2024 - 2028
Delaware State Energy Plan

Delaware State Energy Office

DNREC Division of Climate, Coastal and Energy

December 2024


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Authors and Acknowledgements

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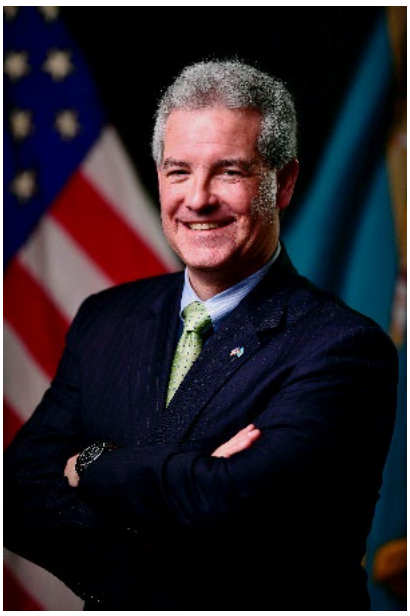
A Message From DNREC Secretary Shawn M. Garvin



Delaware's 2024 – 2028 State Energy Plan outlines strategies to fulfill state energy goals, modernize an aging energy grid and pave the way for a resilient and equitable energy future.

As we grow our collective understanding of Delaware's energy profile and its evolution in the face of climate change, this plan serves as a living document to offer adaptive strategies that can shift alongside the changing times.

The Delaware Climate Change Solutions Act of 2023 established statutory targets for greenhouse gas emissions reductions of 50% from a 2005 baseline by 2030, and achieving net zero emissions by 2050.

Strategies for reaching those goals are laid out in Delaware's Climate Action Plan, and include expansion of clean and renewable energy, increased energy efficiency measures and transitioning to zero-emission vehicles.

To meet our greenhouse gas reduction targets, shifting residential and commercial buildings from fossil fuels to renewably sourced energy and improving building energy efficiency is critical. Equally critical is the need to modernize our grid to assure it can handle higher loads, as well as accommodate growing renewable energy sources as they come online.

The Plan outlines grid reliability and resilience strategies such as updating distribution networks for renewable energy sources, utilizing non-wires alternatives to address increasing demand and costs, and devising innovative rate designs and programs that promote stabilization.

As Delaware moves forward in addressing our energy needs now and into the future, a foundational component of the Plan is energy justice. Energy justice, or energy equity, seeks to identify and address the inequities that result from energy systems and related extractive economies. This includes energy burden, exposure to more extreme heat, exposure to increased air pollution and poor health outcomes. This Plan addresses historical causes of energy inequality and the associated health, social and economic burdens.

The Plan also identifies strategies to ensure Delaware's workforce is prepared to meet the demands of a clean energy future. Expanding professional development, career pathway programs and removing barriers keeping workers out of the sector will be key in developing a skilled workforce that is adequately prepared to move Delaware into a clean energy future.

Developed over the course of more than a year and a half, the Plan incorporates and synthesizes input from technical and community stakeholders, members of the public, other state policies and goals from the Climate Action Plan.

Feedback from technical and community experts was primarily achieved through the Governor's Energy Advisory Council. Additionally, two rounds of public input sessions informed the strategies identified in the Plan.

Moving forward, the successful implementation of the State Energy Plan will require continuing collaboration among government, industry and residents. Delaware's commitment to energy justice is emphasized by its dedication to community and stakeholder engagement, ensuring that all Delawareans, particularly those in disadvantaged communities, can benefit from these initiatives.

Shawn M. Garvin
Secretary, Delaware Department of Natural Resources and Environmental Control

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Executive Summary

Delaware is in the midst of a far-reaching energy transition. The energy systems that we rely on to power, cool and heat our homes, meet our transportation needs and power commerce and industry are facing unique challenges, including reducing climate impacts, increasing the use of renewable energy, improving energy efficiency, addressing issues of energy justice, adapting the power grid to changes in generation and distribution of power and preparing our workforce to meet our changing energy needs. The 2024 - 2028 State Energy Plan (Plan) serves as a guidebook for the State Energy Office (SEO) and stakeholders in government, industry and the public to meet these challenges over the next five years and beyond.

Development of the Plan

Development of the 2024 - 2028 State Energy Plan was guided by the statutory mandates of the Delaware Energy Act and the Climate Change Solutions Act of 2023. The Delaware Energy Act established the statutory authority for the SEO to develop and update a comprehensive state energy plan every five years that ensures equitable access to clean and affordable energy to all Delawareans.[1] The Plan incorporates input from the Governor's Energy Advisory Council (GEAC, or Council) and a variety of stakeholders, is designed to support the Climate Action Plan and builds on the ongoing development of energy policies and programs.

The GEAC was established in 2004 and charged with updating the state energy plan every five years, with the last plan produced in 2009.[2] In 2022, the Delaware Energy Act was amended to expand the Council to 25 members and update its mission. It was further updated in 2023 to clarify the respective roles of the GEAC and the SEO. The GEAC, staffed and supported by the SEO, prepares policy and program recommendations, drawing upon the expertise and policy perspectives of a wide array of stakeholders. The SEO prepares a new energy plan based on the recommendations of the GEAC, additional analysis, public input and statutory requirements.

[1] URL: https://delcode.delaware.gov/title29/c080/sc02/index.html
[2] URL: https://dnrec.delaware.gov/climate-coastal-energy/energy-office/advisory-council/

The Delaware Energy Act mandates that the Plan include but not be limited to "… encouraging and promoting conservation of energy … and encouraging and promoting the use of renewable electric generation facilities and alternative energy technologies…" and "support[s] the state's greenhouse gas emissions reductions targets…"

The reconstituted GEAC began meeting in June 2023 and established four workgroups: Renewable Energy and Clean Technologies, Energy Efficiency and Electrification, Grid Modernization, and Environmental Justice and Energy Equity. In 2023, the GEAC held 25 public meetings (five each of the full Council and each workgroup) and gathered public input at three public engagement sessions. At the end of this process the GEAC met again in January 2024 to review and approve 82 recommendations, which are summarized in the Council's 2023 Activity Report.[3]

In developing its recommendations, the GEAC built on the policy work of previous planning efforts, including the 2009 Delaware Energy Plan, the 2021 Climate Action Plan and the many energy programs and policy initiatives already in place. The Council's recommendations are incorporated in the Plan.

Strategies for Delaware's Energy Future

Building on these statutory mandates and the broad public engagement process, five overarching action categories are identified:

- **Energy Justice** that addresses historical causes of energy inequality and the associated health, social and economic burdens.
- **Renewable Energy and Clean Technologies** that centers on the carbon-free generation essential to achieving goals identified in the Climate Change Solutions Act.
- **Energy Efficiency and Promoting Beneficial Electrification** in homes and businesses to enable achievement of the state's greenhouse gas emissions reduction goals.
- **Grid Modernization** to overcome new and emerging challenges to grid reliability and take advantage of new energy opportunities.
- **Workforce Development** to ensure Delaware's workforce is prepared to meet the demands of a clean energy future.

[3] URL: https://documents.dnrec.delaware.gov/energy/geac/2023-Annual-Activity-Report.pdf

Below is a more detailed description of each action category and a summary of the strategies each entails.

Energy Justice

Energy justice, or energy equity, builds on the environmental justice movement to address the inequities that result from energy systems and related extractive economies. This includes energy burden (the relative cost of energy), exposure to extreme heat, exposure to increased air pollution and poor health outcomes.

Energy justice is more than just protecting communities from harm; it is also about ensuring fair access to opportunity. The clean energy transition will bring many benefits to Delaware, including cleaner air, cleaner transportation, more efficient homes with lower energy bills and access to good jobs in the rapidly expanding clean energy sector. Energy justice means ensuring that all communities have equitable access to these benefits.

The Plan details strategies to ensure that all communities are engaged in, and benefit from, the energy transition:

- Identify communities in the state that are affected by energy inequities.
- Identify and work with trusted partners to effectively engage those communities.
- Identify policy gaps and direct policies and programs to serve those communities.
- Continually monitor and measure progress towards addressing those inequities to continually improve services to those communities.

Renewable Energy and Clean Technologies

Promoting renewable energy and other clean technologies is central to the Plan. Renewable energy policies and programs have been in effect for more than 20 years, and the Plan aims to further these efforts by pursuing pathways to net zero emissions and expanding equitable access to renewable energy.

The Plan details strategies to promote clean and renewable energy, including:

- Map pathways to achieve net zero emissions in the energy sector by 2050.
- Promote continuing growth of solar generation at all scales and expand equitable access to solar energy.
- Develop and implement an offshore wind strategy that meets Delaware's needs.
- Monitor and assess potential benefits of emerging renewable and clean technologies.
- Assess the feasibility and market potential of renewable fuels.

Energy Efficiency and Beneficial Electrification

Shifting residential and commercial buildings from fossil fuels to renewably sourced energy and improving building energy efficiency are critical in realizing Delaware's greenhouse gas reduction goals. The SEO will lead this effort by promoting electrification of vehicles, homes and businesses, and improving energy efficiency through home improvements and updated building codes.

The Plan details strategies to expand energy efficiency and electrification, including:

- Improve, expand or create energy efficiency and electrification programs for residential and commercial buildings.
- Strengthen building energy codes and standards.
- Promote vehicle electrification.
- Establish more rigorous tracking and reporting mechanisms for program implementation.

Grid Modernization

Delaware's grid is facing increasing challenges, including higher loads, the need for new technologies and climate-related stresses. Much of our electric grid was designed and built in the 1960s and 1970s. While new technologies have been developed and deployed, much of the grid infrastructure we use today is old and needs to be modernized to accommodate new technologies.

The Plan takes a critical look at our grid infrastructure and proposes strategies designed to maximize its resiliency, prepare it for increased renewable generation and meet increasing demand without increasing energy burdens. Strategies include:

- Prepare electric utility transmission lines and substations to integrate the increasing use of renewable resources.
- Modernize Delaware's distribution networks to integrate distributed energy resources and non-wires alternatives.
- Maximize resiliency of energy infrastructure to combat climate change vulnerabilities such as extreme heat and weather events.
- Adopt innovative rate design and utility programs that use smart grid technologies for peak shaving, demand response and increased reliability as cost effectively as possible.

Workforce Development

As the transition to clean energy progresses, Delaware employers in the sector are facing hiring challenges. Expanding professional development and career pathway programs and removing barriers keeping workers out of the sector will be key in developing a skilled workforce that is adequately prepared to move Delaware into a clean energy future.

The Plan proposes strategies to recruit and train a modern energy workforce, including:

- Complete a workforce needs assessment for the clean energy economy.
- Expand clean energy workforce development programs.
- Increase collaboration in expanding clean energy workforce development programs.
- Build awareness of clean energy jobs and training opportunities.
- Build the professional capacity in state government agencies to meet the planning, program and regulatory challenges of leading the energy transition.

The Plan also presents a State Energy Profile, which presents a snapshot of current energy generation, transmission, distribution and end use, along with an overview of the agencies, utilities and other key entities that shape our energy systems. The successful implementation of the Plan will require collaboration among government, industry and residents.

This Plan is best understood as a living document. Conditions will evolve and new technologies will develop. While our energy and climate planning efforts require looking ahead as far as 2050, this iteration of the Plan is designed to guide us for the next five years, at which time it will be updated.

Just as the development of the Plan involved broad public involvement, implementing it will likewise require the participation of stakeholders from all points of view in the public and private sectors.

With gratitude to the many Delawareans who participated in offering their opinions, expertise and recommendations, the State Energy Office presents the 2024 - 2028 Delaware State Energy Plan as the basis for our common work navigating and managing the energy transition.

1. Introduction

Delaware is undergoing a rapid transformation of its energy landscape. The 2024 – 2028 Delaware State Energy Plan describes the actions the state can take to achieve greenhouse gas reduction targets to mitigate climate change impacts while shifting toward a more resilient and reliable electric grid. The Delaware Energy Act establishes the statutory authority for the State Energy Office (SEO) to develop and update a comprehensive state energy plan every five years that ensures equitable access to clean and affordable energy to all Delawareans.[4]

This Plan is the product of more than a year of stakeholder and public engagement. Strategies outlined in the Plan were informed by feedback from the public gathered at events throughout the state, as well as by specific recommendations from the Governor's Energy Advisory Council.[5]

The Plan compiles information about Delaware's energy systems and outlines a series of strategies to meet the state's energy goals. In developing the Plan, the State Energy Office drew heavily upon the greenhouse gas emissions reduction strategies established in Delaware's 2021 Climate Action Plan.[6]

The publication of the 2024 – 2028 Delaware State Energy Plan comes one year after Delaware's Climate Change Solutions Act of 2023 was signed into law, which sets targets of a 50% reduction in greenhouse gas emissions by 2030 (from a 2005 baseline) and net-zero emissions by 2050.[7] While these targets are ambitious, they are in line with federal emissions goals and are necessary to mitigate the effects of climate change in Delaware. Delaware's 2020 Greenhouse Gas Inventory reports that almost a quarter (24.5%) of gross emissions are from the electric power sector.[8] For these reasons, the strategies described in the Plan are critical in meeting emissions reduction targets.

1.1 Outline of the State Energy Plan

The State Energy Profile provides a high-level overview of Delaware's current energy laws, programs and policies governing the energy systems.

[4] URL: https://delcode.delaware.gov/title29/c080/sc02/index.html
[5] URL: https://dnrec.delaware.gov/climate-coastal-energy/energy-office/advisory-council/
[6] URL: https://dnrec.delaware.gov/climate-action-plan/
[7] URL: https://legis.delaware.gov/BillDetail/130272
[8] URL: https://documents.dnrec.delaware.gov/Air/greenhouse-gas/2020-DE-GHG-Inventory.pdf

The next five chapters, which represent the heart of the Plan, outline strategies in five key areas:

- **Energy Justice** reviews the historical causes of energy inequality and the associated health, social and economic burdens, and proposes policies and programs to address those inequities.
- **Renewable Energy and Clean Technologies** focuses on carbon-free generation that is essential to achieving goals identified in the Climate Change Solutions Act of 2023, the Delaware Energy Act of 2024, and the Renewable Energy Portfolio Standards law.
- **Energy Efficiency and Beneficial Electrification** outlines policies and programs to improve energy efficiency in homes and businesses that will facilitate state greenhouse gas emissions reduction goals.
- **Grid Modernization** presents the emerging challenges to grid reliability and proposes policies to enable the grid to integrate and benefit from new energy technologies.
- **Workforce Development** proposes policies and programs to ensure Delaware's workforce is prepared to meet the demands of a clean energy future.

1.2 Development of the Plan

This plan was drafted by the SEO. It incorporates and synthesizes input from technical and community stakeholders, members of the public, other state policies and goals from the Climate Action Plan. Feedback from technical and community experts was primarily achieved through the Governor's Energy Advisory Council and its four workgroups.

1.3 Governor's Energy Advisory Council

The Governor's Energy Advisory Council (GEAC or Council) was established in 2004 and charged with, among other things, updating Delaware's energy plan every five years. The last energy plan produced by the GEAC was in 2009.

In 2022, the Energy Act was amended to expand the GEAC to 25 members and update its mission. The members, representing various state agencies and constituencies, are appointed to multi-year terms. Walter (Ed) Kee, former Secretary of Agriculture, was appointed by the Governor in 2023 to serve as the Chair for a term of three years and will be eligible for re-appointment.

The GEAC is composed of 25 members:

- 1 Chair appointed by the Governor
- 1 designee from The Public Service Commission
- 1 designee from The Public Advocate
- 1 designee from The Weatherization Assistance Program Policy Advisory Council
- 1 designee from Energize Delaware
- 1 member appointed from the Delaware Senate
- 1 member appointed from the Delaware House of Representatives
- The Secretary or designee of the DNREC
- The Secretary or designee of the Delaware Department of Transportation
- The Secretary or designee of the Delaware Department of Agriculture
- 15 members appointed by the Governor representing a variety of interests

The energy law was further updated in 2023. This legislation clarified that the SEO provide support and staff for the GEAC and incorporates the Council's recommendations when developing a new energy plan.

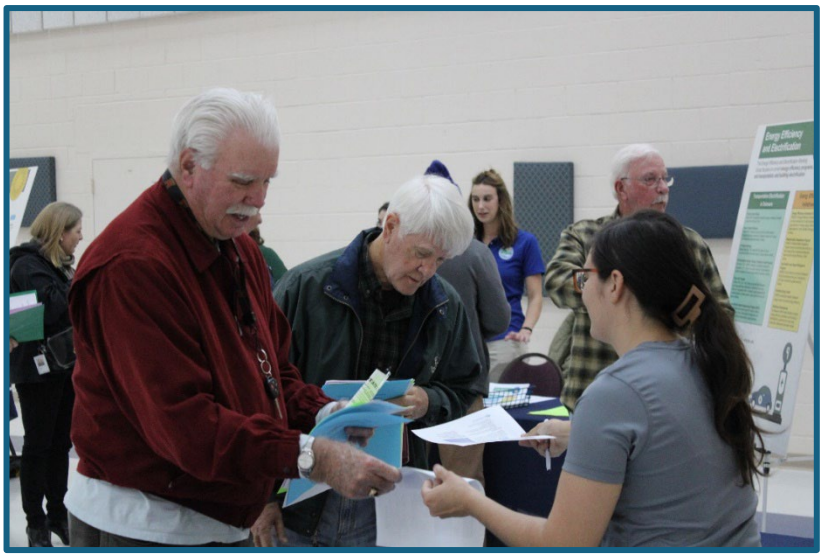
The first meeting of the reconstituted GEAC occurred on June 16, 2023. During this meeting, Chairman Kee proposed establishing four workgroups to help facilitate the work of the Council. The following workgroups were established:

- Environmental Justice and Energy Equity
- Renewable Energy and Clean Technology
- Energy Efficiency and Electrification
- Grid Modernization

Chairman Kee appointed the following workgroup chairs:

- Dale Davis, Renewable Energy and Clean Technologies;
- Bahareh van Boekhold, Energy Efficiency and Electrification;
- Dr. Steven Hegedus, Grid Modernization;
- Cassandra Marshall, Environmental Justice and Energy Equity.

To ensure that all Delawareans' interests were represented, and to benefit from the expertise of technical subject matter experts, a small number of non-GEAC members was appointed by Chairman Kee to serve on workgroups. All four workgroups were asked to consider climate change, public health and safety, workforce development, business opportunities, ratepayer impact, innovative technologies and environmental justice in their deliberations.



1.4 Public Engagement

The full Council and each workgroup met five times between July and December in 2023. All 25 meetings of the GEAC and its workgroups were open to the public, posted on the state public meeting calendar and posted on DNREC's public meeting calendar. These meetings were held in a hybrid format, allowing members and the public to participate in person or online via Zoom Webinar. Per the request of GEAC members, and in response to comments received from the public, most meetings featured two opportunities for public comment. Public comments were also welcomed through a dedicated email for the GEAC. Meeting minutes, presentations and the official recommendations were posted on the DNREC-hosted GEAC website.

During November 2023, DNREC held a series of three public engagement sessions on behalf of the GEAC, attracting 167 in-person participants. DNREC staff and GEAC members were on hand at all three events, holding informal one-on-one conversations to address individual questions and concerns. Participants were asked to complete a survey. An online version of the survey was also offered for those who could not make it to an in-person session, or for those who preferred to fill out a digital survey. A report summarizing the survey results was made available to GEAC members and posted online.[9] Three additional public engagement events were hosted by the State Energy Office in August 2024 to gather additional feedback on the strategies proposed in the state energy plan.

[9] URL: https://documents.dnrec.delaware.gov/energy/geac/Public-Engagement-Summary-Report.pdf

2. Delaware's Energy Profile

Delaware presents a unique energy landscape characterized by its geography, population and location in the Mid-Atlantic region.

