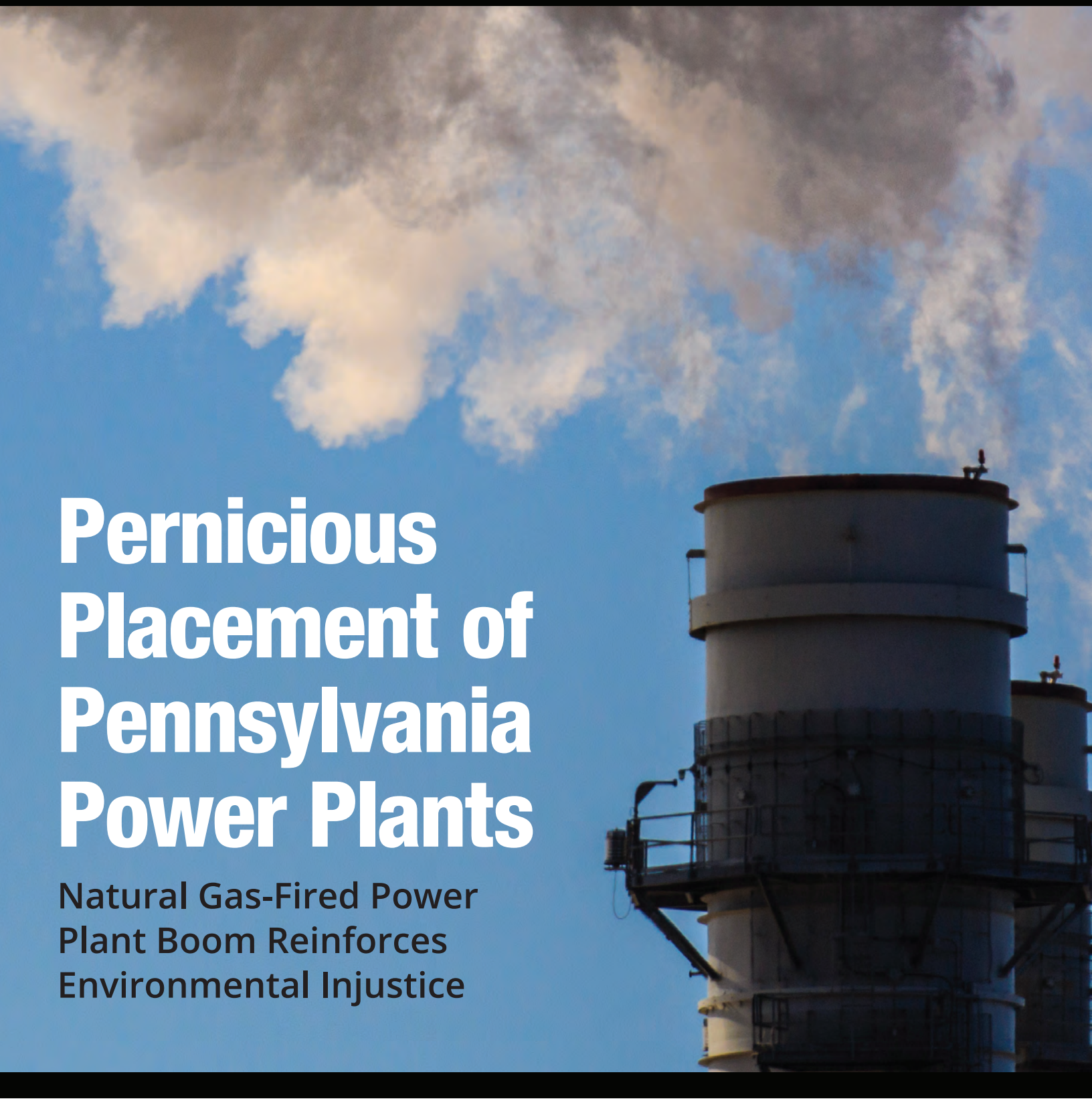

Pernicious Placement of Pennsylvania Power Plants

Natural Gas-Fired Power Plant Boom Reinforces Environmental Injustice

food&waterwatch

About Food & Water Watch

Food & Water Watch champions healthy food and clean water for all. We stand up to corporations that put profits before people, and advocate for a democracy that improves people's lives and protects our environment. We envision a healthy future for our families and for generations to come, a world where all people have the wholesome food, clean water and sustainable energy they need to thrive. We believe this will happen when people become involved in making democracy work and when people, not corporations, control the decisions that affect their lives and communities.

Food & Water Watch has state and regional offices across the country to help engage concerned citizens on the issues they care about. For the most up-to-date contact information for our field offices, visit *foodandwaterwatch.org*.

National Office
1616 P Street, NW
Suite 300
Washington, DC 20036
(202) 683-2500

Oakland, California
1814 Franklin Street
Suite 1100
Oakland, CA 94612
(510) 922-0720

Los Angeles, California
915 Wilshire Boulevard
Suite 2125
Los Angeles, CA 90017
(323) 843-8450

Santa Barbara, California
222 E Canon Perdido Street
Suite 207C
Santa Barbara, CA 93101
(323) 843-8456

Ventura, California
940 E. Santa Clara Street
Suite 202
Ventura, CA 93001
(805) 507-5083

Colorado
1801 N. Williams Street
Suite 400
Denver, CO 80218
(720) 449-7505

Florida
2655 6th Avenue South
Suite 200
St. Petersburg, FL 33712
(954) 687-9224

Maryland
3121 St. Paul Street
Suite 28
Baltimore, MD 21218
(410) 394-7650

New Jersey
100 Bayard Street
Suite 202
New Brunswick, NJ 08901
(732) 839-0860

New Mexico
7804 Pan American
East Freeway NE #2
Albuquerque, NM 87109
(505) 633-7366

New York
147 Prince Street
4th Floor, No. 7
Brooklyn, NY 11201
(347) 778-2743

Illinois
670 W. Hubbard Street
Suite 300
Chicago, IL 60654
(773) 796-6086

Pennsylvania
1501 Cherry Street
Second Floor
Philadelphia, PA 19102
(267) 428-1903

Oregon
1028 SE Water Avenue
Suite 245
Portland, Oregon 97214
(971) 266-4528

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Executive Summary

Polluting facilities like power plants have long been disproportionately located near disadvantaged communities, including lower-income areas and communities of color that face higher pollution burdens than their more affluent and whiter neighbors. In 2017, Pennsylvania's existing 88 power plants fueled by oil, natural gas and coal exhibited this pattern of disparate and unfair location in disadvantaged communities.

Now, energy companies in Pennsylvania have begun building natural gas-fired power plants that will reinforce the historic environmental injustice of the state's existing fossil fuel-fired power plants.

Pennsylvania has been ground zero in the controversial and environmentally destructive technique of hydraulic fracturing (or fracking) used to drill for natural gas. This fracking boom has threatened the health and quality of life of Pennsylvania's rural communities. Since 2011, energy companies have constructed or planned to build 48 new power plants fueled by fracked gas (collectively referred to here as "proposed" plants, for consistency). The surge in power plant construction locks in reliance on dirty fossil fuels, encourages more destructive fracking (especially in the shale plays of Pennsylvania, Ohio and West Virginia), amplifies environmental injustice and contributes to increased climate pollution.

Pennsylvania does not need and should not build these new gas-fired power plants. Already, the electricity grid in Pennsylvania is exporting more power to other states than the state's residential customers have used.[1] The new plants provide symbiotic profit opportunities for power companies that are capitalizing on low gas prices, and for fracking companies that hope that the new plants will soak up supplies and ultimately raise prices enough to encourage more drilling.[2]

Energy companies are building new gas plants largely to generate power for out-of-state customers: most of the proposed plants promote their connection to the interstate power grid, and around half emphasize their ability to sell electricity outside of Pennsylvania.[3] A proposed Luzerne County plant would supply electricity to New Jersey and New York; Invenergy's power plant in Jessup, in Lackawanna County, is close to existing and proposed transmission lines that will connect to New York; and power from a Snyder County plant would be destined primarily for New York City.[4] Ultimately, the proposed gas plants will benefit energy companies like IMG Midstream, NRG Power Marketing, LLC and Panda Energy[5], as well as electricity consumers, but the localized pollution burden will remain in the disadvantaged areas surrounding these proposed power plants.

The shale gas industry is promoting other ways to sop up surplus gas that affect Pennsylvania communities, including exporting gas to Europe through the controversial Mariner East 2 pipeline and Marcus Hook export terminal in Pennsylvania and building a new petrochemical manufacturing cluster in the Ohio River Valley that would process natural gas and natural gas liquids into chemicals that can make plastics and other products.[6] The natural gas, electric and chemical industries tout the infrastructure expansion and increased exports as a panacea to an overabundance of low-priced gas that can only become profitable if new buyers (power plants or petrochemical facilities), new markets (exports) or new products (plastics) drive up gas demand.[7]

Food & Water Watch studied the location of Pennsylvania's 136 existing, new and proposed fossil fuel-fired power plants (coal, oil and natural gas) and found that the existing power plants were disproportionately located near disadvantaged communities — areas with lower incomes, higher economic stress, lower educational levels and/or communities of color. The proposed gas plants would only reinforce the environmental injustice of siting polluting power plants in more

marginalized communities, including rural areas. These new findings reaffirm the well-established environmental justice literature and are the first to analyze the wave of fracked-gas power plant construction.

This comprehensive analysis examined demographic characteristics (including race, income, indicators of economic stress and education levels) of the census tracts within a three-mile radius of Pennsylvania's existing and proposed power plants. The results describe the environmental injustice of gas plant locations in three basic ways.

First, the study compared the demographics of the population living under the three-mile radius surrounding power plants to the overall Pennsylvania population. Second, it analyzed the communities (based on census tracts) that were predominantly covered by the power plants' three-mile footprints and compared the census tracts (by demographic traits) covered by the power plants' footprints to their statewide distribution. Finally, the study examined the proportion of census tracts (by demographic trait) that were within three miles of one or more plants — essentially, the chance that any type of neighborhood might be near a power plant.

Some key findings include:

- **People of color, people living in poverty and recipients of the Supplemental Nutrition Assistance Program (SNAP) disproportionately lived within three miles of existing and proposed power plants:** People of color made up 39 percent of the population living within three miles of existing and proposed plants, even though they represented 22 percent of Pennsylvania's total population. Likewise, the poverty rate and the SNAP rate was nearly 60 percent higher within three miles of power plants than in the rest of Pennsylvania (see page 8).[8]
- **Existing Pennsylvania power plants were disproportionately located near areas with a higher proportion of people of color:** Minority census tracts where people of color made up 30 percent or more of the population (Pennsylvania's definition of an environmental justice area) made up almost a quarter of all Pennsylvania census tracts but made up nearly half (47.7 percent) of the census tracts within three miles of existing power plants (see page 9).
- **Minority areas were more common near existing power plants at every income level, and upper-income minority areas were twice as likely to be near an existing power plant than the whitest, lower-income areas:** One-fourth of upper-income minority census tracts were within three miles of a plant, compared to only 13.4 percent of lower-income areas where whites made up over 90 percent of the population (see page 11).
- **The combination of existing and proposed power plants disproportionately impacts rural lower-income and higher-economic stress areas:** The rural areas with high SNAP enrollment or lower household incomes were overrepresented near any existing or proposed plant and were even more likely to be near multiple plants (see page 13).
- **Pennsylvania's existing and proposed power plants were disproportionately located in rural areas with fewer college graduates:** The rural areas with the fewest college graduates were significantly overrepresented near existing and proposed power plants, and areas with the most college graduates were unlikely to be near power plants — a gap that was especially pronounced for areas overlapped by multiple plants (see page 13).
- **Proposed gas plants reinforce overall disparities for communities of color, for lower-income and economically stressed areas and for areas with lower education levels:** Although the proposed gas-fired power plants are overwhelmingly located in white, rural areas, the addition of these proposed

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plants locks in the historical pattern of racial and economic disparities. Throughout Pennsylvania, the significant overrepresentation of communities of color and lower-income, higher-economic-stress and less-educated areas beneath power plant footprints remains virtually unchanged even with the addition of new plants in different areas. Near Reading, a proposed gas-fired plant would cover multiple census tracts where people of color make up more than 30 percent of the population (and also closely overlaps an existing, smaller oil-fired plant, meaning that these communities would be in close proximity to two plants), and a proposed plant near Masontown would overlap multiple areas with poverty rates of over 20 percent (see page 15).

