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# Cracked: The Case For Green Jobs Over Petrochemicals In Pennsylvania

While the national economy struggled to recover from the Great Recession, wage and employment growth in Pennsylvania was anemic. This experience mirrored national trends of increasing inequality and a hollowing out of the middle class. Despite the state's aggressive embrace of fracking as a driver of economic growth, fracking jobs remain scarce and temporary. As frackers suffocate in a glut of natural gas (including ethane) and as Pennsylvanians struggle with the environmental damage wrought by fracking and other dirty industries, Pennsylvania lawmakers are attempting to artificially sustain the boom by offering lucrative concessions to mega-corporations and dirty petrochemical producers.

Doubling down on toxic industries won't fix the region's economic woes, but will instead foreclose opportunities for long-term, sustainable growth through green energy manufacturing. Given the economic uncertainties of the coronavirus pandemic, an aggressive commitment to public works investment in green energy is more important now than ever. Solar, wind and energy efficiency are necessary to avert catastrophic climate change. Wind and solar manufacturing would also employ more people than comparable investments in oil, gas, coal or plastics.

## Key Findings

- Despite the unprecedented \$1.65 billion tax giveaway used to attract Shell's ethane cracker, the facility will only employ 600 workers. Attracting a comparably-sized investment in wind and/or solar manufacturing would employ 16,500.
- The fracking boom only boosted employment by about 18,300 in Pennsylvania. With another bust already in progress, fracking cannot provide a sustainable pathway to prosperity or an adequate

solution to the deindustrialization that has imperiled the region for decades.

- Growth and investment alone will not lower unemployment. Food & Water Watch found that from 2010 to 2018, Pennsylvanian counties with lower GDP growth saw employment gains similar to those with higher GDP growth.
- Tax cuts for the largest corporations in the world strengthen corporate power, increase inequality and dampen job growth by encouraging speculation instead of employment.

## **Appalachia Suffers from Uneven, Inequitable and Unsustainable Growth**

As the national economy teeters on the brink of collapse because of the pandemic, many communities and regions had already been left behind by the slow and largely jobless recovery of the previous decade. The sluggish recovery brought small raises for the lowest-income workers (and large raises for the rich), but many struggled to find good-paying work.<sup>1</sup> Despite strong GDP growth, Americans remained trapped in cycles of short-term, no-benefit jobs.<sup>2</sup> Policy inaction and accumulation by the wealthy enables this stagnation. Rather than investing in infrastructure and long-term growth, local governments cut high-publicity deals for short-term infusions of construction jobs. Pennsylvania's \$1.65 billion giveaway for Shell's mega-petrochemical complex in Beaver County epitomizes this trend.<sup>3</sup> These handouts create jobs for a lucky few, but increase inequality, drive unemployment and impoverish public coffers.

Ever since the wells at Pithole went dry in the 1860s, Western Pennsylvania has been whipsawed by the cyclical booms and busts of oil, gas and coal extraction.<sup>4</sup> The toxic legacies of these industries outlast the jobs, leaving the region with polluted water, health complications and weak employment prospects.<sup>5</sup> Communities plagued by fracking experience well-documented and severe environmental impacts.<sup>6</sup> Harms fall disproportionately on frontline communities that are more likely to be rural, lower income and/or communities of color.<sup>7</sup> Even before the latest

oil price collapse, frackers were faltering in a tide of natural gas and natural gas liquids like ethane.<sup>8</sup> Despite obvious weaknesses in the industry, a wave of new petrochemical facilities, such as Shell's Beaver County ethane cracker, promises to buoy demand for ethane and revitalize the region.<sup>9</sup>

Fracking's looming failures will lead to a redoubling of efforts to rescue the industry, with some even calling for direct financial assistance.<sup>10</sup> Even before the latest crisis, frackers were struggling; some had begun significant layoffs.<sup>11</sup> Now, an OPEC price war, weakening demand from global lockdowns and a looming depression threaten to decimate already unprofitable fracking companies, with mass layoffs and bankruptcies on the horizon.<sup>12</sup>

## **Toxic Assets: Dirty industry can't sustain employment**

Propping up fracking by subsidizing petrochemicals makes a bad deal worse. A study published in the journal *Nature Sustainability* found that the economic harms from fracking's air pollution alone (responsible for up to 4,600 deaths) outweighed the employment benefits in the Appalachian shale basin.<sup>13</sup> While the jobs only last as long as a boom, the climate effects and toxic wastewater are an ongoing legacy.<sup>14</sup>

