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Iowa Electric Generation

Condition of the State

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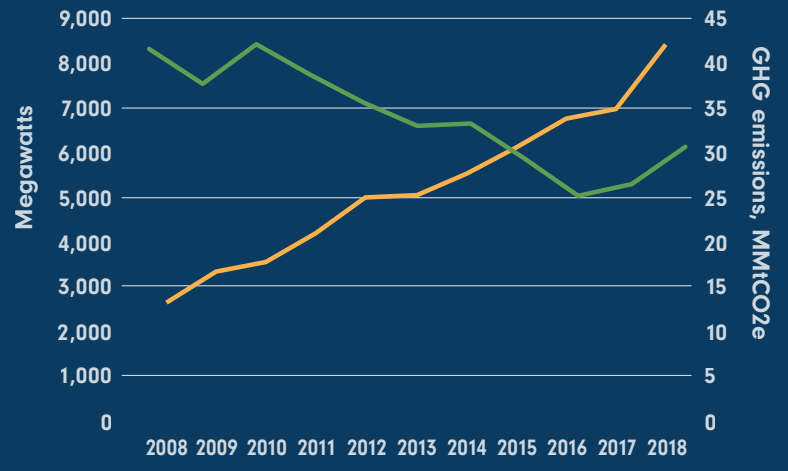
Introduction

Iowa's progress in developing renewable energy over the past twenty years has driven significant reductions in carbon emissions in the electric generation or power sector. Greenhouse gas emissions from Iowa's power sector declined by nearly 40% between 2008 and 2016 as Iowa began generating more than a third of its electricity from wind.

This moved the power sector from Iowa's top greenhouse gas emissions source in 2008 into third place behind agriculture and direct fossil fuel use in homes, businesses, and industry in 2017.[1] However, fossil fuel generation combined (coal and natural gas) still provides the larger share of electricity generation in Iowa, with fossil gas use on the rise. Power sector greenhouse gas emissions increased by 5% between 2016 and 2017 for the first time in years, and again by 16% in 2018. Significant work remains to further reduce emissions and reach very high levels of carbon-free energy.

Chart 1: Iowa wind capacity growth compared to reductions in power sector greenhouse gas emissions



In the absence of any long-term national policy to scale up renewable energy or steeply reduce carbon emissions, states are exploring how to meet 100% renewable energy goals and reach 80-90% reductions in emissions over the next thirty years. In April of 2020, the Iowa Environmental Council released "Iowa's Road to 100% Renewable," which explored various pathways to meet a 100% renewable energy goal in Iowa based on a dozen regional and national studies. IEC found that a 100% renewable goal is achievable and desirable. In fact,

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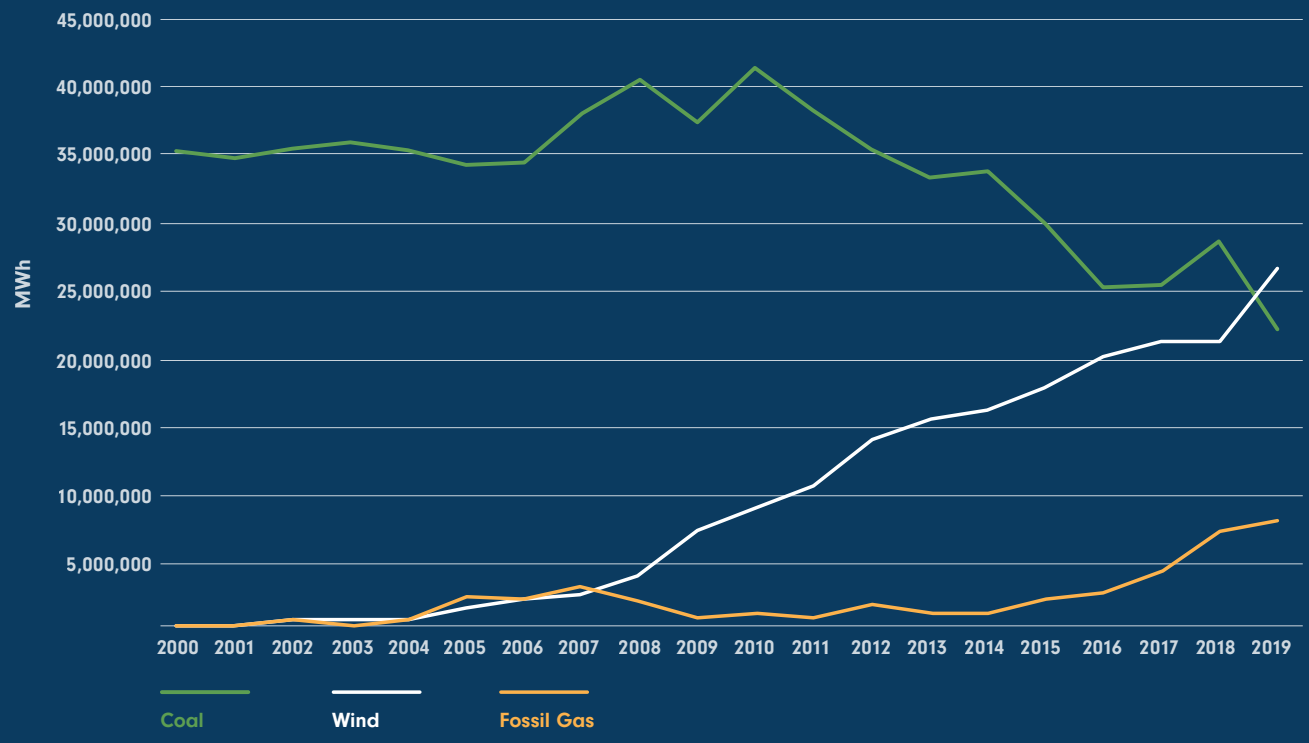
wind energy surpassed coal as Iowa's primary source of electricity for the first time ever in 2019. However, a goal of 100% renewable energy will ring hollow if the fossil fired generation from coal and fossil gas plants is allowed to continue going forward. Relying on 100% renewable energy must also mean getting to zero reliance on fossil energy sources.

Iowa Power Generation Since 2000

Iowa has made significant progress in reducing generation from coal-fired power plants since 2000, while seeing a significant increase in generation from wind. The increase in generation from fossil gas coincides with the construction of new combined cycle fossil gas power plants.

Chart 2: Iowa Generation Sources



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The 2016 to 2019 timeframe is especially noteworthy since renewable generation from wind exceeded coal generation for the first time, but at the same time generation from fossil gas (natural gas) more than doubled.

