise

An often overlooked form of value offered by community energy systems is that they hold the potential to afford local residents opportunities to develop expertise in various aspects of energy development, such as renewable energy installation, building retrofitting, and energy management, as well as expertise in the governance of common pool resources (as discussed in more detail below). Of course, not every community energy project will be able to provide extensive training for residents, but through robust community benefit agreements negotiated with service contractors, much can be achieved. The more common all forms of community energy becomes, the more comfortable energy services companies will become with accommodating –and perhaps even promoting– skills sharing, apprenticeship, and local hiring requirements[4].

Perhaps most interestingly, community energy development and governance tends to create novel forms of expertise that are increasingly in demand beyond the boundaries of a particular community. For example, as the urgency of just, clean energy transitions becomes more acute, hybrid forms of expertise, such as community organizing and energy efficiency retrofitting, or microgrid design and participatory design facilitation, will become increasingly valuable to a larger population. Community members who have gained these hybrid forms of expertise through participation in their own community's energy system development processes could offer their services to other communities seeking to invest in local energy systems.

3.6. Capacity for community governance and experimentation

Community energy endeavors also vary with regard to the extent that they open up avenues for collective governance. Currently dominant arrangements of electricity provision offer paltry mechanisms for participation. Citizens typically have indirect input mediated via either customer service representatives when serviced by a private monopoly or through local officials for municipalized systems. Alternatives such as Solarize, for their part, do not offer opportunities for governance but, increased, access to the private ownership of energy infrastructure. Energy cooperatives, on the other hand, could provide the chance to vote in board members and/or register one's opinion on important issues.

Community-scale energy cooperatives, much like the larger rural cooperatives on which they are somewhat modeled, tend to frame governance in fairly narrow terms. That is, they regularly follow the fairly conservative and non-participatory model of representative democracy and may not strongly encourage more substantive forms of participation or mechanisms for institutional experimentation. There is, unfortunately, little to no research on this issue. Nevertheless, studies of the fairly weak enactments of small-scale democracy within residential cooperatives suggest that the co-op institutional model by itself may not reliably lead to strong forms of community-led governance (Low et al., 2012). That is to say, as the

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[4] Numerous energy efficiency and renewable energy providers include on-the-job training for local community members as a key element of their value proposition (see, for example, http://www.gridalternatives.org/ and http://www.blocpower.org/). As community energy provision becomes more commonplace, we believe it is reasonable to anticipate that the demand for service providers with a social benefit mission will be substantial.

sociologist Robert Putnam (2000) would likely point out, governance is likely to be dysfunctional wherever participants cannot fall back on the social capital developed through informal socializing to steer them through moments of political conflict. Absent other dimensions of thick community, cooperative governance tends to only weakly generate democratic value.

Research concerning institutions for collective governance (Ostrom, 1990), however, can provide some guidance regarding how a community energy system could more substantively foster the generation of political value for participants. The first feature of such institutions is that they govern common pool resources, which provides much of the sanction and motivation for collective action. The distribution of many things of economic and social value, like electricity, could be reorganized so that users perceive and experience them as common pool resources. For instance, planning scholar Donald Shoup (2005) advocates reorganizing the governance of parking under neighborhood improvement districts, in contrast to current practices in which it is primarily given away, owned by a private company, or regulated by a distant municipal office. Having neighborhoods decide their approach to paying for and allocating parking as well as receive a portion, or all, of the revenues from fees turns what was previously a poorly governed commons, private commodity, or state regulated good into grounds and motivation for community-level governance. The same could be true for electricity. Producing electricity within microgrid organized through an EID opens up possibilities for locally produced energy to be framed as a common-pool resource, hence offering a material basis for a collectively conceived purpose and reason to collaborate.

Another feature of effective institutions for collective governance is that mutual monitoring and access of information about other members' activities is relatively inexpensive (Ostrom, 1990; Bowles & Gintis, 1998). Cheap and collective forms of soft surveillance enable the building of trust by making freeriding and incompatible uses visible to all. To this end, community energy systems might enhance their potential for collective governance by incorporating open access to real-time monitoring information reported with varying degrees of privacy and granularity, and publicized in any number of settings and configurations. This data could then be displayed in conjunction with real-time generation information and community-generated goals.

On the other hand, increasing visibility would fail to establish trust if it leads participants to perceive free-riding and incompatible uses to be the norm rather than deviant. For instance, an experiment involving signs imploring visitors not to take wood from Petrified Forest National Park found that messages giving the impression that this practice was common were much less effective than those depicting the taking of petrified wood as both uncommon and not desired (Cialdini, 2003). Moreover, there is a whole spectrum of possibilities regarding how visible incompatible uses are and to/for whom, reflecting a range of ethical concerns regarding privacy. Residents, for instance, might decide to make special exceptions for senior or disabled residents who need more electricity than average because they use mobility scooters or other devices. Alternatively, for those who might desire a greater degree of privacy, energy usage patterns might be made visible at periodic meetings with a confidential board rather than displayed publicly.