2.1 Overall Energy Consumption

In 2021, Delaware consumed 295 trillion British Thermal Units (BTUs) of energy, ranking 47th in the nation for energy consumption. Delaware is also the lowest energy producer of the 50 states, with most of the electricity generated in-state fueled by natural gas imports, with a smaller portion powered by solar. Delaware used almost 70 times more energy than it produced in 2020.

Figure 1 shows the progression of Delaware's total energy consumption through 2020 based on US Energy Information Administration (EIA) data. BTUs are used to create a common measure to compare energy consumption using electricity, heating fuels and transportation fuels.

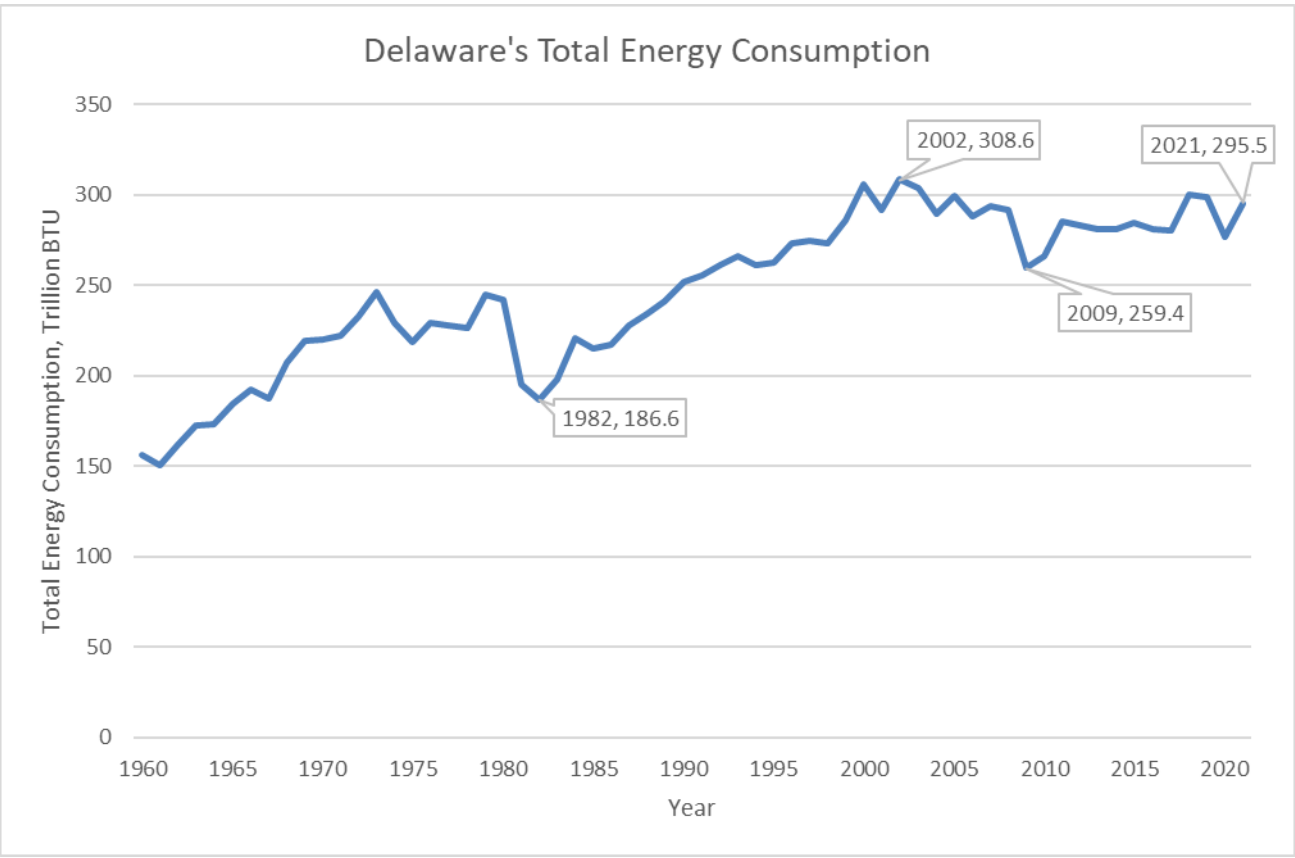


Figure 1: Delaware's Total Energy Consumption, 1960 - 2021

Between 1960 and 2002, the state's energy consumption rose at an average of 1.7% annually. Energy consumption peaked in 2002 at 309 trillion BTUs.

2.2 Delaware's End-Use Energy Consumption

The breakdown of end-use energy consumption by sector in Delaware highlights distinct patterns across various sectors. Figure 2 shows that, according to data from the EIA and

Lawrence Livermore National Laboratory (LLNL), Delaware's transportation sector consumes 79.6 trillion BTUs, followed by the industrial sector (72.4 trillion BTUs), commercial sector (33.8 trillion BTUs) and the residential sector (36.3 trillion BTUs). Electricity generation, which provides energy services to the other sectors, consumed 30.8 trillion BTUs.

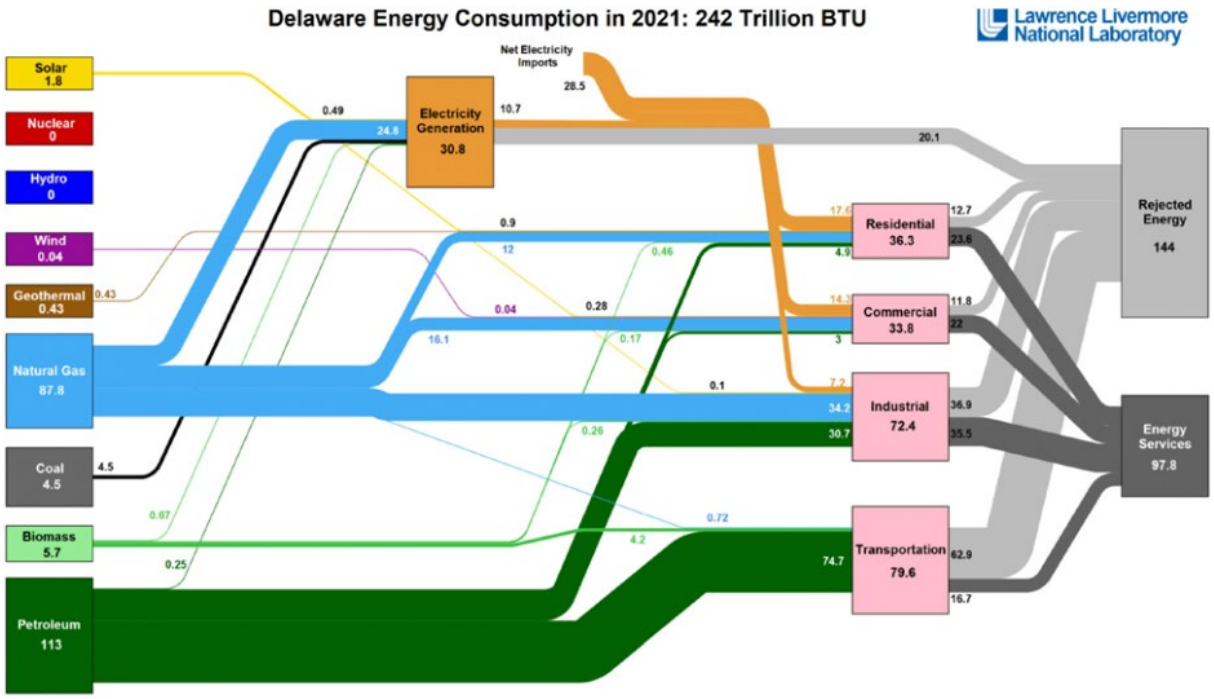


Figure 2: Delaware Energy Consumption by Sector in 2021.[10]

Rejected energy (144 trillion BTUs) refers to energy that is lost during conversion or utilization and is typically released as waste heat into the environment. Energy efficiency measures are designed to reduce the amount of energy lost during conversion or utilization.

2.3 Electricity

To meet electricity demand in Delaware, electricity is generated both in and outside of the state. In-state generation is dominated by natural gas, while electricity brought in from neighboring states is generated by a combination of natural gas, nuclear power and coal. Most of the electricity consumed in Delaware comes from out of state, either through electric power lines or natural gas transmission pipelines.

2.3.1 The Electric Grid

Delaware's electric grid is shaped by Delaware's geography and distribution of population. Delaware is located on the Delmarva Peninsula and has a population of a little over 1 million. Electric load (power consumption) is concentrated in the northern, more populous area of the state. Delaware is situated within the territory served by PJM Interconnection, LLC (PJM), the regional transmission organization that manages the electric grid and wholesale power markets

[10] Source: Lawrence Livermore National Laboratory

for roughly 65 million people through 21 power delivery utilities. The PJM territory covers 13 states and the District of Columbia, from New Jersey to North Carolina, and parts of Illinois.

Modernizing the electric grid, including the transmission and distribution systems, is crucial to integrating more renewable energy, improving reliability, electrifying residential and commercial buildings and increasing adoption of electric vehicles. The transmission system - lines carrying 69 kilovolts (kV) or above - is often compared to the interstate highway system, while the distribution system - primary and secondary lines carrying 34 kV and below - is likened to local streets and roads. Transmission lines move power from generators to substations, where power is stepped down to distribution level voltages that serve homes and businesses.

Transmission upgrades will be needed to accommodate large new sources of renewable energy, such as offshore wind, while distribution system upgrades will be needed to accommodate growth of smaller sources of renewable energy, such as distributed solar.

Energy storage technologies such as batteries and advanced metering and controls hold the promise of providing additional flexibility and security to the grid. Increased energy storage also helps to increase Delaware's resilience as the state faces increasing vulnerabilities from natural and human-caused outage events.

According to the EIA, Delaware's electric customers used roughly 11.3 million megawatt hours (MWh) of electricity a year in 2022.[11] Energy consumption in Delaware is primarily met by fossil fuels, predominantly natural gas.

2.3.2 Delaware Electric Utilities

Delmarva Power & Light (DPL) is regulated by the Public Service Commission (PSC) and does not own generating assets. DPL procures electricity, including renewable energy, through markets. There are nine municipal electric companies in Delaware, eight of which are managed by the Delaware Municipal Electric Corporation (DEMEC). Municipal electric companies operate under the authority of their municipal governments. The Delaware Electric Cooperative (DEC), a rural electric cooperative under Delaware law, reports to its members.

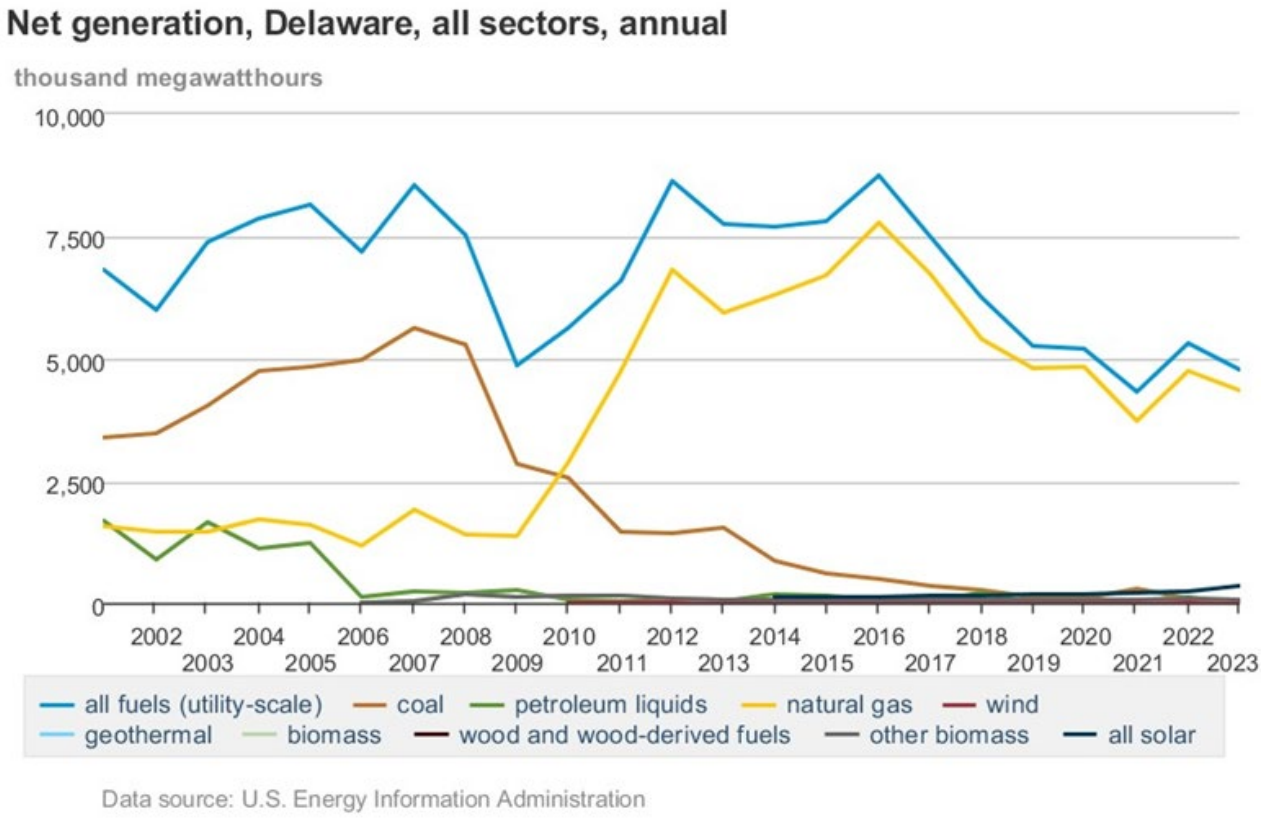
2.3.3 Electric Supply

Delaware is a net electricity importer. The percentage of imports varies year to year due to a variety of factors, but typically ranges from 30% to 55%. Natural gas represents approximately 65.6% of the total installed capacity in the Delmarva Peninsula, while oil represents approximately 21.3% and coal 13%. Comparatively across PJM territory, natural gas accounts for 46.6% of the installed capacity, while coal and oil make up 24% and 3.5% respectively. In 2022, natural gas fueled 87% of Delaware's total in-state electricity generation, followed by coal, petroleum and renewables.[12]

[11] U.S. EIA, Delaware State Profile, https://www.eia.gov/beta/states/states/de/data/dashboard/electricity
[12] U.S. EIA, Delaware State Profile, https://www.eia.gov/beta/states/states/de/data/dashboard/electricity

2.3.4 Electric Generation

Delaware had approximately 3,273 MW of installed generation capacity as of November 2022, approximately 2/3 of the capacity needed to meet the summer peak demand. Delaware imports the remaining electricity needed from the PJM grid. The coal-fired Indian River Power Plant is



scheduled for retirement in the spring of 2025. Figure 3 shows the generation of Delaware'spower plants by fuel sources.

Figure 3: Delaware Net Electric Generator Fuel Sources, Historical

Since 2000, 41% to 68% of Delaware's electricity has flowed into the state over transmission lines from generating units located in neighboring states.

The 2024 PJM load forecast for Delaware projected a summer peak demand of 2,634 megawatts (MW) and a winter peak demand of 2,293 MW. PJM projects incremental demand growth over the next decade. Figure 4 shows PJM's 2024 load forecast for Delaware.[13]

[13] PJM 2023 Delaware State Infrastructure Report (January 1, 2023 – December 31, 2023) https://www.pjm.com/-/media/library/reports-notices/state-specific-reports/2023/delaware.ashx

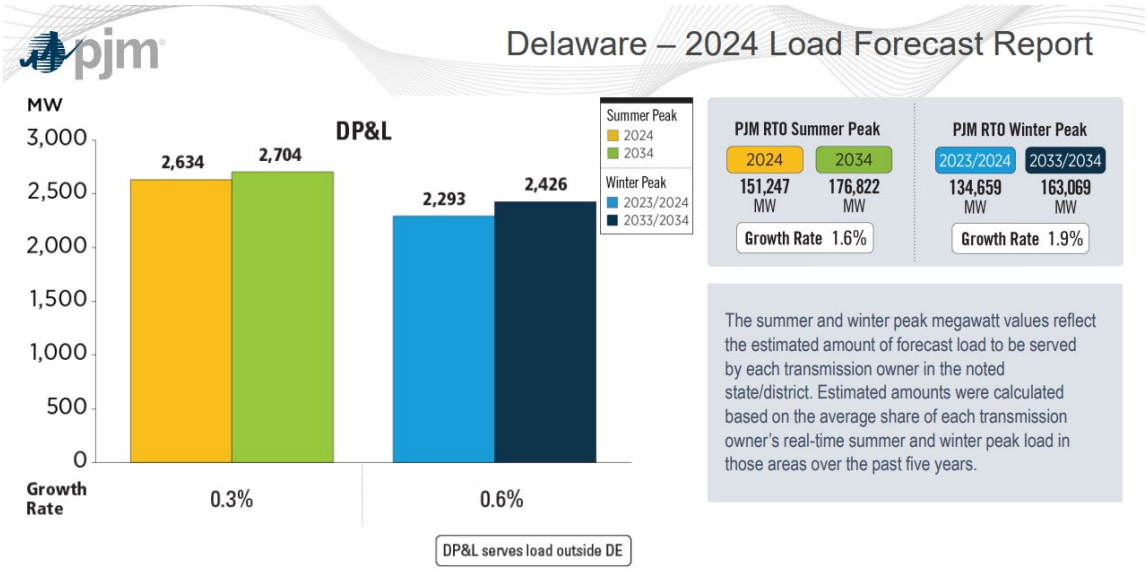


Figure 4: PJM Load Forecast for Delaware

2.3.5 Renewable Energy

Delaware's Renewable Energy Portfolio Standards Act (REPSA) mandates that an increasing percentage of the electricity sold in the state comes from renewable resources each year until 2035. REPSA requires that 24% of Delaware's electricity sales (including 3% solar) be sourced from renewable energy in the current year, increasing to 40% (including 10% solar) by 2035. Under REPSA, large industrial customers with a peak demand in excess of 1,500 kilowatts are eligible to exempt themselves from renewable energy portfolio standards (RPS) compliance costs.

DPL's Renewable Energy Portfolio Standards (RPS) compliance is subject to PSC regulation. DEC and the municipal electric companies (jointly managed by DEMEC) have exercised their right under REPSA to develop and implement a "comparable program" to the renewable portfolio standards. DEC's RPS compliance is governed by its management, which reports to a board representing its members or customers. Municipal electric companies' RPS plans are subject to the oversight of their individual municipal governments.

2.3.6 Offshore Wind Planning

Governor John Carney established the Offshore Wind Working Group in 2017 to study opportunities for developing offshore wind. In its report, the Offshore Wind Working Group advised against procuring offshore wind at that time and identified several options for additional study, including large scale purchases, incremental commitments to future projects, waiting until additional developers propose projects in the Mid-Atlantic Region and evaluating other renewable energy sources.

At the request of DNREC Secretary Shawn M. Garvin and key legislative leaders, the Special Initiative on Offshore Wind (SIOW) at the University of Delaware prepared a 2022 report entitled *Offshore Wind Procurement Options for Delaware*. The purpose of the request was to conduct analyses of market conditions and options for developing offshore wind to serve the state.

In 2023, the Delaware Energy Act was amended to direct the SEO to continue working with PJM Interconnection to study the transmission impacts of offshore wind development., The SEO was also mandated to work with neighboring states and report to the Governor and the General Assembly on an offshore wind procurement process. The report, *Proposed Offshore Wind Procurement Strategy for Delaware*, was released in December 2023.[14]

The Energy Solutions Act of 2024 authorizes the SEO to work with the PSC and the Delaware Renewable Energy Taskforce to craft a solicitation for up to 1,200 megawatts of offshore wind. The law also establishes new regulatory processes for interconnecting utility-scale renewable energy resources to the transmission grid.