These stark findings in Pennsylvania confirm decades of research documenting the disproportionate location of polluting facilities near marginalized communities. The gas power plant building boom will lock in fossil fuel dependence and environmental injustice for decades to come, as the typical lifetime for gas-fired plants has been over 30 years.[9] Pennsylvania's oldest operating gas power plants went online in the 1960s and early 1970s, suggesting that some of these new plants could be around for much longer.[10]

The sunk investment costs in these new greenhouse gas emitters not only discourages investments in clean, renewable energy, but also magnifies demand for natural gas, encouraging more fracking, pipelines and associated leaks of the potent greenhouse gas methane.[11] Methane emissions from gas power plants alone may be considerably higher than thought. A 2017 study found that gas-fired power plants released more than 20 times more methane than the facilities estimated,[12] and the greenhouse gas footprint of natural gas is actually worse than for coal and oil because methane traps more heat in the atmosphere.[13] Building *additional* natural gas power plants would further accelerate greenhouse gas emissions that would warm the planet more than 2 degrees Celsius, a threshold that scientists fear could cause irreversibly destructive climate change.[14]

Instead, Pennsylvania must rapidly shift to clean, renewable electricity generation to replace the existing fossil-fueled power plants that disproportionately impact communities of color and lower-income communities. This means building new solar, wind and geothermal generating capacity and decommissioning the dirty fossil fuel plants that plague disadvantaged communities. In 2017, Pennsylvania generated less than 2 percent of its electricity from wind, solar and geothermal energy — one of the lowest rates in the country.[15] But the state has the potential to generate enough power from solar, wind and geothermal energy to completely replace these polluting power plants with zero-emissions electricity. Pennsylvania and the nation must invest in the shift to 100 percent clean, renewable energy to prevent climate catastrophe and to start delivering environmental justice to disadvantaged communities.

The Historical Pattern of Environmental Injustice

Environmental justice has been elusive for communities of color and lower-income communities living beneath the toxic footprint of powerful corporate polluters. The dangers of pollution are not borne equally. Toxic emissions from industrial facilities and power plants impose an unequal pollution burden on socially and economically disadvantaged communities, including communities of color and lower-income, less-educated and rural communities. Decades of academic studies and reports have repeatedly found that exposure to pollution from petroleum refineries, power plants, garbage incinerators and toxic facilities disproportionately affects these disadvantaged communities.[16]

Marginalized communities often lack the resources or political power to prevent the arrival of unwanted polluters, including toxic waste dumps, industrial facilities and power plants.[17] Even today, the racial composition of neighborhoods can be a strong predictor of where polluters locate their facilities, compounding the historical discriminatory zoning and land-use policies and practices that reinforced racial segregation.[18] A 2005 study found that hazardous waste facility siting has followed a "path of least (political) resistance" for decades; as a result, disempowered communities have "borne a disproportionate share of the society's environmental burdens."[19]

Fossil-fueled power plants have exemplified the disparate pollution exposure that communities of color and lower-income communities face. A 2017 study commissioned by the U.S. Department of Energy found that a higher proportion of people of color and low-income people lived within three miles of oil- and coal-fired power plants than their overall share of the population.[20] A 2012 study by the National Association for the

Advancement of Colored People (NAACP) found that people of color made up 39 percent of the population living within three miles of the nation's coal-fired power plants — a share significantly higher than their share of the national population.[21] A 2017 study found that half of California's gas-fired power plants were located in communities designated as disadvantaged — and only 9 percent of the plants were in the *least* disadvantaged areas.[22]

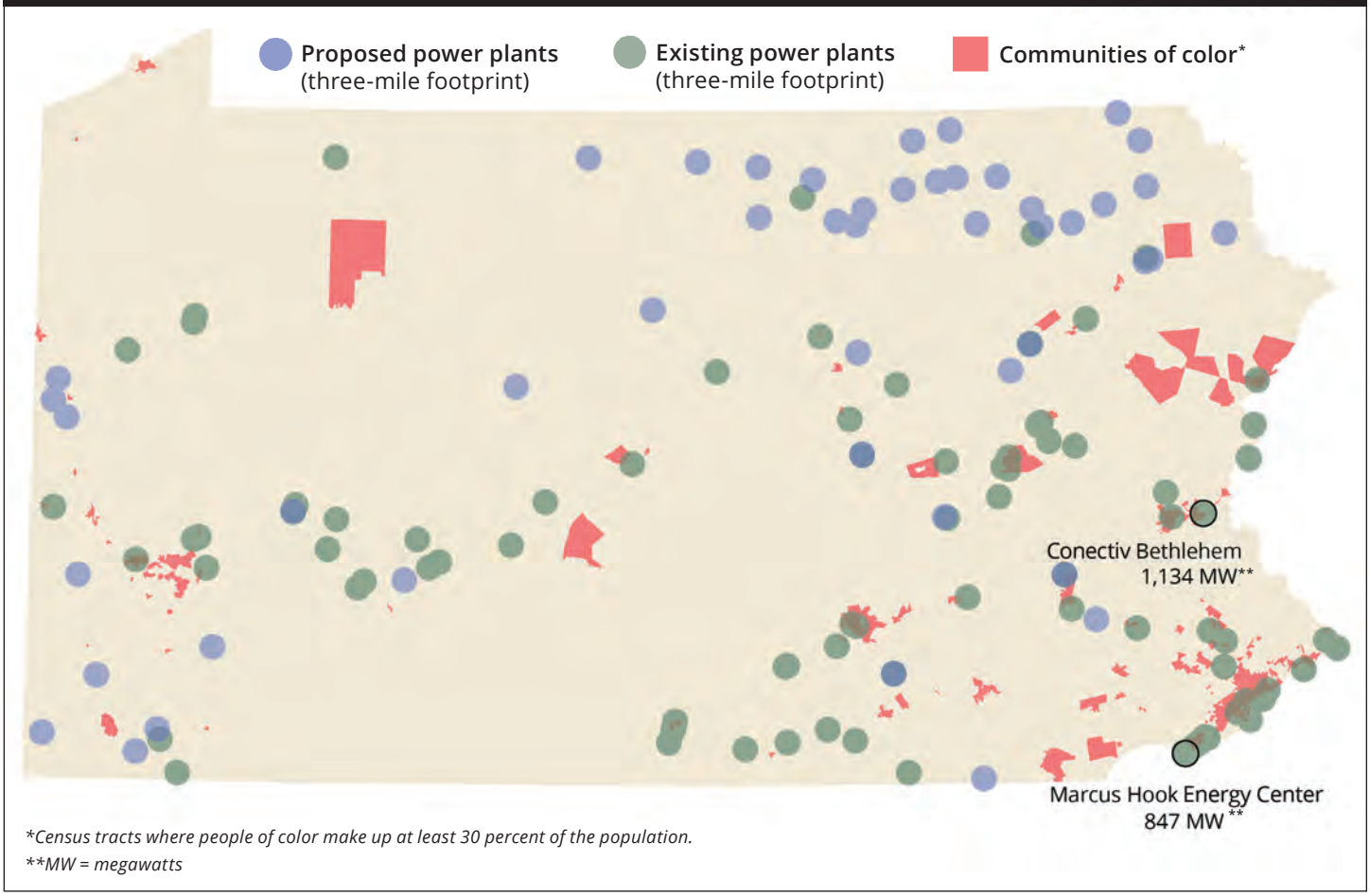
Food & Water Watch found that Pennsylvania's existing and proposed power plants were disproportionately located near socially and economically disadvantaged communities, confirming the findings from other environmental justice power plant studies (see Map 1 and findings below).

Compounding the unequal pollution burdens in marginalized communities, state and federal authorities are less likely to inspect polluters located in socially and economically disadvantaged communities, including power plants, and they impose less severe penalties on facilities, leading to higher levels of pollution.[23] A 2004 study found that petroleum refineries that violated environmental permits in African-American, Latino and lower-income communities received smaller fines than violators in white, more-affluent communities.[24]

The failure to involve the affected communities in the decision-making process of siting and permitting new power plants makes disadvantaged communities more vulnerable to pollutants. Pennsylvania's approval of the proposed natural gas plants appears to short-circuit the environmental justice principles of equity, transparency, inclusion and community empowerment.

Although the Pennsylvania Department of Environmental Protection (DEP) requires an enhanced public participation process for facilities sited within a half mile of environmental justice areas (census tracts where people of color make up more than 30 percent of the population or where over 20 percent of the population lives below the federal poverty line[25]) there was limited evidence that the public participation process was actually improved for the five proposed power plants that fell within designated environmental justice areas.

MAP 1: Pennsylvania Power Plants and Communities of Color



**Census tracts where people of color make up at least 30 percent of the population.*
***MW = megawatts*

There is no evidence or public record that the DEP pursued additional outreach to communities where the Renovo Energy Center (in Clinton County) and Mineral Point Energy (in Susquehanna County) plants would be located — no hearings, notices or mentions of comment periods — even though both affected areas have over 20 percent of the population living below the federal poverty line.[26] The DEP canceled a planned hearing on a proposed natural gas plant near Reading with a footprint that would cover multiple census tracts where people of color made up more than 30 percent of the population.[27]

In contrast, the DEP actively solicited input though public hearings for another proposed and controversial Reading area plant in Birdsboro, which had an overwhelmingly white population with generally higher incomes and lower poverty rates.[28] There is broad-based community opposition to the Birdsboro plant over environmental concerns related to the pipeline that would supply the plant and to existing pollution on the site from a former foundry (Birdsboro Corp. sued to force the federal government to clean up the site in late 2017).[29]

While the DEP did hold a public hearing for another proposed plant near Nemacolin, southeast of Pittsburgh, which would affect lower-income and high-poverty communities, the limited public participation (only two residents asked questions and none provided testimony or statements) may suggest inadequate DEP outreach to publicize the event.[30] Despite low turnout, a consultant for the power plant highlighted the low-income area's "receptive population here that is good for this (type of project)."[31] All affected people and communities must be empowered to participate in decisions that impact their health and well-being, and government and industry actions must not have a discriminatory negative impact on communities of color and lower-income communities.

The public health impacts of environmental injustice

Pollution disproportionately impacts the health of communities that lack the resources to fight back — including communities of color and lower-income, economically depressed and less-educated communities, which already tend to have worse health outcomes than whiter, more economically well-off communities.[32] The disproportionate location of polluters in communities of color and lower-income areas worsens these toxic health and environmental burdens.[33]

Coal, oil and natural gas-fired power plants pose significant health risks to nearby communities. Power plants release air pollutants like mercury, particulate matter, sulfur dioxide (SO_2) and nitrogen oxides (NO_x).[34] All fossil fuel plants discharge SO_2 and NO_x, and coal-fired plants are significant mercury emitters.[35] The SO_2, NO_x and particulate matter pollution from power plants contributes to respiratory health problems, such as chronic bronchitis, asthma, emphysema and existing heart disease, and also causes labored breathing (especially for people living with asthma) and reduces life expectancy.[36]

Although natural gas-fired plants release fewer air pollutants than coal- or oil-fired plants, they are major NO_x emitters, contribute to ground-level ozone and smog, and threaten the environment and human health.[37] Ground-level ozone creates smog when it mixes with particulate matter, which itself has been linked to various cancers.[38] Prolonged exposure to smog has been connected to premature deaths in adults and to low birth weight in babies.[39]

Natural gas-fired power plants can also release radon,[40] a naturally occurring radioactive material that is the second leading cause of lung cancer in the United States, after smoking.[41] The fracked shale gas that will fuel Pennsylvania's new gas-fired power plants may contain more radon than conventional natural gas.[42] Radon radiation exposure can damage DNA, which can result in cancer-causing mutations.[43]

This air pollution disproportionately affects lower-income communities and communities of color, where power plants are most commonly located.[44] A 2014 study found higher NO_2 concentrations in communities of color and lower-income areas than in more affluent, more educated and whiter communities.[45]