An additional feature of communitarian governance is the enabling of experimentation with institutional design. Indeed, as Ostrom (2005) outlines, governance by distant centralized bureaucracies and institutional designs insensitive to local contexts very often crowd out reciprocity and other forms of collective action. Hence, generation of political value via collective governance is likely better assured by not insisting on a standard institutional model, but assisting community members' efforts to devise rule systems that match the particularities of their local energy resources and other sociocultural resources. This provides all-the-more reason not to immediately turn to well-tread models, such as co-operatives, but rather enshrine EIDs with the capacity to set how participation, ownership, surveillance, sanctions and benefits will be implemented –of course, with some degree of oversight to assure some minimal standard of democracy and equity.

3.7. Capacity to enact social and environmental values

Much of the preceding discussion is implicitly informed by the idea of the "experiential gap," the distancing effect that characterizes lived experience within networked technosocieties (Briggle & Mitcham, 2009; Geerts, 2012). As Geerts observes, in electricity systems this gap occurs when there is a "discrepancy between the experience of a consumer of electricity, and the effects of this consumption on the rest of the network" (p. 102). The streams of value we have discussed above result from institutional and infrastructural designs that work to close this experiential gap. We propose that this is a crucial, intangible value of community energy systems: infrastructural and governance regimes are rendered legible and actionable at the individual and group scale. Energy, in turn, is experienced not merely as a commodity whose mechanism of production is invisible to users, but rather as an output of practices thick with social and environmental values. Moreover, the more responsive community energy infrastructures and institutions are –in the case of microgrids, demand response, and EIDs, for example– the greater the capacity for collective “material participation” that is built in to the system (Marres, 2012).

4. Conclusion: toward more generatively just community energy systems

We have focused our discussion on the models of community energy most commonly discussed and promoted by a diverse set of actors: collective purchasing, shared systems, and microgrids. Throughout this discussion we have referred to forms of value that could flow from and through community energy systems. These include economic, environmental, and resiliency values, as well as more novel forms, such as the establishment of thick community, local expertise, and capacities for community governance and experimentation, and the enactment of social and environmental values. It is important to note that none of these models is mutually exclusive to any other. An “all of the above” community energy strategy likely carries very little opportunity costs or other forms of risk. But we think that it is important to imagine and articulate a model of a generatively just, thickly communitarian energy system to guide and evaluate efforts in this domain. It is also key to point out that, at present in the US, no project comes close to realizing more than a fraction of these value streams.

In any case, community energy systems face a number of barriers to their implementation. Most significantly is the current regulatory vacuum for small to intermediate-scale and decentralized energy infrastructure. State policies in the US leave a great deal of uncertainty regarding the legal and regulatory status of microgrids and community energy systems (Morgan & Zerriffi, 2002; King, 2006). Are they permitted? Are they subject to the same regulations as public utilities? How should they be connected to the larger grid and other utility infrastructure? Such uncertainties enable local utilities to block decentralized energy production through expensive interconnection studies and requirements for potentially unnecessary equipment (Tongsopit & Haddad, 2007, p. 326). Moreover, municipal codes frequently do not recognize community-scale energy infrastructure and thus do not address if and how they can be erected in neighborhoods (Wiseman & Bronin, 2013). Creating more room for community energy systems within state and municipal policy is the first step for ensuring their broader realization.

Even if better accommodated and sanctioned in policy and governance regimes, the expertise needed to design, build, and operate community energy systems is either inaccessible to community energy advocates or lacking altogether. Communities interested in developing sophisticated, shared community energy systems may soon find that they are in need of extensive legal and engineering expertise. New York State is beginning to address these barriers by offering planning assistance to communities interested in developing community solar and microgrids through organizations like the New York State Energy Research and Development Authority (NYSERDA). However, the diversity of expertise on offer in these new programs has yet to be demonstrated, and they do not focus on building the more broad-based expertise needed to both build support for and guide development of community energy projects. Indeed, the hybrid forms of expertise that can be generated through participation in community energy systems are also necessary to develop the first wave of community energy. Developing this expertise and providing it to communities is a key area around which local, state, and federal policies can be oriented.

Like any other capital-intensive project, community energy projects often face financial barriers. Certainly, the ability to raise funds through an EID or similar institution is helpful but may not be sufficient for many neighborhoods lacking a suitable reserve of wealth. In this area, distributive justice can be leveraged to "kickstart" more generatively just socio-technical configurations: bill surcharges and other funds mandated and collected by the state can be granted to collective institutions such as EIDs based on economic and environmental justice criteria. These funds can help to overcome the barriers associated with relatively high capital costs faced by community energy projects. More broadly, extending dedicated feed-in tariff carve-outs, low-interest loans, and tax credits to collective energy entities may help to lessen the financial risk community energy participants are exposed to. Given the tendency for most community energy projects to center around renewable resources like solar or bioenergy[5], carbon taxes and other forms of pollution penalties could disincentivize electricity from the fossil-powered macrogrid at the same that they raise funds that could be used to subsidize decentralized energy development.