2.4 Natural Gas

Natural gas is used for electricity generation, industrial applications and heating. In 2022, an estimated 5,308 gigawatt-hours (GWh) of electricity was generated in Delaware, increasing from 4,305 GWh in 2021. Electric generation fueled by natural gas-fired power plants increased from 51% in 2010 to 87% in 2022. Delaware had approximately 3,273 MW of installed generation capacity as of November 2022. In 2021, Delaware's industrial sector was the largest consumer of natural gas, accounting for 40% of the natural gas consumption in the state.

Delaware has two natural gas utility providers which serve the state: Chesapeake Utilities and Delmarva Power, which serve approximately 240,000 customers.

2.5 Liquid Fuels

Petroleum accounts for about 40% of the state's total energy consumption. In 2020, Delaware used more petroleum per capita than about 60% of states. The transportation sector is Delaware's largest petroleum consumer, accounting for 68% of the consumption in the state. In 2020, the industrial sector accounted for 24% of petroleum usage in Delaware, with the residential and commercial sectors accounting for the remainder at 4% each. Approximately one in six households uses fuel oil or propane for heating fuel.

[14] URL: https://documents.dnrec.delaware.gov/energy/offshore-wind/Proposed-Offshore-Wind-Procurement-Strategy-20231229.pdf

Propane is primarily used for residential purposes in Delaware. The residential sector accounts for 57% of the total propane consumption, while the commercial and industrial sectors each represent 19% of the consumption and the transportation sector accounts for 6%.

2.6. Entities that Manage and Regulate Delaware's Energy Systems

A variety of entities manage and regulate Delaware's energy systems, including the utilities, state agencies and others.

2.6.1 Electric and Gas Utilities

Delaware's electric customers use roughly 11.4 million megawatt hours (MWh) of electricity per year. Delmarva Power and Light (DPL), which is regulated by the PSC, does not own generating assets, but procures electricity (including renewable energy), through wholesale markets. There are nine municipal electric companies which are managed by the Delaware Municipal Electric Corporation (DEMEC) and operate under the authority of their municipal governments. The Delaware Electric Cooperative (DEC), a rural electric cooperative, reports to it members.

Chesapeake Utilities and Delmarva Power also deliver gas service to residential, commercial, industrial and electricity generation customers. Approximately 43% of Delaware households use natural gas for home heating.

2.6.2 Public Service Commission

Created in 1949 to regulate investor-owned public utilities, the Delaware PSC[15] works to ensure safe, reliable and reasonably priced cable, electric, natural gas, wastewater, water and telecommunications services for Delaware consumers. For those services that are moving toward competitive markets, the Commission makes rules to level the playing field between competing providers and resolves disputes between these providers.

The PSC is made up of five part-time commissioners appointed by the Governor and confirmed by the state Senate. The commissioners, who are supported and assisted by a staff of full-time state employees, make decisions at formal meetings that are open to the public. Public hearings regarding rate changes, rulemaking and complaints are conducted throughout the year.

Additionally, the PSC's engineering staff inspects underground natural gas and propane systems for compliance with federal pipeline safety regulations through an agreement with the federal regulators.

[15] URL: https://depsc.delaware.gov/

2.6.3 Public Advocate

The Division of the Public Advocate[16] (DPA) was established in 1978 to represent consumer interests whenever PSC-regulated utility companies in Delaware seek changes in the delivery of services, electric distribution rates, natural gas supply, water or wastewater services or local exchange telephone services.

The fundamental mission of the DPA is to advocate the lowest reasonable rates for consumers, consistent with the maintenance of adequate utility service and equitable distribution of rates among all classes of consumers. The advisory role of the DPA includes, when requested, providing guidance to the Governor, the General Assembly or the Secretary of State on matters of energy policy and utility consumers.

The DPA also represents the interests of utility customers before federal regulatory agencies, such as the Federal Energy Regulatory Commission (FERC).

2.6.4 Delaware Sustainable Energy Utility

The Delaware Sustainable Energy Utility (Energize Delaware, or SEU), is a unique 501(c)(3) nonprofit organization offering programs and resources to help residents and businesses save money through clean energy and efficiency.[17] The SEU was created in 2007 by the state to foster a sustainable energy future. It offers a broad array of programs to help residents, businesses, and non-profit agencies adopt renewable energy and energy efficiency measures.

2.6.5 DNREC State Energy Office

The State Energy Office provides leadership on energy policy development in support of renewable energy, energy efficiency, energy security planning and grid modernization.[18] The SEO offers programs to promote renewable energy and energy efficiency measures to benefit Delaware's residents, businesses and non-profit institutions.

The SEO manages and leads the Renewable Energy Taskforce, which was established in 2010 "for the purpose of making recommendations about the establishment of trading mechanisms and other structures to support the growth of renewable energy markets in Delaware."[19] The SEO manages and leads the Energy Efficiency Advisory Council, which was established in 2013 to advise and assist utilities and other program administrators "in the development of energy efficiency, peak demand reduction and emission-reducing fuel switching programs to meet the requirements of this section and in evaluation, measurement and verification of energy savings."[20]

The SEO is the lead agency for developing and updating Delaware's energy conservation codes. Delaware first established a minimum statewide code for energy conservation in 1979, requiring local governments to meet the energy conservation requirements of a national model energy conservation code. Over the years, the requirement has been updated to match changes in national and international model codes.[21] The SEO is tasked with working with stakeholders to update and administer the energy conservation codes on a regular basis.

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[16] URL: https://publicadvocate.delaware.gov/
[17] URL: https://www.energizedelaware.org/
[18] URL: https://dnrec.delaware.gov/climate-coastal-energy/energy-office/
[19] 26 *Del.C.* § 360
[20] 29 *Del.C.* § 8059 (h)
[21] 16 *Del.C.* § 7602)

3. State Greenhouse Gas Emissions

Delaware's 2020 GHG emissions distribution by end-use sectors are summarized in Figure 5 below.

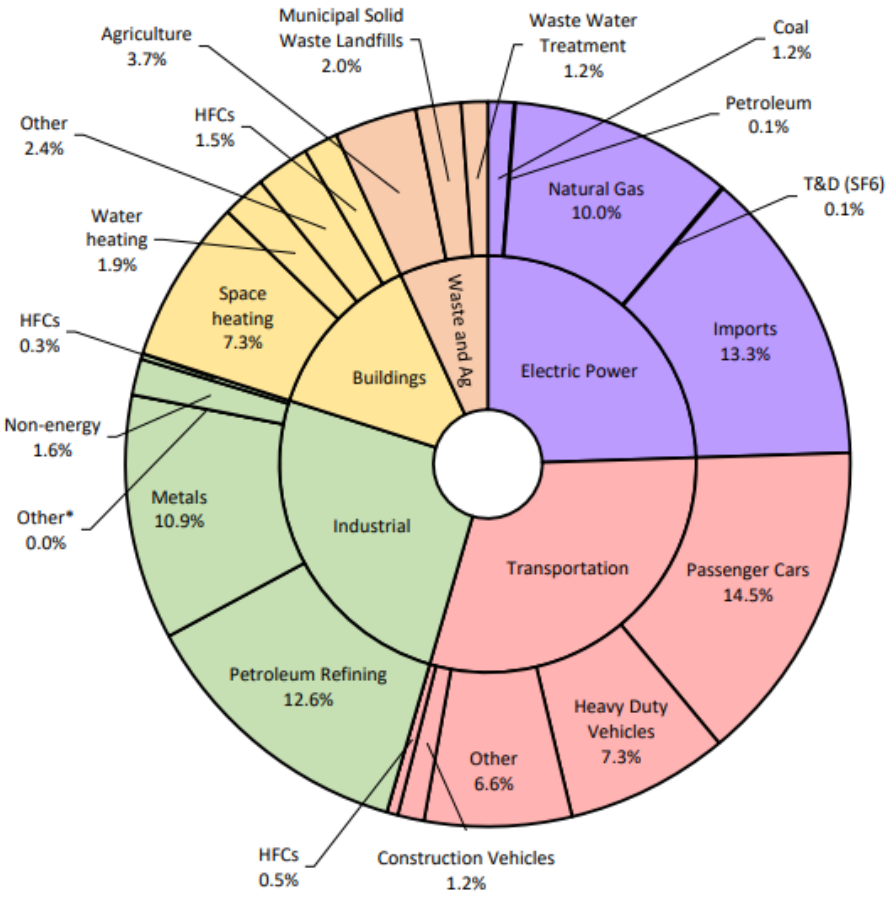


Figure 5: Gross GHG Emissions by Sector and End-Use[22]

3.1 Delaware Greenhouse Gas Emissions Distribution

Almost a quarter (24.5%) of the state's gross greenhouse gas emissions come from fossil fuel combustion for electricity generation. The electric power sector is the third highest emitting sector in Delaware. The largest source of greenhouse gas emissions in Delaware is the transportation sector, which represented 30% of the gross 2020 greenhouse gas emissions. The industrial sector is the second largest contributor of greenhouse gas emissions, accounting for 25.4% of gross emissions. Total electric power sector emissions in 2020 are the sum of the greenhouse gas emissions associated with in-state electricity generation and imported electric power. Combining in-state electricity generation and imports gives total emissions from electricity consumption from the combustion of fossil fuels, including coal, natural gas and petroleum products.

[22] Delaware's Greenhouse Gas Inventory 2024, https://documents.dnrec.delaware.gov/Air/greenhouse-gas/2020-DE-GHG-Inventory.pdf

3.2 Electric Sector GHG Emissions

Because roughly half of the electricity used to serve Delaware is imported from neighboring states, the SEO monitors emissions trends in the PJM region and in Delaware, shown below in figures 6 and 7.

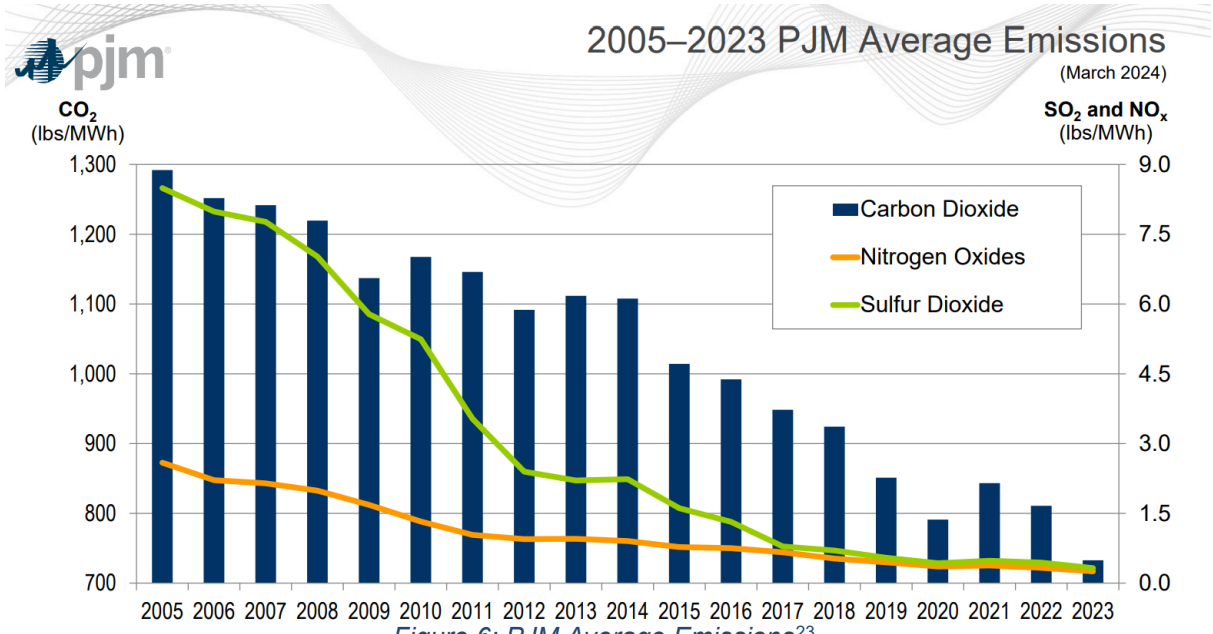


Figure 6: PJM Average Emissions[23]

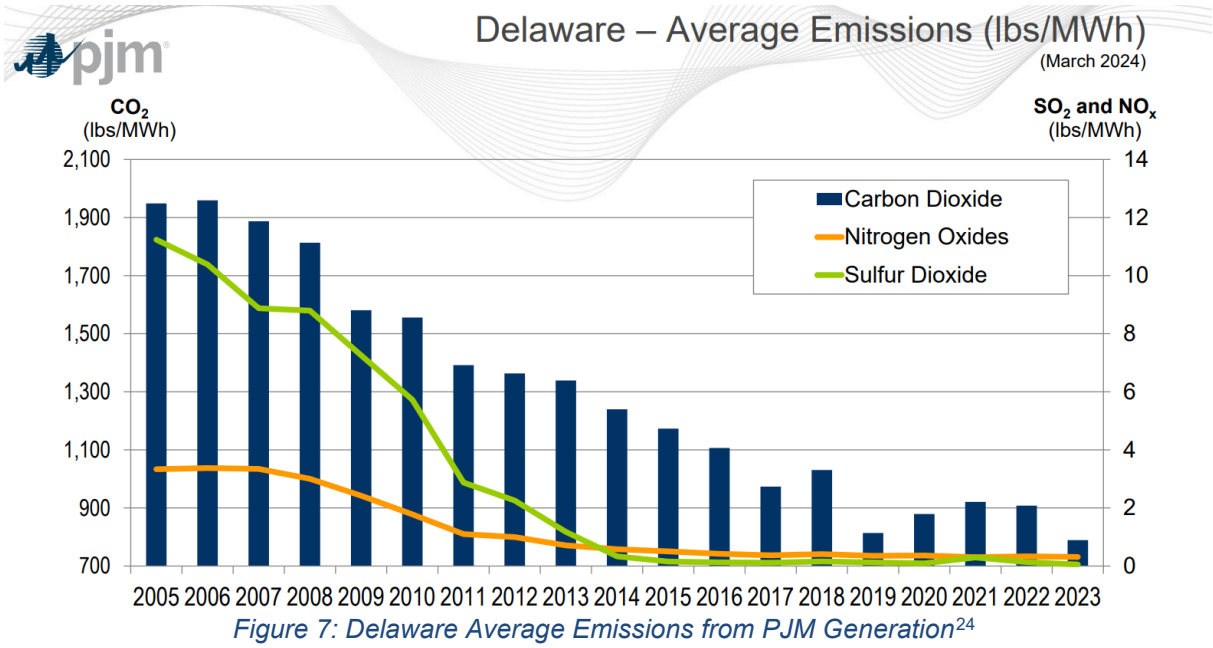


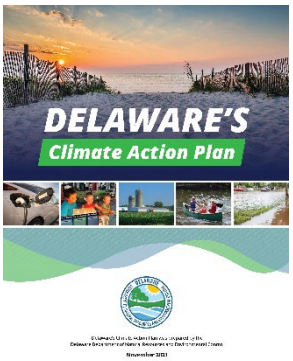
Figure 7: Delaware Average Emissions from PJM Generation[24]

[23] PJM 2023 Delaware State Infrastructure Report (January 1, 2023 – December 31, 2023) https://www.pjm.com/-/media/library/reports-notices/state-specific-reports/2023/delaware.ashx

[24] PJM 2023 Delaware State Infrastructure Report (January 1, 2023 – December 31, 2023) https://www.pjm.com/-/media/library/reports-notices/state-specific-reports/2023/delaware.ashx

3.3 Delaware's Climate Action Plan

The Delaware Energy Act (29 Del. C § 8053 (c)(7)) directs that the state energy plan be "consistent with the state's greenhouse gas emissions reduction targets, as specified in § 10003 of Title 7, and the Climate Action Plan issued pursuant to § 10004 of Title 7. The Plan must also support the state's greenhouse gas emissions reduction targets and Climate Action Plan."



The Delaware Climate Change Solutions Act (DCCSA) was adopted in 2023. The DCCSA establishes goals to reduce greenhouse gas emissions within the state by 50% from a 2005 baseline by 2030 and reach net-zero by 2050.[25]

Delaware's Climate Action Plan, which was released in 2021[26] and is scheduled to be updated in 2025, is used to guide state efforts to:

- Minimize greenhouse gas emissions, which drive the climate change we see today, and
- Maximize resilience to climate change impacts.

The Climate Action Plan identifies five key action areas for minimizing greenhouse gas emissions:

- Clean and renewable energy expansion, which has the greatest potential to reduce emissions in the long term.
- Implementing energy efficiency measures, which can be put in place relatively quickly and implemented through existing programs.
- Transitioning the transportation sector to zero-emission vehicles while establishing more efficient transportation systems.
- Reducing high global warming potential emissions which include greenhouse gases other than carbon dioxide.
- Offsetting carbon emissions by preserving forests, croplands, wetlands, and urban greenspaces that absorb (or sequester) carbon dioxide from the atmosphere, providing a cost-effective, temporary or long-term carbon storage solution.

Delaware's Climate Action Plan Mitigation Analysis

For the development of the 2021 Climate Action Plan, DNREC staff completed a technical analysis to assess potential greenhouse gas emissions reductions from new actions that could be implemented in the state.

If all actions studied in the analysis were fully implemented, Delaware's net greenhouse gas emissions would decline by 31% in 2025 from 2005 levels. The analysis projects that Delaware could achieve a reduction of 41% in 2035, from 2005 levels, if all the strategies in the Climate Action Plan were fully implemented. The analysis revealed three important takeaways:

1. **Decarbonizing the electrical grid** has the greatest emissions reduction potential in the mid- and long-terms and accelerates the emissions reduction potential of other actions.
2. **Energy efficiency actions** provide effective and low-cost strategies to meet Delaware's short-term goal and remain important for emissions reduction in the long term.
3. **Electrification of the transportation and building sectors** is an important transition that can lead to significant greenhouse gas emissions reductions over time. Achieving the greatest potential emissions reductions from these actions depends on decarbonizing the electrical grid.

[25] URL: https://legis.delaware.gov/BillDetail?LegislationId=130272
[26] URL: https://dnrec.delaware.gov/climate-plan/

The Climate Action Plan mitigation analysis can be shown in terms of mitigation actions as shown in Figure 8 below. The actions are grouped into "type" categories: Waste sector, High Global Warming Potential, Transportation, Energy Efficiency and Renewable Energy.