Despite sustained unemployment and slow wage growth in Pennsylvania, some politicians claim that fracking has brought an economic renaissance.<sup>15</sup> Food & Water Watch has extensively documented the flawed methodologies that back up these claims, showing that the jobs created fall short of the number promised.<sup>16</sup> In reality, employment directly related to oil and natural gas production and transportation in Pennsylvania rose from 7,633 (2001-2006) to 25,960 (2016-2018), a change of 18,327; this is a plausible estimate of fracking's employment impact.<sup>17</sup> However, this is only 3.3 percent of the number of jobs the American Petroleum Institute claims would be lost after a fracking ban.<sup>18</sup> These jobs also come at the cost of green jobs. Developers admit that the region would see significantly more wind and solar jobs if not for abundant fracked gas.<sup>19</sup> Lucrative shale gas jobs also drive high-school dropout rates, undermining a skill-base capable of supporting long-term

growth.<sup>20</sup> Once resource booms end, fossil fuel-dependent counties are often worse off than before the boom.<sup>21</sup>

This new petrochemical burden would reinforce a long legacy of boom and bust pollution. Lower-income communities in Appalachia are prone to having toxic neighbors and being disproportionately harmed by pollution. Rural pollution can originate from industrial facilities, factory farms or resource extraction like mining and drilling — all of which contribute to environmental and health disparities for lower-income rural residents.<sup>22</sup> Despite Appalachia's plentiful fossil fuel resources, it is not a center of economic prosperity. Rather, the region's natural resource exploitation is linked to "a history of marginalization, extraction-related health issues, and a cycle of poverty."<sup>23</sup>

Petrochemical manufacturing can't support long-term growth because it merely shifts the gas glut down the supply chain. New ethane crackers power a growing oversupply of single-use plastic that's choking our oceans.<sup>24</sup> Even current levels of plastic production mean that we won't meet climate goals and preserve a safe environment.<sup>25</sup> Either plastic production must decline or climate instability will undermine the global market for plastic consumption.<sup>26</sup>

## Pennsylvania Needs shared Prosperity, not Unequal Growth

Petrochemical tax breaks for large multinational corporations will increase inequality at public expense. These subsidies could facilitate growth without creating jobs. Job growth is determined by macroeconomic factors like innovation and inequality, whereas local growth distributes rather than creates jobs.<sup>27</sup> Without macroeconomic improvements, local hiring may be offset by an influx of out-of-state workers or restricted to a narrow, lucky few who benefit from all of the added income — both common phenomena in the fossil fuel and petrochemical sectors.<sup>28</sup> Existing petrochemical zones still face significant unemployment. For example, Port Arthur, Texas has a developed petrochemical industry and an unemployment rate twice as high as the state average.<sup>29</sup>



Despite a decade of GDP growth, Pennsylvania suffers from high unemployment. From 2008 to 2018, its job growth (3.1 percent) has lagged both national job growth rates (7.6 percent) and job growth in most neighboring states.<sup>30</sup> For example, New York and Maryland (states where fracking is banned) had job growth rates of 9.1 and 4.9 percent respectively.<sup>31</sup> Despite lagging job growth, overall economic performance has been strong; in 2018, Pennsylvania's economy generated \$56,000 for every adult and child.<sup>32</sup> Within Pennsylvania, job growth has gravitated toward Pittsburgh, Philadelphia and their suburbs, while employment remains below pre-recession levels in much of western Pennsylvania.<sup>33</sup> Despite promises that the Trump administration would bring back steel, manufacturing employment in the Pittsburgh area fell to record lows in 2019.<sup>34</sup> Meanwhile, nearly 80 percent of job growth there has been in the (typically low-wage) service sector.<sup>35</sup>

Our analysis shows that between 2010 and 2018, improvement in the employment rate in Pennsylvania counties was not determined by GDP growth.<sup>36</sup> While Pennsylvania saw lower unemployment across the board, counties with strong growth did not necessarily see a faster reduction in unemployment. In western Pennsylvania, investment hasn't corresponded to employment. In 2018, the 10-county Pittsburgh region saw 32 percent less capital investment than 2017, but 15 percent more new jobs.<sup>37</sup>

