



## Not a 'Petro Metro': challenging fossil fuel expansion

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### ABSTRACT

In this article, we draw on archival research, participant observation and content analysis to examine urban sustainability, networked infrastructures and environmental justice movements. We do this by focusing on proposal to develop Philadelphia into a natural gas energy hub. The proposal aimed to fully utilize fracking in the Marcellus Shale by privatizing the city's gas utility (PGW) and expanding gas infrastructure such as petrochemical complexes and large gas transmission pipelines. The proposed development was enabled by federal and state-level legislation favorable to corporate interests, and by support for selling PGW by the Mayor of Philadelphia. Resistance by local- and national-scale environmental and climate justice coalitions and local labor unions soon drew the attention of Philadelphia City Council members, who refused to authorize the sale. This resistance put in motion several important developments that effectively blocked re-making Philadelphia into the next energy capitol. While it should be seen as just one chapter in an ongoing struggle against the complete utilization of fracking in the Marcellus Shale, this case illustrates the power of local resistance to block the flow of fracked gas through cities, and to push for less environmentally destructive economic expansion plans.

### KEYWORDS

Environmental justice;  
energy transition; climate  
justice; natural gas; pipelines

Gas and oil extracted from shale rock formations, tar sands, coal seams, and other places are now being produced in Argentina, Australia, Canada, China, Germany, Poland, Russia, the United Kingdom and the United States. Recently, the rapid buildout of fossil fuel infrastructure has sparked protests over the XL Pipeline (in Canada) and the Dakota Access Pipeline (in the United States) (Avery 2013; Bradshaw 2015; Sammon 2016). But despite the presence of abundant reserves of oil and gas, a US-style fracking boom has not occurred outside of North America for reasons including state ownership of subsurface land rights (in Norway), lack of pipeline infrastructure (in China), and fracking bans resulting from intense political opposition (in France) (McMahon 2013).

Currently, the United States is the world's top producer of natural gas (International Energy Agency 2017) and is in the midst of a massive buildout of natural gas infrastructure, which includes refineries and petrochemical complexes, liquid natural gas (LNG) export terminals, and large pipelines transporting fracked gas and gas liquids (Hauter 2016; National Transportation Safety Board (NTSB) 2015; Pipeline and Hazardous Materials Safety Administration (PHMSA) 2015). All of these infrastructures are long-lasting agents of technological lock-in (Unruh 2000); as such, each new pipeline or facility built takes us further away from sustainability (Erickson and Lazarus 2014; Gerenscer and Vital 2012; Howarth

2015). As journalists and environmentalists have pointed out, the unquestioning acceptance of fracked natural gas as a cleaner 'bridge fuel' means that gas infrastructure has become the de-facto energy policy of the United States: infrastructure is destiny (Douglass 2015). For this reason, the focus in this paper is on fracked natural gas rather than the entire spectrum of unconventional oil and gas.

Most researchers examining natural gas as an environmental justice issue focus on the extraction point of the energy supply chain, examining rural communities impacted by fracking. Communities near unconventional gas wells have suffered greatly from the pollution of their drinking water and air with toxic chemicals, the poisoning and destruction of their land, and egregious violations of their rights as citizens by oil and gas corporations too often working hand in glove with federal and state government (Andrews and McCarthy 2014; Clough and Bell 2016; Hauter 2016; Kinchy 2016; Shonkoff, Hays, and Finkel 2014; United States Census Bureau, 2006–2010 American Community Survey. United States Environmental Protection Agency (EPA) 2016; Willow 2014).

Despite the importance of gas infrastructures to supporting and maintaining fracking as a profitable enterprise, and enabling the continuing and increasing use of fossil fuels causing climate change, few studies have focused on their social,

political, and economic aspects (but see Groves 2015; Groves, Munday, and Yakovleva 2013; Widener 2013). The invisibility of gas infrastructures (when not malfunctioning or being politicized by activists) is another reason for researchers' lack of attention (Star 1999). But gas infrastructures should be investigated by environmental justice researchers because of the serious hazards they pose to the health and safety, environmental quality, and human rights of communities near and atop them and because of the potential fossil fuel technological lock-in they suggest (Groves 2015; Groves, Munday, and Yakovleva 2013; Pipeline Safety Trust 2016).