In Pennsylvania, African Americans and Latinos are considerably more likely to experience health effects from air pollution than whites. The Pennsylvania asthma hospitalization rate was over five times higher for African-American children and nearly three times higher for Latino children than for white children.[46] The two counties with the largest African-American populations, Philadelphia and Pittsburgh's Allegheny, are at higher risk for asthma due to exposure to prolonged and high levels of ozone and particulate matter.[47] A 2014 study

linked Allegheny County air pollution to lower infant birth weights in lower-income areas, leading researchers to conclude that "poor pregnancy outcomes among the less affluent and minority residents of Allegheny County may be partially attributed to higher pollution levels in those neighborhoods" and that "there may be ongoing environmental justice issues."[48] These health problems can be further exacerbated by poorer quality of health care and unequal access to services.[49]

The environmental injustice in lower-income, rural fracking zones

Lower-income communities are disproportionately affected by toxic polluters irrespective of race and location. Although a host of industrial facilities such as power plants are present in Pennsylvania's cities and factory towns, where many people of color and lower-income families live,[50] lower-income rural communities, especially in Appalachia, are prone to having toxic neighbors. This rural pollution can originate from industrial facilities, factory farms or natural resource extraction such as mining and drilling — all of which contribute to environmental and health disparities for lower-income rural residents.[51]

In Pennsylvania, fracking is an environmental justice issue for the lower-income, rural areas where drilling and fracking boomed.[52] Over the past decade, the controversial technique supercharged a natural gas renaissance across Pennsylvania, with more than 10,000 shale gas wells drilled between 2005 and 2016.[53] Fracking companies have targeted lower-income areas for drilling. In 2016, one fracking executive admitted that his company avoids drilling gas wells in affluent communities near "big houses" where people have the financial resources to fight back.[54] Shale gas production has diminished the quality of life for the rural communities where most new wells have been drilled — with a labyrinth of fracked gas pipelines, hundreds of compressor stations, traffic, heavy truck accidents, public health problems, crime spikes and more.[55]

The proposed gas-fired power plants are largely in northeastern and southwestern Pennsylvania — the hotbed of the shale gas boom — where some of the state's poorest rural communities live near an excessive number of wells and associated fracking pollution.[56] A 2015 study found that the rural Pennsylvania areas near fracking activity had a larger portion of people living in poverty.[57] Although only 5 percent of fracked wells are

PHOTO © SWPA-EHP / FRACTRACKER.ORG

in Pennsylvania-designated "Environmental Justice Areas" for having poverty rates of over 20 percent, many fracked communities have high poverty rates that do not exceed the 20 percent threshold but are nonetheless economically stressed.[58] A 2016 study found that rural Pennsylvania communities dependent on fracking exhibited "persistent economic marginalization," making them "one of the most chronically poor pockets of Pennsylvania."[59]

Rural areas near natural resource development, such as fracking, endure disproportionate health and environmental impacts.[60] For example Dimock, Pennsylvania — an "energy sacrifice zone" — used to be surrounded by coal mining but is now exposed to the more recent dangers associated with fracking,[61] with widespread pollution of drinking water that required much of the community to get water trucked to their homes.[62]

Many rural Pennsylvania communities lack the political power to protect themselves from the disproportionate pollution from the fracking industry.[63] A 2012 study found that widespread fracking in Bradford County, Pennsylvania caused "collective trauma" to residents bullied by the industry and its supporters when they expressed concerns; this was "reinforced through uneven political, social, and economic power."[64] The proposed natural gas power plants would compound the environmental injustice in Pennsylvania's rural areas already burdened by fracking.

The Environmental Injustice of Pennsylvania's Existing and Proposed Fossil Fuel Power Plants

Food & Water Watch analyzed multiple demographic characteristics of the census tracts within a three-mile radius of existing fossil fuel-fired power plants (coal, oil and natural gas) and the proposed natural gas-fired plants. The analysis found that the placement of both existing and proposed power plants was disproportionately in close proximity to lower-income, economically marginalized and less-educated communities and communities of color.

This comprehensive, geospatial analysis examined the power plants that covered the majority of census tracts within a three-mile radius of the plants. The analysis assessed multiple demographic characteristics (race and ethnicity, household income, economic vulnerability, educational attainment and population density) of the census tracts that fell predominantly within the three-mile radius (where the radius covered more than 50 percent of the census tract area or where the radius covered the geographic midpoint of the census tract) of 112 existing and proposed coal-, oil- and gas-fired power plants. Further, it examined the census tracts that were predominantly within three miles of two or more power plants. (See Methodology at page 19 for a more complete discussion of this analysis.)

Some of the largest existing and proposed plants overlapped areas where people of color made up a greater proportion of the population as well as areas with higher economic stress, including the 847 megawatt NextEra plant in Marcus Hook (Delaware County) and the 1,134 megawatt Connectiv plant in Bethlehem (Northampton County). And some of the largest proposed plants overlap areas of economic stress, including the 1,200 megawatt Shamokin Dam plant (Snyder County) and the 900 megawatt Hickory Run Energy Center (Lawrence County). The largest new plant, the 1,500 megawatt plant under construction in Jessup near Scranton (Lackawanna Energy Center) partially overlaps an area of economic stress and has drawn broad-based community opposition over pollution and whether the plant would benefit the local community (see Map 2).[65]

The geographic pattern of Pennsylvania's power plants conforms to the academic literature documenting the disparate proximity of polluting facilities to communities of color and lower-income, less-educated and rural communities. The proposed addition of nearly 50 new gas-fired power plants maintains and exacerbates the significant proximity disparities in communities of color, lower-income, less-educated and more-rural areas.

The environmental injustice of Pennsylvania's existing fossil-fueled power plants

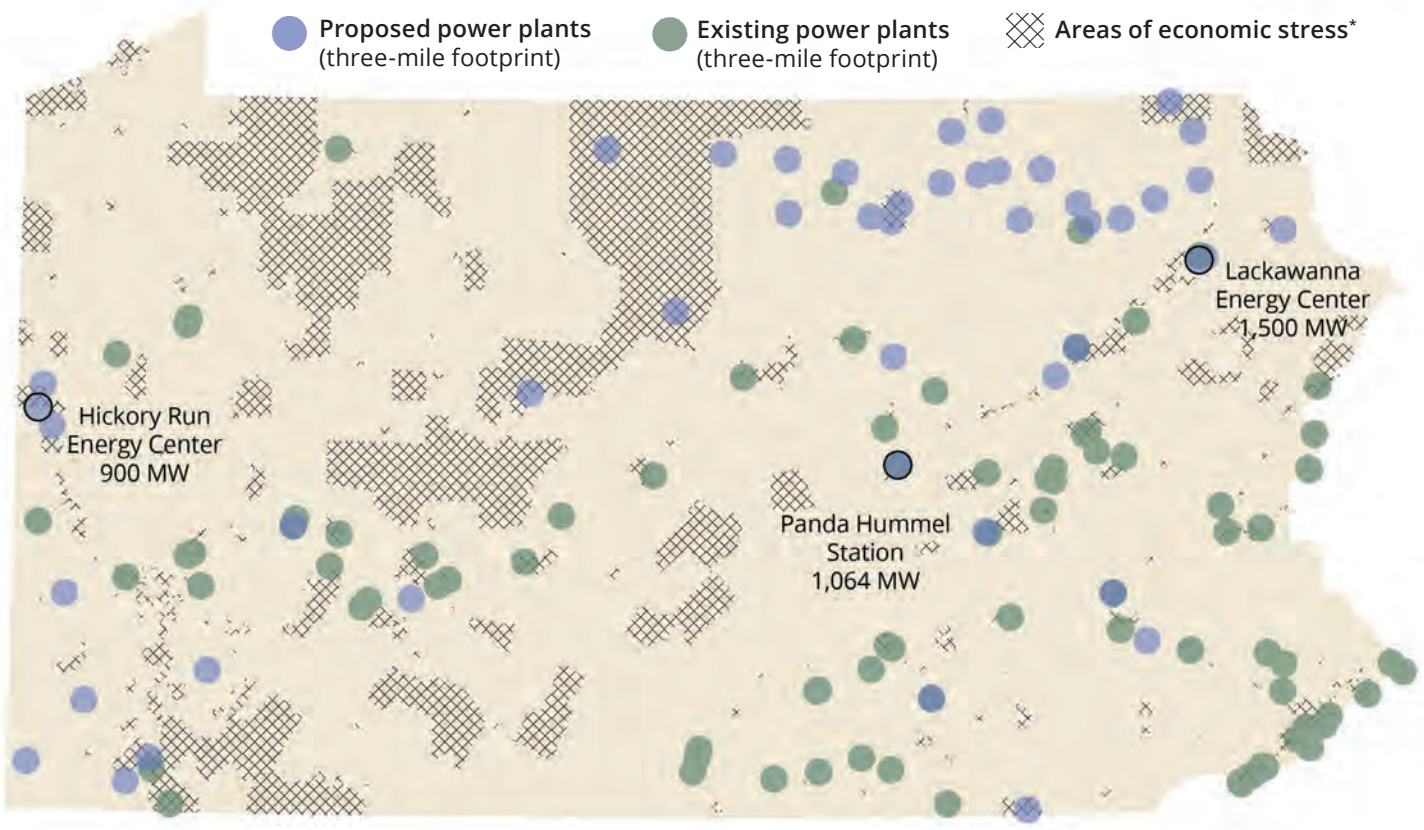
Pennsylvania's existing power plants were overwhelmingly in close proximity to communities of color and lower-income and less-educated communities. The census tracts within three miles of the existing coal-, oil- and gas-fired power plants included a disproportionate concentration of people of color, lower-income households, people without college degrees and other indicators of higher economic stress (higher poverty levels, higher use of nutrition programs and higher levels of unemployment).

The census tracts with higher populations of people of color, lower incomes, lower educational levels and higher economic stress were also substantially more likely to fall within the three-mile footprints of two or more existing power plants, meaning that these neighborhoods faced a higher cumulative pollution burden from multiple nearby emitters.

Additionally, a large proportion of these disadvantaged census tracts are covered by a power plant footprint, meaning that the chance that a lower-income household or person of color will live within three miles of an existing power plant is substantial. In contrast, the most advantaged areas with the largest white populations, highest median household incomes and more educated populations are underrepresented in the footprints of existing power plants.

These findings reinforce decades of literature documenting the substantially disproportionate pollution burden faced by disadvantaged communities in closer proximity to polluters. Food & Water Watch found that 40.4 percent of the population living within three miles of Pennsylvania's existing power plants were people of color, almost double their share of the statewide population (21.9 percent). Similarly, the poverty rate and Supplemental Nutrition Assistance Program (SNAP) participation rate was nearly 60 percent higher within three miles of existing plants than throughout Pennsylvania (the poverty rate and SNAP participation rate were 20.7 percent and 20.3 percent, respectively, near power plants, compared to 13.0 percent and 12.9 percent, respectively, statewide) (see Map 2 on page 9).[66]

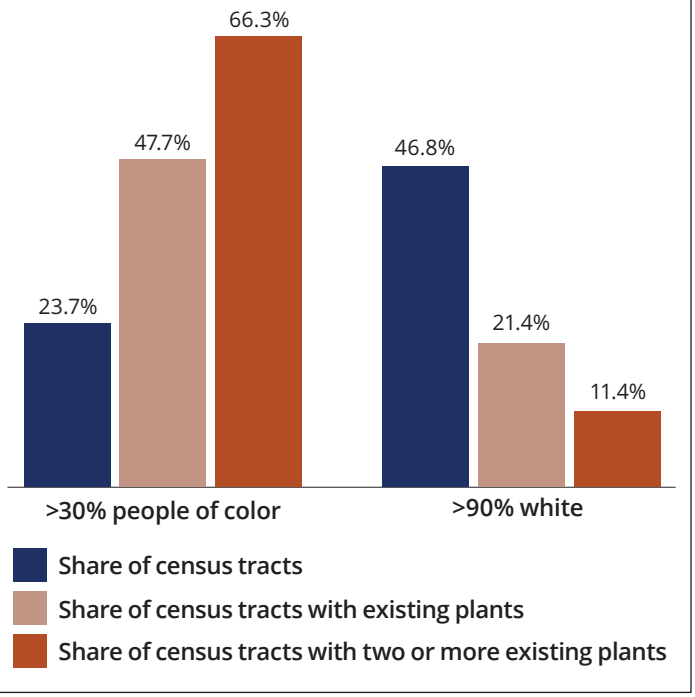
MAP 2: Power Plants in Pennsylvania and Areas of Economic Stress



**Census tracts with higher concentrations of economic stress (including poverty rate over 20 percent, unemployment rate over 15 percent, household SNAP participation rate over 20 percent or areas below 80 percent of state median household income).*

Pennsylvania's existing power plants were disproportionately sited within three miles of communities of color: The census tracts where people of color made up 30 percent or more of the population, which Pennsylvania considers environmental justice areas,[67] were twice as likely to be within three miles of an existing power plant than their distribution throughout the state, and nearly three times as likely to be near two or more plants. People of color made up 30 percent or more of the population in nearly one-fourth (23.7 percent) of Pennsylvania census tracts but made up nearly half (47.7 percent) of the census tracts within the three-mile footprint of an existing power plant and 66.3 percent of the census tracts within the footprint of two or more plants (see Figure 1). In contrast, although census tracts where whites made up more than 90 percent of the population constituted nearly half the Pennsylvania census tracts, they made up only 21.4 percent of the areas within three miles of a power plant and made up 11.4 percent of the tracts within the footprint of two or more plants.