While growth is unrelated to unemployment, growing wealth and income inequality contributes to a jobless recovery. Because the rich disproportionately hoard rather than spend their income, inequality lowers the employment potential of the economy. In fact, strong evidence suggests that rising inequality since

the 1980s is to blame for the Great Recession and sluggish recovery.<sup>38</sup> (Shell helped lay the groundwork for this power grab by playing a critical role in breaking refining and chemical union power in the early 1960s.)<sup>39</sup> Rather than spending on manufactured goods, the rich spend additional money on financial speculation, creating crises.<sup>40</sup> In addition to worsening inequality, corporate subsidies actually discourage employment. When companies receive incentives for investment, they invest in labor-saving technologies and real estate, not new jobs.<sup>41</sup>

Rising corporate power and inequality are at the core of Pennsylvania's struggles. In the 1980s, Pennsylvania's regional economy collapsed when the steel industry was largely offshored;<sup>42</sup> companies that stayed in the U.S. used the threat of closure to drive down wages and extract expensive tax concessions.<sup>43</sup> Despite the shale boom, Beaver County continues to lose manufacturing jobs as plants close and often move their operations out of state.<sup>44</sup>

### **Shell's Beaver County handout is the latest in an expensive history of failed tax deals**

Pennsylvania has a long track record of using taxpayer money to lure rich multinational corporations. In 1976, Pennsylvania attracted a Volkswagen plant to Westmoreland (30 miles from Pittsburgh) after the state offered \$70 million in incentives.<sup>45</sup> The deal was significant at the time, attracting Volkswagen's \$250 million in investment using a low-interest loan and five years of exemption from local taxes.<sup>46</sup> The plant employed 5,700 workers at its peak, but after several years was operating at half capacity.<sup>47</sup> Barely 10 years after it opened, Volkswagen shuttered the plant, laying off the remaining workers.<sup>48</sup>

In 1997, Pennsylvania and the federal government gave \$400 million to European shipbuilder Kvaerner for a Philadelphia shipyard that would employ 1,000. After long delays, the project required a \$40 million bailout to keep it open.<sup>49</sup> In 2000, Pennsylvania signed a \$55.5 million deal to keep corporate offices of Vanguard Group from moving out of state.<sup>50</sup> Pennsylvania even shelled out \$40 million in grants for a new Comcast skyscraper in 2014.<sup>51</sup>

The latest tax breaks are larger and bring fewer jobs per dollar. Shell, the second largest Fortune Global 500 energy company, received the largest tax break in recent Pennsylvania history.<sup>52</sup> According to a Good Jobs First database of corporate subsidies, during the past decade Pennsylvania's handout to Shell was the ninth-largest deal in the nation.<sup>53</sup> This \$1.65 billion handout goes to Shell's \$6 billion plant that will only create 600 permanent jobs.<sup>54</sup> Pennsylvania is paying \$2.75 million for every long-term job created, enough to pay every worker at Shell's plant a \$90,000 salary for 30 years.<sup>55</sup>

To make matters worse, in July 2020 the Pennsylvania legislature passed a sweeping set of tax credits to double down on petrochemicals as a solution to the region's gas glut. The proposal authorizes about \$167 million in credits for four separate companies that use dry natural gas (methane) to make petrochemicals or fertilizer. (This means that Shell's wet gas-fueled ethane cracker wouldn't qualify.) While the handout will cost the state as much as \$667 million in lost revenue, the state only requires the companies create 800 jobs, counting temporary construction jobs toward this total.<sup>56</sup>

### **Shell is spending billions of dollars to create hundreds of jobs**

The unprecedented spending on Shell's ethane cracker was sold using absurd job promises. At an event in June 2012, the Corbett administration said that the project could create up to 20,000 jobs.<sup>57</sup> This number appears cribbed from the American Chemistry Council's finding that the plant could directly and indirectly create 17,541 new permanent jobs. This projection assumed that Shell would directly employ 2,396 people, four times the plant's actual payroll.<sup>58</sup> State officials defended the 20,000 number by pointing to state estimates, but those projections lowered job numbers by over 10,000.<sup>59</sup>

As the project progressed, even temporary job estimates fell. From 2012 to 2014, Shell said that the plant could create up to 10,000 construction jobs.<sup>60</sup> Now that the plant is under construction, Shell admits that construction will employ only 6,000 — and only during the peak of construction.<sup>61</sup>