In this paper, we examine gas and gas liquids infrastructure through the lens of environmental justice studies, drawing also on the best insights from multidisciplinary research on cities and science and technology studies. We use the case of the proposal to turn Philadelphia into a gas hub to show how gas infrastructure generates both multiple types of environmental injustice and resistance at multiple locations and scales. This analysis demonstrates how technical infrastructures are also political infrastructures, in which laws, policies, and technologies coproduce the social order (Bowker et al. 2010; Carse 2014; Hess 2016; Lampland and Star 2008).

### Literature review

Natural gas infrastructures are spatially and socially embedded within networks of energy production and delivery, and of chemical manufacturing. These networks are links in global energy supply chains that operate at various scales, within neoliberalist, privatizing, and deregulated contexts (Boons, Baumann, and Hall 2012; Mol and Spaargaren 2006; Rutherford and Coutard 2014; Shove and Walker 2010). The combined risks to environment, human health, and human rights from gas infrastructures place them in the realm of environmental justice movement (EJM) issues.

Environmental injustice involves (among many other things) inequalities in the healthiness, safety, and beauty of people's living environments. It is contextual, has multiple meanings, and in the United States tends to disproportionately impact low-income communities and African Americans and Hispanics (Bullard 2005; Holifield 2001; Kuletz 1998; Roberts and Toffolon-Weiss 2001; Taylor 2014; Walker 2012). These racial categories resulted from the enslavement of African Americans and the annexation and invasion of Mexico and thus are unique to nations with similarly racialized history (Morning 2008); the US government uses them to measure progress toward racial/ethnic equality. In other parts of the

world where racial/ethnic categories are not used or not meaningful, environmental injustice tends to disproportionately impact the poor or deprived (Anguelovski and Martinez-Alier 2014; Walker 2012). Although space does not permit a complete review of the extensive literature published by environmental justice studies researchers, several excellent works provide an overview (Downey 2007; Mohai, Pellow, and Roberts 2009; Taylor 2014; Walker 2012).

The proliferation of gas infrastructure in and of itself generates a number of threats to community safety and health. Natural gas and gas liquids are highly flammable and toxic. Accidents, explosions, and fires involving pipelines, terminals, and refineries all pose serious risks to people living nearby, who may be killed or injured or face health risks from drinking contaminated water or breathing toxic effluents.

Compared with shipping by rail or by truck, transmission pipelines for gas and gas liquids are much safer (Pipeline and Hazardous Materials Safety Administration (PHMSA) 2015). But when pipelines fail, the result is often loss of life, serious injuries, environmental contamination, and expensive damages. By 2015, there were 2.7 million miles of natural gas and natural gas liquids pipeline in the United States (Hauter 2016); from 1996 to 2015, there was an average of 47 serious incidents per year, causing an annual average of 17 deaths and 67 injuries (Pipeline and Hazardous Materials Safety Administration (PHMSA) 2015). Chronic leaks and spills from pipelines can contaminate drinking water and release toxic and flammable vapors into the air (Osland 2015). Pipelines can rupture due to digging during construction, corrosion, or defective seam welds. Yet, some types of pipeline lack any government oversight; and among those that are regulated, the government relies on pipeline operators to inspect many types of lines due to a lack of inspectors. In addition to methane leaks from pipeline rupture, methane is also emitted by the compressor stations needed to push the gas through high-pressure pipelines (Subramanian et al. 2015), generating hazards from flammable gas, air pollution, and greenhouse gas emissions.

LNG terminals are large facilities where gas is chilled to transform it to a liquid state to enable shipping; smaller such facilities that enable extra gas to be used for home heating during cold weather are called peak shaving plants. If systems malfunction or are damaged by natural disasters or acts of terrorism, these facilities could pose extreme hazards to the public from a release of gas vapor clouds which are explosive and flammable (Alderman 2005).

It is threats such as these to their homes or communities that cause people to mobilize into EJMs (Groves 2015; McAdam and Boudet 2012; Snow et al. 1998). In the United States, urban residents on the

'fenceline' of large refineries and petrochemical complexes tend to be disproportionately African American and Hispanic, and poor (Bullard 2005). The clustering of industrial hazards in poor, predominantly minority areas has been characterized as 'distributional injustice', which also involves a split distribution of risks to the marginalized and benefits to the privileged (Clough and Bell 2016; Jenkins et al. 2016; Shrader-Frechette 2002; Walker 2012).

Energy transitions are thus embedded in the unjust distribution of risks and benefits existing in the city. But fracking and climate change have further expanded EJMs by stimulating new demands for 'energy justice' or 'climate justice' as fracking creates environmental sacrifice zones in white, middle-class communities (Willow 2014), violating property rights and generating new sources of opposition (Klein 2015).

