



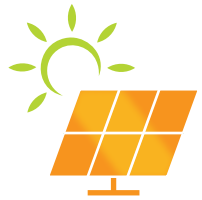
SECTION 06

Solutions and Strategies

A Utilities-led Decarbonization Revolution

IN THIS SECTION, WE COVER:

- 39 A multi-stakeholder approach to solving obstacles
- 40 Examples of utilities taking action
- 47 Six strategies for the utilities' road to net-zero



Utilities have the opportunity to lead economy-wide decarbonization in the U.S. and set a positive precedent for other sectors.

Just as utilities revolutionized the world by bringing power to a nation over a century ago, they can lead the way to a clean energy economy.

However, achieving decarbonization goals and conquering the obstacles that utilities face will require support from all stakeholders, from the government to the end consumer.

The following section presents a multi-stakeholder approach to solving the obstacles that utilities face and uses these solutions to draw possible decarbonization strategies for utilities.

Solutions to Obstacles

A Multi-stakeholder Approach

There are four key stakeholders that can help overcome the obstacles to utility decarbonization:

01 Utilities

- ▶ Cross-industry collaboration
- ▶ Fleet electrification
- ▶ Pilot testing programs
- ▶ Nuclear power

02 Government

- ▶ Retraining programs
- ▶ Grid planning and permitting
- ▶ Funding

03 Investors

- ▶ Capital allocation
- ▶ Decarbonization advocacy
- ▶ Public-private partnership (PPP) programs

04 Customers

- ▶ Education and awareness
- ▶ Smarter households
- ▶ Net-metering programs
- ▶ Resourceful communication



Stakeholder 01

Utilities

Utilities can take up various initiatives to conquer some of the technological and socio-economic hurdles on the road to decarbonization.

Cross-industry collaboration

Collaboration with companies from different industries like telecommunications and battery manufacturing can help accelerate utility decarbonization through synergies.

For example, utilities can collaborate with data-analytics companies to identify customers living in remote areas, and to better understand their customers to build tailored solutions. Similarly, partnerships with telecommunications companies can help utilities in informing customers about decarbonization practices.

While cross-industry collaboration can be complex for industries that have been historically independent, utilities now have the opportunity to find support in new places to renew, rebuild, and revitalize the country's infrastructure.

CASE STUDY



Duke Energy & Honeywell Collaborate to Improve Energy Resiliency²⁴

To help combat outages induced by extreme weather conditions due to climate change, Duke Energy Sustainable Solutions (DESS) and Honeywell partnered up to create municipal microgrids for certain U.S. communities.

Municipal microgrids are self-sufficient subsystems of the electric grid that serve as a means of backup power for local communities. In case of outages, microgrids can disconnect from the larger grid and operate autonomously, providing communities with additional energy security.

Honeywell will lead solutions development using its smart cities expertise, and will use its IoT platform to build technologies and control systems. DESS will own and manage the energy assets, leveraging its competency in designing and implementing distributed energy solutions for communities.

CASE STUDY



PG&E and Tesla Build one of the World's Largest Energy Storage Facilities²⁵

Californian utility PG&E, in collaboration with Tesla, has built an operational 182.5-megawatt lithium-ion battery storage facility in Monterey County. The facility is expected to be one of the largest battery storage systems in the world, with 256 of Tesla's Megapack battery packs set to relay over 730 MWh of energy to the electrical grid.

The additional energy storage is expected to provide PG&E and the State of California with enhanced grid reliability and integration of intermittent renewable energy sources. The project also has an option to boost power supply to the grid during peak hours.

Tesla and PG&E's energy storage facility in Moss Landing, Monterey County, California
Source: Tesla



Fleet electrification

Electrifying vehicle fleets can help reduce emissions from on-site travel and employee commuting, both of which contribute to a utility's carbon footprint.

Switching to electric vehicles for business operations will not only advance decarbonization within the company but also help achieve federal EV goals.



CASE STUDY



PG&E and GM Collaborate on EV Technology²⁶

PG&E and GM are testing how GM EVs can be an on-demand power source for customers in PG&E's service area.

The companies plan to use GM EVs to test vehicle-to-home connections on a small group of customers, allowing them to receive power from the EV in the absence of grid electricity. This will demonstrate how EVs can be used to safely power homes during outages, increasing resiliency and reliability.

The partnership also supports California's EV adoption goals and PG&E's 2030 fleet electrification goals.