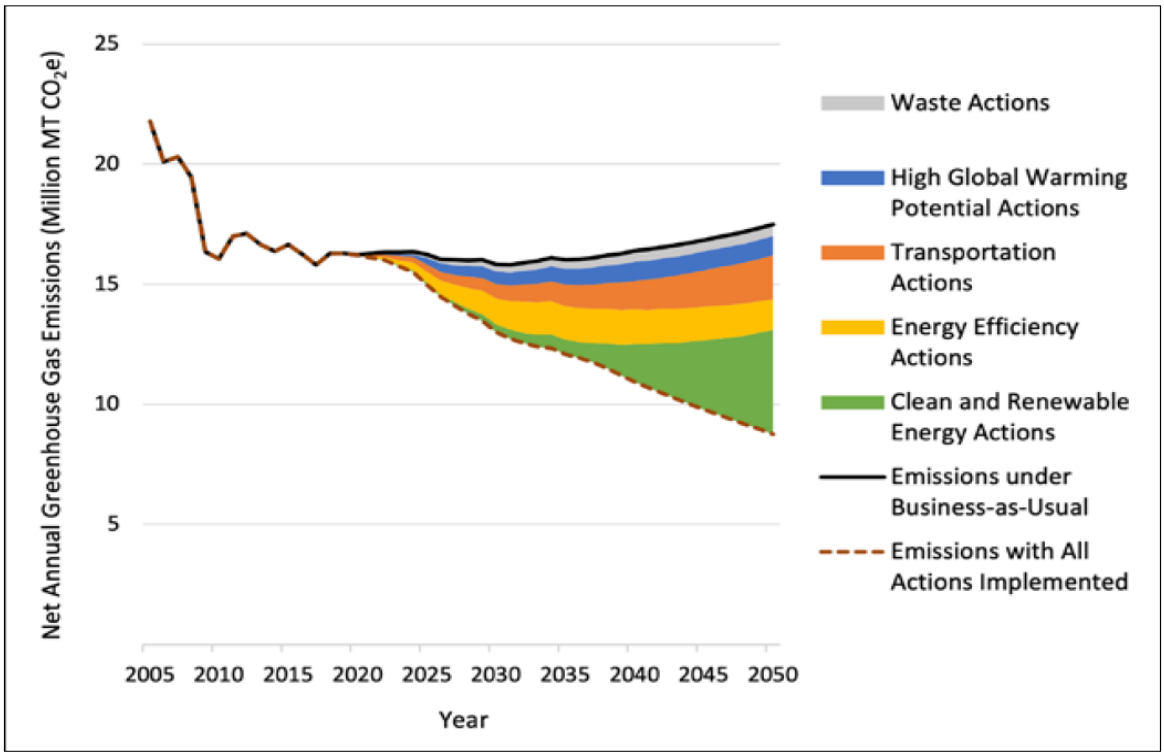


Figure 8: Net GHG Emissions Mitigation by Action Category, Delaware's Climate Action Plan, p. 32

3.3.1 Delaware's 2023 Climate Action Plan Implementation Report

Delaware's 2023 Implementation Report of the Climate Action Plan provide a comprehensive assessment of progress made toward achieving climate goals and outlines actions taken across several sectors.[22] The report assesses progress toward greenhouse gas emission reduction and provides data on emissions trends. The report compared current levels (at the time) with baseline years, and evaluated the effectiveness of implemented strategies in reducing emissions. The report also highlighted actions taken to enhance resilience to climate impacts. These include coastal protection and adaptation against sea-level rise and storm surges, water resource management and measures to safeguard vulnerable communities from storms and heat waves.

Delaware is updating its Climate Action Plan to guide efforts in addressing climate change and achieving its emission reduction goals.

4. Energy Justice

4.1 Background

Energy justice, often referred to as energy equity, accounts for historical causes of current inequalities; remediates social, economic and health burdens from energy production and consumption; and establishes the fair distribution of benefits of a clean, energy efficient and modernized grid.

Environmental justice and energy justice are inherently linked. Environmental justice is the fair treatment and meaningful involvement of all people, regardless of race, color, national origin or income, with respect to the development, implementation and enforcement of environmental laws, regulations and policies, and the equitable access to green spaces, climate resilience, public recreation opportunities and information environmental hazards. Energy justice builds on the environmental justice movement to address the inequities that stem from energy systems and the related extractive economies.

Analyses of energy justice often indicate four tenets: recognition, procedural, distributional and restorative.

Recognition justice acknowledges that structural, social and cultural practices have led to patterns of misrepresentation and underrepresentation of people of color and other marginalized populations in energy decision-making.[27]

Procedural justice focuses on establishing a just and fair energy system that ensures disadvantaged and underserved communities participate in or lead decision-making processes.

Distributional justice focuses on the distribution of benefits and burdens associated with energy production and use across time and space. It is widely acknowledged that burdens from burning coal, oil refining, chemical production and the like have fallen predominantly on low-income communities and communities of color.[28]

Restorative justice focuses on creating opportunities to improve environmental and social conditions within communities. This includes job and enterprise creation and remediation of legacy pollution.[29]

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[27] Jamal Lewis, Diana Hernández, and Arline T. Geronimus. 2019. Energy efficiency as energy justice: addressing racial inequities through investments in people and places. *Energy Efficiency*. https://doi.org/10.1007/s12053-019-09820-z

[28] U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. n.d. Energy Equity and Environmental Justice. https://www.energy.gov/eere/energy-equity-and-environmental-justice

[29] U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. n.d. Energy Equity and Environmental Justice. https://www.energy.gov/sites/default/files/2022-07/Environmental%20Justice%20Explainer%207_25_22.pdf

Underserved communities in Delaware bear significant burdens that stem from historical racial and social discrimination. These forces have caused underserved communities to struggle with disproportionate energy burdens, energy insecurity and resulting negative health impacts.

Delaware Household Home Energy Burden

Federal Poverty Level	# of Households	Home Energy Burden
Below 50%	20,009	38%
50% - 100%	23,430	20%
100% - 125%	12,595	13%
125% - 150%	12,653	11%
150% - 185%	20,306	9%
185% - 200%	8,688	8%

Chart 1: Number of households that experience high energy burden by federal poverty level, 2022[30]

According to the U.S. Department of Energy, the median energy burden for households across the United States is 3.1%.[31] Nationwide, low-income households; Black, Hispanic and Native American households; renters and senior households all have disproportionately higher energy burdens than the national median. In Delaware, low-income residents, defined as having incomes at or below the federal poverty level, spend almost 20% of their income on energy.

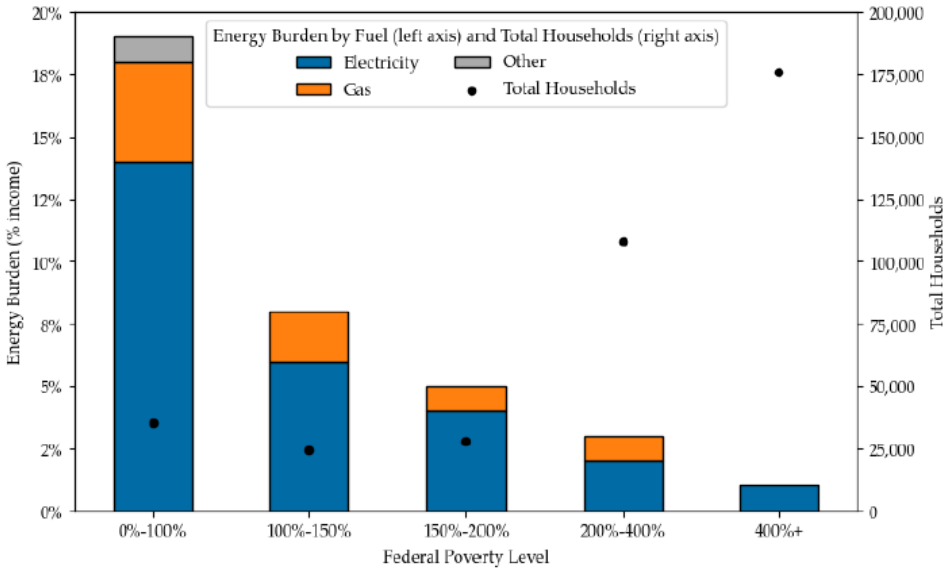

Figure 9: Energy burden, spending on energy as a percent of income based on income as a percent of the federal poverty level.[32]

[30] Taminiau, Sanchez Carretero, Esfandi, and Byrne. 2024. Evaluating the Implications of the IRA, p. 36)
[31] Ariel Drehobl, Lauren Ross, and Roxana Ayala. 2020. *How High Are Household Energy Burdens?* p. iii.
[32] Job Taminiau, Daniel Sanchez Carretero, Saeed Esfandi, and John Byrne. June 2024. Evaluating and Modeling the Implications of the Inflation Reduction Act (IRA) on Home Energy Efficiency in Delaware, Focusing on Low- and Moderate- Income Households. Foundation for Renewable Energy and Environment. See p. 8.

Key factors driving high energy burden include:[33]
Socioeconomic – Persistence of economic hardships, inability to afford up-front costs of energy investments or difficulty securing financing.
Behavioral – Information barriers due to language or education around availability of clean and renewable energy programs and/or conservation practices.
Physical – Housing age and type, condition of building envelope, buildings systems and appliances.
Policy gaps – Utility rate design, insufficient or inaccessible policies, and programs for low-income households.

Households experiencing high energy burden may reduce energy consumption to a point of negatively affecting the health or safety of the individuals residing in the home. Energy burdened households may heat or cool their homes less to save money, use unsafe heating or fuel sources, or even forego medical care, medicine or nutrition to pay energy bills. As with high housing costs, high energy burdens can make it challenging for individuals and families to invest in their family, health and education.

Energy justice is more than protecting communities from harm; it is also about ensuring fair access to opportunity. The clean energy transition will bring many benefits to Delaware, including cleaner air, reduced dependence on cars for mobility and accessibility, more efficient homes with lower energy bills and access to good jobs in the rapidly expanding clean energy sector. Energy justice means ensuring that all communities have equal access to these benefits.

DNREC has developed a map-based environmental justice (EJ) tool, called DNREC EJ Area Viewer, to better integrate environmental justice into the Department's decision-making. The tool utilizes an existing analysis from the Delaware Department of Transportation and the American Community Survey dataset to consider percentage of the population in poverty compared to the state average or the number of Black, Hispanic, Asian, or Native American populations compared to the state average. This process created a more informed Equity Focus Area layer than what would be created by census data alone.

The EJ Area Viewer also identifies populations living in limited English neighborhoods, which are identified as areas where 15% of the population speaks a language other than English. DNREC's Environmental Justice Office provides staff with Community Engagement Plan guidelines to assist in communicating with and engaging these communities in decision-making processes. The Environmental Justice Office also developed the Community Assets Campaign, which generates map points of local businesses, religious buildings and meeting spaces so Department staff can meet these communities where they live.

Figures 10 and 11 demonstrate some of the capabilites of the DNREC EJ Area Viewer.[34] Figure 10 illustrates the distribution of limited English-speaking neighborhoods and Equity Focus Areas designated by the Delaware Department of Transportation (DelDOT).

[33] https://www.aceee.org/sites/default/files/pdfs/u2006.pdf
[34] URL: https://dnrec.delaware.gov/environmental-justice/data/

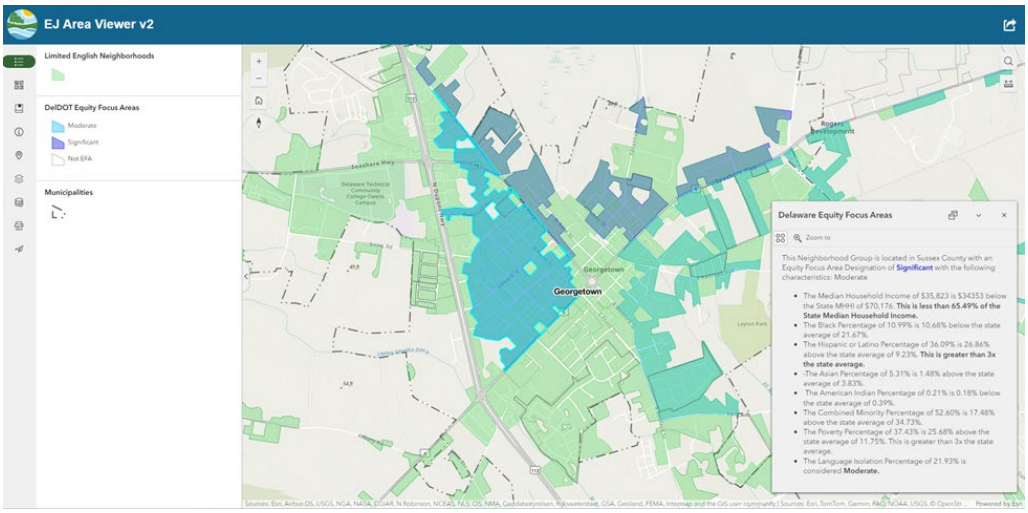

Figure 10: DNREC EJ Area Viewer depicting limited English-speaking neighborhoods and DelDOT Equity Focus Areas

Figure 11 illustrates communities' EJ Index exceedances as of July 2024. The EJ Index is a combination of environmental and socioeconomic information.

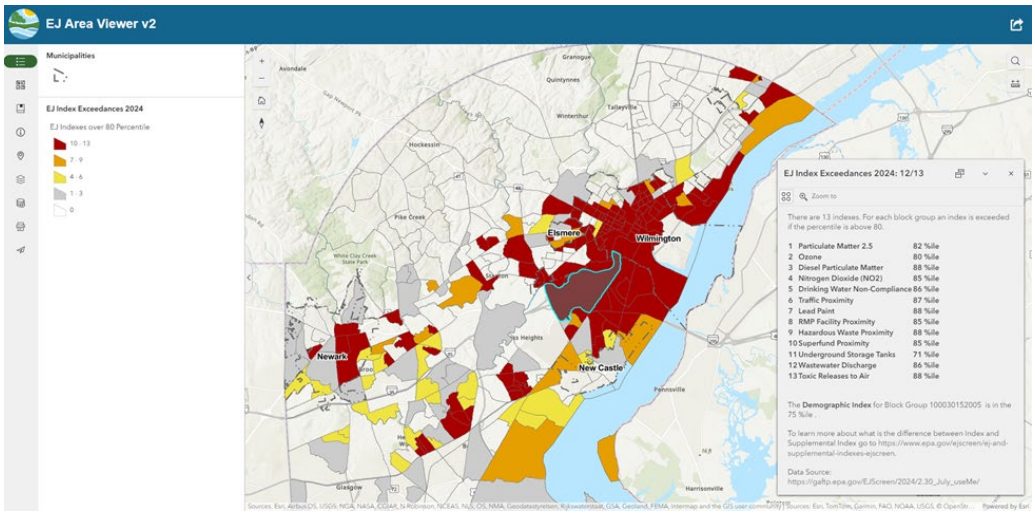

Figure 11: DNREC EJ Area Viewer depicting communities' EJ Index exceedances as of July 2024

Other mapping tools include the U.S. EPA Environmental Justice screening and mapping tool (EJSCREEN), the White House Council on Environmental Quality Climate and Economic Justice Screening Tool (CEJST), and the Environmental Justice Index (EJI) released by the Agency for Toxic Substances and Disease Registry.

4.2 Path Forward

The Plan details strategies to ensure that all communities are engaged in, and benefit from, the energy transition, including:

- Identify communities that are affected by energy inequities.
- Identify and work with trusted partners to effectively engage those communities.
- Identify policy gaps and direct policies and programs to serve those communities.
- Continually monitor and measure progress toward addressing inequities to improve services to those communities.

4.2.1 Community Engagement

Policy makers and program administrators will work with communities to identify barriers that prevent program participation and limit the benefits of renewable and efficient energy systems. Community members know their needs and are well qualified to help develop strategies to remove and mitigate these obstacles. It is incumbent upon Delaware energy entities to provide programming and engage in effective outreach to guarantee equity in the clean energy future.

Strategy: Initiate studies to identify energy burdened communities.
The SEO will work to identify the underserved communities experiencing a disproportionate energy burden. The SEO will use the EJ Area Viewer, in addition to data from federal tools such as the U.S. Department of Energy Low-income Energy Affordability Data (LEAD) Tool[35] and the National Renewable Energy Laboratory (NREL) State and Local Planning for Energy (SLOPE)[36] data. Doing so will combine socioeconomic indicators with energy cost information and housing stock data such as ownership, building type, building age and heating fuel type.

Strategy: Coordinate across sectors to deliver solutions to communities experiencing multiple energy challenges.
The state can maximize benefits to communities by identifying synergies between clean energy, transportation and climate change adaptation. For example, applicants in low-income and rural areas with limited access to electric vehicle charging should be provided with expanded clean public transportation options. When applicants may not own their homes or have space for rooftop solar, they should have the opportunity to subscribe to community solar programs. They should also be directed to emergency planning and resources that increase resiliency to extreme heat and flooding.

Strategy: Enlist trusted partners from community-based organizations.
The most effective way to plan and design programs and policies to serve the needs of communities is for program providers to work in partnership with community leaders and local

[35] URL: https://www.energy.gov/scep/slsc/lead-tool
[36] URL: https://maps.nrel.gov/slope

organizations. Many of these entities already serve and engage in efforts to increase emergency preparedness and climate adaptation. These organizations can act as trusted partners in Plan implementation, as well as facilitate access and marketing of available programs.

4.2.2 Program Improvements

The SEO, Energize Delaware, electric and gas utilities, and other entities throughout Delaware administer numerous energy efficiency and renewable energy programs targeting income-qualified applicants. These programs provide assistance with home repairs, utility bills, weatherization, and energy efficiency services, as well as rebates and incentives for updated home systems, appliances and integration of renewable energy. This array of programs can be difficult to navigate. The following strategies aim to create clarity around program offerings, streamline application processes and ensure program funds are targeting the communities that need them most.

Strategy: Develop energy justice program targets and metrics.
Program administrators should establish targets and metrics to ensure that funds are being used for the benefit of underserved communities. The use of mapping methods can be used to design, target, and measure program impact in underserved communities. For example, DNREC's Electric Vehicle Charging Equipment Rebates program offers enhanced incentive levels of up to 80% of eligible installation costs for existing multi-family dwellings in priority underserved communities. However, this program does not yet have a target for number of qualified dwellings to be serviced. Improving target-setting, program monitoring and evaluation can ensure these programs are adequately addressing the needs of underserved communities and improving energy justice efforts.

Strategy: Establish a new public-facing energy program interface.
Navigating available program offerings from the federal government, various state agencies, individual utilities, and nonprofits can be challenging. Many Delawareans are neither fully aware of, nor taking advantage of, existing programs. This may be due to inadequately advertised programs, confusing eligibility guidelines or because program information is difficult or time-consuming to explore. A new multilingual website providing information on all energy-related federal, state, utility and nonprofit program offerings should be developed to improve accessibility. This should also include the development of simple, broadly accessible marketing and messaging that can be easily circulated on social media to help expand awareness of existing programs.

Strategy: Establish a new public-facing database to report energy program metrics.
A new database should be developed to track energy program implementation and performance metrics, particularly for environmental and energy justice communities. This database should encompass all programs and services provided by state agencies, utilities and Energize Delaware.

Strategy: Improve information sharing between utilities and program administrators.
Utilities and program administrators should collaborate and share data on both energy consumption and program subscriptions to improve delivery of services to those most in need. Programs can be developed that target the highest energy users and decrease utility disconnections among low-income customers. Energy consumption data is needed from utilities to evaluate effectiveness of programs such as the Low-Income Home Energy Assistance Program (LIHEAP), Weatherization Assistance Program (WAP) and others. For this data to be

used successfully, utilities must use this data if they are to identify customers and communities with the highest need.

4.2.3 Reduce Energy Costs and Maximize Funding for Underserved Communities

Energy costs are particularly burdensome for low-income households. In our public engagement process, a significant number of respondents voiced concerns about whether the transition from fossil fuels to clean energy would cost them more in the long term, with particular concern among low-income households. In promoting renewable energy and energy efficiency to meet Delaware's greenhouse gas reduction goals, particular attention must be paid to ensure that underserved communities are not bearing disproportionate costs in the clean energy transition.

Strategy: Expand the reach of current programs using new federal funding streams.
The SEO and other eligible Delaware entities receive federal grant funding for low-income heating and cooling assistance, home weatherization assistance, revolving loan funds and more. The federal government has also established the Justice 40 initiative, which aims to allocate 40% of certain federal climate, clean energy, affordable and sustainable housing and other investments to communities that are identified as marginalized by underinvestment and overburdened by pollution.[37] Funding from the Bipartisan Infrastructure Law and the Inflation Reduction Act targets state-level policies and programs that reduce energy inequities. The SEO and other eligible Delaware entities receive federal grant funding for programs for low-income heating and cooling assistance, home weatherization assistance, revolving loan funds and more. Existing programs should continue to use these funding streams to expand services to underserved communities, meet Justice 40 requirements and alleviate high energy burden throughout the state.

