OPERATIONS

Excel in Safety, Operational Performance and Environmental Stewardship

3 OPERATIONS

2019 Highlights

- Remained one of the electric utility industry's top leaders in safety performance for the fifth year in a row with a Total Incident Case Rate of 0.38.
- Announced a new goal to achieve net-zero carbon dioxide emissions from electricity generation by 2050.
- Increased our previous goal to reduce carbon dioxide emissions from 40 percent to at least 50 percent by 2030 (from 2005 levels).
- Since 2005, decreased carbon dioxide emissions by 39 percent, sulfur dioxide emissions by 97 percent and nitrogen oxides emissions by 79 percent.
- Announced pursuit of subsequent license renewals for all of our nuclear power plants, which are carbon-free, for an additional 20 years of operation.
- Since 2010, retired 51 units at coal-fired power plants, totaling approximately 6.6 gigawatts (GW). In 2019, filed for accelerated depreciation of approximately 7 GW of coal generating capacity.
- Reduced water withdrawn for electric generation by 684 billion gallons since 2016.
- Recycled 77 percent of our solid waste, diverting approximately 91,000 tons of solid waste from landfills.

Challenges and Opportunities

- Maintain industry-leading safety performance and continue to focus on the prevention of serious injuries to our workers.
- Continue to demonstrate our commitment to operational excellence, which is fundamental to our company's success.
- Further strengthen our grid to enable more renewable energy and to protect against cyber and physical threats.
- Continue to move to a low-carbon future by retiring coal plants and replacing them with natural gas plants and renewable energy.
- Advocate for public policies that advance the innovations necessary to achieve a net-zero carbon future – including longer-duration energy storage, carbon capture, advanced nuclear power plants and other technologies.

Duke Energy's Path to Net-Zero Carbon

Duke Energy continues to achieve significant decreases in overall carbon emissions, driven largely by utilizing more natural gas and renewables generation and less coal.

Duke Energy is serious about doing its part to deliver the cleaner energy future that its customers want and deserve, while keeping energy affordable and reliable.

In September 2019, the company refreshed its climate strategy and announced the acceleration of its carbon-reduction goals from electric generation. Duke Energy's new goals are to reduce carbon dioxide emissions at least 50 percent by 2030 from 2005 levels, and strive to be net-zero by 2050. The company is the largest power generator in the United States to have such a net-zero goal.

Duke Energy continues to achieve significant decreases in overall carbon emissions, driven largely by utilizing more natural gas and renewables generation and less coal. As of year-end 2019, the company has reduced carbon emissions by 39 percent from 2005 levels.

While there are many factors that influence emissions on an annual basis, Duke Energy is confident in its ability to meet its 2030 goal of at least a 50 percent carbon emissions reduction, and its 2050 goal of net-zero carbon emissions.

Achieving these ambitious goals requires a bold vision and a pragmatic strategy. This vision includes continuing to modernize the current fleet and grid with increased investments in renewables, storage, natural gas and energy efficiency. Importantly, the company plans to continue to operate its existing nuclear fleet and retire coal plants.

To reach our net-zero 2050 target, we must have additional non-emitting technologies. We are working with the private and public sectors to drive research, development and demonstration of new technologies – such as longer-duration (up to seasonal) storage, carbon capture, advanced nuclear and new, carbon-free solutions that don't exist yet at scale.

The company has taken a holistic approach to managing the climate issue that includes three key areas of focus: adaptation, mitigation and innovation.

- **Adaptation** – Duke Energy is preparing for the changing global climate, including water conservation and storm preparation.
- **Mitigation** – Duke Energy is working to slow climate change with a variety of carbon-reduction and land conservation efforts.
- **Innovation** – Duke Energy is helping drive the technology necessary for a carbon-free future, including grid modernization and new technologies.

The company has already made meaningful progress in each area and will continue to update plans to ensure that climate change is tackled from all angles.

You can read more on this approach in the company's 2020 Climate Report.

Duke Energy's nuclear power plant teams generate carbon-free electricity around the clock.