Cities are important to energy transitions because they have been built on the paradigm of intensive energy use and have historically served as the central end users for extractive industries (Jones 2014). Their centrality to energy use and often progressive politics makes cities simultaneously a target of transitions toward sustainability, and the instruments for executing such transitions (Rutherford and Coutard 2014). Mayors, city councils, and city administrators have shown themselves to be crucial in shaping, driving, and implementing sustainability policy, which is often contentious (Hughes 2016). Urban energy controversies also make visible the connections between the inequalities and injustices suffered by local residents and other marginalized people at places of gas extraction, refining, transport, and use throughout the world (Bradshaw 2015; Neville and Weinthal 2016; Watts 2004).

Other issues of environmental injustice are generated by the networked nature of gas infrastructures, which causes problems of governance and regulation. Gas extracting, refining, storing, and shipping facilities all connect with state level and interstate railroads and transmission pipelines, and to international markets through tanker ships for overseas shipping. Energy infrastructures are thus governed by, and interact with, a complex and multilayered set of laws, regulations, and policies (Goldthau 2014). The 'deterritorialization' caused by infrastructural flows has weakened the power of urban governments to plan, control, and govern networked infrastructures and transferred more of that power to corporations (Adams 2007; Graham and Marvin 2001; Offner 2000). These different levels and scales have been termed 'governable spaces' (Watts 2004) or 'legal geographies' (Andrews and McCarthy 2014). At levels above the local municipality, important stakeholders (such as people who live near petrochemical complexes or LNG terminals) are

frequently excluded from decisions involving the development and placement of risky infrastructure, creating participatory injustice (Shrader-Frechette 2002; Schlosberg 2009; Young 1990). Urban governments seeking to transition away from fossil fuel use also face the deep economic and social embeddedness of energy technologies and infrastructures, which makes them resistant to change (Keck 1980). This embeddedness creates technological lock-in, in which cleaner energy technologies cannot compete against the environmentally damaging energy infrastructures (Keck 1980; Unruh 2000).

### Research methods

We used a multi-method approach to study the proposal to develop Philadelphia as a gas hub, focusing on the years 2004–2016. This time period was chosen because 2004 was when discussions to privatize Philadelphia Gas Works (PGW) began to occur. Given the significance of privatization to efforts to expand fossil fuel importation and exportation, it was important to chart the discussion and controversies as they developed. The passage of the federal Energy Policy Act of 2005 and the pro-fracking Pennsylvania law known as Act 13 in 2012 also laid important groundwork for later fossil fuel expansion efforts and were included in our analysis. The year 2016 ends the time period under study because decisions made in this year signaled that the expansion of Philadelphia as a gas hub was unlikely to occur.

Our methods included archival research, participant observation, and content analysis. Archival research included examination of the city archives (e.g. meeting minutes, reports, and requests for proposals and bids) and press releases and public statements from business organizations, nonprofit organizations, labor unions, and energy companies from 2004 to 2016. We analyzed these materials to better understand when and how Philadelphia officials encouraged or blocked fossil fuel expansion as well as to identify the tactics governmental officials and agencies used during this time period. Participant observation was conducted at the Summit for a Clean Energy Revolution (23 July 2016), March for a Clean Energy Revolution (24 July 2016), Southport Terminal Complex public meeting (9 March 2016), webinars about Act 13 (22 November 2016), and a Philly Thrive training program (5 March 2016) to better understand actors and viewpoints. Content analysis of media coverage of fossil fuel expansion and the privatization of PGW in Philadelphia region from 2004 to 2016 was conducted using LexisNexis Academic.

NVivo was used to manage and code media content. To ensure intercoder reliability, two researchers independently coded media accounts, analyzing which stakeholders were quoted in particular

accounts and which narrative frames were used to justify their positions (Benford and Snow 2000). Through this analysis, the key narrative frames that emerged were references to economic impact (positive and negative), disproportionate effects on the public (e.g. the poor or elderly would be more affected), environmental impact, increases and decreases in jobs depending on the path proposed, and the importance of (but lack of) transparency in political processes. From this analysis, it became clear that the years 2012–2016 were the years in which efforts to transform Philadelphia into a fossil fuel hub gained traction. Thus, we focus on these years in our analysis and discussion.