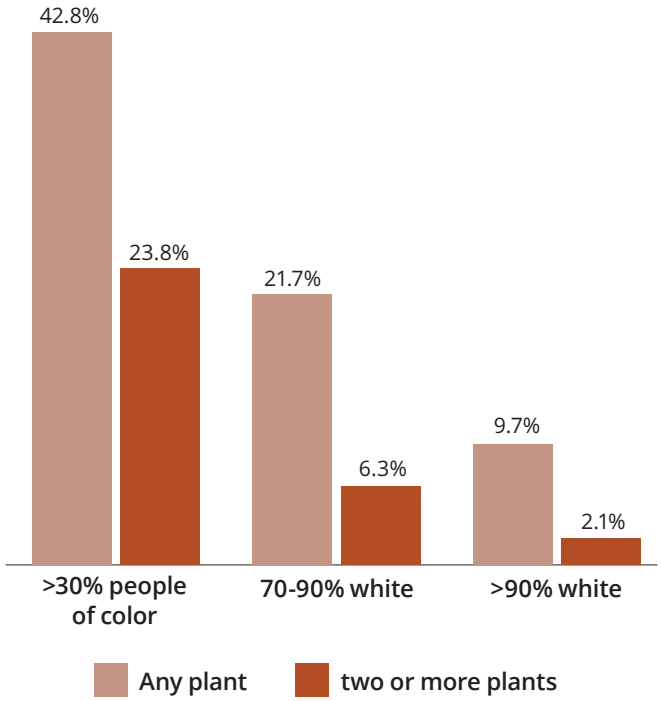
FIG. 1: Distribution of Census Tracts by Race Within Three-Mile Footprint of Existing Power Plants



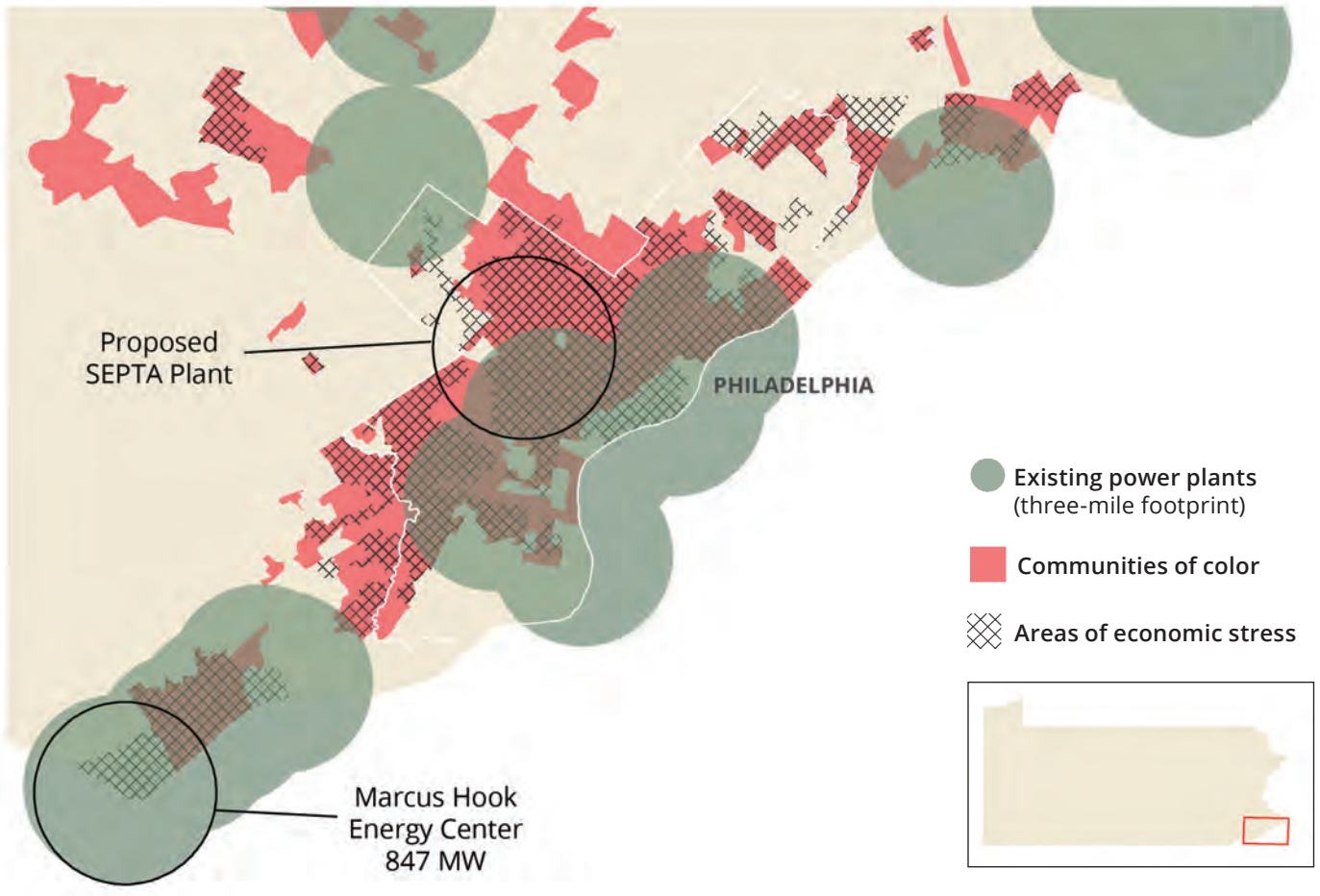
A significant portion of communities of color resided within three miles of an existing power plant, and areas with higher proportions of white residents were substantially less likely to be within three miles of a power plant. Nearly half (42.8 percent) of census tracts where people of color made up more than 30 percent of the population were within three miles of a power plant. and nearly one-fourth (23.8 percent) were within three miles of at least two plants (see Figure 2). In contrast, only 9.7 percent of census tracts where whites made up more than 90 percent of the population were within three miles of a power plant, and only 2.1 percent of these tracts were within three miles of two or more plants.

The Philadelphia area has a significant concentration of power plants, and many communities of color and lower-income areas were within three miles of multiple plants. A new proposed plant by the Southeastern Pennsylvania Transit Administration would only add to the cumulative pollution burden for these neighborhoods (see Map 3 and page 16).

FIG. 2: Proportion of Census Tracts Within Three Miles of Existing Power Plants by Race



MAP 3: Philadelphia's Impacted Communities and Areas Affected by Power Plants



Communities of color were substantially more likely to be within three miles of existing power plants than the whitest areas, even when controlling for household income: These stark racial disparities remained even when controlling for the incomes of the census tracts. Large portions of census tracts of color were within three miles of an existing power plant at every household income level, while few overwhelmingly (over 90 percent) white census tracts at every income level were within three miles of a plant (see Figure 3). The gulf was widest at the lower income levels but consistent at every income level. Lower-income, minority areas were almost four times more likely to be near power plants than lower-income, overwhelmingly white areas, and upper-income (over 120 percent of Pennsylvania's median household income), minority areas were three times more likely to be near plants than upper-income, overwhelmingly white areas.

People living in the upper-income, minority census tracts were about twice as likely to live within three miles of a power plant than people living in the whitest, lower-income census tracts: one-fourth (25.0 percent) of upper-income minority census tracts compared to only 13.4 percent of the overwhelmingly white, lower-income census tracts (below 80 percent of the statewide median household income).

Pennsylvania's existing power plants were disproportionately sited within three miles of lower-income and economically stressed areas: Census tracts with the highest poverty levels, highest levels of unemployment, highest levels of SNAP participation and lowest household median incomes were disproportionately covered by existing power plant three-mile footprints. Areas where 20 percent or more of the population lived below the federal poverty line, which Pennsylvania considers environmental justice areas,[68] were twice as common within three miles of existing plants as they were throughout the state, making up 42.3 percent of the census tracts within three miles of plants but 21.9 percent of Pennsylvania. These high-poverty census tracts were substantially overrepresented in areas covered by two or more existing plant footprints, making up 59.0 percent of the census tracts covered by two or more plants.

Families living in these lower-income and higher-economic-stress areas were substantially more likely than average to be within three miles of existing power plants (see Figure 4). More than 40 percent of high-poverty and higher-unemployment (over 15 percent unemployment rate) census tracts were within three miles of an existing plant (40.9 percent and 45.2 percent, respectively). More than one-third of the lower-income

FIG. 3: Proportion of Census Tracts Within Three Miles of Existing Power Plants by Race and Median Household Income

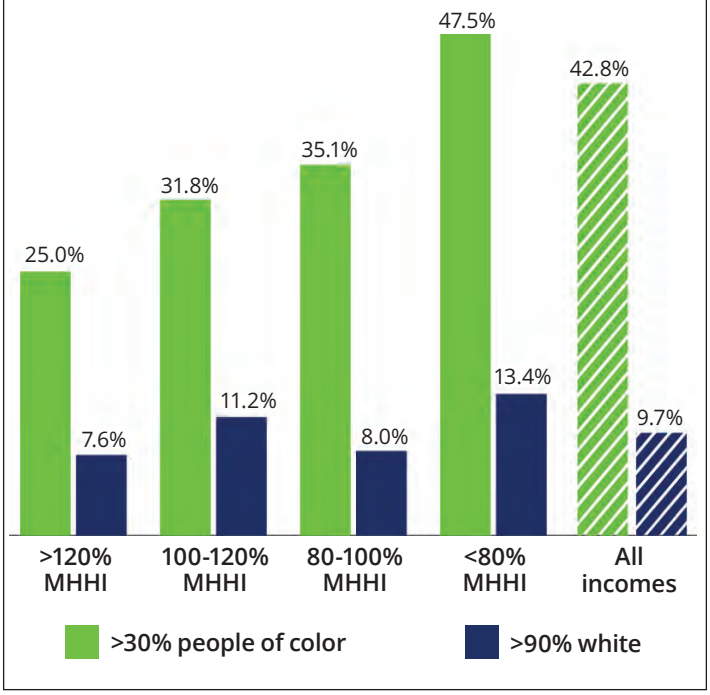
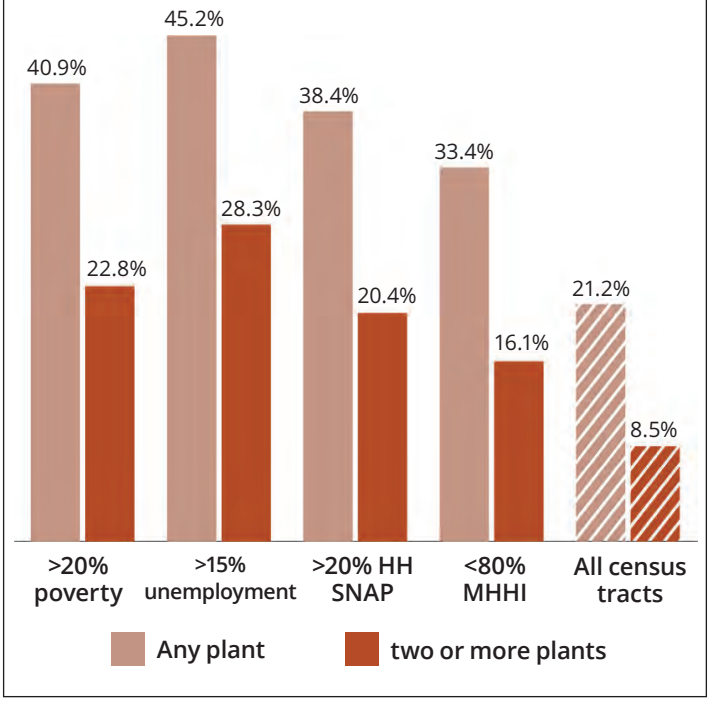


FIG. 4: Proportion of Census Tracts Within Three Miles of Existing Power Plants by Economic Stress



tracts and areas with over 20 percent household SNAP participation were within three miles of existing plants (33.4 percent and 38.4 percent, respectively). More than 20 percent of the high-poverty, high-unemployment and high-SNAP participation tracts were within three miles of two or more existing power plants.