Chart 3: 2019 MidAmerican Resource Mix

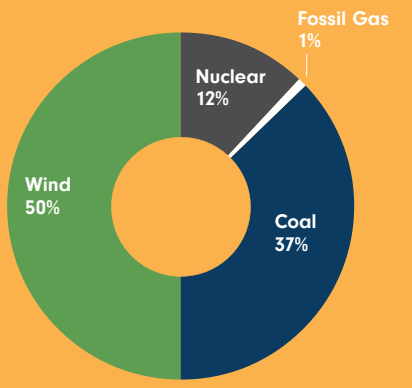
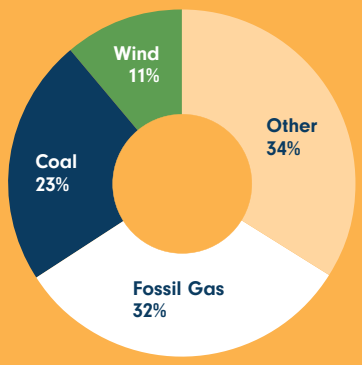
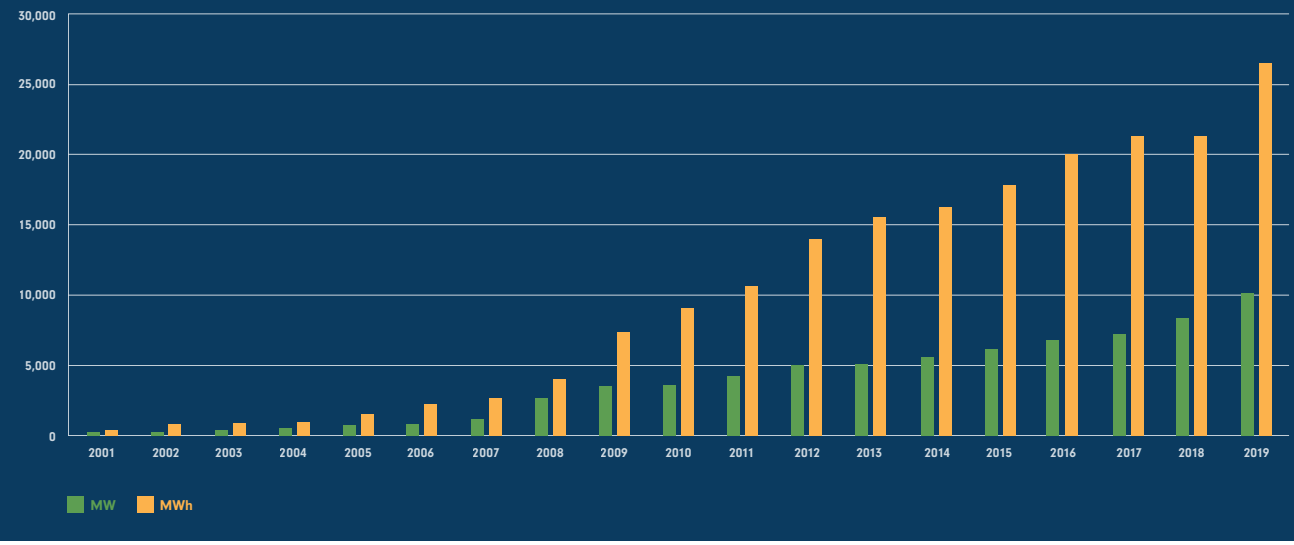


Chart 4: 2019 Alliant Resource Mix



The 2019 Iowa resource mixes for Iowa's two largest utilities, Alliant Energy and MidAmerican Energy, are shown above.[2] Wind represented 50% of the MidAmerican Energy generation and 11% of the Alliant Energy generation. The graph below shows the total wind capacity (MW) in Iowa since 2001, and the generation (MWh) from those wind turbines, including the notable 2016 to 2019 timeframe.[3] [4]

Chart 5: IOWA WIND Capacity (MW) vs Generation (MWH)



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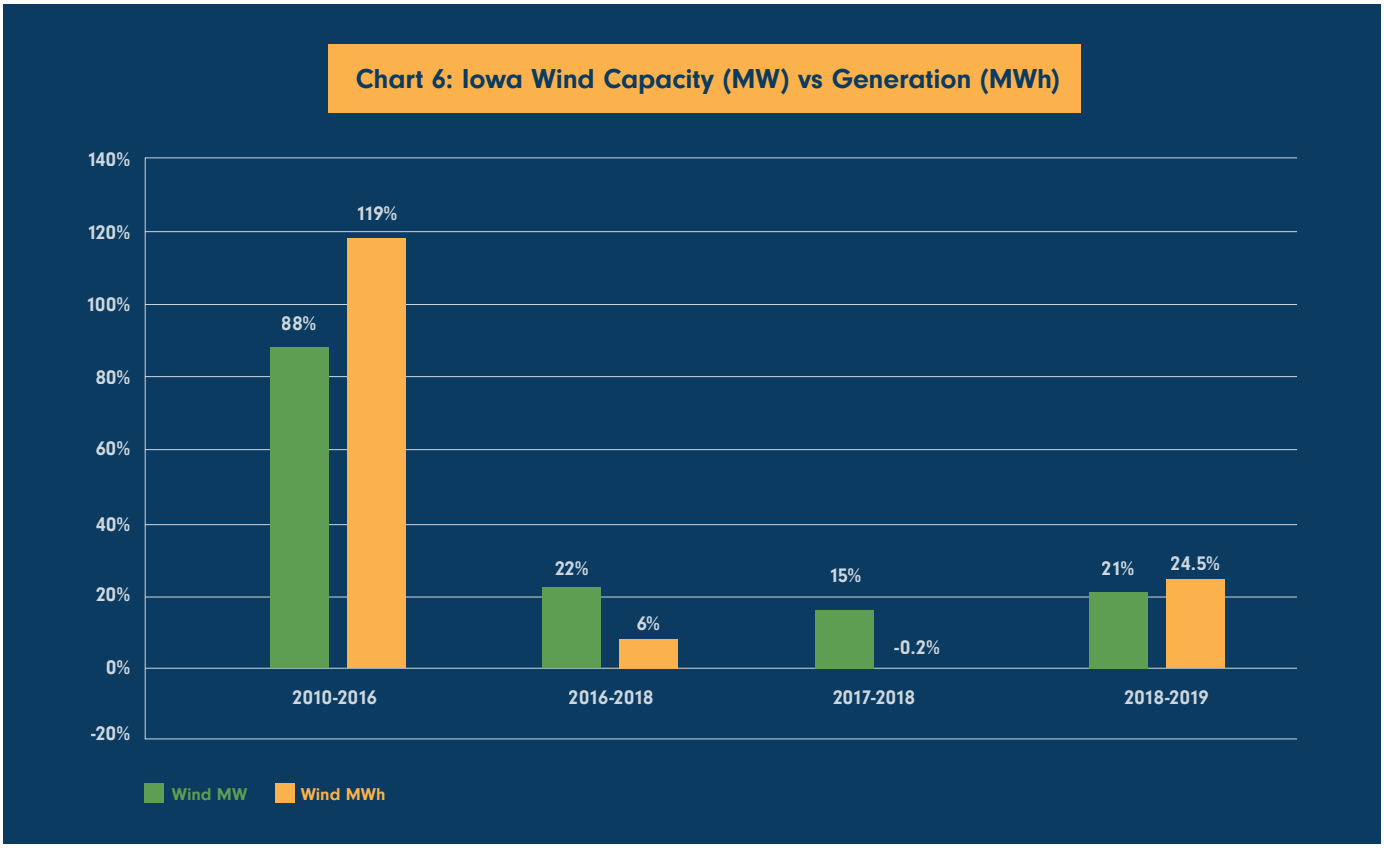

From 2016 to 2018, wind capacity increased by 22% (an additional 1,505 MW) in Iowa, yet wind generation increased by only 6% and actually decreased from 2017 to 2018. From 2018 to 2019, wind capacity increased by 21% (an additional 1768 MW) in Iowa, and wind generation increased by 24.5%.