Much-touted spillover jobs are limited by Shell's labor outsourcing. Despite Governor Wolf's claim that the construction jobs would go to Pennsylvanians, construction may primarily benefit out-of-state workers.<sup>62</sup> (Wolf's eagerness to promote fracking has even earned him praise from the Marcellus Shale Coalition, a fracking booster.)<sup>63</sup> The Shell plant is being built by Bechtel, a multinational corporation that does most of its own construction and prefers to work through pre-existing, rather than local, relationships.<sup>64</sup> Moreover, many of the 380 electricians working on the plant relocated from out-of-state.<sup>65</sup>

Building material purchases, a potential source of trickle-down jobs, are going to out-of-state industries. Shell constructed two river docks to import fully constructed pieces by barge.<sup>66</sup> This allowed Shell to bring in the largest element, the quench tower, fully assembled.<sup>67</sup> Petrochemical companies have even begun importing plants that were almost entirely preassembled.<sup>68</sup> While many of Shell's supply chains are opaque, Shell is importing thousands of tons of steel from countries like China and Brazil.<sup>69</sup> When asked, Shell refused to disclose how much imported steel the plant uses. A nearby fabrication business said that it got no new business from Shell's plant.<sup>70</sup>

## Petrochemicals Power Unsustainable Development

### Private gain, public costs

The long-term jobs at Shell will benefit a few lucky workers with trickle-down scraps for the region. Shell's jobs require extensive credentials<sup>83</sup> and an average of five years of relevant experience.<sup>84</sup> Even the "entry level" rungs will be out of reach without specific qualifications. Maintenance workers (welders and machine operators) will need related experience, operations workers will need two-year associates degrees in process technology and management will need four-year or graduate chemical engineering degrees.<sup>85</sup> Shell doesn't know how many of the permanent jobs are going to locals, but more than half are already filled by out-of-state workers.<sup>86</sup> Many locals, including social service officials, don't know anyone who's landed one of the elusive jobs.<sup>87</sup>

## Appalachian Petrochemical Boom on the Horizon

Across Appalachia, petrochemical plants are being proposed and propped up by pro-industry decision makers. The American Chemistry Council suggests that the Appalachian shale basin could support up to nine crackers.<sup>71</sup> These polluting projects are being promoted as the panacea to economic woes.

In Belmont County, Ohio, PTT Global Chemical (the petrochemical arm of the state-owned Thai oil and gas company PTT) is planning a new ethane cracker which state officials say could bring "hundreds of jobs."<sup>72</sup> The proposed plant would use 90,000 barrels per day (b/d) of ethane to produce 1.5 million metric tons of ethylene per year.<sup>73</sup> Ohio has already lavished \$50 million in grants toward site preparation.<sup>74</sup> But PTT's environmental track record is concerning.<sup>75</sup> PTT has also been implicated in corruption; company officials rigged bids after accepting more than \$11 million in bribes from Rolls-Royce.<sup>76</sup>

Exxon has also begun pursuing a petrochemical cracker in Appalachia, looking for a 240-acre flat site with river access.<sup>77</sup> Exxon has scouted sites in Beaver, Washington and Greene counties.<sup>78</sup> A 2013 investigation found that Exxon's petrochemical complex in Baton Rouge released four million pounds of volatile organic compounds between 2008 and 2011, without permission from the government.<sup>79</sup> In 2019, a National Labor Relations Board administrative law judge found Exxon engaged in multiple unfair labor practices when bargaining with workers in New Jersey.<sup>80</sup>

Other plans have included a Braskem petrochemical facility in Parkersburg, West Virginia (which recently fell through).<sup>81</sup> And in early 2020, Elis Energy announced a potential methanol production facility in northeastern Pennsylvania.<sup>82</sup>

While steel mills of Pennsylvania's past provided numerous middle class job opportunities to a large number of workers with and without credentials, cracker plants offer a small number of high-wage specialized jobs.<sup>88</sup> Spillovers from high-wage jobs tend to be poorly paid service jobs rather than middle-skill jobs, and wage increases are often less than the increased cost of living.<sup>89</sup> Additionally, foregone revenue from tax incentives could mean either higher taxes or a reduction in public services.<sup>90</sup>

Petrochemical development also strains public infrastructure. The Ambridge Water Authority, the water provider for 30,000 customers in Beaver County, opposed the Falcon ethane pipeline (which supplies the Shell plant) because a leak near its reservoir would be "devastating" to its water supply.<sup>91</sup> This fear is well warranted. Pipelines built since 2010 are five times as likely to have problems than those built from 1980 to 2009, possibly because the rush to complete pipelines during the fracking boom encouraged corner-cutting during construction.<sup>92</sup> In fact, pipeline incidents have already impacted Beaver County; a 2018 explosion destroyed a house and prompted an evacuation. State regulators later found that the company built on land it knew to be unstable and erosion-prone.<sup>93</sup>