Furthermore, community energy systems are likely to be vigorously opposed by entrenched energy actors and corporate conglomerates displeased with the competition. Efforts like Xcel's multimillion dollar battle against Boulder, Colorado's plans for municipalization of their energy infrastructure are suggestive of the kind of opposition to be

[5] While we recognize controversies surrounding the carbon consequences and air pollution associated with some forms of biomass energy, we also recognize the potential for engaged resource management and innovative system design in mitigating these negative outputs and note the possibilities for supply chain localization associated with bioenergy as a fuel.

expected against emerging community energy systems (Kroh, 2013). Favorable national-level policies could help but may not be forthcoming given the pervasiveness of regulatory capture –the undue influence of corporate and monied interests on government agencies– within the United States. Advocates of community energy systems, therefore, might best economize on their activist energies by focusing their collaborative efforts on working with rural energy cooperatives, which already serve some 42 million Americans.

Finally, subtle but not insignificant cultural barriers stand in the way of citizens' desire and capacity to seek out communitarian projects. Some may be wary of the communitarian focus of these energy systems, given the patriarchical character of some traditional, community-centric societies. Similarly, those habituated to the privatism afforded by networked living in affluent or so-called developed societies may find community-led forms of soft surveillance concerning their energy usage unsettling, despite their clear environmental benefits. Such cultural patterns and ways of thinking about the good social life are likely to influence the possibilities for realizing different forms of community energy. Hence, they are already a constituent of the dominant sociotechnical regime, constraining the potential for alternative energy futures.

These socioculturally constructed ideas about community and expectations for private living or unencumbered consumer liberty are likely to be deeply entrenched within the minds of many citizens, especially in the United States. As such, they may not be displaced by arguments pointing to the capacity for tolerance and respect for difference demonstrated among certain Native American communities and Quakers. Nor are they likely to be unseated by pointing out how turning to individualistic, bureaucratic institutions to provide the services previously offered by community often comes with new kinds of harms and injustices rather than unalloyed liberation. Contemporary North Americans, for instance, seem more likely to call on police to arrest parents who let their children play alone in local parks rather than keep an eye on their neighbor's children for them (Olmstead, 2014). Populations that are interpreted as inconvenient rather than valuable in strongly individualistic societies, like the elderly, are often viewed as problems to be solved by being hidden away in old folk's homes and similar spaces rather than integrated into social life. We make this observation, of course, not with the intention of downplaying or ignoring the existence of coercive and undesirably exclusionary form of collectivism, such as evangelical churches that demonize or attempt to forcibly "convert" gay teens. Our point, rather, is to suggest that more collective forms of life need not be so. More so, trotting out the cliché of intolerant community[6] to dismiss possibilities for thick community out-of-hand denies recognition to those who suffer as a result of living in societies they regard as overly individualistic and anomic. Regardless, the wariness of some citizens regarding more communitarian social forms may only shift with incremental gains in successfully experimenting with and realizing strongly democratic thick communities that lack many of the pathologies that have affected many traditional ones.

The concept of generative justice helps to broaden thinking about the diversity of values that could be controlled by and recirculated within communities *vis-à-vis* appropriately-scaled energy infrastructure. We hope that the preceding analysis can serve as a first approximation of how a form of technology assessment explicitly aimed at evaluating technologies according to their "political ergonomics" (Winner, 1995) for generative justice might proceed. Moreover, in explicitly inquiring into the possibilities for, advantages of, and barriers to community-scale and community-governed energy infrastructures, we have sought to act as "thoughtful partisans" for such technologies and those who stand to benefit from them, helping to reimagine how technological societies could be "reconstructed" (Woodhouse, 2005) to be more generatively just. Readers who are at least partly persuaded of the utility of our approach would do well to consider some of the following questions within their own thinking and research: which sociotechnical system designs are more compatible with generating values like democracy, community and sustainability from the bottom-up? What are the barriers to realizing those technologies? How can such barriers be lessened? Seeking answers to such questions will help leverage the concept of generative justice into a focal point for imagining and strategizing how to incrementally realize alternative, more desirable futures.

[6] Recent research has begun to undermine the stereotype of rural and working class communities and cultures as bigoted and the view that middle to upper class, anonymous urban areas offer the only sure path to LGBTQ acceptance and liberation (Kazyak, 2010). Hubbs (2014) goes so far as to argue that the view is a myth that ignores the long history of working-class queer acceptance and is propagated by members of the affluent, urban, and white "narrating class" in order to assure themselves of their own of moral and cultural superiority.

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