Strategy: Empower underserved communities with financing through green banks.
Delaware is already pursuing greenhouse gas reducing energy programs with funding from Regional Greenhouse Gas Initiative (RGGI) proceeds. However, as the electric grid becomes increasingly supplied by renewable energy over the next decade, RGGI proceeds will wane. It is important that RGGI-reliant entities diversify revenue sources. The state could pursue other sources of funding, including private grants, bonds, private investments and interest revenue from loans and financing. By focusing on underserved market sectors, tools for directing clean energy investments can complement existing clean energy programs by addressing market gaps and energy insecurity.[38]

Strategy: Encourage beneficial fuel-switching in energy justice communities.
Beneficial fuel switching describes the replacement of technologies that rely on fossil fuels with those that use electricity. One example is switching a home's natural gas heating to a heat

[37] URL: https://www.whitehouse.gov/environmentaljustice/justice40/
[38] URL: https://www.epa.gov/statelocalenergy/green-banks#ref3

pump. Fuel switching can significantly reduce greenhouse gas emissions and have substantial health benefits. For example, gas stoves release nitrogen dioxide and benzene within the home, both of which are associated with an increased risk of asthma among children.[39] State agencies and relevant stakeholders should expand existing program offerings to promote beneficial fuel switching in energy justice communities.

Strategy: Expand efforts to identify and address Delaware's urban heat islands.
Heat islands are typically urbanized areas that experience relatively higher air temperatures than more suburban areas with less asphalt and more tree cover. Structures such as buildings, roads and other infrastructure absorb and re-emit the sun's heat more than natural landscapes. High concentrations of these structures can make urban spaces up to 20 degrees Fahrenheit warmer than greener areas.[40] The state should continue to support the work of the University of Delaware's Climate Hub and the Delaware Resilience Hub, which have begun heat mapping in Wilmington. Data from heat mapping should also be used to strategically deploy heat mitigation programs in coordination with community organizations.

Strategy: Assess a new utility rate structure for low-income electric customers.
To ease the energy burden of low-income Delawareans, all utilities should work with their regulatory authorities to assess the feasibility of implementing a new rate structure designed for low-income ratepayers. For example, a tiered discount rate, as opposed to a flat discount rate, might better serve qualifying customers. Examples of this rate structure can be found in Connecticut and New Hampshire, among other states.

Strategy: Address predatory practices related to solar energy marketing.
As the solar industry grows, there is a growing need to protect solar customers against unsafe solar installations, and false or misleading sales and business practices. Discussions within the GEAC and the Renewable Energy Taskforce, as well as public feedback, have demonstrated the need for added protections, particularly for community solar subscribers and residential solar customers. Updated regulations can enable the PSC to provide better protections for community solar subscribers, while the Renewable Energy Taskforce should coordinate the development of strategies to better protect those seeking to invest in small scale solar.

[39] URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9819315/
[40] URL: https://www.udel.edu/udaily/2024/february/climate-hub-wilmington-delaware-heat-watch-urban-heat-mapping/

5. Renewable Energy and Clean Technologies

5.1 Background

The growth of carbon-free energy generation is essential to achieving the goals outlined in the Climate Change Solutions Act. Increasing the amount of renewable and clean energy powering our electric grid has the greatest potential to reduce greenhouse gas emissions and is critical to achieving the state's emissions reduction objectives. Shifting away from carbon-intensive energy sources to produce electricity, also referred to as decarbonization, can compound the impact of other emissions reduction strategies.

Renewable energy is derived from resources that are naturally replenishing and virtually inexhaustible in duration, but limited in the amount of energy that is available per unit of time. Renewable energy sources include biomass, hydropower, geothermal, solar and wind.

Clean energy is zero-carbon energy derived from sources other than wind and solar.

Policies and programs promoting renewable energy have been codified for more than two decades, supported by the SEO, Energize Delaware and the state's electric utilities. While the state has seen significant growth in renewables, new policies and programs are needed to meet the needs of a modern, decarbonized electric grid that is facing increased demand for the first time in decades.

5.2 Path Forward

This section of the Plan details strategies to promote clean and renewable energy, including:

- Map pathways to achieve net zero emissions in the energy sector by 2050.
- Promote continuing growth of solar generation at all scales and expand equitable access to solar energy.
- Develop and implement an offshore wind strategy that meets Delaware's needs.
- Monitor and assess potential benefits of emerging renewable and clean technologies.
- Assess the feasibility and market potential of renewable fuels.

5.2.1 Renewable Energy Portfolio Standards

Delaware's renewable energy strategy is codified in the Renewable Energy Portfolio Standards Act (REPSA), the Climate Change Solutions Act of 2023, and the Delaware Energy Act of 2024. REPSA was first adopted in 2005 and has been amended six times since, most recently in 2024.[41]

REPSA sets minimum percentages of renewable energy that must be procured by electric utilities increasing annually to 40% (including 10 percent solar PV) by the compliance year beginning June 1, 2035. The standard for the compliance year June 1, 2024, to May 31, 2025, is 24 percent (including 3.25 percent solar photovoltaic).

REPSA provides that large energy users can be exempt from paying Renewable Energy Portfolio Standards (RPS) compliance costs. It also states that a municipal electric company or the Delaware Electric Cooperative (DEC) may exempt itself from RPS requirements "if it

[41] 26 *Del.C.* 351-364

develops and implements a comparable program to the Renewable Energy Portfolio Standards." DEMEC and DEC have elected to use this provision. Their plans are not subject to approval or regulation by the PSC or other state agencies, but instead are subject to the jurisdiction of their municipal governments or, in the case of the co-op, its members.

REPS compliance can be achieved by owning renewable energy facilities or by buying Renewable Energy Credits (RECs) or Solar Renewable Energy Credits (SRECs). Eligible energy facilities must be located in the PJM region or deliver energy to the PJM grid. The PSC maintains a database of eligible energy resources. Most RECs are supplied by out-of-state wind projects, while most SRECs are supplied by in-state solar installations. The REPS has driven the growth of solar sited in Delaware from 2 megawatts (MW) at the end of 2008 (when the 2009 Energy Plan was being finalized) to more than 219 MW at the end of 2023.[42]

The Renewable Energy Taskforce was established under REPSA to provide recommendations for establishing renewable energy trading mechanisms and other structures to support the growth of renewable energy in Delaware.[43] The Taskforce is directed by REPSA to promote a market for renewable energy at all scales. The Taskforce has largely focused on creating a stable market for SRECs using long-term contracts for Delmarva Power. DEC and DEMEC have pursued separate strategies for RPS compliance.

REPSA includes a provision for utilities to pay an Alternative Compliance Payment (ACP) if RECs are not available for $25 or less or SRECs for $150 or less. Instead of paying more for SRECs than the ACP price, utilities are required to make ACP payments into their Green Energy Funds, which are used to support the growth of renewable energy. Delmarva Power has used this provision for the last two compliance years. The City of Dover used this provision in 2023.

If ACPs representing 15% or more of the total eligible load are paid into a utility's Green Energy Fund for two consecutive compliance years, the RPS will remain at the percentage specified for the immediately preceding year and does not increase until less than 15% of the REC obligation is satisfied by ACPs. The use of ACPs to meet the REC portion of the RPS does not affect the solar carveout or SREC portion. Delaware's utilities have consistently reported that they are meeting their solar requirements.

[42] URL: https://depsc.delaware.gov/applications-for-eligible-energy-resources/
[43] URL: https://dnrec.delaware.gov/climate-coastal-energy/renewable/renewable-energy-taskforce/

Because of the constricted supply of land-based wind and other renewable resources in the PJM region, there are significant challenges in moving new utility-scale resources through the PJM interconnection queue. Additionally, the increasing demand for RECs among many PJM-state RPS markets likely means that utilities will soon have difficulty in finding RECs for $25 or less, which would delay progress toward RPS targets. The limited supply of land wind RECs in the PJM territory was cited in the SEO's December 2023 report, *Proposed Offshore Wind Procurement Strategy for Delaware*, as a reason for pursuing offshore wind to meet Delaware's renewable energy requirements.

5.2.2 Achieving Net Zero Emissions in the Energy Sector by 2050

Possible pathways to achieving net zero emissions in the energy sector by 2050 include the following strategies:

Strategy: Map possible pathways to achieving net zero emissions in the energy sector by 2050.

The SEO will evaluate and recommend policy mechanisms to achieve net zero emissions in the energy sector by 2050. Policy approaches could include amending the RPS or adopting a Clean Energy Standard, which could incorporate other carbon-free technologies.

5.2.3 Solar Photovoltaic Energy

Solar photovoltaic (PV) systems convert sunlight directly into electricity using semiconductor materials. Solar PV can be deployed at various scales, from residential rooftops to utility-scale solar facilities. According to figures compiled by the PSC, solar in Delaware has grown from 275 installations totaling 2 MW in 2008 to 9,000 installations (mostly small rooftop solar) totaling 219.7 MW at the end of 2023, with the largest project to date being 50 MW. (Figure 12)

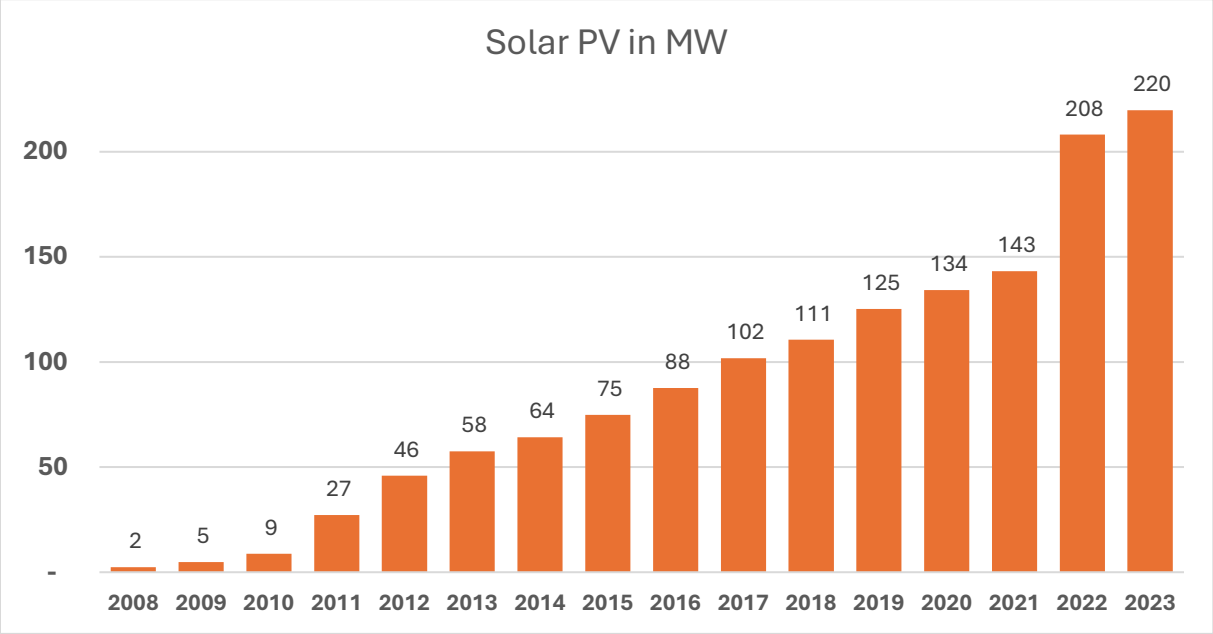

Figure 12: Solar photovoltaic capacity in Delaware, 2008-2023

Solar Installations in Delaware, Year-End 2023

Size Range	# Installations	Capacity
Up to 50kW	8,876	81.0 MW
>50 kW to 1 MW	191	39.7 MW
>1 MW to 4 MW	10	14.6 MW
>4 MW	5	84.4 MW
Total	9,076	219.7 MW

Source: Delaware Public Service Commission

In 2021, legislation was adopted to accelerate the adoption of community solar in Delaware and to set up a regulatory process to be implemented by the PSC. This law allows for multiple types of ownership models, defined as community-owned generating facilities, to exist and compete in the marketplace.

Community solar is defined as a solar energy development model in which multiple participants share, invest in, and benefit from a single solar energy system. Individuals either own or lease a portion of the system and reap the benefits (such as cost savings) of a larger solar installation without having to install solar on their rooftops. In Delaware, community solar projects are capped at a maximum size of 4 MW and each system owner must certify that it serves at least 15% low-income customers. In November of 2021, Delmarva Power opened its Community Solar Program. As of September 2024, roughly 200 applications were submitted to the program. Delmarva Power expects the first of these projects to come online by the end of 2024, with more anticipated in 2025.

Strategy: Establish statewide goals for distributed solar generation.
To establish a statewide goal for distributed solar generation, the state will need to assess possible gaps in reporting. Currently, there is no single database that documents all solar installations in the state, though the PSC maintains a database of certified eligible energy resources.

Distributed Solar is small-scale electricity production that is on-site or close to the primary user and is interconnected to the utility distribution system.

The SEO, working with all electric utilities, plans to evaluate the current percentage of residential and commercial properties with solar. With a baseline of market penetration established, the SEO will analyze the technical potential and establish percentage goals for various market segment. This market potential analysis and targeting will include low- to moderate-income residential, public school, government, brownfields and landfill, and commercial rooftop market segments.

Strategy: Expand equitable access to solar.
In 2022, the SEO launched Delaware's first Low- to Moderate-Income Solar Program. The program, among the first in the country, offers free solar installations to qualifying low-income homeowners and covers 70% of the cost for qualifying moderate-income homeowners. While the program was initially designed for Delmarva Power customers only, it was expanded to include all Delawareans, regardless of their utility.

Additional funding sources and partnerships should be explored to secure long-term funding for these programs. Funding opportunities should also be explored to provide roof repairs to eligible homes so that they may accommodate solar installations. The SEO will also recommend strategies to encourage the development of equity-focused solar projects in other market segments, utilizing best practices from other states.

Strategy: Capitalize on co-location benefits.
To maximize benefits, solar installations at all scales should be co-located with microgrid controls, battery storage, fuel cells, energy efficiency measures and combined heat and power technologies. These applications should be explored on farmland in agrivoltaic (combined solar and agricultural land use) configurations; on brownfields; in multi-family, public and critical facilities (such as hospitals); and in water and wastewater treatment plants to foster system resilience. The state should also establish a regulatory framework that is conducive for co-locating.

Strategy: Lead by example in state government.
Delaware's current electric supply contract for government operations includes a program to procure 50% renewable energy through the purchase of renewable energy credits or RECs. The SEO should work with the Office of Management and Budget (OMB) on a path toward 100% renewables by 2035, through both REC contracts and the direct installation of renewables on state government property. The SEO will work with OMB to explore the relative advantages and cost-effectiveness of installing solar on state facilities, procuring RECs alone and procuring energy bundled with RECs.

5.2.4 Offshore Wind

The growing offshore wind industry offers the opportunity to procure utility scale renewable energy that connects directly into Delaware's transmission grid. East Coast states from North Carolina to Massachusetts have procured contracts for offshore wind to help meet their renewable energy needs.

In 2008, Delaware was poised to become the first state to contract for offshore wind when a proposal from Bluewater Wind led to enabling legislation and PSC approval for a 200 MW project. Bluewater Wind was subsequently acquired by NRG, which eventually cancelled the project.

As other East Coast states began developing programs to procure offshore wind, Governor John Carney established the Offshore Wind Working Group in August 2017 to study opportunities for Delaware to participate in developing offshore wind. The Working Group

presented its report to Governor Carney in June 2018.[44] In its report, the Offshore Wind Working Group advised against procuring offshore wind at that time and identified several options for additional study, including large scale purchases, incremental commitments to future projects, waiting until additional developers propose projects in the Mid-Atlantic Region and evaluating other renewable energy sources.

The Special Initiative on Offshore Wind (SIOW) at the University of Delaware prepared a report, *Offshore Wind Procurement Options for Delaware*, in 2022 at the request of DNREC Secretary Shawn M. Garvin and key legislative leaders.[45] The purpose of the request was to conduct analysis of market conditions and options for developing offshore wind to serve Delaware. The SIOW is an independent project at the University of Delaware's College of Earth, Ocean and Environment that supports the advancement of offshore wind.

The SEO issued a report, *Proposed Offshore Wind Procurement Strategy for Delaware*, in December 2023. This report proposed an offshore wind procurement program for Delaware that builds on the broad recommendations of the Offshore Wind Working Group, incorporates the market intelligence and technical analysis found in the SIOW report, is based on the centrality of renewable energy in the Climate Action Plan (codified in the Climate Change Solutions Act of 2023), and covers the topics enumerated in the Delaware Energy Solutions Act of 2024 (29 *Del.C*. § 8051 and § 8056). The report, including a detailed set of recommendations, can be found on DNREC's Offshore Wind webpage.[46]

The Energy Solutions Act of 2024 was signed into law in September 2024. The law authorizes the SEO, with the approval of the PSC, to issue solicitations to procure offshore wind in aggregate amounts of up to 1,200 MW. Under the law, the SEO would draft a solicitation for wind energy at a price no greater than 110 percent of the "Delaware Benchmark Price," defined as the average price that Delmarva Power has paid for power and renewable energy

[44] Offshore Wind Working Group Report to the Governor (delaware.gov), https://documents.dnrec.delaware.gov/energy/offshore-wind/Offshore%20Wind%20Working%20Group%20Report%20June%2029%202018.pdf
[45] SIOW, Offshore Wind Procurement Options for Delaware, https://documents.dnrec.delaware.gov/energy/offshore-wind/SIOW-report.pdf
[46] URL: https://dnrec.delaware.gov/climate-coastal-energy/renewable/offshore-wind/

compliance over the prior three years. The law provides for flexibility in procurement timing and structure to allow the procurement process to better respond to market conditions. It also enhances the PSC's current Certificate of Public Convenience and Necessity (CPCN) process by giving the Commission authority to issue a CPCN in connection with renewable energy interconnection facilities, such as the transmission lines from an offshore wind or utility scale solar project to a nearby substation.

Strategy: Create an offshore wind procurement process that works for Delaware.
The strategic value of offshore wind for Delaware is underscored by the fact that there are not many other options available for delivering sufficient renewable energy at the scale that will be needed to meet the state's renewable energy goals, which in turn will be crucial to meeting Delaware's climate goals. An offshore wind procurement program for Delaware will require navigating the challenges facing a small state attempting to effectively engage in an industry in which scale is paramount.

Delaware's offshore wind strategy is built on the work of the Offshore Wind Working Group, the SIOW report, the GEAC's recommendations, the SEO report (*Proposed Offshore Wind Procurement Strategy for Delaware*), and the Energy Solutions Act of 2024, which provides flexibility in procurement and emphasizes the value of Delaware partnering or coordinating with projects serving other states.

Strategy: Develop partnerships with neighboring states.
The Energy Solutions Act of 2024 also requires the SEO to work with other buyers, such as other states, in procuring offshore wind. Coordinating offshore wind procurement activities offers Delaware the opportunity to participate in larger projects or time a Delaware procurement to best meet market conditions (i.e., when key supply chain assets are most likely to be available).

From the DNREC OSW Report:
The procurement program should include possible partnerships with neighboring states on subjects including procurement, transmission, and supply chain development to take advantage of economies of scale beyond those of Delaware's buying capacity.