Pennsylvania's existing power plants were disproportionately sited within three miles of less-educated areas: The census tracts with the lowest percentage of the population with four-year college degrees were significantly overrepresented in the three-mile footprint of existing power plants. The less-educated areas (with less than 15 percent of the over-25-year-old population with college degrees) made up 25.9 percent of Pennsylvania but 37.5 percent of the tracts within three miles of any existing plant and 43.2 percent of the areas near two or more plants. The tracts with the highest education levels (with over 30 percent of the over-25 population with four-year degrees) were the exact opposite: they made up one-third (34.1 percent) of the state but over one-fourth of the area near one or more plants (29.4 percent and 29.7 percent, respectively).

This is consistent with the environmental justice literature finding that communities with fewer college degrees endure disproportionate amounts of environmental hazards.[69] An *American Journal of Public Health* study found that people with lower educational levels (high school or less) are significantly more likely to live within a mile of polluting facilities.[70] Food & Water Watch found that the share of the population with college degrees was 8 percent lower within three miles of existing power plants than throughout Pennsylvania (26.2 percent and 28.6 percent, respectively).[71] Communities with lower educational attainment may also lack the power and capacity to engage in the political process surrounding the siting of polluting facilities.[72]

Pennsylvania's proposed natural gas-fired power plants lock in existing environmental injustice and expand disparities to economically disadvantaged rural areas

Pennsylvania's proposed natural gas-fired power plants maintain the environmental injustice of power plants being disproportionately located near lower-income, economically disadvantaged areas and communities of color. The proposed gas plants are overwhelmingly located in rural areas, locking in the existing disparities for lower-income communities and communities of color in more densely populated areas and expanding the environmental injustice throughout rural areas with lower incomes, higher levels of economic stress and lower levels of educational attainment. Many of the proposed gas plants are clustered closely together, meaning that some disadvantaged areas are covered by multiple nearby plants.

The three-mile footprints of 28 of the proposed natural gas-fired power plants covered the majority of census tracts in rural areas, with population density below 2,500 people per square mile, the Census Bureau's definition of rural.[73] More than 83 percent of the census tracts under the three-mile footprint of the proposed plants were in these rural areas. The most rural areas with fewer than 285 people per square mile — the Center for Rural Pennsylvania's population density definition for rural[74] — made up only one-fifth (22.1 percent) of Pennsylvania but were 44.2 percent of the areas covered by the proposed plants. The addition of the proposed gas plants substantially increased the number of rural and most-rural census tracts covered by any power plant's three-mile footprint (13.9 percent and 48.5 percent, respectively, compared to a 3.7 percent increase for all Pennsylvania tracts).

The combination of the proposed gas-fired plants and the existing power plants disproportionately affects economically disadvantaged communities and areas with lower levels of education. Although these rural areas generally have fewer lower-income, higher-poverty and higher-economic-stress households, these marginalized areas are overrepresented in the areas under the three-mile footprint of the existing and proposed power plants.

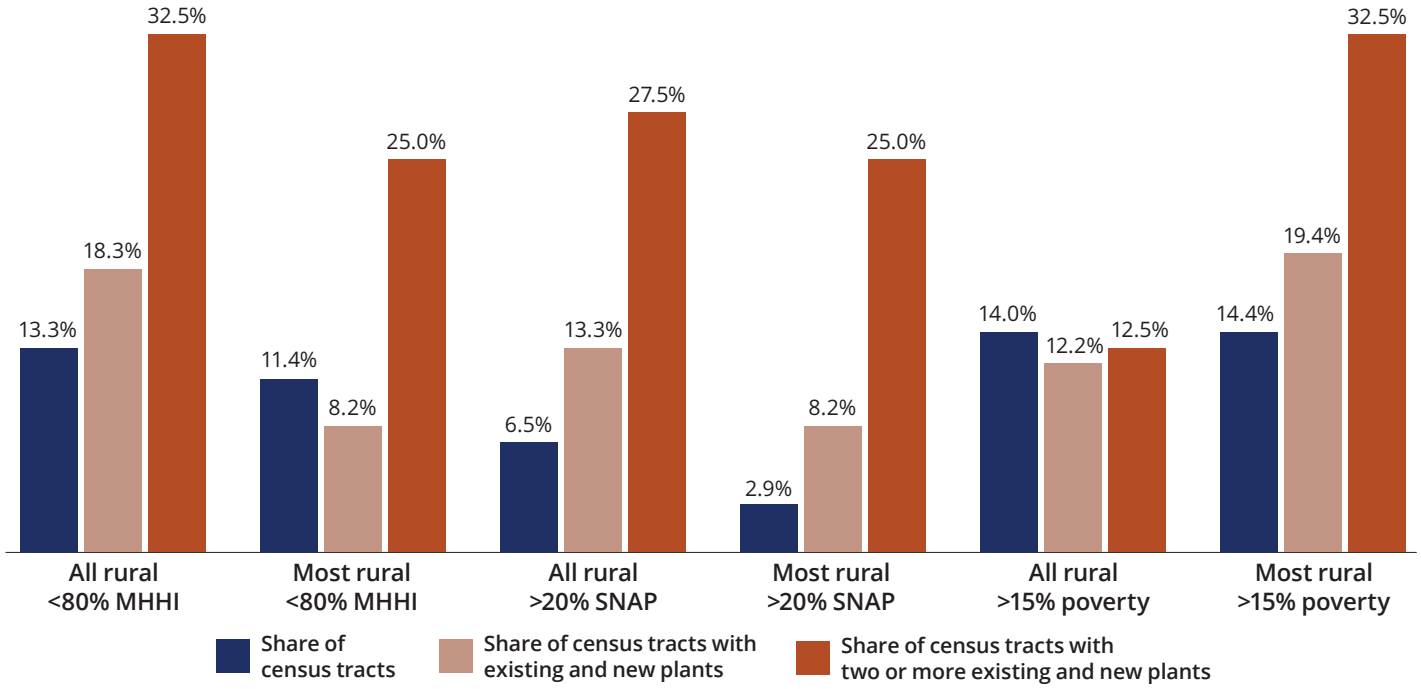
Many new gas-fired power plants are being sited near major shale plays, where shale gas development is occurring in poorer, rural areas of the United States, particularly the Appalachian region where natural resource development is linked to "a history of marginalization, extraction-related health issues, and a cycle of poverty."[75] New power plants are often sited in existing or vacant industrial land or in open, rural land, which can have a significant impact on rural communities. These findings confirm the academic literature that finds that polluting facilities are disproportionately located in the rural areas with the least political power and higher levels of economic stress.

The addition of proposed gas-fired plants disproportionately would affect lower-income and economically stressed rural areas: Rural areas with higher poverty levels, the highest levels of SNAP participation and the lowest household median incomes were disproportionately covered by the existing and proposed power plants' three-mile footprints and multiple plant footprints — and economically disadvantaged areas in the most rural areas had the greatest disparities (see Figure 5).

The rural areas with lower household incomes or higher economic stress (higher poverty or SNAP participation) were more common within three miles of an existing or proposed plant and even more likely to be within three miles of two or more plants (see Map 4 on page 14). The rural areas with 20 percent SNAP participation were twice as common near one plant and four times more common near *multiple* proposed gas plants than they were throughout these rural areas. Rural lower-income areas and the most-rural areas with more than 15 percent of the population living in poverty were more than twice as common under the footprints of two or more power plants.

Pennsylvania's existing and proposed power plants in rural areas were disproportionately sited within three miles of less-educated areas: The rural and most-rural areas with the lowest percentage of the population with four-year college degrees were significantly overrepresented in the three-mile footprint of existing and proposed power plants, and areas with the highest proportion of college graduates were less likely

FIG. 5: Distribution of Census Tracts by Income Indicator in Rural Areas Within Three-Mile Footprint of Proposed and Existing Power Plants*



*Distribution within census tracts by population density; most rural has fewer than 285 people per square mile, all rural has fewer than 2,499 people per square mile.

MAP 4: Pittsburgh's Power Plants and Areas of Economic Stress

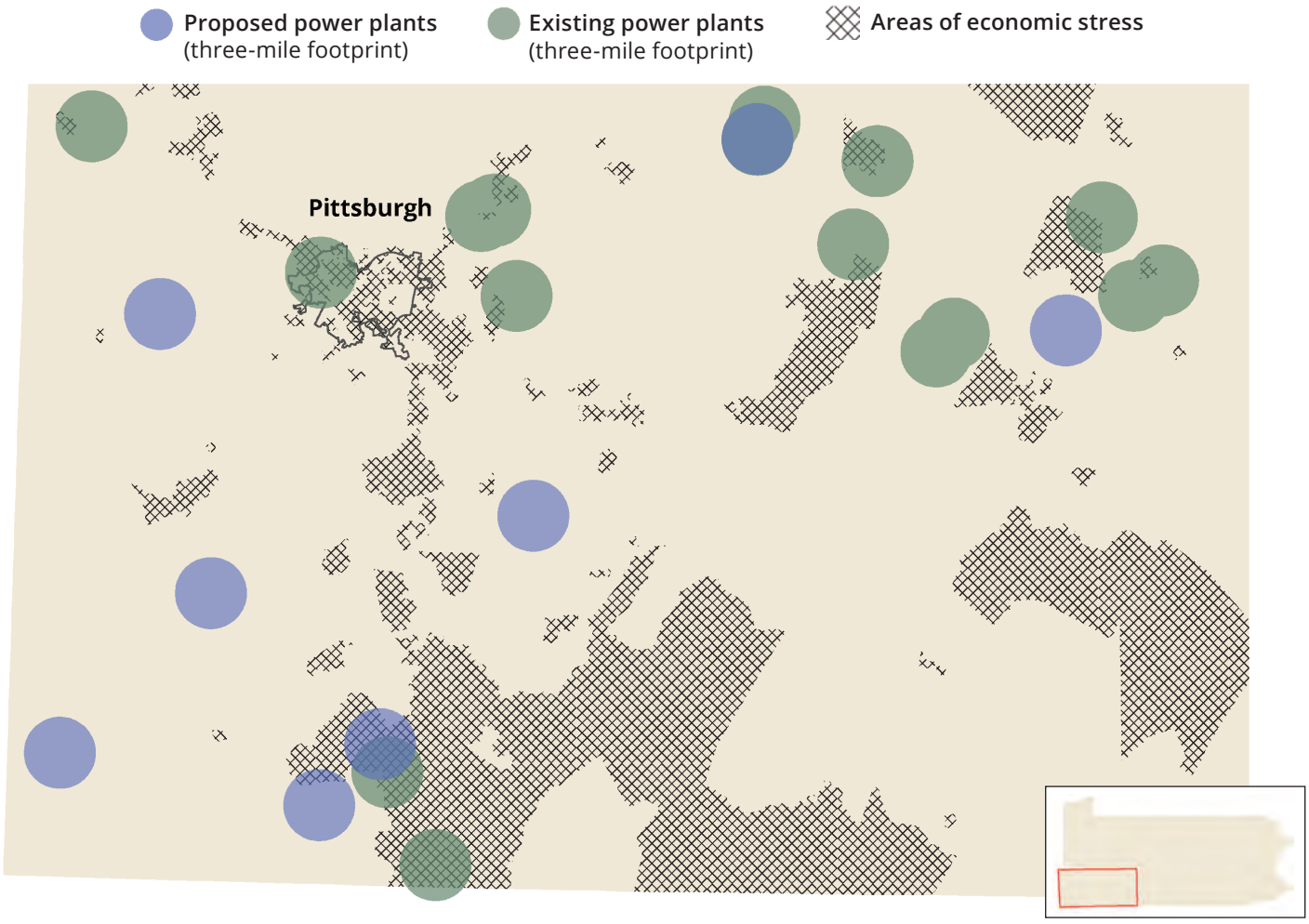
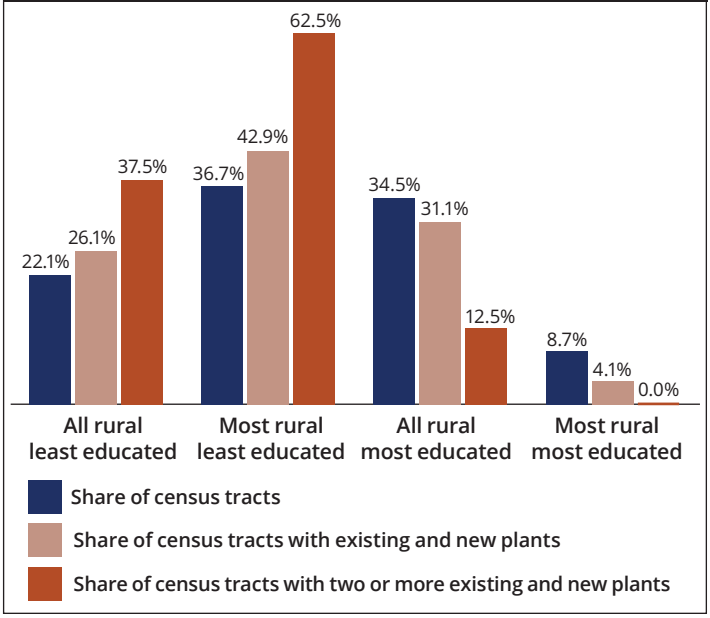