### Expanding gas import and export in Philadelphia

In Philadelphia, business executives, organized through the Greater Philadelphia Energy Action Team (GPEAT), led a vision of proposed expansions of gas importation, storage, transformation, and exportation that would both increase fossil fuel infrastructure in Philadelphia and connect Philadelphia to fracking fields in Pennsylvania and farther west via new pipelines. Plans included the expansion of the existing Philadelphia Energy Solutions refinery and of two city-owned gas storage and liquefaction facilities, plus the bid to build another petrochemical complex on the Southport parcel of the disused Navy Yard. Each would increase the capacity to refine natural gas and use natural gas liquids as feedstocks for plastics manufacturing (Greater Philadelphia Energy Action Team (GPEAT) 2016). Aiming to legitimize and neutralize the proposed expansion, advocates used the phrase ‘energy hub’ to describe the potential transformation of Philadelphia.

Three of the four locations proposed for expansion are in the South Philadelphia district, which averaged (in 2010) 50% non-Hispanic white, 27% black, and 8% Hispanic and had a median household income of \$39,868 (Sicotte 2016). That year, 36.9% of Philadelphia residents were non-Hispanic white, 43.6% were non-Hispanic black, and 12.3% were Hispanic. Median household income was \$36,251 (Sicotte 2016). Heat-related mortality, exacerbated by climate change accelerated by methane releases, disproportionately affects Philadelphia’s poor, elderly residents who tended to live in the city’s densest, hottest areas, one of which is South Philadelphia (Hondula et al. 2012). The fourth (one of the two gas storage and liquefaction plants) is located in the Bridesburg–Kensington–Richmond district, which averaged 50% non-Hispanic white, 31% Hispanic, and 13% black, with a median household income of \$32,654 (Sicotte 2016).

Also planned was the expansion of existing petrochemical complexes along the Delaware River close to Philadelphia (Greater Philadelphia Energy Action Team (GPEAT) 2016), including one in Marcus Hook, PA (81% non-Hispanic white and 13% non-Hispanic black with a median household income of \$33,561) and another in Paulsboro, NJ (51% non-Hispanic white, 35% black, and 9% Hispanic, median household income \$43,846). Without any such expansions, each of these Philadelphia-area communities was already among those containing more hazardous sites or facilities than 90% of Philadelphia-area communities (Sicotte 2016). The racial/ethnic diversity and low incomes characteristic of Philadelphia and its industrial suburbs are in stark contrast with the suburban communities that make up most of the Philadelphia–Camden–Wilmington statistical area, which was 69.4% non-Hispanic white, 20.7% non-Hispanic black, and 7.3% Hispanic with a median household income of \$60,259 (US Census 2006–2010).

The building of high-pressure transmission lines connecting Philadelphia with gas fields in Northeastern and Western Pennsylvania, which was already underway by 2016, also affects residents of suburban, predominantly white, middle-class communities. Even the most affluent of these communities are entirely cut out from the decision-making process, which has been narrowed to a transaction between gas pipeline corporations and Federal Energy Regulatory Commission (FERC), the federal agency that uncritically approves their applications (Hauter 2016). These communities also suffer loss of property rights and value due to gas pipeline corporations’ use of eminent domain to site pipeline on privately owned land (Phillips 2016a). Thus, at every location, gas infrastructure expansion in Philadelphia would exacerbate environmental injustice.

### Laying the groundwork for transforming Philadelphia into a gas hub

The proposed expansion was enabled by a series of legal, political, and technological efforts. As hydraulic fracturing was encouraged and incentivized in Pennsylvania after the passage of the Energy Policy Act of 2005, plans to transport and export fossil fuels in Philadelphia began to be developed by corporate leaders and politicians. These efforts were multifaceted and included efforts to privatize PGW, lay new pipelines, reopen the refinery in South Philadelphia, and expand gas processing and export facilities in South Philadelphia and Marcus Hook. Such efforts built on Pennsylvania’s long history as an extractive state, Philadelphia’s history as an energy distribution hub, and the socio-technical infrastructures that support such activities (Jones 2014).

The Energy Policy Act of 2005 made fracking more profitable by exempting gas-drilling activities from clean air and water laws, allowing gas corporations to externalize much of the environmental costs associated with gas extraction (Centner and O'Connor 2014). It also repealed the Public Utility Holding Company Act of 1935, which had outlawed corporate ownership of public fuel, water, transportation, and communication utilities.