Nuclear Essential to Meeting Carbon Goals

Nuclear power remains Duke Energy's largest greenhouse gas emissions-free generator. And the company plans to rely on it as it seeks to be carbon neutral by 2050.

In September 2019, the company announced it would seek to renew the operating licenses of the 11 reactors it operates at six nuclear stations in the Carolinas for an additional 20 years.

The first nuclear plants will approach the end of their current operating licenses in the early 2030s. Rigorous, ongoing preventive maintenance programs across the nuclear fleet and technology upgrades and investments over the years have contributed to their continuing strong operating performance. In 2019, Duke Energy's nuclear fleet marked its 21st consecutive year with a fleet capacity factor – a measure of reliability – greater than 90 percent.

The company expects to submit the license renewal application for Oconee Nuclear Station in South Carolina in 2021, followed by its other nuclear stations.

In 2019, the Duke Energy nuclear fleet generated almost 74 billion kilowatt-hours of electricity and avoided the release of more than 52 million tons of carbon dioxide – equivalent to keeping more than 11 million passenger cars off the road.

U.S. nuclear facilities are licensed by the U.S. Nuclear Regulatory Commission and were originally licensed to operate for 40 years based on economic considerations, not technology limitations.

Regulations allow nuclear licensees to renew their licenses for up to 20 years at a time. All Duke Energy-operated nuclear units have received one renewed license for an additional 20 years. The process to renew licenses for a second 20 years requires a comprehensive analysis and evaluation to ensure the units can safely operate for the extended operation period.

Nuclear power remains Duke Energy's largest greenhouse gas emissions-free generator.

Safety Performance Metrics

	2015	2016	2017	2018[1]	2019
Employee and contractor work-related fatalities	5	0	2	3	**3**
Employee Total Incident Case Rate (TICR)[2,3]	0.41	0.40	0.36	0.43[4]	**0.38**
Employee Lost Workday Case Rate (LWCR)[2,5]	0.18	0.15	0.15	0.15	**0.14**

1 2018 is the first year that Piedmont Natural Gas results are included.
2 Includes both employees and workforce augmentation contractors.
3 Number of recordable incidents per 100 workers (based on OSHA criteria). Top decile in 2018 for employee TICR was 0.51 (Edison Electric Institute survey for companies with more than 7,000 employees).
4 TICR excluding Natural Gas Business Unit was 0.34.
5 Number of lost workdays per 100 workers.

The company is committed to leading the industry in safety by proactively addressing risk and empowering employees.

Duke Energy Remains Committed to Worker Safety

Despite an improving safety trend, Duke Energy tragically experienced three work-related fatalities and two life-altering injuries in 2019. By working internally and with other Edison Electric Institute companies in 2020, Duke Energy will continue our efforts to reduce the number of serious injuries and become an even safer workplace.

The company is committed to leading the industry in safety by proactively addressing risk and empowering employees. Workers put safety first by actively caring, recognizing hazards and taking accountability for their actions.

Consistent with our industry-leading performance from previous years, employees continued to deliver strong safety results in 2019, meeting our target total incident case rate. Since 2012, the company has reduced its number of recordable injuries by 46 percent.

To enhance safety performance, the company used data to identify safety risks and prevent injuries before they occurred. New programs and technologies also improved employee safety behavior through better on-the-job observations.

In addition to injury reduction initiatives, Duke Energy introduced a decentralized safety governance model to improve accountability. The Environmental, Health and Safety business unit primarily provides direction and oversight, allowing safety professionals to directly support daily operations.

Duke Energy also continues to provide work-life programs to support the health and overall well-being of employees.

Turning the Corner on Coal Ash

A year of strong momentum in ash basin closure culminated with a breakthrough achievement that puts the coal ash debate to rest in North Carolina. Duke Energy, state regulators and environmental groups agreed to a plan to permanently close the company's remaining nine coal ash basins, primarily by excavation with ash moved to lined landfills.

This reasonable, common-sense approach protects people and the environment while keeping costs in check as much as possible, saving approximately $1.5 billion when compared to the full excavation order that state regulators issued on April 1, 2019.