FIG. 6: Distribution of Census Tracts by Education Levels Within Three-Mile Footprint of Existing and Proposed Power Plants



to be near power plants. The gap between the most and least educated areas was especially pronounced for areas overlapped by two or more power plants, especially in the most-rural areas (see Figure 6). These plants would have a particular impact on communities that already have faced the brunt of fracking, such as Bradford County, where nine proposed plants would largely overlap less-educated areas (see Map 5 on page 15).

Areas where less than 15 percent of the population had college degrees made up more than one-fifth (22.1 percent) of Pennsylvania's rural areas but made up more than one-third (37.5 percent) of the census tracts within three miles of two or more power plants. In contrast, the most-educated rural areas (where over 30 percent had college degrees) were considerably less common beneath the footprint of multiple plants than their distribution in rural and most-rural areas. These most-educated areas made up one-third (34.5 percent) of rural areas but only 12.5 percent of the tracts within three miles of multiple power plants.

The proposed gas plants would reinforce overall disparities for communities of color, lower-income and economically stressed areas, and areas with lower education levels: Although the proposed gas-fired power plants are overwhelmingly in more rural areas where whites make up the vast majority of the population, the addition of these plants does not dilute the substantial disparate proximity for disadvantaged communities and communities of color. Throughout Pennsylvania, the overrepresentation of these areas beneath the footprints of power plants remains virtually unchanged with the addition of the new plants in different areas. For example, areas where more than 30 percent of the population were people of color made up one-fourth (23.7 percent) of all census tracts but made up nearly half of the census tracts beneath the three-mile footprint of both existing power plants and existing and proposed plants combined (47.7 percent and 46.0 percent, respectively). This pattern holds true for household income, poverty levels, unemployment levels, SNAP participation and educational attainment.

The combination of the proposed gas-fired plants and existing plants very modestly increases or maintains

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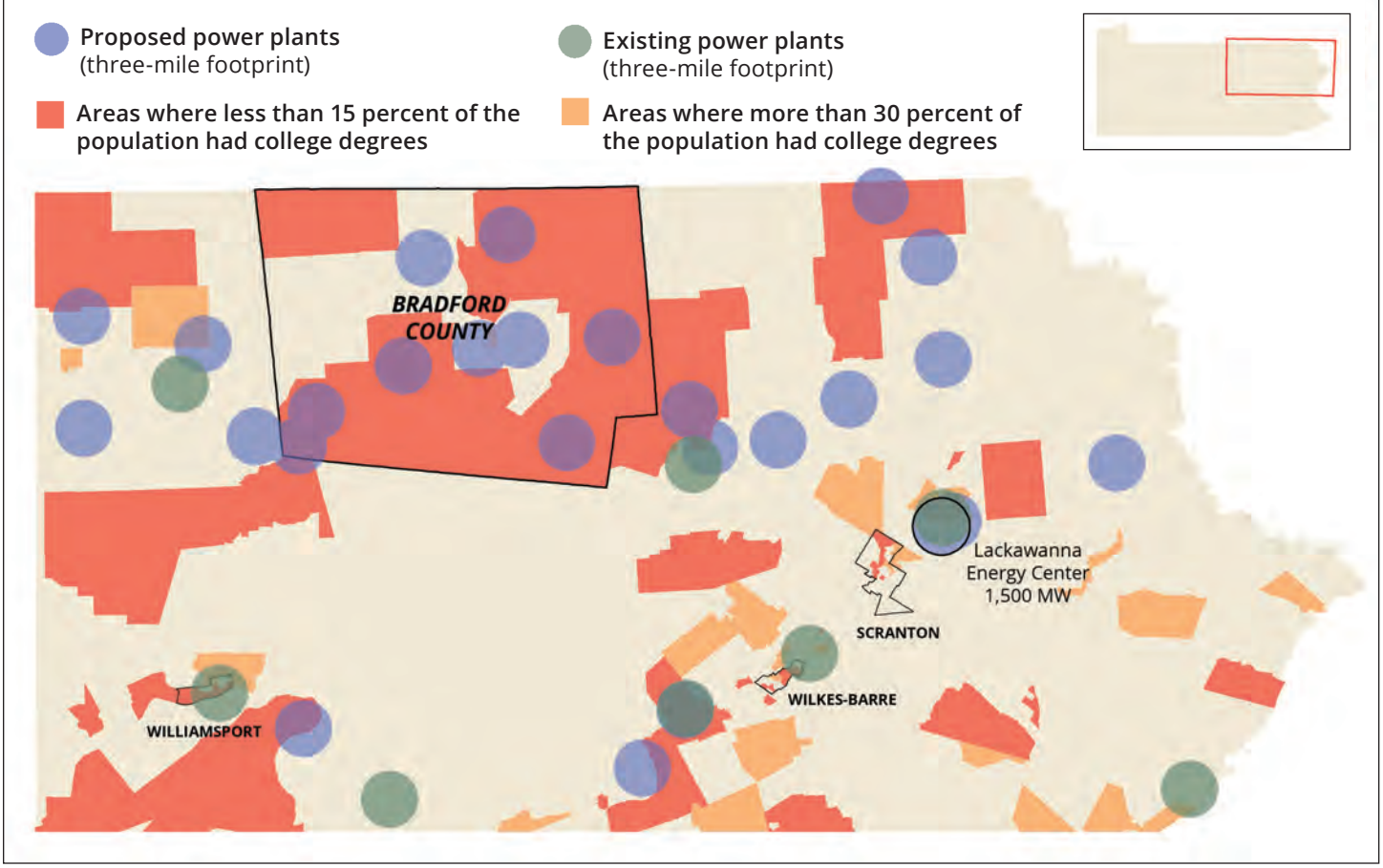
MAP 5: Pennsylvania Power Plants and Low-Education Communities

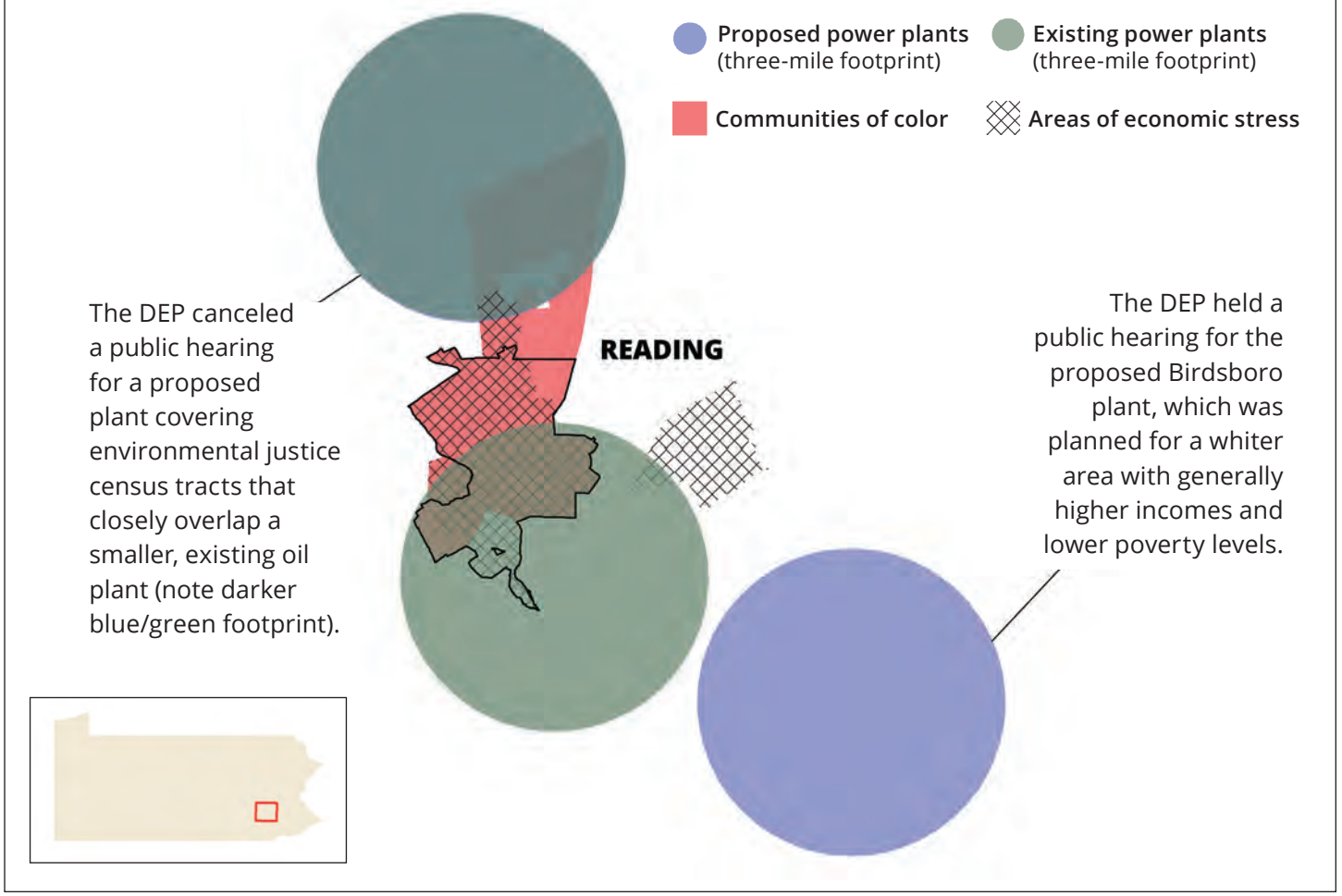


the likelihood that families in these disadvantaged areas would live within three miles of any plant. For example, one-third of areas where household incomes were below 80 percent of Pennsylvania's median household income were within three miles of both existing plants and existing and proposed plants combined (33.4 percent and 34.1 percent, respectively). This pattern holds true for all of the other indicators as well. In one area near Reading, a proposed gas-fired plant would cover multiple census tracts where people of color make up more than 30 percent of the population (and also closely overlaps an existing, smaller oil plant, meaning that these communities would be in close proximity to two plants; see Map 6), and another proposed plant in southwestern Pennsylvania near Masontown would overlap multiple areas with poverty rates over 20 percent.