Fossil Generation

Alliant has significantly increased production at Marshalltown (MGS) and Emery (fossil gas fired combined cycle power plants) since 2017, while MidAmerican significantly increased production at Louisa and Walter Scott #4 (coal fired power plants) in 2018. From 2017 to 2019, Alliant increased its fossil-fueled generation by 19% while MidAmerican reduced fossil-fueled generation by 10% over the same time.

In 2019, fossil-fueled generation represented 38% of MidAmerican generation and 55% of Alliant generation. By comparing the generation from each fossil-fueled power plant, it is easy to identify the specific sources of increased fossil-fired generation and where generation has decreased.

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Chart 7: Alliant 2017, 2018 & 2019 Fossil Fueled Generation

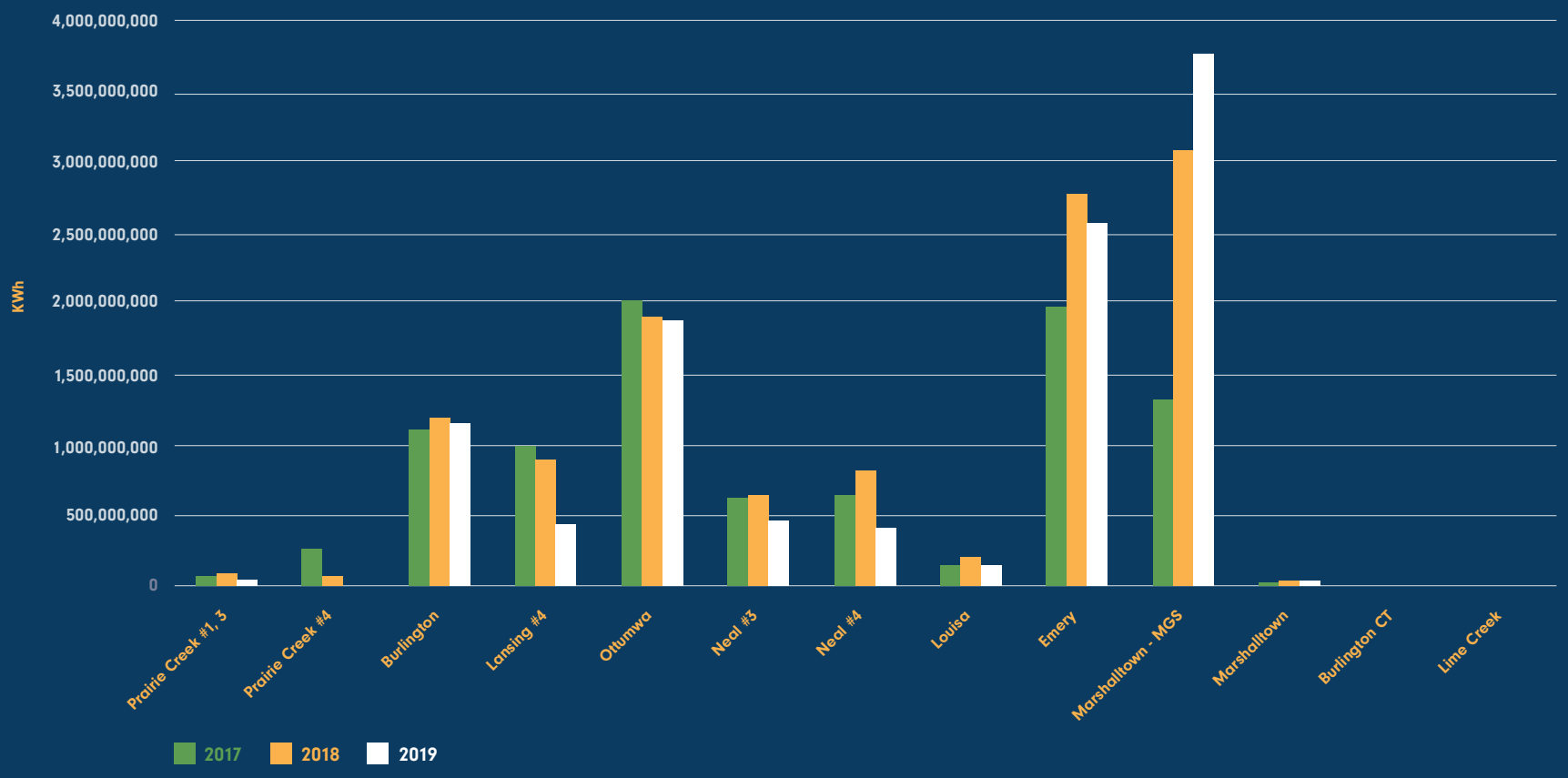

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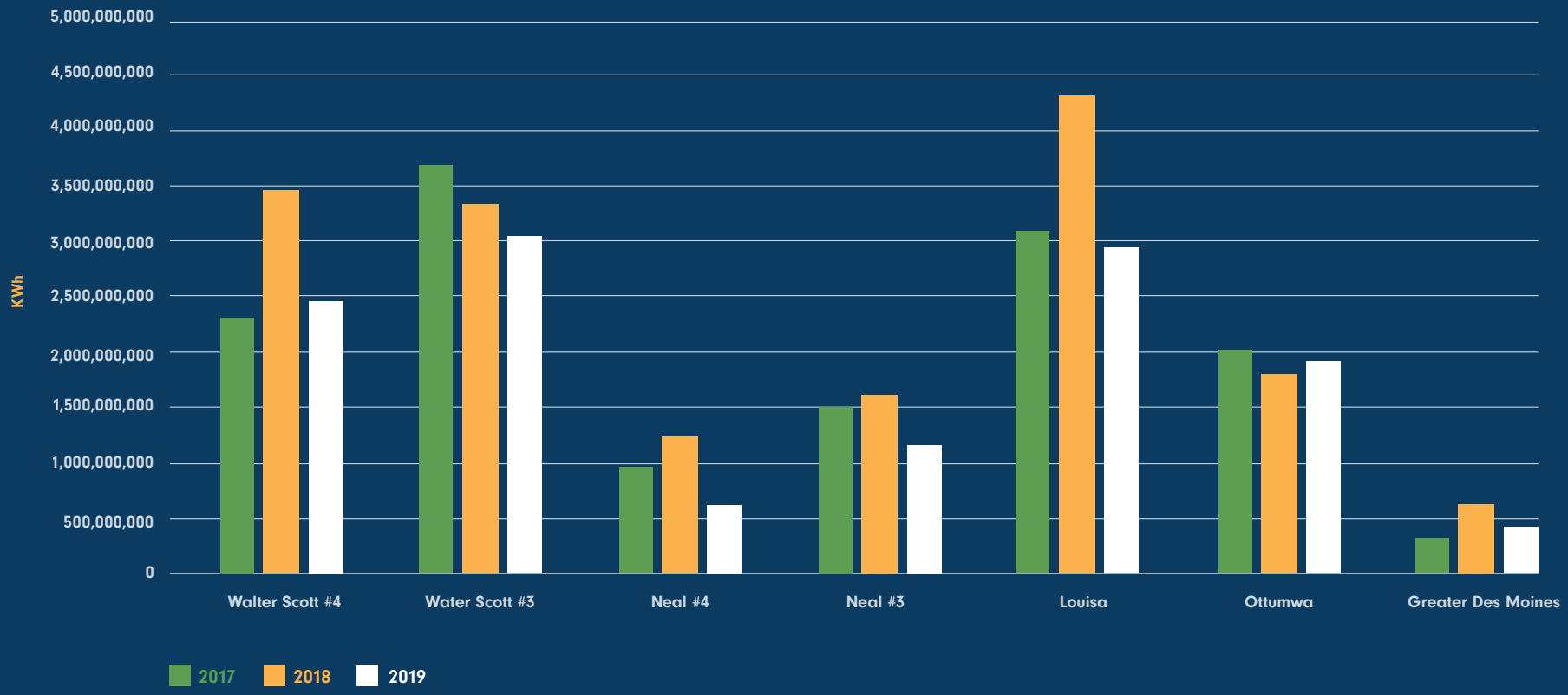
Chart 8: MidAmerican 2017, 2018 & 2019 Fossil Fueled Generation



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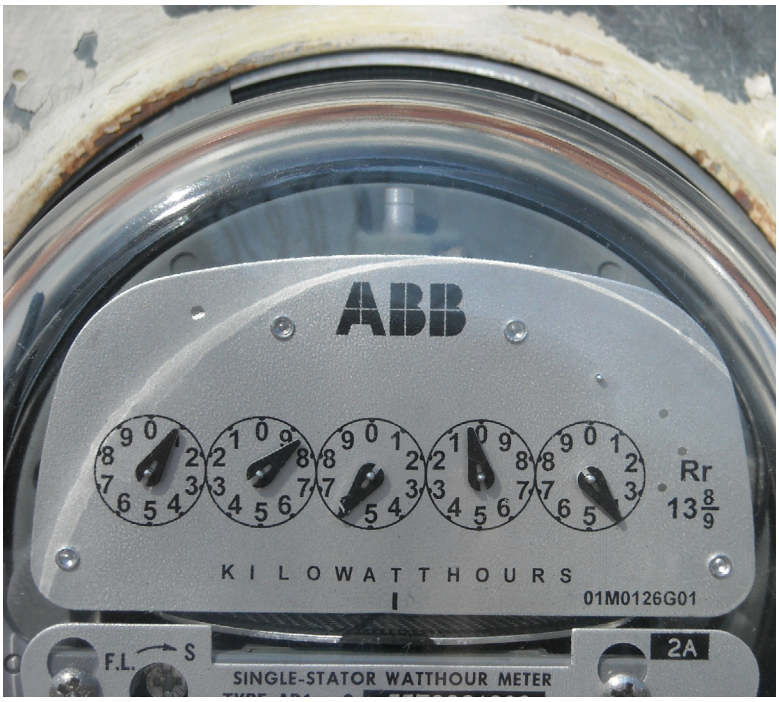
Iowa Retail Load

To meet a 100% renewable goal, most people would expect that you will use renewable generation to provide all of your generation in every hour of the day, year-round. This is not how MidAmerican is defining their goal to deliver 100% renewable energy to Iowa customers by 2021. MidAmerican has said:

> *"MidAmerican Energy has achieved an exciting milestone as a renewable energy leader," Adam Wright, MidAmerican Energy President and CEO, said. "We have now crossed the 50-yard line and we're moving closer to the goal, which is the vision we announced in 2016 to ultimately provide 100 percent renewable energy for* ***our customers****."*[5]