Coal Plant Retirements[1]

Duke Energy is increasingly providing cleaner energy to our customers, shifting to more flexible, lower- and no-carbon sources while maintaining reliability and rates below the national average. Since 2010, we have retired 6,539 megawatts (MW) of older coal capacity, while investing in natural gas and renewables. By 2024, we plan to retire an additional 862 MW of older coal capacity, which will bring total coal plant retirements to 7,401 MW, or roughly one-third of our former coal portfolio.

Retired Coal Units[2]

	Location	Units	Total capacity (megawatts)	Actual retirement date
Edwardsport Station	Ind.	6, 7, 8	160	2010
Cliffside Steam Station	N.C.	1, 2, 3, 4	198	2011
Buck Steam Station	N.C.	3, 4	113	2011
W.H. Weatherspoon Plant	N.C.	1, 2, 3	170	2011
Gallagher Station	Ind.	1, 3	280	2012
Cape Fear Plant	N.C.	5, 6	316	2012
Beckjord Station	Ohio	1	94	2012
Dan River Steam Station	N.C.	1, 2, 3	276	2012
H.F. Lee Plant	N.C.	1, 2, 3	382	2012
Robinson Plant	S.C.	1	177	2012
Buck Steam Station	N.C.	5, 6	256	2013
Riverbend Steam Station	N.C.	4, 5, 6, 7	454	2013
Sutton Plant	N.C.	1, 2, 3	553	2013
Beckjord Station	Ohio	2, 3	222	2013
Beckjord Station	Ohio	4, 5, 6	543	2014
W.S. Lee Steam Station	S.C.	1, 2	200	2014
W.S. Lee Steam Station	S.C.	3	170	2015 Converted to natural gas
Miami Fort Station	Ohio	6	163	2015
Wabash River Station	Ind.	2, 3, 4, 5, 6	668	2016
Crystal River Energy Complex	Fla.	1, 2	766	2018
Asheville Plant	N.C.	1, 2	378	2020
Total		**51**	**6,539**	

Planned Coal Unit Retirements

	Location	Units	Total capacity (megawatts)	Planned retirement date
Gallagher Station	Ind.	2, 4	280	2022[2]
Allen Steam Station	N.C.	1, 2, 3	582	2024
Total		**5**	**862**	

Coal Units with Proposed Accelerated Depreciation

	Location	Units	Total capacity (megawatts)	Potential retirement date
Allen Steam Station	N.C.	4, 5	516	2024[2]
Rogers Energy Complex (Cliffside Steam Station)[3]	N.C.	5	544	2026[2]
Gibson Station	Ind.	5	310 Duke Energy's ownership share	2026[2]
Cayuga Station	Ind.	1, 2	995	2028[2]
Marshall Steam Station[3]	N.C.	1, 2	740	2028[4]
Mayo Plant	N.C.	1	727	2029[2]
Roxboro Steam Plant	N.C.	3, 4	1,392	2029[2]
Gibson Station	Ind.	3, 4	1,252	2034[2]
Gibson Station	Ind.	1, 2	1,260	2038[2]
Total		**15**	**7,736**	

Coal Unit Retirement Dates from Integrated Resource Plans

	Location	Units	Total capacity (megawatts)	Potential retirement date
Roxboro Steam Plant	N.C.	1, 2	1,047	2028
Marshall Steam Station[3]	N.C.	3, 4	1,318	2034
Belews Creek Steam Station[3]	N.C.	1, 2	2,220	2037
Rogers Energy Complex (Cliffside Steam Station)[3]	N.C.	6	844	2048
Total		**7**	**5,429**	

1 In addition to coal unit retirements, a number of older oil/natural gas generation units have been or will be retired.
2 In rate cases filed in 2019, the company has proposed shortening the depreciable lives of coal units as it transitions to cleaner energy sources. These depreciation dates have not been approved yet by state regulatory commissions.
3 Coal units that have been or will be retrofitted to run fully or partially on natural gas.
4 In response to a rate case filed in 2016, these depreciation dates were approved in 2017 by the state regulatory commission.