The 2005 Act expanded the privileges given to companies by the Natural Gas Act of 1938 which had given the FERC exclusive control over permitting interstate gas pipelines, gasification plants and LNG terminals, and the power to grant a 'certificate of public convenience' to gas companies, certifying them as public utilities. This certification allowed gas companies the power to take privately owned land to site gas pipelines, as public utilities were assumed to be acting in the public interest (Klass *Forthcoming*; Hauter 2016; Wiseman 2009). Corporations responded by exponentially increasing their unconventional drilling activities in Pennsylvania from 2005, when only three active unconventional gas wells existed in Pennsylvania, to 2012 when there were 5,081 (Pennsylvania Department of Environmental Protection (PADEP) 2016).

In 2012, Pennsylvania's Act 13 was signed into law, giving gas companies unprecedented powers. It placed doctors in communities where fracking was occurring under 'gag orders' that made it illegal to speak to patients, other care providers, or anyone about fracking chemicals (because of their status as 'trade secrets'); relieved Pennsylvania Department of Environmental Protection and gas companies from the requirement to notify households whose water came from private wells of any chemical contamination (those on public water systems still had to be notified); banned municipal governments from enacting zoning prohibiting fracking; and gave gas corporations the right to condemn and take land by eminent domain if it bordered or was close to an area where they planned to transport or store gas (Pennsylvania General Assembly 2012). The provision giving gas corporations the right to take land for pipelines or gas storage pools by eminent domain rested upon the idea that as 'public utilities', gas corporations were acting on behalf of the public good (Kamin 2016).

With these laws in place, two other important developments in 2012 helped facilitate the plan to remake Philadelphia into a gas hub: first, the Sunoco gasoline refinery, the largest refinery in Philadelphia, was saved from closing when it was purchased by Phil Rinaldi (a Texas oil executive) and the Carlyle Group (a bank) and renamed Philadelphia Energy Solutions (PES). The United Steelworkers Union played a crucial role in bringing these groups together in order to save the refinery workers' jobs

(Maykuth 2015). Second, Philadelphia Mayor Michael Nutter announced that he was seeking a buyer to purchase the PGW, a city-owned public utility.

The privatization of PGW would be an important element of expansion for three key reasons. First, it would transform a nonprofit organization whose main mission is to serve the greater Philadelphia region into a for-profit company whose main aim would be the creation of profit. By switching the institutional aim to global markets and profit, a privatized PGW would help fossil fuel expansion to occur. Second, privatizing PGW would allow gas companies to assume the mantle of a public utility, which would allow them to use Pennsylvania's eminent domain law to obtain privately held land to site pipelines. Finally, owning PGW would provide increased capacity for the storage and processing of gas, and the ability to expand its peak shaving plant into an export facility for LNG.

Although conversations about privatizing PGW began in the late 1990s, the effort gained traction once Mayor Nutter (Democrat) championed the issue during his tenure as Mayor (2008–2016). Self-identified with sustainability strategies and enhancement of bicycle infrastructure, Mayor Nutter promoted privatizing PGW primarily as a way to break the Local 686 of the Public Utility Workers Union's hold on the organization and to use the sale funds to subsidize the City's pension plans. PGW had been poorly managed throughout the 1990s and early 2000s, and initial discussions to privatize highlighted this point. But appointment of new management had turned the institution around, and these financial troubles were no longer salient by November 2012 when Mayor Nutter issued a formal request for proposals for a broker (Maykuth 2012a). Conversation about privatization took center stage in 2014 when the UIL Holding Company, a Connecticut-based gas corporation, emerged as the lead bidder to purchase PGW for \$1.86 billion.

As efforts to privatize PGW grew, groups organized against its sale. Environmental groups such as the Green Party, Protecting Our Waters, and the Clean Air Council opposed the sale because they could see its direct link to fossil fuel expansion and increased pollution (Colinari 2014). Community Legal Services, which acts as the city's public advocate, opposed the sale due to concerns over the end of subsidies for poor and/or elderly customers (Maykuth 2012b). The Local 686 of the Public Utility Workers Union protested the privatization of PGW, and members regularly showed up at City Council meetings with bullhorns and protest signs. The Local 686 consistently called attention to the risks to both workers and customers if the sale went through. Keith Holmes, President of the Local 686, for example, noted, 'You privatize a public utility, the rates will increase or

there will be massive job loss. One of the two things have to happen' (Macdonald 2014).

The protests against privatization were successful, and the City Council refused to put the issue on the agenda as a way to sunset the privatization effort. UIL Holdings Corp withdrew its \$1.86 billion offer in December 2014 in response to City Council's refusal to hold hearings or vote on the proposed sale (Maykuth 2014).