But the plants in this study are not the only ones in the pipeline, and some of the known proposals pose substantial environmental injustices. The Southeastern Pennsylvania Transportation Authority (SEPTA) has proposed constructing a new gas-fired power plant in an overwhelmingly African-American community in North Philadelphia to power mass-transit trains.[76] More than 90 percent of the residents within one mile of the proposed plant were African American, and the Nicetown neighborhood already endures some of the highest particulate pollution in the country and has the highest rate of childhood asthma hospitalizations in Philadelphia.[77]

As of December 2017, this plant was not in the DEP's catalogue of proposed plants, but the proposed SEPTA plant would only add to an already substantial pollution burden for African-American and lower-income residents in North Philadelphia (see Map 3 on page 10). Late in 2017, the Philadelphia Air Management Services (AMS) issued a permit for SEPTA to move forward with the proposed plant over the vehement objections of community leaders and environmentalists who objected not only to the decision but to the AMS's failure to respond to comments or to inform the community of the decision.[78]

MAP 6: Proposed Power Plants Near Reading, Pennsylvania



Conclusion and Recommendations

The fossil fuel power plants in Pennsylvania are disproportionately located near lower-income, economically stressed, less-educated areas and communities of color; the proposed addition of nearly 50 gas-fired plants only reinforces long-standing environmental injustice. Much of the electricity generated by these plants is destined for distant, out-of-state consumers, but the pollution would remain to burden disadvantaged Pennsylvania communities.

The proposed gas plants would increase the climate-destroying emissions both from the plants and from the widespread methane leaks from connecting infrastructure, meaning that natural gas cannot be considered a low-carbon fuel.[79] Instead, Pennsylvania must rapidly shift to 100 percent clean, renewable energy; invest in energy efficiency; and shut down the dirty plants that afflict the state's disadvantaged communities.

Pennsylvania can fully shift to zero-emission, clean, renewable power.[80] The northeastern portion of the state where the new gas plants are proposed has good wind speed for utility-scale turbines, and one offshore wind project on Lake Erie could power nearly 4,000 homes.[81] More than one-third of the state's power needs could be met by rooftop solar panels alone.[82] And Pennsylvania has geothermal hotspots that could generate economically competitive energy.[83]

The existing Pennsylvania power plants have not delivered economic vitality to the surrounding areas — this analysis found that nearby areas have higher concentrations of lower-income households and higher poverty and unemployment rates. In rural communities, natural gas development has often turned areas into energy sacrifice zones, where companies reap the benefit of the oil or gas extraction but the community bears the concentrated environmental burden.[84]

Nor has natural gas development been the sure-fire job engine that the industry and its supporters contend, and fracking jobs have often been overhyped.[85] Today, more Pennsylvanians already work in the wind and solar energy and energy efficiency sectors (over 69,000 jobs) than in the oil, gas and coal sectors (about 34,000 jobs), according to Department of Energy data.[86] Pennsylvania could expand this economic opportunity by moving toward 100 percent renewable power.

Pennsylvania should not double down on dirty energy by increasing the number of fossil fuel power plants with 48 proposed new natural gas plants. Food & Water Watch recommends:

- **Pennsylvania and the nation should halt the construction of the proposed natural gas plants and any new fossil fuel plants:** Pennsylvania should require the power companies to replace the aging and polluting fossil fuel-fired plants with clean, renewable wind, solar and geothermal power plants.
- **Pennsylvania and the nation must rapidly shift to 100 percent genuine renewable energy by 2035:** Pennsylvania should establish ambitious programs for deploying existing renewable energy and energy efficiency technologies in order to slash fossil fuel demand to reach 100 percent clean, renewable energy by 2035; modernize electrical grids to cater to distributed renewable power generation; and implement aggressive energy conservation policies, including large public transport investments and widespread deployment of other energy-saving solutions. These investments must provide a just transition for fossil fuel workers to find comparable, meaningful employment in nearby renewable energy and energy efficiency manufacturing, installation and maintenance.
- **Pennsylvania should substantially strengthen its environmental justice review and public participation process:** The Pennsylvania Department of Environmental Protection should fully include environmental justice issues and concerns in regulatory and permitting decision-making to account for vulnerable communities and for the cumulative environmental impacts of all polluting facilities — including multiple power plants and other toxic emitters. Permits should not be issued or renewed if the permitting authority determines that the permit's terms and conditions are insufficient to avoid unreasonable health or environmental risks. The DEP also should increase the environmental justice review of proposed fracked shale gas extraction sites by including oil and gas drilling under the enhanced review under environmental justice "trigger permits" that apply to coal mines, new criteria air pollutant emitters, and other facilities or activities that "warrant heightened scrutiny" by the DEP.[87] In addition, the DEP must ensure that it provides enhanced public participation by making its

participation guidelines mandatory instead of optional or encouraged — for example, require public hearings, require applicants to assess community impacts and directly engage with stakeholders, require all public meetings and hearings to occur in the evenings to ensure that the public can attend and participate, etc. It also should provide a toll-free environmental justice hotline, create specific mechanisms for community capacity building to facilitate engagement, and perform direct outreach to community leaders, elected officials and community, faith-based and environmental groups.

- **Pennsylvania should assess the disparate impact that fracking, gas-fired power plants and pipelines have on disadvantaged communities:** The DEP should publish on its website an annual report on the impact that the entire natural gas industry and infrastructure — from wellhead to power plant to export terminal — has on communities of color and lower-income and economically stressed communities. The determination of environmental justice areas should be expanded beyond race and poverty alone to account for lower-income and economically stressed areas as well as raising the poverty threshold for consideration, and the area of concern should be expanded to three miles for proposed or expanded permits.

- **The federal government should ensure that all policies and actions do not erode environmental justice and health for low-income communities and communities of color impacted by pollution:** Title VI of the Civil Rights Act requires that recipients of federal funding ensure that their activities do not have a disparate and negative impact on communities of color. The Federal Energy Regulatory Commission should fully investigate the potential disparate impact that proposed natural gas pipelines and export terminals might have on communities of color, lower-income areas and populations with cumulative pollution exposures.
- **Congress should require the U.S. Environmental Protection Agency (EPA) to take action to enforce environmental civil rights violations:** The U.S. Commission on Civil Rights highlighted the appalling backlog of environmental civil rights complaints and the EPA's failure to enforce environmental civil rights violations. Congress should increase funding for the EPA's Office of Civil Rights, empower enforcement and agency coordination, and actively engage communities of color.[88]
- **Congress should restore the private right of action that ensures that individuals and communities can bring their own environmental justice complaints:** Restoring a private right of action under Title VI of the Civil Rights Act of 1964 will enable communities harmed by disproportionate impacts to use legal action to address racial discrimination when it comes to siting or permitting polluting, hazardous facilities.
- **Pennsylvania and the nation should halt fossil fuel infrastructure:** Pennsylvania should halt all pending and proposed gas pipelines and infrastructure to support the export of natural gas and other fossil fuels and products, including petrochemical and plastics manufacturing.
- **Pennsylvania and the nation must ban fracking:** Pennsylvania should immediately ban fracking and associated activities, such as sand mining and waste disposal that support fracking, and fully investigate claims of environmental contamination from drilling and fracking.

Methodology

Food & Water Watch analyzed multiple demographic characteristics of both Pennsylvania's population and census tracts that were within three miles of 136 existing or proposed coal-, oil- and gas-fired power plants. The study compared the distribution of the demographic characteristics (race and ethnicity, household income, economic vulnerability — which includes poverty, unemployment and participation in the Supplemental Nutrition Assistance Program (SNAP) — educational attainment and population density) of the population and covered census tracts to the overall composition of Pennsylvania's population and census tracts.

The population analysis determined the demographic characteristics of the population that lived within three miles of any power plant using areal apportionment to estimate the population based on the fraction of each census tract that is covered by a power plant footprint. Fractions of census tracts that fell under the footprint were treated as having the same demographic distribution as the entire census tract. The census tract's demography (percent of population of color, percent unemployment) were applied to the overall population to calculate demographic numbers. The areal apportionment estimates of the population living within three miles of power plants was compared to Pennsylvania's statewide demographic characteristics.

The census tract-level analysis assessed these demographic characteristics of Pennsylvania census tracts that fell predominantly within the three-mile radius of 112 existing and proposed coal-, oil- and gas-fired power plants. The census tracts were considered "covered" by a nearby plant or plants when the area beneath the three-mile radius of any plant covered either the majority of the geographic area of the tract or the geographic midpoint (technically, the geometric center or centroid) of the tract.

Additionally, the analysis examined the census tracts that fell predominantly within a three-mile radius of multiple power plants. The covered census tracts represented the population in proximity to one or more fossil fuel power plants. The study compared the distribution of the demographic characteristics of the covered census tracts to the overall distribution of comparable Pennsylvania census tracts. Census tracts were overrepresented under the footprint of any power plant or multiple plants when the proportion of covered census tracts exceeded their statewide proportion. In most cases, the proportion of disadvantaged census tracts beneath any plant's footprint greatly exceeded their overall statewide proportion.

Additionally, the analysis determined the proportion of census tracts of any demographic group that fell within the covered area of power plants. This determined the likelihood that any family living in these demographic groups (lower income, lower education levels, etc.) would live in proximity to power plants. Large portions of socially or economically disadvantaged census tracts were covered by nearby power plants.

The studied power generating plants: In a 2016 publication, the Pennsylvania Public Utility Commission (PUC) identified existing coal, oil and natural gas electricity generating stations that include power plants that provide power to the electric grid and those that power institutions (universities) or facilities (factories).[89] Food & Water Watch obtained the list of proposed natural gas power plants from a Right to Know Law request to the Pennsylvania Department of Environmental Protection (DEP) as of December 2017.[90] Sites with multiple generators were counted as a single power plant (for example, an NRG Energy complex in Adams County has both an oil and a gas generating unit). The proposed gas plants include new gas plants constructed or proposed since 2011; plants that were included on both the PUC and DEP list were categorized as proposed plants (for example, the NRG Power/New Castle Power Plant in Lawrence County).

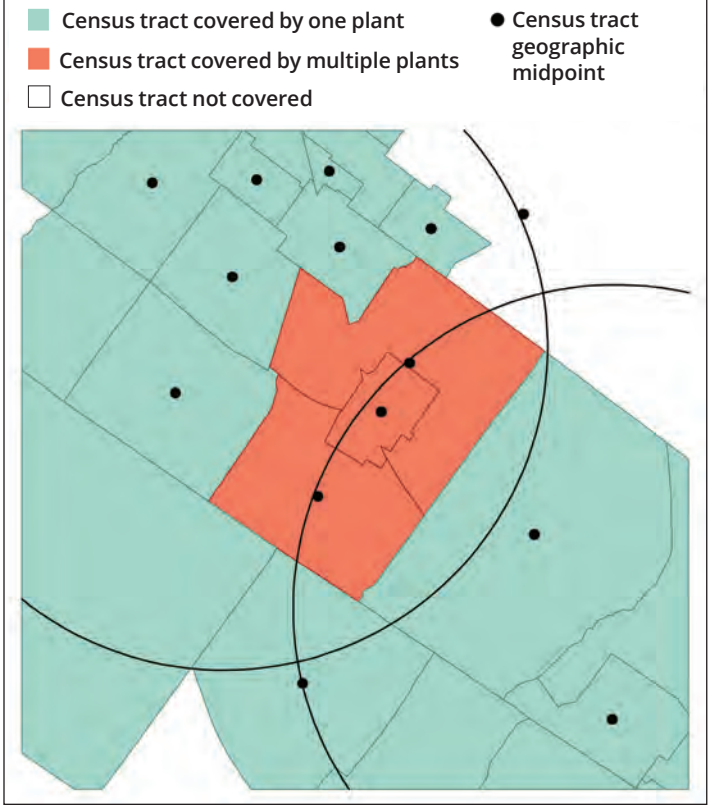
Detailed description of geographic analysis method: The 136 power plants were mapped using ArcGIS based on the geographic location (latitude and longitude) of each plant, obtained from the U.S. Energy Information Administration's Form EIA-860 detailed data where available. For those not included in the EIA's database, latitude and longitude were determined from the street addresses in the Pennsylvania DEP's Environment Facility Application Compliance Tracking System (eFACTs) for 12 proposed plants.[91] A 13th proposed plant's latitude and longitude (Hilltop Energy Center, LLC) was obtained through its Air Quality Permit review.