> *"MidAmerican Energy Company will be the first investor-owned electric utility in the country to generate renewable energy equal to* ***100 percent of its customers' usage*** *on an annual basis, upon completing its newest proposed wind energy project."*[6]

> *"Wind XII will transform our 100 percent renewable energy vision from a bold dream into a reality," Adam Wright, MidAmerican Energy's President and CEO, said. "We are listening and working with* ***our customers*** *to put them first. Wind XII is a clear demonstration of our commitment to and investment in the cleaner, more sustainable energy future* ***our customers want and our environment deserves...****"*[7]



So, what is an Iowa customer? An Iowa customer has a utility meter at a location in Iowa and receives electricity from the utility. The electricity is used by the customer and becomes a part of the utility retail load. However, MidAmerican and Alliant also sell electricity to other utilities. The sales of electricity to other utilities are classified as "sales for resale", and are not considered sales to customers.

By looking at the electric generation produced in Iowa by MidAmerican and Alliant for the years 2016 through 2019, we can see in Chart 9 what portion of the generation is serving Iowa customers and what portion is serving the financial interests of MidAmerican and Alliant.[8]

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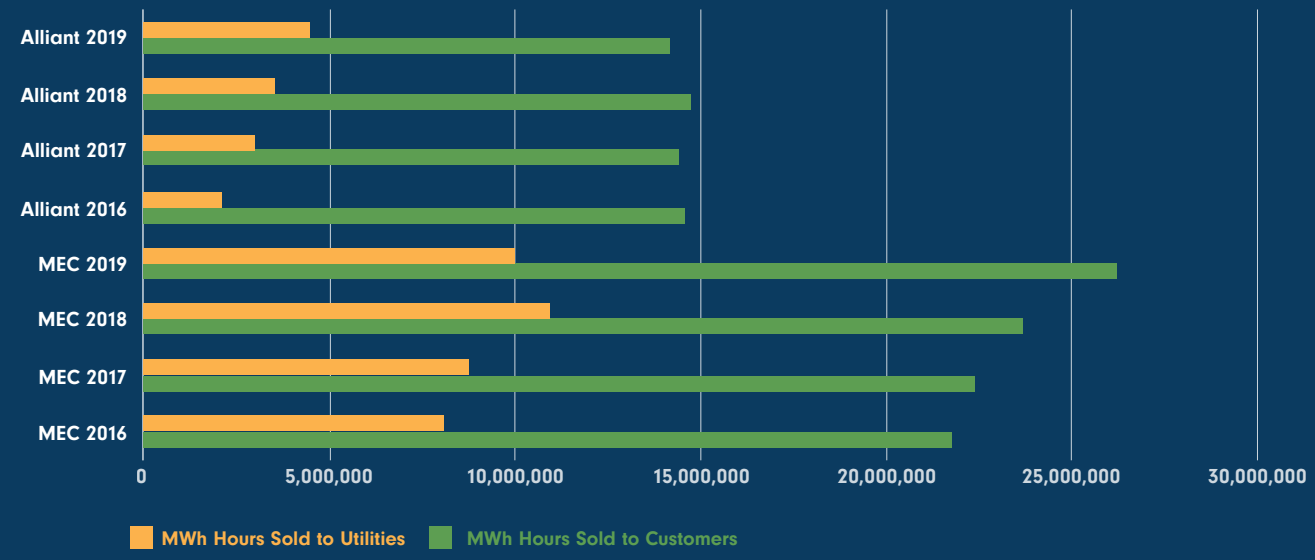
Chart 9: MidAmerican & Alliant Electricity (MWh) Sold