As the City Council weighed the benefits and costs of the privatization of PGW, GPEAT held a meeting on 5 December 2014 to discuss the legal, financial, and technical changes needed to support expansion. GPEAT, headed by Phil Rinaldi (CEO of PES, Philadelphia's largest refinery), comprises stakeholders from the petrochemical corporations, energy providing companies, engineering companies, and banks. As stated by the Chamber of Commerce for Greater Philadelphia (CCGP) (2016), GPEAT sought to promote hydrocarbon use for heating, manufacturing, petrochemical processing, and other industries; promote the development of pipelines from the gas fields of Western and Northern Pennsylvania to the greater Philadelphia region; and thereby to stimulate direct and indirect economic growth and job creation in the region.

GPEAT's discussions culminated in the highly publicized release of a report titled *A Pipeline for Growth* at the 30 March 2016 meeting held at the Chemical Heritage Foundation (Greater Philadelphia Energy Action Team (GPEAT) 2016). Although initially planned as an open meeting, the organizers quickly turned it into a closed meeting due to concerns about questions and protest.

The report sketches GPEAT's plan to expand both the demand for gas and the capacity to process gas by expanding processing capacity at existing petrochemical plants and building new ones at the Southport Marine Terminal Complex and other sites. Gas is used as a feedstock at chemical manufacturing plants (particularly, in the manufacture of plastics); thus, both the demand for gas and plastics manufacturing in the Philadelphia area would increase (Greater Philadelphia Energy Action Team (GPEAT) 2016). The GPEAT team claimed that building natural gas pipeline infrastructure would generate \$10 billion in manufacturing infrastructure investment and create more than 10,000 new skilled labor and professional jobs, netting a wage tax increase of \$4.2 million for the City of Philadelphia (Greater Philadelphia Energy Action Team (GPEAT) 2016, pg. 37). From the first announcement of gas hub plans, though, reporters disputed boosters' claims of job creation as inflated (Kerkstra 2014; Phillips 2016b).

As people became aware of GPEAT's 'vision', groups mobilized against the plans to turn the Philadelphia region into 'an energy hub'. Although environmental and environmental justice

organizations (EJOs) tended to work in coalition with other such groups and with neighborhood organizations, unions tended to work alone; some unions supported the gas expansion (e.g. United Steelworkers Union) while others (e.g. Longshoremens Union, Public Utility Workers Union) were against it. In contrast to previous moments such as the protest of NAFTA or the WTO, labor and environmental organizations did not work interorganizationally, nor did labor unions form alliances with other labor unions (Dreiling 1998; Gould, Lewis, and Timmons Roberts 2004; Mayer 2009).

In contrast to the fragmentation of labor unions, Green Justice Philly, a coalition of 23 groups formed in October 2014 to coordinate and advance EJOs efforts 'to protect Philadelphians' health and safety from the city's fossil fuel industry' (Green Justice Philly 2014). EJO tactics included litigation, resource sharing, coalition building, marches, letter writing campaigns, and summits. Established nonprofit organizations such as the Clean Air Council and the Delaware Riverkeepers Network filed lawsuits to protect property owners' rights to their property and to protect waterways and air. The Clean Air Council, for example, filed suit against Sunoco's right to use eminent domain to take homeowners' land in order to build a 350-mi natural gas liquids across Southern Pennsylvania on 27 August 2015 (Hurdle 2015). The Delaware Riverkeepers Network, which has a strong track record of using litigation to protect waterways and watersheds, filed suit against the FERC on 2 March 2016. The lawsuit alleged that FERC's processes are biased toward the natural gas industry and that FERC does not have the right to bypass state and local authorities in pipeline approvals. The Clean Air Council created and maintained the website Energy Hub Watch, which includes a fossil fuel energy hub map that shows completed and proposed infrastructure, a glossary of related terms, places and individuals, and links to relevant news coverage.

The EJOs that actively opposed fossil fuel expansion included but were not limited to organizations such as Action United, Earth Quaker Action Team, Food and Water Watch, Moms Clean Air Force, Clean Water Action, and 350 Philadelphia. Such groups, working together and at times alone, organized protests at events such as the Greater Philadelphia: The Next Energy Hub meeting (5 December 2014), the Philadelphia Regional Port Authority's (PRPA) public hearing about the proposed development of the Southport Marine Terminal Complex (9 March 2016), as well as at the PES refinery (7 May 2016). The international group Food and Water Watch created a day-long Summit for a Clean Energy Revolution on 23 July 2016 in Philadelphia, and a March for a Clean Energy Revolution on 24 July 2016, a date that coincided with the Democratic National Convention. The

Summit included speakers and breakout sessions dedicated to educating participants about energy policies and effects, and to training participants in organizing and strategic development. Approximately 10,000 people marched in Philadelphia to protest fracking, gas infrastructure, and climate change and to show their support for clean energy sources.