The analysis created a three-mile buffer area around each plant (a commonly used distance to assess communities in close proximity to power plants in environmental justice studies[92]). The demographic analysis includes any census tract where a three-mile buffer

MAP 7: Single Census Tract Covered by Multiple Plants

The majority of the darker-shaded census tract is not covered by either of the two plants, but together, they cover more than 50 percent of the tract and it is included in this study.

MAP 8: Census Tracts Covered by One Plant and by Multiple Plants



zone covers the majority of the area of any tract (areal containment method) or covers the geometric center of any tract (centroid containment method). This analysis includes census tracts where no single plant covered more than 50 percent of the area, but where multiple plants covered the majority of the tract (see Map 7). The analysis also identifies census tracts where the majority or midpoint were covered by multiple plants, yielding areas that are within three miles of two or more plants (see Map 8).

Plants not covered by this analysis: The study only examined the areas (census tracts) covered by the three-mile radius of existing and proposed power plants, but not all of the existing and proposed plants covered the majority of any census tract. Since census tracts include 4,000 people on average, more-rural census tracts have considerably larger geographic areas, and, as a result, some power plants do not cover the majority of any census tract. These plants and census tracts were not considered in this analysis that compared the communities living in close proximity to these plants. Since the power plant footprints may cover only a small portion of a census tract (on average about 15 percent of the area), including the entirety of these areas does not necessarily reflect the population and demographics of the communities in proximity to the power plants.

There were 88 existing and 48 proposed power plants, but only 112 of them were included in the demographic analysis that covered the majority of one or more census tracts. Twenty-four plants were not included in this demographic analysis (20 proposed plants and 4 existing plants) because they did not cover the majority of any census tract, largely because they were within or on the edge of census tracts with large geographic areas. The three-mile footprint of these excluded plants partially covered census tracts that were considerably larger than average or typical census tracts (excluded census tracts had a median area of 81 square miles compared to a statewide median of 1.5 square miles). These partially covered census tracts also had especially low population density (with an average of 72 people per square mile and a median of 50 people per square mile), far below the Pennsylvania rural definition of 285 people per square mile (see population density/ruralness in demographics, below).

While these plants are not covered by this study, the partially covered census tracts exhibit similar social and economically disadvantaged characteristics to

the studied plants in rural areas. An estimated 32,000 people live within three miles of the excluded plants (less than 0.25 percent of Pennsylvania's population). This population has a median household income that is 5 percent below the statewide median and has a significantly lower share of people with four-year college degrees (17.5 percent near excluded plants versus 28.6 percent statewide).

Demographic characteristics considered: The analysis covers multiple demographic characteristics of census tracts associated with social or economic disadvantage including race and ethnicity, median household income, economic vulnerability (unemployment rate, poverty rate and percent of households participating in SNAP), educational attainment and population density. All demographic data by census tract were downloaded from the U.S. Census Bureau based on the 2015 American Community Survey data and broken into groups to compare area based on comparable demographic indicators.

People of color as percent of total population: The percentage of the population that was not non-Hispanic white alone was broken into three groupings: 1) over 30 percent people of color (23.7 percent of census tracts), which corresponds to Pennsylvania's definition of an environmental justice area, 2) 70 to 90 percent white (29.0 percent of census tracts), and 3) over 90 percent white (46.8 percent of census tracts).

Median household income: The census tract median household income relative to Pennsylvania's median household income of $53,599[93] was broken into four groups in line with the Federal Reserve Board and the Federal Financial Institutions Examination Council[94]: 1) below 80 percent of state median household income (MHHI) (30.7 percent of census tracts), 2) 80 to 100 percent of MHHI (22.5 percent of census tracts), 3) 100 to 120 percent of MHHI (17.8 percent of census tracts), and 4) over 120 percent of MHHI (27.8 percent of census tracts).

Educational attainment: The percent of the over-25 year-old population with at least a four-year college degree was broken into three groups: 1) under 15 percent with college degree (25.9 percent of census tracts), 2) 15 to 30 percent with college degree (39.5 percent of census tracts), and 3) over 30 percent with college degree (34.1 percent of census tracts). Overall, 28.6 percent of Pennsylvanians over 25 have college or advanced degrees.

Economic stress (unemployment, poverty and SNAP participation): The percent of the population living below the poverty line (poverty rate) was broken into 5 percentage point increments, and this analysis considered the two highest levels to represent higher economic stress: the highest poverty category (over 20 percent poverty rate, which Pennsylvania considers an environmental justice area, 21.9 percent of census tracts) and the second highest (over 15 percent poverty rate, 32.3 percent of census tracts, inclusive of the highest rate). The percent of the unemployed workforce (unemployment rate) was broken into three groups, and this considered the highest unemployment of over 15 percent unemployment as high economic stress (about double the median unemployment rate of all census tracts of 6.9 percent, this higher unemployment rate represented 11.6 percent of census tracts). The percent of households participating in SNAP was broken into three groups (under 10 percent, 10 to 20 percent and over 20 percent), roughly in line with the median census tract SNAP participation of 9.7 percent.

Population density and ruralness: Rural areas were defined as those census tracts with fewer than 2,500 people per square mile, the Census Bureau's definition of rural (51.4 percent of census tracts). Most rural areas were defined as those areas with fewer than 285 people per square mile, the Center for Rural Pennsylvania's definition of rural[95] (a subset of rural and 22.1 percent of census tracts).

Appendix

List of All New/Planned Pennsylvania Natural Gas Power Plants as of December 2017

Applicant	County	Municipality	Project Phase (as of December 5, 2017)
Armstrong Power, LLC	Armstrong	South Bend Twp.	In shakedown operation*
Birdsboro Power, LLC (EmberClear)	Berks	Birdsboro Borough	Under construction (expected completion by June 2019)
Ontelaunee Power	Berks	Ontelaunee Twp.	In commercial operation
Panda Liberty, LLC (formerly Moxie Liberty)	Bradford	Asylum Twp.	In commercial operation
Beaver Dam Energy, LLC	Bradford	Canton Twp.	In shakedown operation
Alpaca Energy, LLC	Bradford	Canton Twp.	In shakedown operation
Mill Creek Energy, LLC	Bradford	Granville Twp.	Issued, construction not started
Litchfield Energy, LLC	Bradford	Litchfield Twp.	Issued, construction not started
Milan Energy, LLC	Bradford	Smithfield Twp.	In shakedown operation
Delmar Energy, LLC	Bradford	Stevens Twp.	Issued, construction not started
Gateway Cogeneration 1, LLC	Bradford	Towanda Borough	Issued, construction not started
Wolf Run Energy, LLC	Bradford	Wilmot Twp.	Issued, construction not started
CPV Fairview	Cambria	Jackson Twp.	Under construction (expected completion in 2020)
NRG Rema LLC / Shawville Generating Station	Clearfield	Bradford Twp.	Issued / In commercial operation
Renovo Energy Center, LLC	Clinton	Renovo Borough	In comment period
Hilltop Energy Center, LLC	Greene	Cumberland Twp.	Issued, construction not started
Bayles Energy, LLC	Greene	Greene Twp.	Issued, construction not started
APV Renaissance Partners OPCO, LLC	Greene	Monongahela Twp.	Under completeness review
Archbald Energy Partners, LLC (EmberClear)	Lackawanna	Archbald Borough	Issued, construction not started
Lackawanna Energy Center, LLC (Invenergy)	Lackawanna	Jessup Borough	Under construction (expected completion in Mid 2018)
Hickory Run Energy, LLC	Lawrence	North Beaver Twp.	Under construction (expected completion in April 2020)
Garner Energy, LLC	Lawrence	Pulaski Twp.	Issued, construction not started
NRG Power Midwest, LP / New Castle Power Plant	Lawrence	Taylor Twp.	In commercial operation / Issued
UGI Development/ Hunlock Creek Energy Center	Luzerne	Hunlock Twp.	Issued, construction not started
Moxie Freedom, LLC	Luzerne	Salem Twp.	Under construction (expected completion in May 2018)
Panda Patriot, LLC (formerly Moxie Patriot)	Lycoming	Clinton Twp.	In commercial operation
Anchor Energy, LLC	Potter	Hebron Twp.	Issued, construction not started
Future Power PA, Inc. (EmberClear Good Spring Project)	Schuylkill	Porter Twp.	Issued, construction not started
Panda Hummel Station, LLC (formerly Sunbury Generation)	Snyder	Shamokin Dam Borough	Under construction (expected completion in March 2018)
Shamokin Dam Station, LLC	Snyder	Shamokin Dam Borough	Under technical review
Roundtop Energy, LLC	Susquehanna	Auburn Twp.	In commercial operation
Holdridge Energy, LLC	Susquehanna	Herrick Twp.	Issued, construction not started
Hop Bottom Energy, LLC	Susquehanna	Lenox Twp.	Issued, construction not started
Mineral Point Energy, LLC	Susquehanna	Oakland Twp.	Under technical review
Wrighter Energy, LLC	Susquehanna	Thompson Twp.	Under technical review
Niles Valley Energy, LLC	Tioga	Charleston Twp.	Issued, construction not started
Sabinsville Energy, LLC	Tioga	Clymer Twp.	Issued, construction not started
Bass Wood Energy	Tioga	Duncan Twp	Issued, construction not started
ESC Tioga County Power, LLC	Tioga	Richmond Twp.	Under completeness review
Pine Hill Energy, LLC	Tioga	Union Twp.	Issued, construction not started
Amity Energy, LLC	Washington	Amwell Twp.	Issued, construction not started
Robinson Power Co, LLC / Beech Hollow Power Plant	Washington	Robinson Twp.	Issued, construction not started
Stourbridge Energy, LLC	Wayne	Berlin Twp.	Issued, construction not started
Tenaska Pennsylvania Partners, LLC	Westmoreland	South Huntingdon Twp.	Under construction (expected completion in late 2018)
Oxbow Creek Energy, LLC	Wyoming	Nicholson Twp.	Under construction
Florey Knob Energy, LLC	Wyoming	Washington Twp.	Under construction
Talen Brunner Island, LLC	York	East Manchester Twp.	In commercial operation
Calpine Mid Merit LLC / York Energy Center Expansion	York	Peach Bottom Twp.	Under construction (expected completion in 2018)

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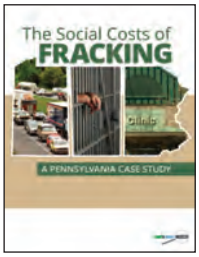
More Food & Water Watch Research on Energy and The Environment

The Trans-Atlantic Plastics Pipeline: How Pennsylvania's Fracking Boom Crosses the Atlantic

America's oil and gas rush is coming to Europe, polluting both sides of the pond, contributing to climate change and threatening coastal wildlife. Over the past decade, the U.S. fossil fuel industry has surged by employing new techniques and technologies that combine horizontal drilling and hydraulic fracturing (or fracking) to extract oil and gas from shale and other underground rock formations. The boom, combined with low-priced fossil fuel-based natural gas, also spawned a resurgence in North American petrochemical and plastics manufacturing — and the pollution that comes with it.

Paying to Pollute: The Environmental Injustice of Pollution Trading

Market-based pollution credit schemes are undermining successful environmental laws like the Clean Air Act and the Clean Water Act by allowing industries to pay for the right to dump contaminants into our waterways and air. The health and environment of communities surrounding these pollution sources pay the price for these free market environmental policies. All too often, these are lower-income neighborhoods and communities of color.



The Social Costs of Fracking

Pennsylvania's natural gas boom has brought thousands of new gas wells, a number of transient workers and a host of social problems. Food & Water Watch found that traffic accidents, civic disturbances and public health problems in rural Pennsylvania counties have increased since the shale rush began in 2005, diminishing the quality of life for residents.

The Urgent Case for a Ban on Fracking

Fracking, or "hydraulic fracturing," is a dangerous process that brings a host of problems. This comprehensive report details the facts on fracking and the many reasons why it should be banned.

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Food & Water Watch

National Office
1616 P Street, NW
Suite 300
Washington, DC 20036
(202) 683-2500
foodandwaterwatch.org