The Keystone Opportunity Zone Act allows the plant to avoid local taxes for 15 years.<sup>94</sup> For scale, the previous occupant of Shell's location paid property taxes of \$275,000 to the Central Valley School District and \$40,000 to Potter Township — seven percent of the town's budget, or the entire volunteer fire department budget. Local officials have said that the revenue loss is particularly difficult given the need for sewer and water updates to accommodate the petrochemical facility.<sup>95</sup> These new costs could have a serious impact on already stressed county finances. Beaver County's municipal bond credit rating fell twice between 2016 and 2018 while the county raised property taxes 17 percent.<sup>96</sup>

Geologists predict a huge number of abandoned unplugged wells as a result of the Marcellus boom, saying that the state doesn't have the funding to address the issue.<sup>97</sup> Pennsylvania is already home to as many 750,000 abandoned wells, which leak

methane, pollute groundwater and sometimes cause explosions.<sup>98</sup> Plugging orphaned wells can cost the state up to \$100,000 per well.<sup>99</sup> Meanwhile, the buildout of new crackers will compound existing air pollution problems in the region, releasing volatile organic compounds, carbon monoxide, nitrogen oxides and other toxins. Beaver County already has some of the worst air quality in the nation, according to the American Lung Association.<sup>100</sup>

## Real Solutions: Green Growth and Full Employment

Instead of doubling down on more polluting fossil fuel and chemical facilities, Pennsylvania should massively invest in clean energy. Renewable energy manufacturing tends to be located in traditional manufacturing areas.<sup>101</sup> Green energy jobs could begin to address the widening income and wealth inequality that has made it impossible for working families to get ahead. These aren't make-work jobs — a dramatic economic reorientation to 100 percent renewable energy is necessary to stave off the worsening effects of this climate catastrophe.<sup>102</sup>

Technology exists to support a transition to 100 percent clean, renewable energy backed up by storage and transmission at prices lower than current energy costs.<sup>103</sup> Including federal subsidies, current wind and solar power purchase agreements are often cheaper than natural gas.<sup>104</sup> While some contend that renewables require dispatchable generation to function, a variety of energy storage technologies can provide cost-effective, reliable, long-term backup for a 100 percent renewable energy system.<sup>105</sup> Solar and wind energy are well-suited to large-scale manufacturing necessary to meet "crash decarbonization" timelines.<sup>106</sup>

In 2019, Pennsylvania wind and solar employed 2,815 and 4,219 people respectively, more than either coal or natural gas plants.<sup>107</sup> Nationally, the BLS projects that solar photovoltaic installer and wind turbine service technician will be the two fastest growing professions in the U.S.<sup>108</sup> Jobs in wind, solar and building efficiency include installation, construction and manufacturing jobs. Both renewable energy and energy efficiency jobs tend to be inherently

localized and domestic, and are almost impossible to outsource.<sup>109</sup> In just two years, energy efficiency jobs grew by 10 percent, employing more than 68,000 Pennsylvanians in 2019.<sup>110</sup>

An investment in renewable energy manufacturing that is proportionate to the size of Shell's ethane cracker tax break would create substantially more jobs. Attracting a comparably-sized investment in solar and/or wind manufacturing would employ around 16,500.<sup>111</sup>

But subsidies and tax breaks alone are unlikely to attract manufacturers. Subsidies have little impact on the siting of an investment/facility and incentives.<sup>112</sup> Rather, surveys find amenities like parks and schools play an important role because the managers and executives who make siting decisions often relocate to the factory site.<sup>113</sup> Local demand is another key consideration. Renewable manufacturers are significantly more likely to locate in states with aggressive renewable energy deployment policies, such as strong renewable portfolio standards. When renewable portfolio standards mandate renewables, electricity prices may actually fall.<sup>114</sup>

## Wind jobs

Wind energy provides well-paying jobs for both rural and urban residents. These jobs are educationally diverse, providing employment opportunities to applicants with a wide range of qualifications.<sup>115</sup> That's because each component of a wind turbine (like blades, nacelle, tower, etc.) has to be individually designed and created.<sup>116</sup> According to the National Renewable Energy Laboratory, manufacturers receive approximately 75 percent of every dollar invested in new wind energy.<sup>117</sup> Large portions of this supply chain are domestic, because many wind energy components are hard to transport.<sup>118</sup>