The SEO is engaging in regional collaborations on several fronts. Delaware has been invited to participate in the SMART-POWER Coalition (Maryland, Virginia and North Carolina) to conduct an in-depth supply chain and workforce development analysis, and the Northeast States Transmission Collaborative, which is exploring possible pathways to coordinated transmission planning. DNREC also participates in the Mid-Atlantic Regional Council on the Ocean (MARCO), which is coordinating mapping and planning for environmental impacts of offshore wind development. The SEO will confer with neighboring states on their procurement timetables to identify opportunities for a coordinated Delaware procurement.

Strategy: Participate in regional transmission planning.
Delaware is participating in the Northeast States Transmission Collaborative to map out possible approaches to long-range offshore wind transmission planning. Delaware has asked PJM Interconnection to model the cost and grid impacts of connecting a 1,000 MW offshore wind project as a follow-up to its Offshore Wind Transmission Study: Phase 1, which was released in 2021. The results of this analysis will aid Delaware and potential offshore wind

developers by providing more information on the costs and potential benefits of grid upgrades needed to accommodate offshore wind.

The SEO is also participating with its peers from Maryland, New Jersey, Pennsylvania, Washington, D.C. and West Virginia in a USDOE-funded training conducted by the NREL on FERC Order 1920. Order 1920, issued in May 2024, is intended to improve regional electric transmission planning and cost allocation by requiring transmission providers, such as PJM, to conduct long-term regional transmission planning that takes stakeholder input into consideration.

5.2.5 Emerging Clean Technologies

As the nation moves toward decarbonization, new and innovative clean technologies will continue to develop. Delaware must monitor technological advancements, invest in research and development and utilize innovative clean technologies to meet our emissions reduction goals.

5.2.6 Nuclear Power

Small modular reactors (SMRs) are advanced nuclear reactors that have a power capacity of up to 300 MW per unit, about one-third the generating capacity of a traditional nuclear power plant. SMRs[47] are physically small and modular, meaning they can be factory assembled and then transported. They utilize nuclear fission to generate heat to produce energy. By comparison, the newly operational Vogtle 3 and 4 reactors in Georgia each total 1,100 MW.

While recognizing the potential benefits of SMRs, it should be noted that the industry is still nascent. At of the start of 2024, there was only one operational SMR in the world: the Shidao Bay demonstration reactor in China, which entered commercial operation in December 2023.[48] Nationally, SMR development is facing significant challenges. The first company to receive a design certificate by the Nuclear Regulatory Commission announced last year that the project proposed for Idaho was being cancelled.[49] Rising costs and the variety of SMR designs have significantly hindered the industry's ability to ramp toward commercial feasibility.

Even with these challenges, SMRs represent an opportunity to provide carbon-free baseload generation that could contribute to achieving net-zero generation by 2050. State government agencies should closely monitor the development of SMRs to assess whether and how the technology can be a part of Delaware's energy portfolio in the future.

5.2.7 Carbon Capture and Storage

Carbon capture and storage, or CCS, is a broad term used for a variety of technologies that remove carbon dioxide (CO_2) from the air or catch emissions and store them before they are released into the atmosphere. Post-combustion capture — capturing CO_2 from industrial activity and power generation — is a three-step process. It involves capturing the emission, known as flue gas, transporting it and permanently storing it. Once the flue gas is captured, CO_2 is separated from the gas's other components. Once captured, the CO_2 is pressurized into a liquid state for transportation by pipeline. There are many commercial uses for CO_2. Sequestering or

[47] https://www.iaea.org/newscenter/news/what-are-small-modular-reactors-smrs
[48] World Nuclear News. "China's demonstration HTR-PM enters commercial operation." December 6, 2023. Available at https://www.world-nuclear-news.org/Articles/Chinese-HTR-PM-Demo-begins-commercial-operation
[49] URL: https://www.reuters.com/business/energy/cancelled-nuscale-contract-weighs-heavy-new-nuclear-2024-01-10/

storing CO_2 is achieved by injecting it deep underground into suitable rock formations. However, a frequent result of this process is the gas being released into the atmosphere.

As of the end of 2023, 15 CCS facilities were operating in the United States. Combined, they have the capacity to capture 0.4% of the nation's total annual CO_2 emissions. Most of these facilities provide the captured CO_2 to oil companies that use it for enhanced oil recovery. The limited use of CCS to date is due to its high implementation cost compared to its value. The 2021 Infrastructure Investment and Jobs Act provided $8.2 billion in advance appropriations for CCS programs from 2022-2026. However, predictions vary on whether CCS will be able to grow over the next decade.[50]

Strategy: Monitor and assess the development of future innovative clean technologies
Renewable and clean energy technologies are constantly evolving. The SEO will monitor the development of future innovative clean technologies, including nuclear power and carbon capture, and their potential applications in Delaware and the PJM region.

The state should also support and encourage research, development and commercialization for promising and emerging clean energy innovations. The SEO will also track the progress of in-state clean energy technology demonstrations and pilot programs.

5.2.8 Hydrogen

Hydrogen is the lightest and most abundant chemical element, and it is almost always found as part of another compound such as water or methane. Once separated from a chemical compound, hydrogen is an energy carrier that can be used to store, move and deliver energy produced from other sources.[51] Hydrogen has the potential to play a crucial role in hard-to-decarbonize sectors like heavy industry and long-distance transportation. However, the environmental impact and energy efficiency of hydrogen depends heavily on how it is produced.

To differentiate hydrogen by its carbon intensity and the source or process used to make it, nine color codes are commonly utilized. Green hydrogen is produced via water electrolysis using electricity from renewable sources. Blue hydrogen is made from fossil fuels and uses carbon capture and storage to sequester resulting carbon emissions. Black or brown hydrogen is produced from fossil fuels and directly emits CO_2 and carbon monoxide. Pink hydrogen is produced via nuclear power with no carbon emissions, but results in nuclear waste.

Hydrogen is primarily produced at or in close proximity to where it will be used, typically at large industrial sites. Hydrogen can then be distributed through pipelines, high-pressure trailers or liquefied hydrogen tankers. Due to the small size of the hydrogen molecule compared to methane, it cannot be delivered through the same pipelines as natural gas without significant

[50] URL: https://www.cbo.gov/publication/59832#:~:text=Status%20of%20Carbon%20Capture%20and,under%20construction%20or%20in%20development
[51] URL: https://www.energy.gov/eere/fuelcells/hydrogen-fuel-basics

leakage or pipeline upgrades. To date, hydrogen's application in the energy sector has been hindered by its cost.

In 2023, the Mid-Atlantic Clean Hydrogen Hub (MACH2) was one of seven Regional Clean Hydrogen Hubs named a recipient of federal funding from the Bipartisan Infrastructure Law. MACH2 is a coalition of entities within states that includes Delaware, New Jersey, and Pennsylvania that seeks to generate clean, predominantly zero emission green and pink hydrogen, reusing and revitalizing existing pipeline infrastructure for transport.[52] The University of Delaware's Center for Clean Hydrogen, which is involved in MACH2, was launched to accelerate the transition to clean energy by reducing the cost of hydrogen and related technologies.

Strategy – Prioritize clean hydrogen's deployment in hard to decarbonize sectors. Industrial decarbonization has been a significant challenge due to the lack of low-carbon energy alternatives. Clean hydrogen is well suited to replace current fossil fuel-based energy sources currently used in heavy duty industry and transportation. A review of current regulatory requirements is needed to ensure the proper permitting, regulation and safeguarding of clean hydrogen production, refining, transmission and use.

5.2.9 Renewable Fuels

Even with the progress in the electrification of Delaware's light duty fleet, there are medium- and heavy-duty applications where no electric option is viable. In those cases, alternative fuels like biodiesel, ethanol, compressed or liquefied natural gas or hydrogen may offer a lower carbon alternative to gasoline and diesel. These alternatives can come with significant reductions in GHG emissions.

Biodiesel is a renewable, biodegradable fuel that is manufactured domestically from vegetable oils, animal fats or recycled restaurant grease. It can be blended with diesel and used in existing medium- and heavy-duty vehicles to reduce GHG emissions without any new investments in specialized vehicles, equipment or infrastructure. Biodiesel is a cleaner burning renewable fuel that can be used on its own as a fuel or as an additive for any petroleum-based diesel equipment. Using biodiesel also reduces lifecycle emissions because CO_2 released during combustion is offset by the CO_2 absorbed from growing soybeans or other feedstock used to produce the fuel.[53]

Biodiesel is not the same fuel as renewable diesel, which is made from fats and oils and is processed to be chemically the same as petroleum diesel. This can be used as a replacement fuel or blended with any amount of petroleum diesel. The majority of all domestically produced and imported renewable diesel is used in California because of the incentives under the state's Low Carbon Fuel Standard.[54]

Ethanol is a renewable fuel that can be blended with gasoline and used in any vehicle that runs on regular gasoline. It is derived from the fermentation of agricultural products such as corn, sugar, or grains to convert starches and sugars to ethanol. It can also be made by processing agricultural wastes, grasses or wood to convert cellulosic matter into ethanol. In the U.S., most ethanol is derived from corn starches and sugars. Cellulosic ethanol is more environmentally

[52] URL: https://mach-2.com/
[53] URL: https://afdc.energy.gov/fuels/biodiesel-benefits
[54] URL: https://afdc.energy.gov/fuels/renewable-diesel

sustainable than current ethanol stocks, especially when produced from agricultural waste, co-products of another industry or dedicated crops, which results in lower levels of lifecycle emissions.

Ethanol can be blended up to 10% with gasoline to form E10 and can be used in any engine that takes regular gasoline. Because ethanol corrodes rubber fuel system parts, specialized adaptations are necessary for blends greater than 10%. Alternatively, consumers can use "flex-fuel" vehicles that are designed to run on higher percentages of ethanol. Ethanol is suitable for use in light-duty transportation applications.

Renewable Natural Gas (RNG) is a pipeline quality gas fully interchangeable with natural gas. RNG, also known as biogas, is the gaseous product of the decomposition of organic matter and is processed to purity standards for commercial use. It is produced naturally by the anaerobic breakdown of organic matter from farms, landfills and wastewater treatment plants, among other sources.

When these emissions are not captured, they are released to the atmosphere. Fugitive methane becomes a greenhouse gas that is approximately 30 times more potent than CO_2.[55] Capturing and utilizing RNG can displace traditional natural gas in carbon-intensive sectors like transportation, space heating and process heating. In transportation, RNG can be used as a fuel in the form of compressed natural gas (CNG) or liquefied natural gas (LNG). RNG remains more expensive than traditional natural gas and, as demand grows, there could be additional upward pressure on prices.

Strategy: Assess the feasibility of a Low Carbon Fuel Standard.
DNREC, working with relevant stakeholders, will assess the feasibility of Delaware adopting a Low Carbon Fuel Standard (LCFS). An LCFS requires fuel providers to continually decrease the carbon intensity of the fuels they sell and allows for credit trading to reduce the cost of compliance.

Strategy: Assess Delaware's potential for renewable natural gas.
Capturing methane from landfills and other sources can provide renewable natural gas, which can replace other types of fossil fuels. Electricity generated from landfill gas is a qualified renewable resource under REPSA. A rigorous assessment of the potential for expanding the quantity and quality of the RNG sources should be conducted to assess the market potential and identify barriers to more widespread use. Landfills operated by the Delaware Solid Waste Authority capture methane for electricity generation. However, methane gas from landfills can be contaminated with siloxanes, which are harmful to internal combustion engines but may be acceptable in other applications. Completing an assessment on the potential for RNG in Delaware can be used to develop cost-effective strategies to support RNG development and for identifying opportunities to expand fueling stations for low carbon fuel-dedicated vehicles. This assessment may include recommendations on the potential to increase RNG production, the viability of fueling stations or pipeline injection, the potential market value of different biofuels in alternative end uses and what, if any, incentives should be utilized to increase their production.

Strategy: Assess the feasibility of a clean energy heat standard.
A clean heat standard is similar to an RPS in that it requires retail suppliers of heating fuels to sell a consistently increasing share of renewable fuels or electric alternatives within their product

[55] URL: https://afdc.energy.gov/fuels/natural-gas-renewable

offering (propane, natural gas and/or heating oil). Working with relevant stakeholders, DNREC will assess the feasibility of a clean heat standard. This evaluation should include a regional fuel market impact analysis and could be incorporated with the RNG market potential study recommended above.

6. Energy Efficiency and Beneficial Electrification

6.1 Background

Improving the energy efficiency of homes and businesses and shifting residential and commercial buildings from fossil fuels to electric power is essential to meeting the state's greenhouse gas reduction goals. Energy efficiency measures are of particular importance for reducing emissions in the near term because they can be put in place quickly and implemented through expansion of existing programs.

The SEO and other state agencies have a long history of adopting policies and programs that promote energy efficiency. The state will need a new suite of policies and programs to promote beneficial electrification of existing and newly constructed building systems.

Beneficial electrification refers to programs that reduce carbon emissions by displacing direct fossil fuel use with electric power use.
In contrast to energy efficiency programs - which reduce electricity or fuels usage - beneficial electrification programs increase electric power consumption.
Energy efficiency and beneficial electrification are actions often paired together because energy efficiency can offset the increased electric load from beneficial electrification projects. In addition, as the grid becomes increasingly powered by renewable energy and clean fuels, there will be a net reduction in greenhouse gas emissions.

Delaware's Climate Action Plan details the 2050 greenhouse gas emissions reduction potential resulting from full implementation of policies and programs that promote building energy efficiency and electrification.

6.2 Path Forward

This section of the Plan details strategies to expand energy efficiency and electrification, including:

- Improve, expand or create energy efficiency and electrification programs for residential and commercial buildings.
- Strengthen building energy codes and standards.
- Promote vehicle electrification.
- Establish more rigorous tracking and reporting mechanisms for program implementation.

6.2.1 Buildings Energy Efficiency and Electrification Programs

While the Energy Solutions Act of 2024 laid the groundwork for expanding energy efficiency programs, additional work is required to quantify the greenhouse gas reduction potential from current and planned efficiency and electrification programs, align energy savings targets with the state's climate policy and work with the public to ensure sufficient program offerings and participation.

Program implementers are entities that administer the state's energy efficiency and electrification programs. The SEO, Energize Delaware and various gas and electric utilities offer energy efficiency programs throughout the state. Currently, DPL, DEMEC and the DEC offer a range of energy efficiency or load management programs. Programs offered by the SEO and Energize Delaware focus on saving energy across all fuel types statewide, while programs offered by DPL, DEMEC and DEC are focused on electric savings specifically for their customers. Chesapeake Utilities has won approval from the PSC for three efficiency program

offerings: Home Energy Counseling and Checkup (HEC), Home Performance with Energy Star (HP) and Assisted Home Performance with Energy Star (AHP).[56]

Despite recent expansions of energy efficiency program offerings, Delaware currently offers a limited number that are electrification-focused. To successfully achieve Delaware's target of net zero emissions by 2050, these programs must not only make sure they are saving energy and money as they were designed to do, but must also incentivize transitioning homes and businesses from fossil fuel-burning systems to electrified systems.

In 2014, the Energy Act was amended (29 Del. C.§8059) to give regulated electric and gas utilities the ability to provide cost-effective energy efficiency programs in collaboration with Energize Delaware. This amended law created a 13-member Energy Efficiency Advisory Council (EEAC), which collaborates with the PSC and Public Advocate to assist in the development of energy efficiency, peak demand reduction and emission-reducing fuel switching programs. This law allowed regulated utilities to seek ratepayer-funded cost recovery for efficiency programs. The EEAC recommends three-year efficiency program portfolios, establishes evaluation, measurement and verification standards and compiles reports on program results for energy providers.

Historically, three-year annual energy savings targets have been set as a percent of utility retail energy sales in a specified reference year. During the initial planning cycle from 2016-2019, savings targets were based on energy efficiency potential and included a "ramp rate" intended to increase energy savings over the three-year period. These targets were established using data from a statewide potential study completed in 2014.[57] The study showed how the state could reduce usage of electricity, natural gas and fossil fuel in the building sector with the implementation of energy efficiency technologies and practices. The study estimated energy efficiency potential, including analysis of market barriers and program intervention.

The study, completed in two phases, assessed the energy efficiency potential in Delaware over a 12-year study period from 2014-2025. Results of the study suggest that significant cost-effective energy efficiency resources could be included in Delaware's energy resource mix over the 12-year period, representing significant net cost savings to customers and reducing greenhouse gas emissions by millions of metric tons.

The study was updated in 2019 to support target-setting for the next three-year planning cycle. During the 2020-2022 planning cycle, energy reduction targets were determined by averaging expected achievements proposed by the affected energy providers. At the end of 2022, the council discussed setting new goals. However, the goal-setting process was paused because program administrators did not submit their program plans in time. To date, savings have been below the achievable efficiency savings identified in Delaware's energy efficiency potential study and Delaware's Climate Action Plan strategy to build upon existing incentive programs to reduce energy consumption by 0.7% annually by 2022 and by 1.5% annually from 2023 forward.

[56] URL: https://www.chpk.com/chesapeake-utilities-corporation-gains-approval-to-establish-energy-efficiency-programs-in-delaware/
[57] URL: https://documents.dnrec.delaware.gov/energy/information/Documents/Potential.Study/EEPotentialStudy.pdf

Strategy: Incorporate greenhouse gas emissions into energy efficiency potential studies. Incorporating greenhouse gas reduction into potential studies is the first key step in ensuring the state will meet its climate targets. The SEO will refresh the energy efficiency potential study for residential and commercial buildings, which identifies energy efficiency and electrification programs needed to achieve Delaware's new greenhouse gas reduction targets. Future studies should identify and quantify the costs and potential energy savings from energy efficiency and fuel switching programs and measure greenhouse gas reduction opportunities.

Strategy: Ensure that energy efficiency programs are consistent with the Climate Change Solutions Act of 2023

Energy efficiency programs regulated by the Energy Solutions Act of 2024 are instrumental in achieving greenhouse gas reduction targets outlined in the Climate Change Solutions Act of 2023. However, the Energy Act predates the Climate Change Solutions Act of 2023: the former currently requires the EEAC to set energy reduction targets without linkage to state greenhouse gas reduction potentials indicated in the latter.

Strategy: Develop building decarbonization plans

The SEO will identify the barriers Delawareans face in participating in energy efficiency and electrification programs. These barriers vary by program, stakeholder, customer, building system vendors and installers. Building decarbonization measures should encompass all sectors: residential, commercial and industrial buildings. The SEO will identify ways to reduce energy use and greenhouse gas emissions among Delaware's largest energy users and industrial entities, while promoting cutting-edge technologies such as industrial heat pumps, carbon capture, energy efficient processes and on-site steam and power generation.

6.2.2 Building Energy Codes and Standards

Building energy codes and standards are cost-effective tools to reduce greenhouse gas emissions in new and existing buildings. In 2009, the Code for Energy Conservation (16 *Del.C.* § 7602) was updated to tie Delaware building and plumbing codes to both the International Energy Conservation Code published by the International Code Council (ICC) and the Energy Standard for Buildings Except Low-Rise Residential Buildings published by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). Under the law, the SEO is required to review and update the state's regulations every three years. In June 2020, the SEO amended the regulations by adopting the 2018 International Energy Conservation Code (IECC) and the ASHRAE 90.1 2016 Energy Standard for Buildings Except Low Rise Residential Buildings as the state's base building energy codes. These codes became effective on Dec. 11, 2020.

The SEO is in the process of evaluating options for adopting a more recent version of IECC.

While the SEO is authorized to adopt the base building energy code statewide, building energy codes are implemented and enforced by local jurisdictions. The SEO is committed to working with and supporting local governments in adopting, implementing and enforcing building energy codes.