The price of gas also dropped throughout this period while demand for container shipping facilities grew, making the economic case for fossil fuel expansion hard to sustain (Frazier 2016; Maykuth 2016). The combination of markets and sustained protests helped determine the development outcome of the Southport Marine Terminal, a 194-acre site that was key to fossil fuel expansion efforts. Although plans to develop this site had been discussed for decades, the PRPA issued an official call for proposals in September 2015 and followed up with two public outreach meetings on the potential development of the site on 8 and 9 December 2015 at the Philadelphia Sheet Metal Workers Hall. Over the winter of 2015, PRPA chose six finalists; four of the six proposals were either focused on fossil fuel infrastructure or were submitted by fossil fuel companies. The PRPA held a public hearing on the proposals on 9 March 2016 at Philadelphia Sheet Metal Workers Hall. The public meeting was widely attended by neighborhood residents and members of community and environmental organizations – the large hall was packed with standing room only. Activists kept up the pressure on PRPA by holding protests throughout Philadelphia and by instigating letter writing campaigns to the chairman of the PRPA board, Gerard Sweeney, in the following months. On 22 November 2016, the PRPA announced that no petrochemical complex would be built at the Southport Marine Terminal. Instead, the site would be developed to increase container shipping capacity at the port – an outcome supported by the longshoreman unions because of its potential to increase jobs in a booming market.

### Analysis of the ‘energy hub’ controversy

As 2016 drew to a close, it became clear that Philadelphia’s transformation into an energy hub on the scale of Houston, Texas, or Louisiana’s ‘chemical corridor’ was exceedingly unlikely. Gas development had been enabled by federal and state legislation and was being promoted by powerful actors, including the Philadelphia Chamber of Commerce, the CEO of the city’s largest gas refinery, and Philadelphia Mayor Michael Nutter. The case study of the Philadelphia gas hub proposal illustrates one very important thing: that opposition at every scale can create local ‘clogs’ impeding the flow of fracked gas, even in a state with a history of fossil fuel extraction.

Despite having power and money on their side, the Philadelphia gas hub boosters faced three important defeats. Their first and most important defeat was the failure to privatize the PGW in October 2014. Serving in his second and last term, Mayor Nutter was invulnerable to the displeasure of labor unions and Philadelphia voters; but Philadelphia City Council members were not. Faced with local opposition from labor unions and environmental groups as well as voting residents who were concerned about higher gas prices and poorer service under privatization, they refused to authorize the sale of PGW to a gas corporation. This kept PGW’s production, transportation, and shipping capacity from being used by gas corporations and made it harder for gas corporations to argue that they were in fact public utilities. On 4 January 2016, Jim Kenney (known for his ties to labor unions) was elected Mayor of Philadelphia. These developments illustrate the continuing power of labor unions to shape urban life, despite facing opposition from right-leaning actors at state and federal levels.

The second defeat was the September 2016 Pennsylvania Supreme Court decision that Act 13 was a ‘special law’ benefiting one interest (gas companies) and thus was unconstitutional. In their opinion, the justices argued that the public interest was only incidental in the use of eminent domain to take privately owned land for underground gas storage; in order to avoid violating the constitution, it would have to be ‘paramount and primary’ (*Supreme Court of Pennsylvania Middle District* (J-34A-B-2016)). This decision was cheered by local and national-level environmental groups including The Delaware Riverkeeper, who had already filed lawsuits aimed at striking down Act 13. The Supreme Court ruling immediately made the pipeline siting process slower and more expensive, which both gave time for local opposition to form and raised the cost of building the amount of pipeline needed to cheaply transport gas through Philadelphia.

The defeat of the Philadelphia Energy Hub also owed much to the intervention of national-level environmental organizations such as the Delaware Riverkeeper and Food and Water Watch; exclusively local grassroots groups (such as Philly Thrive) may not have been able to succeed without the attention and assistance provided by outsiders. The importance of outsiders’ help has been demonstrated in environmental justice struggles in Louisiana (Roberts and Toffolon-Weiss 2005). Researchers have also argued that all social movements begin as local struggles but only the successful ones morph into national-scale movements (McAdam and Boudet 2012). Clearly, movements confronting fracking and climate change have now reached this level. At the March for a Clean Energy

Revolution, it was evident that Philadelphia activists successfully tied the local gas hub fight together with state- and national-level concerns about gas pipelines, fracking, climate change, and infrastructure. While US EJM's have often been hampered by the lack of a unified vision emphasizing the common causes of local threats, this case shows that it is also possible for local sites of resistance to multiply under linked threats, broadening the base of the movement (Klein 2015).