Pennsylvania is well-suited for wind energy manufacturing. As of 2016, there were more than 500 wind-related manufacturing facilities in the U.S., employing 25,000 manufacturing workers, with more production plants being built in Pennsylvania and Colorado. These facilities produce wind turbines and their components, including nacelles, blades, towers and gearboxes.<sup>119</sup> The Rust Belt is emerging

as a national leader in wind manufacturing, with Ohio leading the nation with 60 wind-related manufacturing plants. Other leaders include Illinois with 35, and Pennsylvania, Michigan and Wisconsin (26).<sup>120</sup> Pennsylvanian manufacturers are positioned to benefit from wind manufacturing as companies already produce main shaft bearings, component castings, fasteners, pitch control systems and A/C drives in the state.<sup>121</sup>

Pennsylvania has already successfully created jobs by attracting wind manufacturing. In 2006, Pennsylvania used \$10 million in grants, loans and tax credits to attract a wind turbine manufacturing company, which by 2011 employed 800. While employment fell short of the 1,250 originally promised due to the recession, total jobs cost the state \$12,500, or 0.4 percent of the cost of the Beaver County petrochemical jobs.<sup>122</sup>

In addition to manufacturing jobs, installing wind energy in 2018 supported approximately 600 construction and transportation jobs for every 100 megawatts deployed.<sup>123</sup> Operation and maintenance also employ five to seven technicians for every 100 megawatts for the entire lifetime of a turbine.<sup>124</sup> In Pennsylvania, the average salary for maintenance jobs is \$59,000.<sup>125</sup>

Pennsylvania already produces more than 1,450 megawatts of wind energy, enough electricity for more than 350,000 houses.<sup>126</sup> While existing wind farms are in the northeast and southwest central portions of the state, substantial wind resources exist along the coast of Lake Erie.<sup>127</sup> The DOE estimates that Pennsylvania could support 3 gigawatts of onshore and 6 gigawatts of offshore wind.<sup>128</sup> Technological improvements could unlock up to 43 gigawatts of wind in Pennsylvania.<sup>129</sup>

## Solar jobs

From 2014 to 2019, solar employment grew at five times the rate of the economy. Many of these jobs are available without advanced degrees; only 32 percent of solar manufacturing hires in 2019 had a bachelor's degree or higher.<sup>130</sup> Currently, solar panel manufacturing relies on extensive supply chains for different photovoltaic technology components. Since solar glass is expensive to transport, glass manufacturers tend to collocate with panel producers.<sup>131</sup>

Solar manufacturing is already prominent in the region.<sup>132</sup> For example, First Solar's \$400 million photovoltaic plant in Lake Township, Ohio employs 500 people to produce 1.3 gigawatts of solar annually. Built in only 18 months, the plant is sold out through 2021.<sup>133</sup> In addition, the factory spurred the construction of a nearby transparent conductive oxide (TCO) plant, employing 125 to 150 people.<sup>134</sup> Other regions have demonstrated the benefits of solar manufacturing. In September 2019, Hanwa Q opened its \$200 million, 1.7 gigawatt solar cell facility in Dalton, Georgia. The plant provides well-paying jobs for 650 employees in a region left struggling after the decline of its carpeting industry.<sup>135</sup>

Pennsylvania is well-suited to substantial solar power development. Technology supports more than 400 gigawatts of solar capacity in Pennsylvania.<sup>136</sup> However, Pennsylvania solar installation lags behind nearly two dozen states and only produces a fraction of its electricity from solar.<sup>137</sup> In 2017, many of the nearly 70 people that attended a visioning session in Beaver County expressed an interest in expanding small-scale solar projects.<sup>138</sup> Pennsylvania solar benefits from a well-developed local supply chain of manufacturers, installers, developers and abundant land.<sup>139</sup> The jobs created to install these projects pay an average of \$46,000.<sup>140</sup> A 2018, Pennsylvania Department of Environmental Protection study found that meeting a mere 10 percent of Pennsylvania's electricity demand with solar could create more than 115,000 construction jobs and up to 1,700 permanent operating jobs.<sup>141</sup>