Pilot testing programs

Utilities can partner with early-to-advanced stage technology companies to engage in pilot testing programs for technologies that are not currently available at scale.

Through pilot programs, utilities advance decarbonization research and development for the entire industry and can also play an important role in breakthrough innovations. Simultaneously, utilities can also include customers and communities in the decarbonization conversation by incentivizing them to participate in pilot programs.

CASE STUDY



Duke Energy Tests Honeywell's New Flow Battery Storage Technology²⁷

Honeywell has developed a new flow battery technology that stores energy from intermittent renewable sources like wind and solar. The stored energy can then be used when wind and sunlight are absent.

Duke Energy is testing this technology at its Mount Holly facility in North Carolina, and if successful, it will allow for greater flexibility and reduced dependence on fossil fuels for power generation. The testing begins with a 400 kWh unit to be delivered to Duke Energy in 2022. By 2023, this will be scaled up to a 60 MWh pilot project.



Nuclear power

Nuclear power is an emissions-free source of reliable electricity, offering several advantages provided the problem of nuclear waste is addressed. To fill in the gaps left behind by intermittent renewable generation, utilities can incorporate more nuclear power, either through owned reactors or purchased power agreements.

CASE STUDY



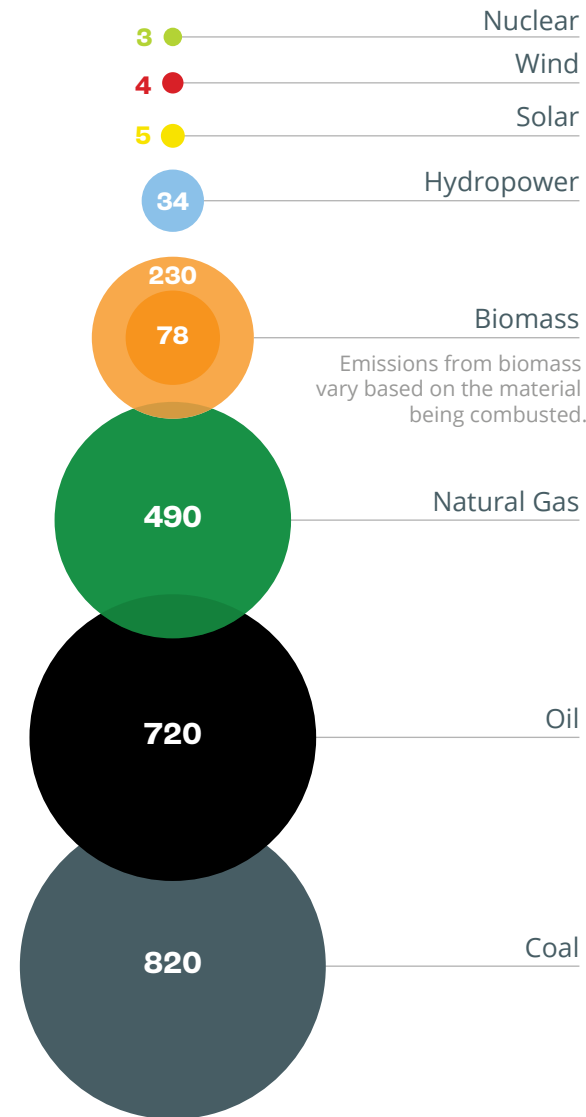
Exelon's Source of Clean Energy

Exelon is the largest IOU by energy generation and ranks highly in this year's decarbonization index. The company scored a 5 in both the fuel mix and the emissions intensity metrics, suggesting that it primarily generates clean energy and emits relatively less CO₂ per MWh.

The company's nuclear power plants—the largest fleet of reactors in the U.S.—account for 60% of its owned net energy generation. Since nuclear power plants do not generate any emissions during generation and run on their maximum capacity for over 90% of the year, they play a key role in keeping Exelon's emissions low for the amount of energy it generates.

The Most Efficient Source of Low-Carbon Energy

CO₂-equivalent emissions per GWh of electricity over the lifecycle of the power plant (metric tons)



Source: Our World in Data²⁸



Stakeholder 02

Government

The federal, state, and local governments have a critical role to play in supporting utility decarbonization, and they can do so in several ways.

Retraining programs

Administrative efforts to retrain and upskill existing employees will be critical in helping both utilities and at-risk workers in the shift to clean energy. Local and state administrations can also collaborate with utilities to create training programs for employees.