Duke Energy scientists ensure lakes and rivers next to power plants remain clean and healthy.

Duke Energy had appealed that decision; the settlement resolves that appeal as well as all other pending environmental litigation related to basin closure methods in North Carolina.

The company made tremendous progress safely closing its other basins – nearly 28 million tons of ash have been excavated across all of our service territories since closure began.

Notably, basin excavation was completed at several power plants: Dan River Steam Station (Eden, North Carolina), along with Sutton Plant (Wilmington, North Carolina), Riverbend Steam Station (Mount Holly, North Carolina), East Bend Station (Union, Kentucky), and the second of three basins at W.S. Lee Steam Station (Williamston, South Carolina).

In Indiana, Duke Energy received approval from state regulators for the closure and post-closure plans for several of its basins; discussions continue to move toward resolution on the others.

Systemwide, the company completed technology upgrades at its operating coal plants to take all ash basins permanently out of service, with the exception of Gallagher Station (Floyd County, Indiana) since it is being retired in 2022.

Production ash is now handled dry – either in lined landfills or recycled. Additionally, the company is nearing completion on ash recycling facilities at three retired coal plant sites in North Carolina to reprocess ash for use in concrete beginning in 2020.

Learn more about how we are leading the industry in safely closing ash basins.

Environmental Scientists Protect Lakes and Habitat

In lakes and rivers adjacent to its power plants, scientists from Duke Energy take water samples, survey the fish population, and collect habitat and lake health information throughout the year.

What does that have to do with generating power? The data helps optimize plant operations while also complying with state and federal regulatory requirements that protect the public and the environment.

Duke Energy's scientific monitoring has been underway for 60 years in some water bodies, allowing the company, governmental agencies and other stakeholders to see long-term trends and confirm that environmental conditions remain healthy for aquatic life and human use.

In lakes and rivers adjacent to its power plants, scientists from Duke Energy take water samples, survey the fish population, and collect habitat and lake health information throughout the year.

Duke Energy wildlife biologist Tim Hayes protects animals and plants at renewable energy sites.

Samples are handled under strict guidelines and sent to regulators for independent verification, using scientifically established procedures with a robust quality assurance process in the field and the lab.

Lake Norman north of Charlotte, North Carolina, for example, was created by Duke Energy as home to three generating facilities: Cowans Ford Hydro Station, Marshall Steam Station and McGuire Nuclear Station. The company has conducted scientific monitoring of the lake since 1959, collecting more than 20,000 samples with nearly 1.5 million individual test results.

Such tests aren't limited to areas immediately around generating facilities – the company collects samples from over 70 locations lakewide, including near each public drinking water intake, sharing data with local municipalities. Additionally, semiannual fish testing by Duke Energy scientists demonstrates that fish are healthy and thriving; sample results are independently tested and verified by state resource agencies.

Similar tests (such as water quality monitoring and fish sampling) are conducted across all 27 North Carolina water bodies managed by the company, as well as several waterbodies within South Carolina and Indiana. In sum, decades of scientific monitoring confirm that Duke Energy facilities continue to be safely operated under strict permits designed to protect public health and the environment.

Keeping the Lights On and Protecting Wildlife

Duke Energy Renewables Environmental Development Director Tim Hayes spends a lot of time looking at the ground.

That might seem odd, but it's the way of a wildlife biologist. Eyes pointed just beyond his feet, he looks for tufts of fur, tracks, and even scat for clues as to what wildlife lives near solar and wind sites.

People are often surprised to learn energy companies have biologists, but it's imperative as the company expands renewables. When his team isn't looking for wildlife, they're working with government agencies, nonprofits and technology developers to create policies, products and plans that keep wildlife safe while producing clean energy that customers depend on.

Before construction, they survey species, consult with wildlife agencies, perform biological surveys and decide if the site will move on to construction or if the wildlife risk is too great.

During construction, Duke Energy hires consultants who specialize in the area's threatened or endangered plants and animals. At Mesteño Wind Project, the team worked around species like the Texas tortoise.