Strategy: Support voluntary stretch code adoption.
The law governing energy codes (16 Del. C § 7602) was updated to allow local governments to adopt more stringent building energy codes in the form of stretch codes. Stretch codes allow local governments to pick more stringent code provisions from a menu of options provided by national and international codes. Local stretch codes can provide an opportunity to provide builders and developers in the construction industry the opportunity to familiarize themselves with new building practices prior to base code changes, easing the transition into future code revisions. State and local governments should leverage federal and regional funding and resources to support local stretch code adoption through the development of policy tool kits and training resources.

Stretch Energy Codes
A stretch code is a local government-mandated code or alternative compliance path that is more aggressive than base code, which results in higher energy savings.
Enabling and encouraging local jurisdictions to adopt stretch building energy codes can help Delaware meet its net zero energy cable building targets.

Strategy: Support net-zero building energy codes in new construction.
Delaware Code (16 Del. C § 7602) mandates that the SEO adopt net-zero energy-capable building codes and develop programs to promote net-zero energy homes. More specifically, the Code "requires the adoption of a net-zero energy-capable code for residential buildings effective December 31, 2025, and for commercial buildings by December 31, 2030."

According to the Code, "A 'zero net energy home' or 'zero net energy building' is defined as a residence or commercial building that, through the use of energy efficient construction, lighting, appliances and on-site renewable energy generation, resulting in zero net energy consumption from the utility provider." A recent study completed by the SEO on Delaware's new construction market identified opportunities to support net zero code construction. The SEO will explore ways to support net-zero-capable new construction through incentives, technical resources and training.

Strategy: Adopt and work with local governments to support enforcement of stronger state energy codes.
Statewide building codes are intended to ensure durability and safety of residential and commercial buildings, as well as improve energy efficiency and indoor air quality for residents. For the codes to be effective, they must be adopted and enforced throughout the state without amendments that weaken the intention of the code.[58] Currently, state code does not have include guidance on the process or timeline for a local jurisdiction to adopt and enforce the state's base energy code. All code enforcement and compliance fall under the local government's jurisdiction.

[58] URL: https://www.buildingsguide.com/build/building-codes-by-state/

Strategy: Assess the benefits of appliance standards.
The SEO will assess the feasibility of adopting appliance standards to contribute to achieving the state's emission reduction targets. Appliance standards are minimum energy conservation targets for appliances that are used most often in a home or building. Since 1987, Congress has established or directed the U.S. Department of Energy to set efficiency standards for about 60 products.[59] Common state appliance standards include items such as faucets, showerheads, water coolers and toilets, among others.[60]

Energy Code Training and Support

The State Energy Office offers **education and training** to buildings and construction professionals.

The State Energy Office also offers an energy code **technical support hotline** service that builders and code officials can use to answer questions related to the code. This hotline is managed by a consulting firm working with the State Energy Office on code compliance.

The **Delaware Energy Code Collaborative** was formed in 2011 to bring together a diverse group of state and local stakeholders responsible for advising the Division on energy code implementation, infrastructure, updates and compliance. The members include representatives of homebuilders, building code officials, contractors, architects, the Delaware Sustainable Energy Utility, the Northeast Energy Efficiency Partnerships and the Building Codes Assistance Project.

Strategy: Expand education and training opportunities.
Successful code implementation and compliance requires capacity building, training and expertise in both the code enforcement and building sectors. Key stakeholders in the new construction market also need to know the value of higher energy performance and advanced energy codes. The SEO will plan an in-state building energy and code training infrastructure for code inspectors, builders, contractors and designers. Additional technical assistance and resources can be planned during code adoption cycles.

The DNREC Division of Climate, Coastal and Energy is preparing a workforce needs assessment for the clean energy economy which will be used to guide collaborative workforce training efforts. These outreach efforts can be expanded to educate real estate agents, banks and lenders about the value and return on investment of energy efficiency measures for new construction and existing buildings. The SEO and other stakeholders, such as Energize Delaware, can work closely with banks and lenders to offer beneficial, low-interest loans for energy-efficient and zero net energy construction.

Strategy: Improve existing building energy performance by developing statewide building performance standards.
Building performance standards are designed to improve efficiency and reduce emissions in commercial and multi-family buildings. Performance targets are established for energy use, gas use, water use, electrification and greenhouse gas emissions, including a timeframe to meet those targets. Standards are often intended to become stricter over time, with penalties for buildings that do not achieve the standards. Many building performance standards include alternative pathways to compliance that can be implemented at the state or local level. While many policies address new construction, building performance standards target existing buildings via retrofits.

[59] URL: https://appliance-standards.org/national-standards
[60] URL: https://appliance-standards.org/state-standards#StateStandardsTable

Additionally, building performance standards are customizable to each region's needs, and priorities and can be designed to consider the challenges and opportunities of key stakeholders in their jurisdictions. The SEO will assess existing building stock characteristics and needs to identify the appropriate building performance standard policies. As part of building performance standards policy development, the state will work with key market actors in the Delaware building industry to understand their concerns and limitations.

Strategy: Lead by example in state government.
The SEO will continue to work with the Office of Management and Budget (OMB) to promote energy reduction, responsible energy behavior and energy efficiency strategies in state facilities through education, outreach and building improvements. The OMB provides guidance and technical resources for improving efficiency in state buildings, as well as including renewable energy in the state's electricity procurement.

6.2.3 Vehicle Electrification

Advanced Clean Cars II Standards:
In 2023, Delaware followed 11 other states in adopting the Advanced Clean Car II program, which requires 82% of new cars and trucks sent to Delaware for sale to be zero-emission vehicles by 2032.

Advancing vehicle electrification is a key component of the clean energy transition. According to Delaware's 2020 Greenhouse Gas Inventory, the transportation sector accounts for 30% of the total gross greenhouse gas emissions in the state.[61] Greenhouse gas emissions in the transportation sector come primarily from the combustion of fossil fuels, which accounts for 98% of all greenhouse gas emissions in the transportation sector. Delaware enables the purchase of electric vehicles under the Advanced Clean Cars II standards and manages incentive programs such as DNREC's Clean Vehicle Rebate Program and Delmarva Power's Plug-in Vehicle Rate. It is essential that policymakers also address current challenges in electric grid integration and expand the electric vehicle charging network. This Plan focuses on strategies from managing the increased demand for energy from electric vehicle charging. Other state planning efforts, including Delaware's Climate Action Plan and the Delaware Department of Transportation's (DelDOT) Statewide EV Infrastructure Plan, focus on strategies to deploy electric vehicle charging.

Delaware is expected to have nearly 60,000 EVs on the road by 2027, and 205,000 by 2032 (more than 9,000 were on Delaware's roads in October 2024).[62] As of April 2024, the state had more than 180 direct current fast charging and more than 300 Level 2 charging ports publicly available to support electric vehicle charging. Public chargers are mostly located in northern New Castle County and the southeast portion of Sussex County. The number of private home chargers is unknown. Private charging at home is limited to those who have access to dedicated parking, private drives and garages, and have the power supply to support charging a vehicle.

[61] Delaware's Greenhouse Gas Inventory 2024, https://documents.dnrec.delaware.gov/Air/greenhouse-gas/2020-DE-GHG-Inventory.pdf
[62] URL: https://deldot.gov/Programs/NEVI/index.shtml

DNREC and DelDOT completed a forecast to provide policymaker insight into how many public charging ports will be required to support electric vehicle adoption throughout the state.[63] The expected level of adoption will necessitate an estimated 821 direct current fast charging ports and 12,313 public Level 2 charging ports to fully support the vehicles operating in Delaware by 2032. This anticipated need for chargers is in addition to private charging at private homes and businesses.

Electric vehicles increase electricity demand, which requires a combination of energy management strategies and infrastructure upgrades. For electric vehicles to become the easy choice for personal vehicle and fleet use, Delawareans must feel confident that they can charge their vehicles at home, at their workplaces and at convenient public ports throughout the state. Policymakers and utilities need to deploy new technologies and implement new rate designs that manage the increased demand from electric vehicles without necessitating increased electric power generation. Strategies in this Plan detail how Delaware can eliminate cost barriers, improve infrastructure, clear regulatory hurdles and create consumer awareness to enable a rapid transition to electric vehicles.

Restructuring Motor Fuel Taxes and Fees

GEAC recommendation EE 17 brings to light the conflict between an increasingly electrified transportation sector and the impact to the state tax revenue that supports Delaware's Department of Transportation.

Motor fuel tax receipts will decline as vehicles become more fuel-efficient and increasingly electrified. While this is not an energy issue, it is an important issue impacting the transportation sector.

The Delaware Legislature must follow other states across the nation in initiating studies and pilots to identify alternative sources of revenue, such as the road user charge system, vehicle miles traveled or mileage-based user fees.

Strategy: Adopt and work with local governments to support enforcement of EV-ready residential and commercial building codes.

To fully decarbonize personal and business travel, residential and commercial buildings must be capable of charging electric vehicles. New Castle County has amended codes to require new residential construction be designed to accommodate electric vehicle charging equipment. State code requires the SEO to adopt "EV-Ready" building codes starting in January 2025 and engage and educate builders, local officials, homeowners and businesses on the requirements.[64] This reduces barriers for EV adoption and saves money when adding electric vehicle charging equipment to existing buildings.

Strategy: Encourage on-street EV charging.

Many current electric vehicle owners have a Level 2 charger installed at their home, often inside a garage or accessible from their driveway or dedicated

[63] URL: https://deldot.gov/Programs/NEVI/index.shtml
[64] 16 *Del.C.* §§ 8003-4 https://delcode.delaware.gov/title16/c080/index.html

parking spot. These drivers can plug in their vehicle when they return home and let it charge until it's time to leave again. However, many Delawareans don't live in a single-family home with dedicated off-street parking. Residents of cities and towns often rely upon on-street parking and may not feel confident that they could charge a vehicle at home.

Partnerships between utilities and local governments can demonstrate personal or social charging pilots. To reach state goals for electrification, local governments should develop electric vehicle charging ordinances to permit the placement and installation of on-street charging stations, and mechanisms must exist for residents to request the installation of on-street or pole-mounted chargers near their residences.

Strategy: Ensure the electric distribution network is ready for electric vehicles.
To avoid costly and time-consuming electric distribution infrastructure upgrades, strategies need to be implemented to shift new electric vehicle charging loads away from peak periods while addressing distribution system constraints. This is achievable by numerous means, including improving utility demand response approaches, designing time-of-use rates, implementing smart charge management and using electric vehicles as an energy resource via Vehicle-to-Grid. Utilities can use emerging technology, create awareness and incentivize customer behaviors to balance load and optimize the existing electric distribution grid capacity.

Strategy: Reduce barriers for commercial customers.
Current electric rate designs can discourage the growth of EV charging station networks. Demand charges are fee structures used by utilities to recover the cost of maintaining the grid. Demand charges for nonresidential customers, particularly those with direct current fast chargers, can result in unexpectedly high energy costs. Solutions include educating commercial customers, piloting programs and designing rates that incentivize load management. These solutions can accelerate electrification while minimizing cost and impact on the grid. Mitigating the effects of this costly barrier is necessary for electrifying large fleets and public transportation.

Strategy: Educate consumers about new programs and incentives.
Promoting EV adoption will require building public awareness and providing education on utility, state and local vehicle electrification policies and programs. Program providers, dealerships and consumers need to be kept abreast of electric vehicle and charging infrastructure incentives. Furthermore, consumers must be empowered to participate in program offerings that pilot new technologies and manage charging.

6.2.4 Tracking and Measuring Progress

The Delaware Energy Solutions Act of 2024 requires the SEO, working with the Energy Efficiency Advisory Council, to set energy efficiency targets to reduce energy consumption throughout the state. Additionally, the state offers initiatives that include energy efficiency programs, building codes and appliance standards to improve energy performance and reduce greenhouse gases. However, despite the progress made thus far, Delaware faces challenges from a lack of coordinated and transparent data reporting across key stakeholders and program implementers.

Strategy: Track and measure progress toward energy efficiency and electrification.
The SEO should take the lead in creating uniform tracking, reporting and accountability systems that will measure progress toward state goals. A survey conducted by the University of Delaware in 2019 showed that 73% of Delawareans support stronger energy efficiency

standards. These findings are consistent with responses to public engagement on the 2024 – 2028 Delaware State Energy Plan. However, there is a general lack of knowledge of existing policies and programs and a lack of centralized evaluation and monitoring mechanisms indicating the performance of those programs. To meet statewide goals toward a more resilient energy future, it is crucial that metrics are established to inform policy decisions and identify areas for improvement so that Delaware can track and manage progress of building efficiency, vehicle electrification and compliance with building energy codes.

7. Grid Modernization

7.1 Background

The electric grid connects, distributes, and delivers electricity from generating resources to customers. The traditional electric grid, originally designed for one-way flow of electricity from centralized – mainly fossil-fuel powered – electric generators to consumers is increasingly outdated. The growth of new technologies such as solar at all scales, wind power, energy storage, microgrids and electric vehicles presents new challenges and opportunities. Grid operators are facing increasing stresses to the power grid brought on by climate change, such as hotter temperatures and stronger storms.

As Delaware incorporates more renewable energy, climate change is driving hotter summers and more intense storms. As consumers demand more electricity, entities managing the electric system must incentivize smarter, quicker and more flexible technologies. This Plan takes a critical look at the current electric grid infrastructure and proposes strategies to:

- Prepare electric utility transmission lines and substations to integrate the increasing use of renewable resources.
- Modernize Delaware's distribution networks to integrate distributed energy resources and non-wires alternatives.
- Maximize resiliency of energy infrastructure to combat climate change vulnerabilities such as extreme heat and weather events.
- Adopt innovative rate design and utility programs that use smart grid technologies for peak shaving, demand response and increased reliability as cost effectively as possible.

Key Smart Grid Terms:

- **Front-of-the-Meter** – Supply-side energy services controlled by entities that manage the grid.
- **Behind-the-Meter** – Demand-side energy services controlled by the customer.
- **Distributed Energy Resources (DER)** – Small, modular, energy generation and storage technologies that provide electric capacity or energy where you need it on the distribution grid. Examples include small wind, solar, fuels cell and co-generation systems.
- **Demand response programs** - Incentive-based programs that encourage mainly residential and commercial electric power customers to temporarily reduce their demand for power at certain times in exchange for a reduction in their electricity bills. Some demand response programs allow customers to retain control, while others allow operators to reduce load directly.
- **Demand-side management** - Actions that reduce or curtail mainly industrial end-use equipment or processes to reduce customer load during peak demand on the grid.
- **Non-wires alternatives** – Physical and operating investments that may defer or replace the need for transmission or distribution line projects. Non-wires alternatives can increase reliability, reduce transmission congestion, or distribution system constraints during peak demand. Examples include DER, energy storage, micro-grids or even demand response and energy efficiency measures.

7.2 Path Forward

Strategies in this section build upon those in the Renewable Energy and Clean Technologies and Energy Efficiency sections of the Plan, and are designed to guide Delaware policymakers and facilitate understanding of the challenges facing the electric grid.

7.2.1 Transmission & Substation Infrastructure

Modernizing Delaware's electric infrastructure requires a comprehensive approach that integrates new renewable energy sources while also providing reliability and resilience. Traditionally, high voltage transmission infrastructure (69kV and above) was built to deliver power in one direction from a small number of large power plants (mainly fossil fuel-powered) to substations, where voltage is stepped down to distribution level (34kV and below) and power is delivered to homes and businesses.

Utility-scale renewable energy resources like wind and solar use inverters rather than synchronous generators characteristic of conventional power plants (which deliver power in sync with the grid's 60-cycle frequency). Incorporating more inverter-based resources presents challenges to a grid not originally designed to accommodate them. For these reasons, electric grid operators will need to develop new approaches to maintain stable frequency on the grid when inverter-sourced energy is used.

Significant uncertainty remains as to what will be the best approach to incorporating inverter-based resources regionally and in Delaware.[65] The strategies in this section focus on overcoming the physical, technological and regulatory challenges burdening transmission and distribution substations in Delaware and the steps needed to facilitate interconnection while maintaining a reliable electric grid.

Strategy: Clarify the Public Service Commission's role as siting and routing authority. Clarifying the role of the PSC is needed to create a clearer path for new clean energy facilities to connect to the transmission grid. The PSC's Certificate of Public Convenience and Necessity (CPCN) process provides a regulatory framework to connect new transmission projects to the grid in a way that protects the health, safety and welfare of the general public. This process should align with the state energy plan and Delaware's Climate Action Plan strategies to reduce impacts of climate change, minimize costs and strengthen grid reliability quickly and equitably.

The Energy Solutions Act of 2024 takes an important step in this direction by strengthening the PSC's role in granting CPCNs for "renewable energy interconnection facilities" used to connect wind or solar projects of 30 MW or higher to the PJM transmission grid. The law also establishes a process for DelDOT to allow for such interconnection facilities to use the state's rights of way efficiently and safely.

Strategy: Reform transmission permitting and planning in Delaware and the PJM region. Expanding electric transmission capacity throughout the region is essential to meeting growing demand and the delivery of clean energy from new facilities to customers. However, over the

[65] URL: https://www.nrel.gov/docs/fy22osti/82269.pdf

past decade, transmission lines in the United States have been built at half the rate of the previous three decades, often due to permitting and financing challenges.[66]

The federal government has taken recent steps to tackle siting, routing and permitting challenges with new programs such as the Coordinated Interagency Transmission Authorizations and Permits (CITAP) Program.[67] Large-scale energy projects must obtain permits and approvals from many local, state and federal agencies, including those related to stormwater management, wildlife interactions and potential impacts to airspace, military installations and cultural or historic resources, among others. The required permits depend on the renewable energy technology, location and facility size. To deploy renewable energy quickly, it is imperative that permitting and licensing processes for energy infrastructure projects are streamlined to balance the urgency of mitigating climate change with protection of valuable public resources.

Strategy: Incorporate the social cost of carbon into the cost analysis for utility-scale decarbonization.
Transmission system upgrades require extensive cost-benefit analyses when required by load growth or when generation projects seek to interconnect to the transmission grid. The SEO and PSC have important roles to play in ensuring climate costs and benefits are considered in transmission planning, as well as interconnection, market rules and cost allocations for connecting utility-scale solar and wind. Regulatory bodies should include the economic impact that climate change is having on agriculture, health, energy use and other aspects of the economy in their cost-benefit analyses.

Strategy: Reduce greenhouse gas emissions from grid technologies.
Like many industrial technologies, power grid equipment produces GHG and other emissions hazards. Reengineering power lines, substations and transformers presents opportunities to replace aging, hazardous equipment and materials with more climate friendly alternatives. An example is the use of sulfur hexafluoride (SF6) in gas-insulated transmission and substation equipment.[68] Delaware should review policies in other states that have adopted regulations to drive a market shift toward more climate-friendly grid technologies.

Strategy: Deploy grid-forming inverters and controls that integrate inverter-based renewable energy resources.
As more renewable energy resources are connected to the power grid, renewable energy developers and utilities will need to invest in “grid-forming” power electronic inverters, which provide the functionalities that are traditionally provided by synchronous machinery.[69] One such technology is Static VAR Compensators (SVCs), which are devices deployed at transmission substations to respond to changes in frequency and stabilize grid integration of high voltage renewable energy systems. These technologies are not yet widely deployed in the U.S. for utility scale renewable energy. The SEO should work with regulators to explore incentives to ownership, operation and incorporation of grid-forming inverters at the point of interconnection to ensure a resilient, decarbonized grid.

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[66] URL: https://www.energy.gov/articles/biden-harris-administration-announces-final-transmission-permitting-rule-and-latest#:~:text=WASHINGTON%2C%20D.C.%E2%80%94%20In%20a%20continued,capacity%20throughout%20the%20Western%20United
[67] URL: https://www.energy.gov/gdo/coordinated-interagency-transmission-authorizations-and-permits-program
[68] URL: https://dec.ny.gov/sites/default/files/2023-12/part495supportingdocuments.pdf
[69] Lin, Yashen, Joseph H. Eto, Brian B. Johnson, Jack D. Flicker, Robert H. Lasseter, Hugo N. Villegas Pico, Gab-Su Seo, Brian J. Pierre, and Abraham Ellis. 2020. Research Roadmap on Grid-Forming Inverters. Golden, CO: National Renewable Energy Laboratory. NREL/TP-5D00-73476. https://www.nrel.gov/docs/fy21osti/73476.pdf.