The third defeat suffered by gas hub boosters was the November 2016 decision by the PRPA to develop the 195-acre site known as Southport for bulk container shipping instead of as a petrochemical complex. Residents of South Philadelphia who feared what a petrochemical complex would do to their air quality were joined by local grassroots groups such as Philly Thrive and the Longshoreman's Union. Backed with investments of state monies to build a modern shipping infrastructure, this decision reflected a different vision of Philadelphia as a shipping portal and signaled that it is now much more difficult to build a gigantic polluting industrial complex along the Delaware River waterfront than it was in the past. The efforts of both labor and local grassroots opposition were crucial, and not just because without them national-scale groups would not have been involved in opposing the Philadelphia gas hub proposal at all. In earlier work on LNG plant proposals, researchers found that in all cases in which local opposition did not emerge, plant proposals succeeded (McAdam and Boudet 2012).

But although energy hub plans have been defeated, the struggle against gas infrastructure development is far from over. Philadelphia is located between the gas fields of western and northern Pennsylvania and Texas and Louisiana refineries and market hubs, and near multiple east coast ports where gas can be shipped to Europe. This virtually guarantees that repeated attempts to build gas infrastructure in and around Philadelphia will occur. Low gas prices have not deterred the buildout of infrastructure; indeed, the state Governor has taken the lead on subsidizing the fossil fuel industry to help it remain competitive (Wolf 2016). Higher gas prices would only stimulate more investment in infrastructure.

## Conclusion

Given the current controversies over fracking and similar technologies (e.g. coal seam gas) that are now occurring in many places in the world, lessons learned from this case study are timely. While the United States may present an extreme case of corporate influence over federal and subnational levels of government, it is also just another location facing a

common threat to water resources and a survivable climate. As critics of the political economy of energy have pointed out, fossil fuel infrastructure expansion is enabled by subsidies that prop up dying markets, and by laws and permitting practices that fail to protect human health, human rights, or ecosystems. Fossil fuels are not just used within the global capitalist economic system – they are internally essential to the capitalist mode of production and trade (Huber 2008). A transition to clean energy thus faces not just technical barriers but also formidable legal and economic ones (Andrews and McCarthy 2014; Hauter 2016).

However, this case study also illustrates how 'governable spaces' may conflict, creating spaces where local resistance is empowered to change energy politics and outcomes, even within a 'petro-capitalist' political economy (Watts 2004). Even in the pro-fracking political environment that existed from 2004 to 2016, local actors were instrumental in blocking energy infrastructure expansion. The efforts of labor unions, residents, and environmental organizations were, for the most part, decentralized and not coordinated: instead, they constituted multiple sources of concentrated pressure on government that 'clogged' and politicized gas expansion. These pressures were based on multiple framings of the gas hub expansion plans as destructive: to employment (public utility and longshoremen's unions); to equality, health and ecosystems, and property rights (grassroots, state and national environmental groups, and local residents); and to Philadelphia's economy and its residents' energy bills (local residents). Given the low price of gas, these decentralized, cross-class efforts exhibiting a diversity of interests transformed the terrain so that expanding fossil fuel production in Philadelphia no longer made economic or political sense.

Previous scholarship has argued for the importance of labor-environmental alliances (Dreiling 1998; Gould, Lewis, and Timmons Roberts 2004; Mayer 2009); yet, this study shows that such alliances may not be necessary in particular places, where decentralized, continual political pressure blocked gas infrastructure expansion. But the power of local resistance alone is limited; while no new refineries were built, gas processing continues at refineries in and near Philadelphia. Gas infrastructure expansion is now focusing on Pittsburgh and Midwestern refineries (Maykuth 2017). A just energy transition will require pressures upon subnational, national, and even international-level centers of power. The gas exported from Philadelphia will supply international markets; all nations are implicated in the socio-technical infrastructures that support the supply and demand for fossil fuels and alliances across sectors will be needed for long-term change. But activating and empowering

local-level resistance may be our best hope for overcoming fossil fuel lock-in.

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