The crew built a dirt road through an area Hayes calls a hotbed of tortoise activity. The area was unavoidable, but the tortoise loves the thick brush (a shady place to rest), good soil and plentiful water, so the team educated workers about the tortoise and set a 5 mph speed limit.

Once a site is in production, they monitor ecosystem health. When the results are unexpected, Hayes' team finds solutions. At Los Vientos Wind Project, the team noticed higher than expected bat fatalities, which was an opportunity to test a new Bat Deterrent System. The two-year study reduced overall fatalities by half, and now they're pursuing the continental United States' first commercial installation of the technology.

As the industry grows, it's vital to find solutions like these. Hayes knows it's not a problem he can solve on his own, but he's glad to be part of the solution.

Staying Ahead of Cyber Threats

Cybersecurity continues to be a growing national topic. From threats to the financial, utilities and telecommunications sectors to concerns of election meddling and ongoing email phishing campaigns to expose personal information.

Threats continue to grow and bad actors continue to become more sophisticated as they target their audiences.

As Duke Energy uses more digital capabilities, modernizes the energy grid and introduces new applications, including the customer app, the company is staying ahead to protect the grid, our generating assets and customer, employee and shareholder information. As the largest operator of the energy grid, using a multilayered approach with many safeguards for cybersecurity is a top priority for Duke Energy.

Duke Energy continues to modernize its cyber protection processes. The company is implementing security measures for operational technology, such as substations, power plants and new grid mechanisms.

Reliable Power

Reliable power is one of Duke Energy's most important commitments to its 7.8 million electric customers. To help improve reliability performance, each year the company sets customer delivery and generation reliability targets.

Customer Delivery

In 2019, Duke Energy began using the customer delivery reliability measure, which takes into account the average duration of outages, customers experiencing multiple outages and customers experiencing lengthy outages. The 2019 target was 100 or higher, and the result was 144.

Generation

Duke Energy's diverse generation fleet with carbon-free nuclear, hydro, wind and solar; lower-carbon natural gas; and higher-carbon coal and oil reliably met customer demand.

The nuclear fleet optimized reliability, which is a measure of generation reliability along with the cost to achieve that reliability, continued a five-year positive trend, with a 2019 index of 183.36. The fossil/hydro fleet's optimized reliability continued its five-year positive trend, with a 2019 index of 57.83. The commercial fleet's renewables availability was 94 percent, showing solid performance in 2019.

Generation Reliability

	2016	2017	2018	2019	2019 Target
Nuclear optimized reliability[2,3]	243.88	230.46	198.49	**183.36**	**203.67**
Fossil/hydro optimized reliability[2,3]	63.88	61.64	59.54	**57.83**	**57.34**
Commercial renewables availability[3]	94.2%	94.6%	95.3%	**94.0%**	**95.0%**

1 Outages with a duration greater than five minutes; statistics are reported per customer, excluding planned outages. Calculated in accordance with applicable guidelines.
2 Lower numbers indicate better performance.
3 Based on units operated by Duke Energy and ownership share.

In an effort to protect its systems and engage stakeholders, Duke Energy routinely shares information, lessons learned and best practices with industry partners, peer utilities and government agencies, including the Department of Homeland Security and the Federal Bureau of Investigation.

Duke Energy also has a dedicated team focused on educating employees and increasing awareness of threats – from routine test phishing emails and annual trainings to seminars and video resources.

The company maintains an incident response team of highly-skilled cybersecurity professionals who identify, mitigate and engage organizations across the company, as well as local, state and federal agencies to respond to issues. And, to ensure we are adequately prepared to respond, the company conducts drills to test emergency response plans and ensure employees understand their role in case an event occurs.

In an effort to protect its systems and engage stakeholders, Duke Energy routinely shares information, lessons learned and best practices with industry partners, peer utilities and government agencies, including the Department of Homeland Security and the Federal Bureau of Investigation.

The Power of Partnership in Red Tide Recovery

Residents and tourists along Florida's world-famous Gulf Coast often enjoy catching the popular red drum, or redfish. Yet in the wake of a historic red tide bloom, anglers of all ages released tens of thousands of the fish instead.