For 2019, MidAmerican sold 26.2 million MWh to their Iowa customers and Alliant sold 14.2 million MWh to their Iowa customers. However, for both MidAmerican and Alliant, the portion of the electricity they generate in Iowa being sold to other utilities is substantial, with 31% of MidAmerican's 2019 generation being sold to utilities and 35% of the Alliant 2019 generation being sold to utilities. MidAmerican sold nearly 10 million MWh to utilities in 2019 for $218.4 million while Alliant sold almost 4.5 million MWh to utilities for $147.8 million.

In total, MidAmerican and Alliant generated, or purchased, the following in 2019, categorized by the type of generation:

Table 1: MidAmerican 2019 Generation

Coal	12,181,572
Fossil Gas	440,494
Nuclear	3,848,602
Other	8,950
Wind	16,127,832
Total	**32,607,450**

Table 2: Alliant 2019 Generation

Coal	4,482,462
Fossil Gas	6,354,783
Other	6,685,621
Wind	2,067,059
Total	**19,589,467**

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As noted above, the electricity sold to Iowa customers (retail load) was only a portion of the 2019 generation in Iowa. Since the generation is categorized by resource, the environmental impacts from the different resources can be quantified.

It is well known that coal is the most environmentally damaging fuel to use for electricity generation, with environmental impacts ranging from air and water pollution to high carbon emissions. If we consider the true cost of environmental externalities from health impacts and a changing climate, as well as the overall cost, coal should be the last resort, not the default or "baseload" for generation. With that in mind, the amount of excess coal fueled generation (coal fueled generation serving Iowa customers or being sold to other utilities that could be offset using other sources) can be calculated. The excess coal fueled generation for MidAmerican and Alliant in 2019 is as follows:

Table 3: MidAmerican 2019 Excess Coal Fueled Generation

	MWh
2019 MidAmerican Customer Load	26,200,820
Subtract the Generation from Wind	16,127,832
Subtract the Generation from Nuclear	3,848,602
Subtract the Generation from Fossil Gas	440,494
Subtract the Generation from Other Resources	8,950
Total 2019 Customer Load Not Served by Resources Listed Above	5,774,942
Subtract the 2019 MidAmerican Coal Fueled Generation	12,181,572
Total MidAmerican Excess Coal Fueled Generation	**6,406,630**

Table 4: Alliant 2019 Excess Coal Fueled Generation

	MWh
2019 Alliant Customer Load	14,177,172
Subtract the Generation from Wind	2,067,059
Subtract the Generation from Other Resources	6,685,621
Subtract the Generation from Fossil Gas	6,354,783
Total 2019 Customer Load Not Served by Resources Listed Above	0
Subtract the 2019 Alliant Coal Fueled Generation	4,482,462
Total Alliant Excess Coal Fueled Generation	**4,482,462**

For MidAmerican that means that the 2019 production from Neal #3, Neal #4, Louisa, and 87% of Ottumwa production was not required for Iowa customers and could have been provided with other less polluting sources. Alliant did not need the entire 2019 electricity production for Iowa customers from any of its coal plants, including Prairie Creek #4, Lansing #4, Neal #3, Neal #4, Ottumwa, and Louisa.

The amount of MidAmerican and Alliant excess coal fueled generation appears to be neither necessary, nor consistent with stated reasons for continuing to operate the coal fueled plants. MidAmerican has stated:

> *"MidAmerican Energy will continue to use its natural gas, nuclear and coal-fueled plants to ensure reliable electric service even in times of low wind."*[9]

MidAmerican owns other generation assets that could reduce or eliminate the need for coal.[10] In the case of Alliant, the coal fueled plants were not necessary to meet the needs of Iowa customers. Rather than operating for purposes of ensuring reliability, it appears these coal plants are in fact being operated in order to sell fossil-fuel generated power to other utilities to increase revenues.

Impacts to Iowans from Excess Coal Generation

All fossil fueled electricity generation impacts Iowa's environment and drives climate change. Fossil gas generation and coal fueled generation both degrade the air we breathe and drive climate change but coal fueled generation also produces a substantial amount of solid waste that is landfilled. In 2019, the total excess coal fueled generation from both utilities was 10,889,092 MWh.

Although each coal fueled plant may have slightly different emissions rates, it is possible to calculate a close approximation of the emissions unnecessarily released into the air we all breathe, and the fly ash waste placed in Iowa landfills.

Table 5 shows the 2018 emissions totals for the Alliant and MidAmerican coal fueled plants and Table 6 is the estimation of the excess emissions and waste from these same plants in 2019, calculated as a percentage of 2018 emissions and waste.

Table 5: Alliant & MidAmerican 2018 Coal Fueled Plant Emissions (Tons)

2018 Total*	Alliant[11]	MidAmerican[12]
Sulfur Dioxide	8,382	19,649
Nitrogen Oxides	5,903	13,537
Mercury	0.02260	0.04409
Carbon Dioxide	9,918,518	17,870,337
Fly ash	40,847	428,452

**Last available emission information*

Table 6: Alliant & MidAmerican 2019 Estimated Emissions from Excess Coal Fueled Generation

2019	2019 Excess Generation as % of 2018 Total Generationt	Excess Sulfur Dioxide (tons)	Excess Nitrogen Oxides (tons)	Excess Mercury (lbs)	Excess Carbon Dioxide (tons)	Excess Fly ash (tons)
Alliant	78%	6,538	4605	35.25	7,736,444	31,861
MEC	40%	7,859	5,415	35.27	7,148,135	171,381
Total		**14,397**	**10,019**	**70.53**	**14,884,579**	**203,241**

Impacts to Iowans from Excess Air Emissions

Air pollution from coal-fueled power plants is linked with asthma, cancer, heart and lung ailments, neurological problems, acid rain, climate change, and other severe environmental and public health impacts. Air pollution and climate change are two of the most serious.