7.2.2 Distribution Infrastructure & Smart Grid Technology

In addition to improving frequency response and system protection at the transmission and substation level, upgrades are also needed at the distribution level to manage new two-way flow of power between customer Distributed Energy Resources (DER) and the grid. Grid modernization at the distribution level will increasingly involve shifting toward a more decentralized, intelligent, and responsive energy system.

Strategy: Require integrated distribution system planning from electric utilities.
In the future, every home and business could have solar panels and electric vehicles capable of bi-directional power flow that returns energy to the grid. Using our buildings and vehicles as a resource to balance the peaks and valleys of demand can result in substantial efficiency savings for customers and greater grid stability.

The PSC should initiate a proceeding to better define the scope of electric utility Integrated Distribution System Plans and direct regulated utilities to file plans within one year. Plans should facilitate bi-directional flow and propose the physical and operational changes necessary to open closed circuits so that more Distributed Energy Resources (DERs) and non-wires solutions can be integrated. Plans should also specify cost recovery for these investments and use load forecasts that reflect local climate data and electrification policy.

Incorporate climate data in load forecasting. Climate change impacts such as rising temperatures and more variable precipitation pose challenges to the state's energy infrastructure. Utilities should improve load forecasting to include impacts from climate change in medium- and high-emissions scenarios for mid- and late-century. Electric utilities should incorporate available state downscaled climate modeling for utility-relevant climate impacts and prepare the grid to meet demand from a warmer Delaware. These climate impacts include a decreasing number of heating degree days and increasing number of cooling degree days, as well as an increase in days over 95 and 100 degrees. Delaware has downscaled data available for stakeholders in the Climate Projections Portal, which will be updated on a five-year basis, as per Delaware's Climate Solutions Act of 2023.

Ensure grid readiness in high electrification scenarios. Delaware utilities must address pathways to meeting electrification goals. Utilities will need to work closely with policy makers to assess feasibility, identify needs and pinpoint technology investments to maintain customer reliability amidst expanding demand. Electric utilities should share assumptions in their forecasts when it comes to factors such as adoption of electric vehicles and building electrification targets to ensure forecasts are in line with modeling assumptions and projections in Delaware's Climate Action Plan.

Strategy: Use advanced technologies to integrate and control behind-the-meter distributed energy resources.
Advanced Distribution Management Systems (ADMS) and Distributed Energy Resource Management Systems (DERMS) are software solutions that leverage Advanced Metering Infrastructure (AMI) at homes and businesses to allow operators to aggregate and control disparate DERs on the grid, provide various grid services and mitigate peak load, congestion and voltage deviation scenarios. Regulators and utilities should address barriers, including ratepayer impacts and technical complexities, to using DERMS to integrate more solar energy systems on the distribution grid. Performance metrics could include the number of pilot projects, opened restricted circuits to DER and increased capacity of solar energy on Delaware's distribution grid.

Strategy: Promote microgrid projects in Delaware.
Microgrids are a crucial tool that can be used to ensure grid reliability, especially during extreme weather events and emergencies. Microgrids utilize DERs and energy storage systems to power small populations such as towns or small cities. Microgrids are still connected and interactive with the bulk power grid, but are capable of sustaining service to customers during power outages. However, there are financial, institutional and technical barriers that limit microgrid development in Delaware.

Municipal utilities may be well-suited to leverage federal grant funding to engage community leaders and deploy microgrid demonstration projects. Significant education efforts would be needed to increase awareness of the benefits of microgrids. The SEO should initiate a study to evaluate the state's distribution grid so that it may identify opportunities for battery storage and microgrid projects, which can help to guide and plan future infrastructure investments.

Strategy: Promote energy storage projects at different scales in Delaware.
Energy storage technologies, especially batteries, are important to Delaware's transition to a clean and resilient energy system. Batteries can store excess energy from renewable sources, such as solar or wind, for later use, creating benefits for transmission and distribution grids as well as end-use customers. This can extend the penetration of renewable energy resources and increase grid stability. New technologies in energy storage blur the boundary between power generation and power delivery, so stakeholders must address regulatory and market barriers to increase the use of distribution-scale and customer-sited energy storage projects. Strategies to promote energy storage at different scales include:

- The PSC should commence a proceeding to update rate designs and regulations pre-dating the rise of storage that may inhibit utilities, third-party project developers and customers from deploying storage systems and utilizing them fully.
- Program administrators should modify existing renewable energy incentive programs (such as DNREC's Green Energy Program) to provide incentives for battery storage, especially when located in areas already constrained by solar.
- Federal funding should be leveraged to make significant investments in commercial/industrial battery storage to reduce potential demand charges, provide on-site benefits and contribute to grid stability.

7.2.3 Rate Design
Utility electric rate design is the method by which power companies structure the prices charged to consumers for electricity. Various rate structures, including flat rates, tiered rates, demand

charges and time-of-use (TOU) rates can be tailored to achieve different objectives, such as recovering the cost of electricity supply, encouraging energy efficiency and conservation and managing load on the electric grid. Effective rate design is critical to ensuring fair pricing for customers, guaranteeing utilities can cover the costs of providing electricity and, in the case of investor-owned utilities, increasing the probability of a return on investment to shareholders.

Strategy: Enable proactive utility investment into smart grid technologies, 'modern' substations and other critical infrastructure to interconnect DERs and manage two-way power flow.

Transforming substations into versatile energy hubs that facilitate two-way power flow will require regulatory reform to allow for the integration of, and compensation for, DER at the substation level. Financial incentives and funding mechanisms need to be established to mitigate the upfront costs associated with upgrading infrastructure and incorporating new technologies. This effort requires a clear framework for cost recovery, ensuring that investments made today are financially sustainable and align with regulatory policies and customer interests. Metrics should encompass outage reductions, grid reliability, cost impacts per customer and greenhouse gas emissions reductions. Education and engagement with the public will also be vital to garner support and address concerns such as utility bill impacts. Therefore, public engagement will be a significant requirement in the transition toward a more sustainable, resilient and efficient grid system.

Strategy: Modify rate design to encourage customer-controlled energy management.
TOU rates offer a dynamic pricing model that varies according to the time of day, day of the week and season. TOU rates are structured to reflect the varying costs of generating electricity at different times, with higher rates during peak demand periods and lower rates during off-peak times. This pricing mechanism is designed to encourage consumers to shift their electricity usage to less busy times, thereby reducing peak load on the electric grid and allowing utilities to operate more efficiently. TOU rates are designed to smooth out fluctuations in demand, reducing the need for expensive peak power plants and helping to maintain a more stable and efficient energy system. Establishing new TOU rates should include an analysis to assess the efficacy of current electric vehicle and other TOU rates so that improvements can be made to increase adoption.

8. Workforce Development

8.1 Background

The clean energy industry is expected to grow nationally and regionally as the energy transition progresses. The SEO is working with partners to ensure the advancement of our local clean energy economy results in economic development and job opportunities for both Delaware's existing and emerging workforce. Clean energy jobs can encompass many occupations including energy efficiency, clean energy generation, grid modernization and storage, clean fuels, clean transportation, construction, professional services, manufacturing, utilities and wholesale trade.

Employment growth in the clean energy sector will need to ramp up quickly to achieve state climate goals. Despite the existing workforce development and apprenticeship programs within the state, clean energy companies report experiencing challenges hiring qualified entry-level applicants.

This Plan proposes strategies to:

- Complete a workforce needs assessment for the clean energy economy.
- Expand clean energy workforce development programs.
- Increase collaboration in expanding clean energy workforce development programs.
- Build awareness of clean energy jobs and training opportunities.
- Build the professional capacity in state government agencies to meet the planning, program and regulatory challenges of leading the energy transition.

Strategy: Complete a workforce needs assessment for the clean energy economy.
Through the EPA Climate Pollution Reduction Grant Program, DNREC's Division of Climate, Coastal and Energy has commissioned a workforce needs assessment to evaluate the current and future needs of the energy and climate-related jobs sector in Delaware. Sectors include energy efficiency, renewable energy, energy transmission, distribution and storage, clean transportation, adaptation and resilience. The objectives of this assessment are to establish baseline workforce and workforce development efforts, identify skills gaps and needs and identify workforce development strategies at the state, regional and/or local level. The assessment inventories Delaware's existing training programs, certifications and educational pathways relevant to energy and climate-related workforce sectors. It also engaged key energy sector and community stakeholders in surveys, interviews and workshops to assess the existing workforce landscape and future job market trends. The assessment can guide Delaware decision-makers on how to best fund an adequately prepared workforce that can help achieve Delaware's climate goal of net-zero emissions by 2050.

Strategy: Expand clean energy workforce development programs.
Challenges in staffing these new roles in the clean energy economy are shared among technology sectors. According to the United States Energy & Employment Report (USEER), 48% of energy industry employers in Delaware reported challenges in hiring skilled workers, indicating a gap between job opportunities and the availability of a skilled clean energy workforce.

Advanced and emerging energy and grid technologies require workers with specialized training, skills, experiences and competencies. Investing in our energy workforce must include not only

developing entry-level workers, but also investing in the professional development of current workers to keep them up to date on evolving technologies and necessary skills.

DNREC and its partners have administered a host of energy efficiency and renewable energy programs in Delaware since 2010. These programs have spurred green job growth, especially in the home energy assessment and energy efficiency fields. Local colleges and universities offer courses and certifications that are tailored to the clean energy sector.

If approved, the Mid-Atlantic Clean Hydrogen Hub (MACH2) would likely exert significant influence over workforce development activities in Delaware. The U.S. Department of Energy identified Delaware Technical Community College and the Delaware Workforce Development Board as key partners in hub workforce development. The University of Delaware was selected, along with Cheyney University (Pennsylvania), Rowan University (New Jersey), and the University of Pennsylvania, to lead MACH2's higher education workforce development initiatives.

8.2 Path Forward

Strategy: Increase collaboration in expanding clean energy workforce development programs.

DNREC's Workforce Needs Assessment found many Delaware stakeholders are in various stages of creating programming to support a clean energy workforce, but these efforts are siloed, resulting in potentially duplicative efforts. Meeting the current and future employment demands in the energy industry will require significant collaboration amongst state agencies, educational institutions, community organizations and the private sector. Drawing from the lessons learned through the needs assessment, close collaboration and partnership with these institutions will ensure that available courses, programs and certificates are aligned with the assessment's findings and reach more industries within the clean energy sector.

In developing programs, funding must be focused on improving the lacking ethnic, racial, and gender diversity in the industry. The energy workforce continues to be overwhelmingly male. According to the USEER 2023 findings, the energy workforce was 73% male, while the U.S. workforce average was 53% male. Women made up 26% of the energy workforce, much less than the U.S. average, which was 47%." Additionally, "there was a slightly higher percentage of nonwhite workers in energy, 24% compared to 23% of the entire U.S. workforce." However, it also had a below-average percentage of Black or African American workers. Additionally, Black and African American workers represented are not proportionally represented in technology sectors as compared to their representation in the overall U.S. workforce." Expanding programs, particularly in underserved communities and for under-represented groups, will equip individuals with the requisite skills and experiences for burgeoning employment opportunities in the energy sector.

Strategy: Build awareness of clean energy jobs and training opportunities.
Strategic outreach and awareness campaigns, particularly within disadvantaged communities, are crucial for extending the benefits of workforce development to all Delawareans. Alongside awareness, equitable access is essential to foster stronger economic outcomes statewide. Collaborating with community organizations to offer services and support builds trust and enhances program reach. Workforce opportunities should be presented as modern, high-growth, and dynamic jobs with substantial wage and growth potential, which can deliver tangible benefits to residents in these communities.

Disparate outreach initiatives between state and local government, nonprofits, higher education and energy sector employers can be difficult for job seekers to navigate. Delaware must establish a comprehensive clean energy jobs and training effort to raise awareness of both existing and new career prospects within the state. This effort must include partnerships with employers such as energy utilities to showcase careers in the clean energy sector and highlight success stories, which can inspire youth to pursue these careers.

Strategy: Build the professional capacity in state government agencies to meet the planning, program and regulatory challenges of leading the energy transition.
The energy transition requires the further recruitment and professional development of technical experts in state government. State agencies, including DNREC and the SEO, continue to face significant staffing and retention issues as new generations enter the workforce. The state's pay scale for energy professionals, even when factoring in state employee benefits, is not competitive when compared to other states, the private sector, or local governments in Delaware. The Department of Human Resources should work with relevant state agencies to assess strategies to attract and retain the necessary staff across all agencies.

9. Conclusion/Looking Forward

The 2024 – 2028 Delaware State Energy Plan is the culmination of a great deal of hard work and consultation with stakeholders representing a variety of perspectives. Likewise, implementing the Plan will require engagement and contributions from numerous stakeholders and Delaware residents. Progress in each of the strategic areas outlined in the Plan — Energy Justice, Renewable Energy and Clean Technologies, Energy Efficiency and Beneficial Electrification, Grid Modernization and Workforce Development — will require the active engagement of government, business and community leaders alike.

Development and implementation of new energy policies and programs were not put on hold during the preparation of the Plan, and the Plan does not fully capture this ongoing effort. Likewise, new challenges and opportunities may arise that may not have been fully anticipated. Even so, the Plan provides Delaware with a roadmap for navigating the ongoing energy transition and building energy systems that are cleaner, more resilient and more equitable for all of us. The DNREC State Energy Office is committed to working with partners and stakeholders to refine and implement the Plan over the next five years.

Appendices

A. Acronyms
B. Glossary

Appendix A: Acronyms

Btu	British thermal unit
CAP	Climate Action Plan
CO_2	Carbon Dioxide
DEC	Delaware Electric Cooperative
DEMEC	Delaware Municipal Electric Corporation
DER	Distributed Energy Resource
DERM	Distributed Energy Resource Management
DNREC	Delaware Department of Natural Resources and Environmental Control
DP&L	Delmarva Power and Light
DPA	Delaware Public Advocate
EAEC	Energy Access and Equity Collaborative
EEAC	Energy Efficiency Advisory Council
EEIF	Energy Efficiency Investment Fund
EV	Electric Vehicle
GEAC	Governor's Energy Advisory Council
GEF	Green Energy Fund
GHG	Greenhouse Gas
kW	Kilowatt, a measure of power equal to 1,000 watts
kWh	Kilowatt hour, the amount of energy consumed by using one KW of power for one hour
LEAP	Low Emissions Analysis Platform
LMI	Low- to Moderate-Income
MMBtu	Million Btu
MW	Megawatt
MWh	Megawatt hour
OSW	Offshore Wind
PSC	Public Service Commission
REC	Renewable Energy Credit
RETF	Renewable Energy Taskforce
RGGI	Regional Greenhouse Gas Initiative
RPS	Renewable Energy Portfolio Standard
SEU	Sustainable Energy Utility
SREC	Solar Renewable Energy Credit
VMT	Vehicle Miles Traveled

Appendix B: Glossary

British Thermal Unit (BTU)
A BTU is a standard measure of energy and provides a basis to compare energy sources and uses.

Capacity
The maximum amount of electricity a generator can produce, measured in megawatts (MW).

Climate Change
A long-term change in the average weather patterns that have come to define Earth's local, regional and global climates.

Community Solar
A solar energy development model in which multiple participants share, invest in and benefit from a single solar energy system (often a larger, off-site development). Individuals either own or lease a portion of the system and reap the benefits (such as cost savings) from the solar energy generated by the portion they own or lease.

Decarbonization
Long-term strategies to reduce carbon dioxide emissions by phasing out the use of carbon-emitting processes and technologies. This is primarily done by eliminating the combustion of fossil fuels as an energy source, with the end goal of a carbon-free global economy.

Delaware's State Energy Office
The DNREC State Energy Office is located in the Division of Climate, Coastal and Energy.

Distributed Energy Resources (DER)
Small-scale electricity production that is on-site or close to the primary user and is interconnected to the utility distribution system.

Electric Vehicle (EV)
A type of zero-emission vehicle that has a battery instead of a gasoline tank and an electric motor instead of an internal combustion engine. Also known as an all-electric vehicle or battery-electric vehicle.

Electrification
The process of replacing technologies that use fossil fuels as an energy source with technologies that use electricity. Electrification holds to the expectation that electricity is generated using clean or renewable energy.

Energy Efficiency
Practices in which older or less energy-efficient appliances, vehicles, building materials and other technologies are replaced with newer, more efficient designs that require less energy. By reducing energy demand, efficiency improvements can both reduce greenhouse gas emissions and realize cost savings in the short-term.

Energy Storage
The capturing and storing of energy for future use. Energy can be stored through electrochemical (batteries), thermal and mechanical means, as well as through pumped hydropower and hydrogen.

Environmental Justice
An environmental justice community is a community that is disproportionately impacted by pollutants.

Equity
Just and fair inclusion in a society where all can participate, prosper and reach their full potential.

Federal Energy Regulatory Commission (FERC)
FERC has jurisdiction over the interstate sale and transmission of electricity and natural gas, and regulates PJM.

Greenhouse Gases
Gases in the atmosphere that have the ability to trap heat. Common greenhouse gases include carbon dioxide, methane, nitrous oxide, certain fluorinated gases (such as hydrofluorocarbons and chlorofluorocarbons) and water vapor.

Kilowatt (kW)
A kW is a unit of electrical capacity equal to 1,000 watts.

Kilowatt-hour (kWh)
A kWh is a unit of electrical energy equal to 1,000 watt-hours.

Megawatt (MW)
A MW is a unit of electrical capacity equal to 1,000 kilowatts or 1,000,000 watts.

Megawatt-hour (MWh)
A MWh is a unit of electrical energy equal to 1,000 kWh.

Microgrid
A microgrid is a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid. A microgrid can connect to and disconnect from the grid to enable it to operate in both grid-connect or island-mode.

Net-Zero Emissions
As it relates to greenhouse gas emissions, net-zero emissions is achieved when greenhouse gas emissions from human activities are balanced out by removing greenhouse gases from the atmosphere, a process known as carbon removal. Carbon removal can be carried out via carbon sequestration and storage as well as through the use of carbon removal technology.

Net-Zero Energy Building/Home
Buildings and homes that combine energy efficiency and renewable energy generation to consume only as much energy as can be produced on site through renewable resources over a specified time period.

Peak Demand
The highest electric power demand that has occurred over a specified time period.

PJM
PJM is the regional transmission organization responsible for planning and operating the electric transmission grid across 13 Mid-Atlantic and Midwestern states and the District of Columbia. PJM is also the independent system operator that administers the wholesale power markets in its territory to assure bulk system reliability.

Regional Greenhouse Gas Initiative (RGGI)
The Regional Greenhouse Gas Initiative (RGGI) is the first mandatory market-based program in the United States to reduce greenhouse gas emissions. RGGI is a cooperative effort among several states in the Northeast and Mid-Atlantic regions to cap and reduce CO_2 emissions from the power sector.

Sustainable Energy Utility
Also known as Energize Delaware, a non-profit authorized under the Delaware Energy Act to provide programs to promote renewable energy and energy efficiency.

Weatherization
A range of practices aimed at weatherproofing and installing energy-efficient measures in a building or home to improve the structure's envelope, heating and cooling systems, electrical system and electricity and fuel consumption. Weatherization programs can include home energy audits, air sealing, insulation, moisture control and ventilation.

2024-2028 Delaware State Energy Plan

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and Environmental Control

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