Red tide occurs naturally during most late summers from a bloom of dinoflagellate (algae) that usually dies off in weeks. When a 2017 bloom lingered into 2019, heartbreaking losses of manatees, sea turtles, fish and other marine life resulted.

The massive redfish release effort resulted from a partnership between Duke Energy and the Coastal Conservation Association Florida (CCA). Employees at Duke Energy's Mariculture Center in Crystal River, Florida spawned and raised 34,000 juvenile "fingerlings" and 300 adult redfish. Members of CCA Florida arranged the release events after Duke Energy received permits from Florida's Fish and Wildlife Commission.

By late 2019, release events were completed within a 500-mile span between the Pan Handle's Gulf County to Collier County on the southwest coast.

Fingerlings were released in locations lined with mangroves and other hiding places to increase their survival chances against predators. Adults, which can live for up to 40 years, were tagged and hand-released. If caught, anglers can help researchers by calling the phone number on the tag.

Will 34,300 redfish make a difference? One female redfish can spawn up to 2 million eggs per batch, making millions of new redfish a possibility. That's encouraging news for Florida's delicate coastal ecosystem – including those counting on its longevity to thrive.

Environmental Performance Metrics

2019 Electricity Generated and Generation Capacity[1]

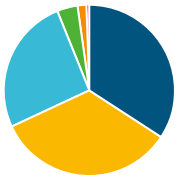
	Electricity Generated (net megawatt-hours)		Generation Capacity (megawatts)	
	MWh (thousands)	Percent	MW	Percent
Total Carbon-Free	**85,885**	**39.7%**	**12,710**	**23.8%**
Nuclear	73,948	34.2%	8,889	16.7%
Wind	6,468	3.0%	1,457	2.7%
Conventional hydro	3,235	1.5%	1,357	2.5%
Solar	2,234	1.0%	1,007	1.9%
Total Lower-Carbon	**74,864**	**34.6%**	**20,261**	**38.0%**
Natural gas	74,834	34.6%	20,257	38.0%
Biomass	30	0.0%	4	0.01%
Total Higher-Carbon	**56,371**	**26.0%**	**18,264**	**34.2%**
Coal	56,276	26.0%	16,989	31.8%
Oil	95	0.0%	1,275	2.4%
Pumped-Storage Hydro[2]	**(714)**	**(0.3)%**	**2,140**	**4.0%**
Total	**216,406**	**100%**	**53,375**	**100%**
Purchased Renewables	**9,407**	**Equivalent to 4%**	**4,298**	**Equivalent to 8%**

1 All data, except for purchased renewables, based on Duke Energy's ownership share of generating plants as of December 31, 2019. Totals may not add up exactly because of rounding.
2 Pumped-storage hydro helps meet peak demand and, like other storage technologies, consumes more energy than it produces.

2019 electricity generated and generation capacity

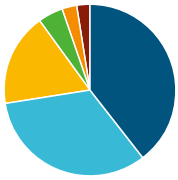
Duke Energy has a diverse, increasingly clean generation portfolio. Almost 40 percent of the electricity we generated in 2019 was from carbon-free sources, including nuclear, wind, hydro and solar. Almost 35 percent was from lower-carbon natural gas, which emits about half as much carbon dioxide as coal when used for electric generation. The remaining 26 percent was from higher-carbon coal and oil. Taken together, owned and purchased renewables are equivalent to over 9 percent of our MWh generation. Duke Energy Renewables sells the electricity and/or Renewable Energy Certificates (RECs) it generates to its customers.

2019 Electricity Generated[1]



34.6% Natural gas
34.2% Nuclear
26.0% Coal
4.0% Wind/solar
1.5% Conv. hydro
0.04% Oil

2019 Generation Capacity[1]



38.0% Natural gas
31.8% Coal
16.7% Nuclear
4.6% Wind/solar
2.5% Conv. hydro
2.4% Oil

1 Excludes pumped-storage hydro.

Fuels Consumed For Electric Generation[1]

	2008	2017	2018	2019
Coal (million tons)	63.1	31.1	29.3	**24.3**
Oil (million gallons)	230.6	30.1	64.9	**26.0**
Natural gas (billion cubic feet)	163.4	496.6	610.3	**567.1**

1 All data based on Duke Energy's ownership share of generating assets as of the end of each calendar year.

Fuels consumed for electric generation

Since 2008, the use of coal and oil as generation fuels has significantly decreased. These fuels are being replaced by natural gas and renewables.