Coal Generation and Air Pollution

When coal burns, the chemical bonds holding its carbon atoms in place are broken, releasing energy. However, other chemical reactions also occur, many of which carry toxic airborne pollutants and heavy metals into the environment.

This air pollution includes:

Mercury: Coal plants are responsible for 44 percent of US mercury emissions.[13] Mercury is a toxic heavy metal that can damage the nervous, digestive, and immune systems, and is a serious threat to child development.[14] Just 1/70th of a teaspoon of mercury deposited on a 25-acre lake can make the fish unsafe to eat. In 2019, the excess coal fueled generation in Iowa was responsible for emitting **70.53 pounds of mercury** into Iowa's air. Iowa coal fueled generation in 2018 and 2019 emitted a total of **237 pounds of mercury** into Iowa's air.

Sulfur dioxide (SO2): Produced when the sulfur in coal reacts with oxygen, SO2 combines with other molecules in the atmosphere to form small, acidic particulates that can penetrate human lungs. It is linked with asthma, bronchitis, smog, and acid rain, which damages crops and other ecosystems, and acidifies lakes and streams.[15] In 2019, the excess coal generation in Iowa was responsible for emitting **14,397 tons of sulfur dioxide** into Iowa's air. Iowa coal fueled generation in 2018 and 2019 emitted a total of **49,698 tons of sulfur dioxide** into Iowa's air.

Nitrogen oxides (NOx): Nitrogen oxides are visible as smog and irritate lung tissue, exacerbate asthma, and make people more susceptible to chronic respiratory diseases like pneumonia and influenza.[16] In 2019, the excess coal generation in Iowa was responsible for emitting **10,019 tons of nitrogen oxides** into Iowa's air. Iowa coal fueled generation in 2018 and 2019 emitted a total of **34,469 tons of nitrogen oxides** into Iowa's air.

Particulate matter: Better known as "soot," this is the ashy grey substance in coal smoke. It is linked with chronic bronchitis, aggravated asthma, cardiovascular effects like heart attacks, and premature death.[17]

Coal Generation and Climate Change

Of coal's many environmental impacts, none are as harmful, long term, and irreversible as climate change. Climate change is driven by emissions of heat-trapping gases, primarily from human activities, that rise into the atmosphere and act like a blanket, warming the earth's surface.

Carbon dioxide (CO2) emissions from combusting fossil fuels are the main driver of climate change. CO2 is also the main byproduct of coal combustion: nearly 4 grams of CO2 are produced for every gram of carbon burned (depending on its type, coal can contain as much as 60 to 80 percent carbon).

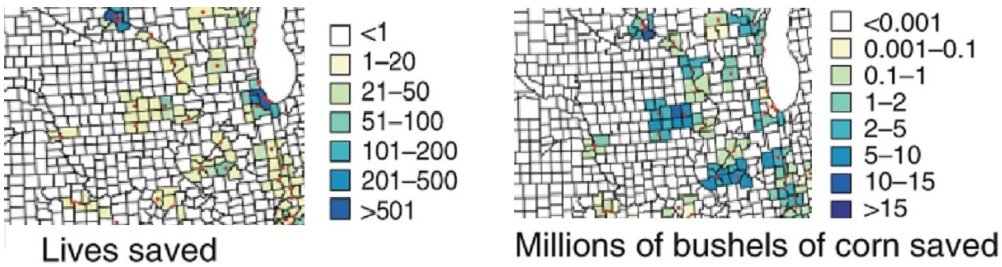
Consequences include rising temperatures and accelerating sea level rise as well as growing risks of drought, heat waves, heavy rainfall from intensified storms, and species loss. Left unchecked, climate change will lead to profound human and ecological disruption. We are already seeing impacts from climate change today in Iowa.

In 2019, the excess coal fueled generation in Iowa was responsible for emitting **14,884,579 tons of carbon dioxide** into the atmosphere. Iowa coal fueled generation in 2018 and 2019 emitted a total of **49,285,459 tons of carbon dioxide** into Iowa's air.

Coal Generation and Crop Yields

Another potentially significant consequence of MidAmerican and Alliant's choice to unnecessarily burn coal is the impact on crop yields. A recent study looked at the increases in crop yields that occurred when coal plants shut down.[18] The study found that counties in the U.S. with a coal plant closure in their immediate vicinity not only experienced reduced mortality rates, but increased corn yields by 1.1% over the study period (2005 to 2016). The Figure below shows the impact of the plant closures experienced in Iowa.