## Energy efficiency

Most energy efficiency jobs are in construction — 1.27 million workers in 2017 (about 18 percent of all construction workers).<sup>142</sup> These jobs are inherently localized and domestic; they are almost impossible to outsource and exist across the country in both rural and metropolitan areas.<sup>143</sup> Another 300,000 manufacturing workers made energy-efficient appliances, lighting and other equipment.<sup>144</sup> For example, energy-efficient window manufacturer Andersen Corporation is investing \$105 million to create approximately 415 jobs in Phoenix, Arizona.<sup>145</sup> Geothermal heat pumps are another promising energy efficiency technology. Deploying energy-efficient geothermal heat pumps could help reduce household electricity use and provide employment similar to what oilfield workers are trained to do. Geothermal development could also provide jobs for those from the oil and gas industry, as the technology involves drilling and well services work that's similar to the petroleum industry.<sup>146</sup>

There are energy efficiency jobs at every skill and wage level.<sup>147</sup> Some of these jobs are in higher-wage, capital-intensive industries, and many pay above-average wages.<sup>148</sup> For entry level, lower-skill workers, many of the most common energy efficiency jobs in the construction industries pay considerably more than the typical pay for workers with high school degrees or less — at least 50 percent more for typical manufacturing workers and nearly double for plumbers and heating/air conditioning workers.<sup>149</sup>

## Invest in Green Energy to Invest in Communities

Building more petrochemical plants like Shell's ethane cracker is a Band-Aid fix for the uneconomical oil and gas industry that is propped up by Wall Street and government handouts. With the growing oil and gas glut, the industry needs this infrastructure more than ever. But chasing more unsustainable levels of fracked gas production only deepens dependency and worsens another inevitable crash. Moreover, giveaways to polluting mega-petrochemical corporations lock us into decades more of climate change and creates piles of unnecessary plastic garbage

while reinforcing inequality and cementing slow job growth. The grandiose promises of these high-profile investments rarely pay off. Rather, they hollow out public coffers and prop up billionaire CEOs.

Real investment in green manufacturing and clean energy through good public policy makes sense for the economy, the climate and the widening inequality gap. It can also alleviate the pollution burdens faced by frontline communities.

The most effective way to ensure the transition to a green economy is through a large-scale buildout of publicly-owned renewable electricity. This should include a comprehensive, New Deal-scale green public works program that guarantees employment for fossil fuel workers that would bear a disproportionate economic brunt of decarbonization. The program must prioritize the procurement of American-made renewable energy and energy-efficient equipment, materials and appliances.

In the interim, state, county and local governments could help foster a green jobs renaissance by implementing their own green public works programs, and by strengthening and regularly upgrading building codes to ensure that newly constructed buildings are energy-efficient and utilize rooftop solar. Community-labor partnerships should be established to recruit and train workers from disadvantaged communities where much of the energy efficiency retrofitting must take place. And fully-funded, high-quality job training is needed to ensure that green jobs provide career opportunities, including fair and just transition programs for fossil fuel and petrochemical workers.

## Methodology

Food & Water Watch calculated the job creation potential of using the Shell ethane cracker tax incentive to attract clean energy. While Food & Water Watch is skeptical of the link between tax incentives and industrial siting choices, we assumed that a \$1.65 billion tax break would be used to attract a comparable investment (\$6 billion)<sup>150</sup> in renewable energy manufacturing. This is a very conservative assumption, as most large tax breaks in Pennsylvania's history (See section "Shell's Beaver County handout is the latest in an expensive history of failed tax deals" on page 4) attracted a much larger investment per dollar of tax breaks.

Food & Water Watch used publicly available information from press releases, news coverage and industry disclosures to estimate the average investment and job creation potential of wind and solar facilities announced or built from 2015 to 2020. Food & Water Watch found that solar manufacturing facilities created approximately 2.1 jobs per \$1 million of investment and that wind manufacturing facilities create 6.9 jobs per \$1 million. These estimates are consistent with academic literature on the jobs impact of the broader wind and solar industries. A 2017 literature review found that every \$1 million spent on solar creates 4.26 direct jobs and that every \$1 million invested in wind energy directly employs four people, before considering secondary effects from the investment.<sup>151</sup> All of these estimates compare favorably to the 0.1 permanent jobs created for every \$1 million invested in Shell's petrochemical facility.

## Endnotes

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(202) 683-2500

[foodandwaterwatch.org](http://foodandwaterwatch.org) • [info@fwwatch.org](mailto:info@fwwatch.org)

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