Environmental Performance Metrics

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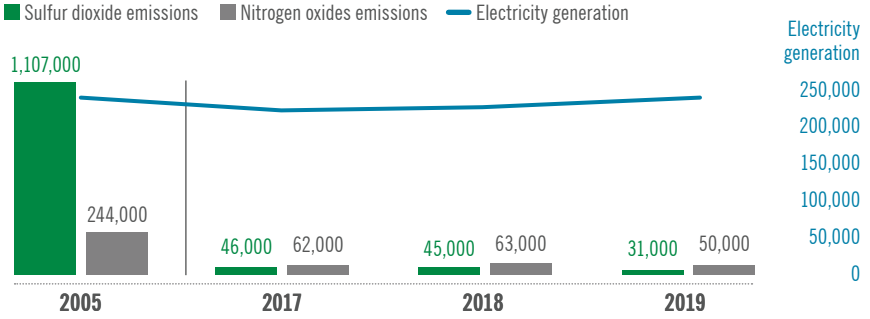
Water Withdrawn and Consumed for Electric Generation
(billion gallons)

	2011	2017	2018	2019
Withdrawn	5,900	5,293	4,991	**4,657**
Consumed	105	71	84	**73**
Consumption intensity (gallons per MWh generated)	456	324	374	**337**

Emissions From Electric Generation[1]

	2005	2017	2018	2019
CO_2 emissions (thousand tons)	153,000	105,000	105,000	**93,000**
CO_2 emissions intensity (pounds per net kWh)	1.29	0.96	0.94	**0.86**
SO_2 emissions (tons)	1,107,000	46,000	45,000	**31,000**
SO_2 emissions intensity (pounds per net MWh)	9.3	0.4	0.4	**0.3**
NO_x emissions (tons)	244,000	62,000	63,000	**50,000**
NO_x emissions intensity (pounds per net MWh)	2.1	0.6	0.6	**0.5**
CH_4 emissions (CO_2 equivalent) (thousand tons)	420	230	218	**186**
N_2O emissions (CO_2 equivalent) (thousand tons)	731	391	369	**361**

Sulfur Dioxide and Nitrogen Oxides Emissions (tons)[2] and Electricity Generation (thousand net megawatt-hours)



Methane Emissions from Natural Gas Distribution
(thousand tons)[3]

	2016	2017	2018	2019
CH_4 emissions (CO_2 equivalent)	184	175	176	**185**

1 All data based on Duke Energy's ownership share of generating assets as of December 31, 2019. Totals may not add up exactly due to rounding.
2 SO_2 and NO_x reported from Duke Energy's electric generation based on ownership share of generating assets.
3 Methane emissions are calculated by applying EPA emission factors to the miles of pipeline and the number of services, and adding component leaks based on survey data.

Water withdrawn and consumed for electric generation

Water withdrawn is the total volume removed from a water source, such as a lake or a river. Because of the once-through cooling systems on many of our coal-fired and nuclear plants, over 98 percent of this water is returned to the source and available for other uses. *Water consumed* is the amount of water removed for use and not returned to the source.

Emissions from electric generation

Many factors influence emissions levels and intensities, including generation diversity and efficiency, demand for electricity, weather, fuel and purchased power prices, and emissions controls deployed. Since 2005, our carbon dioxide (CO_2) emissions decreased by 39 percent, sulfur dioxide (SO_2) emissions decreased by 97 percent and nitrogen oxides (NO_x) emissions decreased by 79 percent. These decreases are primarily due to addition of pollution control equipment, decreased coal generation, increased natural gas generation and replacement of higher-emitting plants.