Figure 1: Lives Saved and Corn Production Increase from Past Coal Plant Closures



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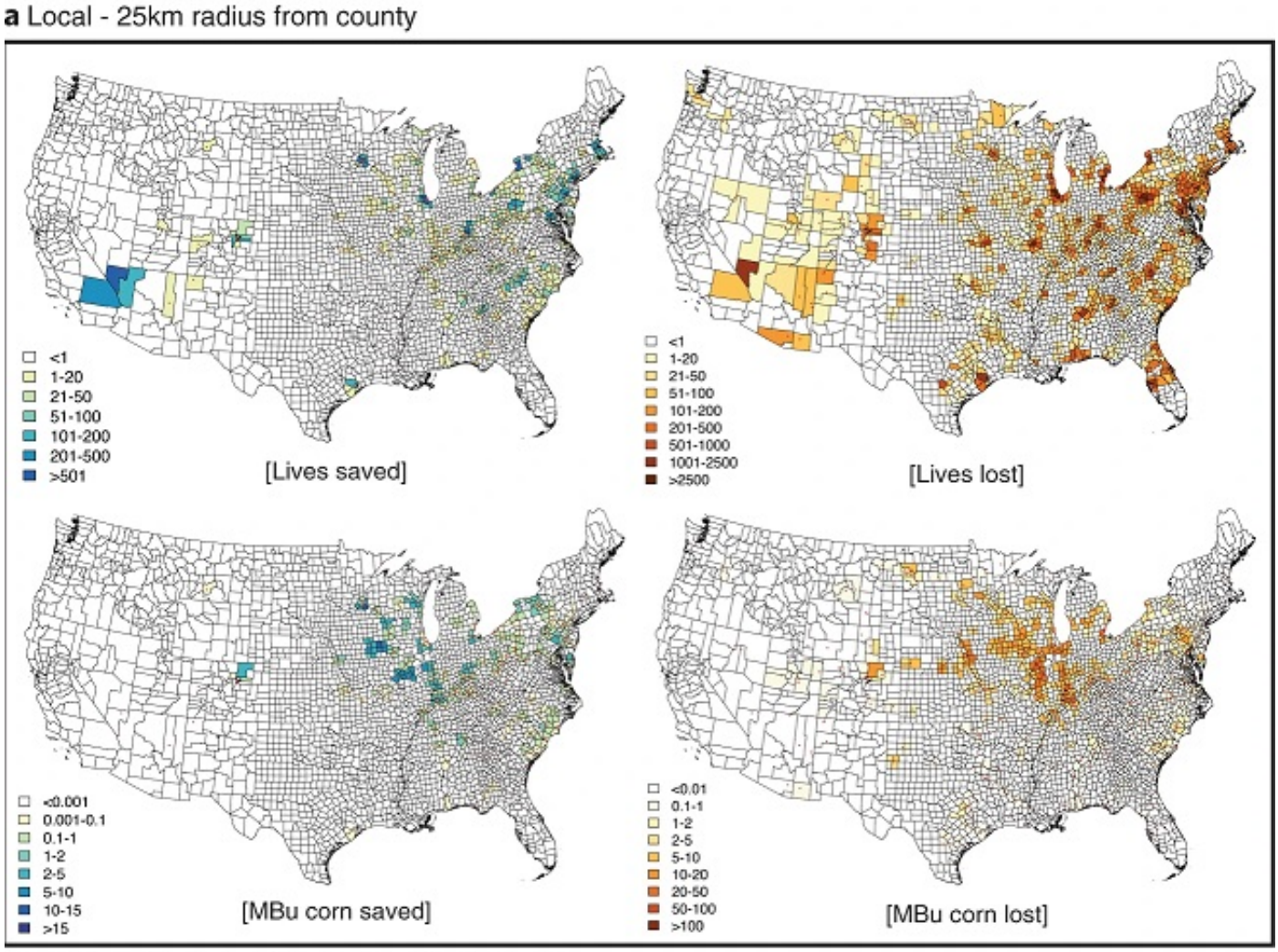
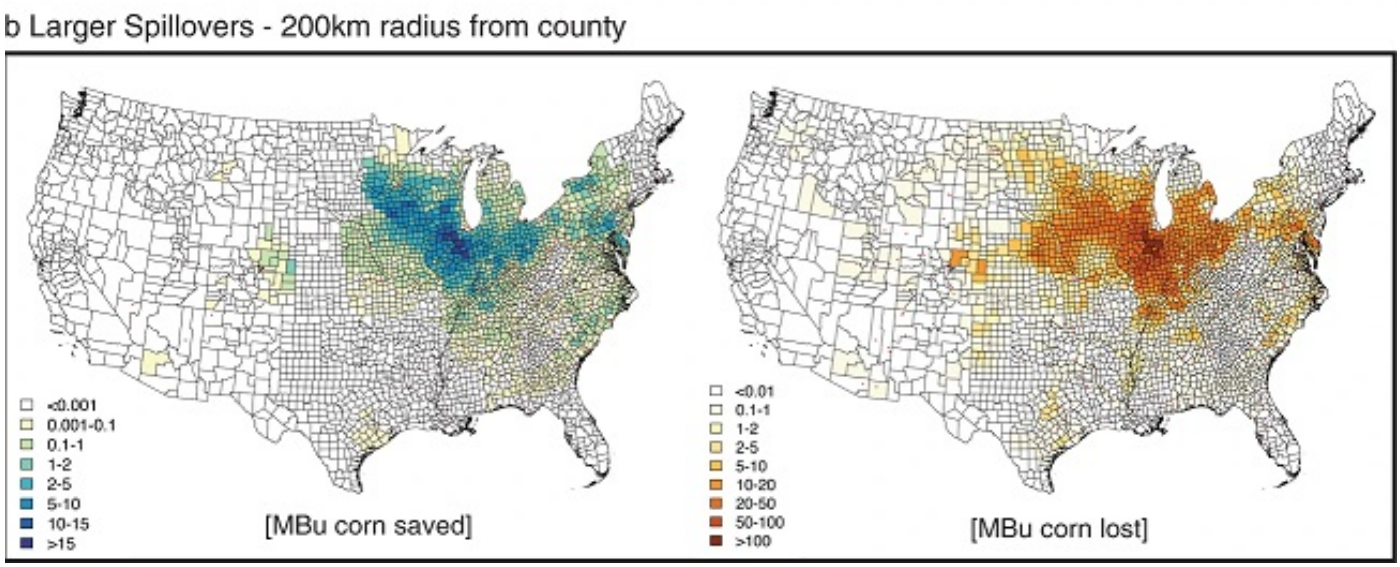
Based on the production impact of the plant closures, the study also estimated the production "penalty" that Iowa farmers experienced as a result of the coal plants that continued to operate in the 2005 to 2016 study period. This estimated loss of production is shown in the figure below.

Figure 2a: Reduced Mortality and Increased Crop Production from Coal Plant Closures



In 'a' above of Figure 2, the left two panels are the same as Figure 1, showing mortality and total corn production impacts over the study period for plants already shut down within 25km (15.5 mi) from each county. The right column shows the calculation described for impacts of remaining coal-fired units still operating, assuming that their impacts are the same as those that have been decommissioned.

Figure 2b: Reduced Mortality and Increased Crop Production from Coal Plant Closures



In 'b' above of Figure 2, the total corn production impacts over the study period is shown for plants within 200km (124.2 mi) from each county. The left panel shows the impacts of units already shut down, and the right panel shows the estimated impacts of coal-fired units remaining in operation.

As seen in in 'b' of Figure 2, more than two-thirds of Iowa counties experienced annual production losses ranging from 1 - 5 million bushels due to the continued operation of the MidAmerican and Alliant coal plants. The estimated annual corn production loss from the remaining 4,384 MW of coal is quantified in Table 7 below.

Table 7: Estimated Annual Corn Lost Due to Operating 4,384 MW of Coal

	Ten Year Corn Production Loss (MBu)	Annual Loss/ County (MBu)	2/3 of Counties	Annual Statewide Corn Loss (Bu)
Minimum Loss	10	1	66	66 Million
Average Loss	50	5	66	330 Million

By comparison, if Iowa were to eliminate coal fueled generation and replace it with solar and wind, the annual corn loss would be significantly less, even when considering the need for some acres being shifted out of agricultural production into renewable energy production.

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In "Iowa's Road to 100% Renewable", published by IEC in May 2020, the study found that Iowa could see, at the top end, 46,000 MW of solar and 61,000 MW of wind in order to reach 100% renewable. The estimated annual statewide reduction in bushels of corn production from the acres required for 46,000 MW of solar and 61,000 MW of wind is quantified in Tables 8 and 9.

Table 8: Estimated Annual Corn Lost from the acres required for 46,000 MW of Solar Generation

Solar Capacity (MW)	Acres / MW[19]	Total Acres	2019 Iowa Avg Yield (Bu/acre)[20]	Annual Statewide Corn Loss (Bu)
46,000	4	184,000	198	36 Million

Estimated Annual Corn Lost from the acres required for 61,000 MW of Wind Generation

Wind Capacity (MW)	Acres / MW[21]	Total Acres	2019 Iowa Avg Yield (Bu/acre)[22]	Annual Corn Loss Bu
61,000	.754	45,750	198	9 Million

Iowa farmers are paying a significant corn production penalty from unnecessary coal fueled power plant pollution. The case is clear that shutting down Iowa's remaining coal fueled power plants and replacing them with wind and solar would be a net positive for corn production even when accounting for the land that will be shifted into producing renewable energy. Such a shift would result in net increased corn production of between 21 and 285 million bushels statewide annually increasing farm revenue. In addition, farm income would increase from the land lease payments for the acres used for the wind and solar renewable energy facilities. This makes the retirement of MidAmerican and Alliant's remaining coal fueled fleet, and shifting to renewable energy, a no-brainer for Iowa's ag economy.[23]

Photo credit[24]

Impacts to Iowans from Excess Solid Waste

As noted in Table 6, in 2019 MidAmerican and Alliant are estimated to have sent **203,241 tons of excess fly ash** to landfills. Coal fueled power plants use special waste landfills called monofills that accept only coal combustion residue. Fly ash is a coal combustion waste composed of particulates (fine particles of burned fuel) that are driven out of coal-fired boilers together with the flue gases. Fly ash is captured by electrostatic precipitators or other particle filtration equipment.

Regardless of the waste produced, there are many toxic substances present in coal ash that can cause major health problems in humans. Some toxic constituents found in coal ash, including coal ash from MidAmerican and Alliant coal plants, are arsenic, boron, cadmium, chromium, cobalt, copper, lead, lithium, mercury, molybdenum, selenium, thallium and uranium.[25]

Monofill facilities are permitted and regulated by the Iowa Department of Natural Resources (IDNR), but even with the best regulations, once the coal combustion residue is landfilled, it poses a perpetual risk of potentially impacting Iowa's groundwater. It is a near-certainty that such contamination will occur at some point as long as the residue is present in the landfill. One example of such pollution is the groundwater surrounding the Neal South monofill, which was found to have elevated levels of arsenic in 2019.[26] MidAmerican was directed to take corrective action to stop this contamination, which involved injecting chemicals into the soils surrounding the monofill intended to immobilize the arsenic in the subsurface soils, preventing future migration of dissolved arsenic in the groundwater.[27]

Conclusion

Iowa has been a leader on clean energy over the past 20 years, deploying significant amounts of wind energy and, as a result, reducing electric-sector greenhouse gas emissions significantly as well. We have the natural wind and solar resources to reach 100% renewable energy. Unfortunately, due to utility marketing efforts many Iowans believe we are already approaching 100% renewable energy. The truth is, we have a long way to go to achieve a true 100% renewable vision and, in the meantime, the continued unnecessary coal generation in Iowa has consequences that impact every Iowan.

The threats to air quality and potential contamination of groundwater are known, quantifiable, and unnecessary. The direct damages to agricultural productivity are just beginning to be better understood and the severe threats we face from climate change in our state are evident today and cannot be allowed to expand unchecked.

Right now, Iowa utilities are burning coal for profit at the cost of Iowans' health and livelihoods even as a switch to clean energy could reduce both pollution and costs for consumers while increasing farm income and productivity. The pursuit of 100% renewable energy starts with an honest accounting, full disclosure, and the complete elimination of unnecessary, dirty coal generation. Only with that full accounting can Iowa continue solidly down the path we have begun toward 100% renewable energy.

About

The primary authors for this paper are Steve Guyer, Kerri Johannsen, and Michael Schmidt with the Iowa Environmental Council.

Endnotes

1 Iowa Department of Natural Resources, 2018 Iowa Statewide Greenhouse Gas Emissions Inventory Report (2019) available at https://www.iowadnr.gov/Environmental-Protection/Air-Quality/Greenhouse-Gas-Emissions

2 2019 Q4 FERC Form 1

3 https://windexchange.energy.gov/maps-data/321

4 https://www.eia.gov/electricity/data/browser/

5 "MidAmerican Energy passes 50 percent mark in renewable energy," MidAmerican Energy (2018), available https://www.midamericanenergy.com/nr-fiftypercentrenewable

6 "Wind XII project positions MidAmerican Energy to hit 100 percent renewable goal," MidAmerican Energy (2018), available at https://www.midamericanenergy.com/nr-100percentrenewable

7 Id

8 2016, 2017, 2018 and 2019 Q4 FERC Form 1, Alliant and MidAmerican

9 https://www.midamericanenergy.com/nr-100percentrenewable

10 Greater Des Moines is a 576 MW combined cycle natural gas plant capable of producing over 5,000,000 MWh per year, while other MidAmerican natural gas plants and purchases could offset the coal generation

11 https://poweringwhatsnext.alliantenergy.com/crr/governance-and-performance/#performancedata

12 https://www.brkenergy.com/assets/pdf/sustainability-midamerican-energy-2018.pdf

13 https://www.epa.gov/mercury/basic-information-about-mercury

14 https://www.who.int/en/news-room/fact-sheets/detail/mercury-and-health

15 https://www.epa.gov/so2-pollution/sulfur-dioxide-basics#effects

16 https://www.epa.gov/no2-pollution/basic-information-about-no2#Effects

17 https://www3.epa.gov/region1/airquality/pm-human-health.html

18 "The downstream air pollution impacts of the transition from coal to natural gas in the United States", Jennifer A. Burney, School of Global Policy and Strategy, University of California, San Diego, https://www.nature.com/articles/s41893-019-0453-5; "Author Correction: The downstream air pollution impacts of the transition from coal to natural gas in the United States", https://www.nature.com/articles/s41893-020-0548-z

19 https://greencoast.org/solar-farm-land-requirements/

20 2019 State Agricultural Overview, https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=IOWA

21 https://sciencing.com/much-land-needed-wind-turbines-12304634.html

22 2019 State Agricultural Overview, https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=IOWA

23 The downstream air pollution impacts of the transition from coal to natural gas in the United States, Jennifer A. Burney, School of Global Policy and Strategy, University of California, San Diego, https://www.nature.com/articles/s41893-019-0453-5; Author Correction: The downstream air pollution impacts of the transition from coal to natural gas in the United States, https://www.nature.com/articles/s41893-020-0548-z

24 Jakec. *Coal_waste_pile_west_of_Trevorton,_Pennsylvania_detail_5.jpg.* August 26, 2014, Wikimedia Commons accessed October 5, 2020, https://commons.wikimedia.org/wiki/File:Coal_waste_pile_west_of_Trevorton,_Pennsylvania_detail_5.JPG

25 Burlington Generating Station, https://dna1.documentdna.com/DocDNAGetDocument.jsp?URL_CONTEXT=/iowadnr&QUERY_STRING=pGrZTtszljljC76L5P5il8i8MsyIoAQKxuI8UczT4HFY5Sx%2FYJ1KVUl6IhIlqX18BB3f0BY6iT2keNNIsGeunCfVdivzlLzZt Rw7GW4nNRdu6m0a

26 Neal South Monofill monitoring and corrective action report, https://www.brkenergy.com/ccr/assets/pdf/mec/NS/Landfill/GW_monitoring_and_corrective_action/Remedy%20Selection%20report/RSR_NS2019.pdf

27 Id

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