Methane emissions from pipeline operations

Methane (CH_4) is the primary component of natural gas, and is a greenhouse gas. We work to minimize methane emissions, but some is released during pipeline operations and maintenance. Duke Energy is a founding partner of the U.S. EPA's Natural Gas Star Methane Challenge program, which is aimed at cost-effective technologies and practices that improve operational efficiency and reduce methane emissions.

Environmental Performance Metrics

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Sulfur Hexafluoride Emissions from Electric Transmission and Distribution

(thousand tons)[1]

	2016	2017	2018	2019
SF_6 emissions (CO_2 equivalent)	573	536	337	**535**

Toxic Release Inventory

(thousand pounds)[2]

	2007	2016	2017	2018
Releases to air	97,969	6,074	5,226	**5,110**
Releases to water	257	212	174	**520**
Releases to land	22,052	9,738	9,728	**10,148**
Off-site transfers	155	2,628	2,211	**3,469**
Total	**120,434**	**18,652**	**17,338**	**19,246**

Waste

	2016	2017	2018	2019
Solid waste				
■ **Total generated** (thousand tons)[3]	102	109	104	**118**
■ **Percent recycled**	76%	80%	79%	**77%**
Hazardous waste generated (tons)[4]	1,195	126	281	**232**
Low-level radioactive waste (Class A, B and C) generated (cubic feet)[5]	193,996	148,188	126,123	—

Reportable Oil Spills[6]

	2016	2017	2018	2019
Spills	40	46	32	**17**
Gallons	1,143	5,062	387	**140**

Environmental Regulatory Citations[7]

	2016	2017	2018	2019
Citations	9	10	17	**25**
Fines/penalties (dollars)	$7,114,090	$19,797	$533,776	**$97,558**

1 SF_6 emissions fluctuations are due to maintenance, replacement and storm repair needs.
2 Data pertain to electric generation facilities Duke Energy owns or operates and where Duke Energy is the responsible reporting party. Totals may not add up exactly due to rounding.
3 Weights are estimated based on volumes where necessary. Excludes Duke Energy Renewables, which has smaller volumes, and large nonreplicable projects such as plant demolitions. Piedmont Natural Gas is included beginning in 2017.
4 Excludes Duke Energy Renewables. Hazardous waste generation fluctuates mainly due to maintenance projects.
5 Total of Class A, B and C waste disposal as reported to the Nuclear Regulatory Commission. Crystal River Unit 3 is not included in these statistics, because it is not part of the operating fleet, and is retired. Data for 2019 will be available later in 2020.
6 Excludes Piedmont Natural Gas.
7 Includes international and U.S. federal, state and local citations and fines/penalties.

Sulfur hexafluoride emissions

Sulfur hexafluoride (SF_6) is an insulating gas used in high-voltage electric transmission and distribution switchgear equipment, and is a greenhouse gas. We work to minimize SF_6 emissions, but some is released during transmission and distribution operations and maintenance.

Toxic Release Inventory (TRI)

Duke Energy's TRI releases for 2018 were down 84 percent from 2007, primarily due to the significant investments we've made in environmental controls for our power plants, and decreased coal generation. Recently increased releases were largely due to coal ash basins and their closure operations. These releases are expected to decrease significantly as coal ash basins are closed. (Data for 2019 will be available in August 2020.)

Waste

Due to downturns in market demand for waste wood for biomass generation, we did not meet our goal to recycle 80 percent of our solid waste. We are working on strategies to improve performance on this goal in the future. (This goal excludes Duke Energy Renewables, which has a relatively small waste stream.)

Reportable oil spills

Oil spills include releases of lubricating oil from generating stations, leaks from transformers, or damage caused by weather or by third parties (typically because of auto accidents).

Environmental regulatory citations

Fines/penalties were relatively large in 2016 because of a 2014 oil spill at the Beckjord Station in Ohio, and a 2014 coal ash spill. See the "Legal Cases Resolved" article in the 2015 Sustainability Report. The increase in the number of citations from 2018 to 2019 was due mostly to an increase in water discharge reporting and compliance issues, which have been resolved with regulatory authorities.