CASE STUDY

nationalgrid & NYSERDA

National Grid and NYSERDA: Heat Pump 101 Training Program²⁹

To support workforce development for clean energy, National Grid developed the Heat Pump 101 training program in partnership with the New York State Energy and Research Development Authority, heat-pump installation company Bloc Power, and New York Edge, the city's largest provider of on-site afterschool programs.

The heat pump 101 program provides skilled training and employment opportunities for young adults from underserved and economically challenged communities in New York. The program summarizes the benefits of heat pumps for electrification, incentives to switch to clean heating and cooling technologies, and the environmental impact of carbon emissions. The program will teach participants about heat pump components, quality installation, system configurations, and their applications.

Grid planning and permitting

The permitting and regulatory differences from state to state make grid expansion inefficient. The federal administration can ease the expansion by streamlining permitting processes at the federal, state, and local levels, especially since the grid is interconnected and shared across the nation.

Funding

The deployment of additional federal funding is necessary to facilitate utility decarbonization by 2035 and a transition to net-zero emissions by 2050.

Utilities require funds to invest in research and development, accelerate technological adoption, and build a resilient and modern transmission network to meet the rising demand for clean electricity.



Stakeholder 03

Investors

As shareholders of publicly-traded utilities, investors hold the power to influence which utilities are given access to additional capital, and how it is allocated.



Capital allocation

Investors can support decarbonization by making it a part of their due diligence.

Capital can be directed to utilities that are making measurable efforts to decarbonize and divested from those that aren't meeting their targets. By funding companies that meet high ESG standards, investors will motivate other utilities to "follow the money".

Decarbonization Advocacy

Investors can encourage peers and other investor groups to fund decarbonization by advocating for utilities that are transparent about their pathways and plans to achieving net-zero emissions and are making active efforts to reach these goals.

Public-private partnership (PPP) programs

Private investors, in collaboration with the government, can stimulate PPP programs to finance, build, and operate decarbonization projects.

Financing utility decarbonization will accelerate economy-wide emissions reduction while also helping investors achieve their ESG investment goals.

Stakeholder 04

Customers

Although effective decarbonization must happen at the level and scale of utilities, electric customers can aid the process by making more informed and environmentally-forward choices.

Education and awareness

The first step utility customers can take to assist in decarbonization is understanding what it is, why it is essential, and the benefits it can bring through lower electricity bills, energy independence, and lower individual carbon footprints.

With that information, consumers can not only make conscious choices themselves but also spread awareness in their local communities.

Smarter households

Reducing overall electricity demand is one way to ease the utilities' transition to clean energy sources. Smart, energy-efficient appliances like digital thermostats allow customers to use more electricity when demand is low, reducing the load on utilities as well as their own electric bills.

Net-metering programs

Proactive climate-conscious customers that have residential solar panels can take decarbonization efforts one step further by participating in net-metering programs. These programs allow customers to supply and sell any excess electricity to the grid, reducing how much utilities need to generate.



Resourceful communication

To support decarbonization, utilities need to solicit feedback from customers and similarly, customers need to actively communicate about their needs and challenges owing to decarbonization. Utilities can host town hall meetings and conferences where customers from a particular community are invited to voice their concerns and work with utilities to address them.

CASE STUDY



Customers Join PG&E and Tesla's Virtual Power Plant³⁰

PG&E's pilot Emergency Load Reduction Program (ELRP) allows customers with a Tesla Powerwall to earn compensation for supporting the grid.

The Tesla "Virtual Power Plant" is the largest distributed battery storage system in the world, wherein customers' Powerwall systems can be used to draw power for the grid during emergencies. Through the ELRP, customers receive \$2 for every kWh of power delivered from their Powerwall during an event.

This pilot program has several benefits, especially in making California's power grid more reliable as the state transitions to renewables and the nation collectively faces more climate disaster-related outages. It also illustrates the potential for collaboration between utilities and customers in achieving a shared communal goal.

Tesla Powerwall+
Source: Tesla



Strategies for the Utilities' Road to Net-zero

Information for the utilities industry
on how to achieve net-zero emissions
by 2050. Download the report now.

To view this content, **download report.**



01

Adapt Climate Strategies and Goals Across Utilities

Utilities industry will be able to meet net-zero emissions by 2050. This report provides a guide to achieving net-zero emissions by 2050. It outlines the key strategies and goals for the utilities industry to achieve net-zero emissions by 2050. The report is a guide to achieving net-zero emissions by 2050. It outlines the key strategies and goals for the utilities industry to achieve net-zero emissions by 2050.

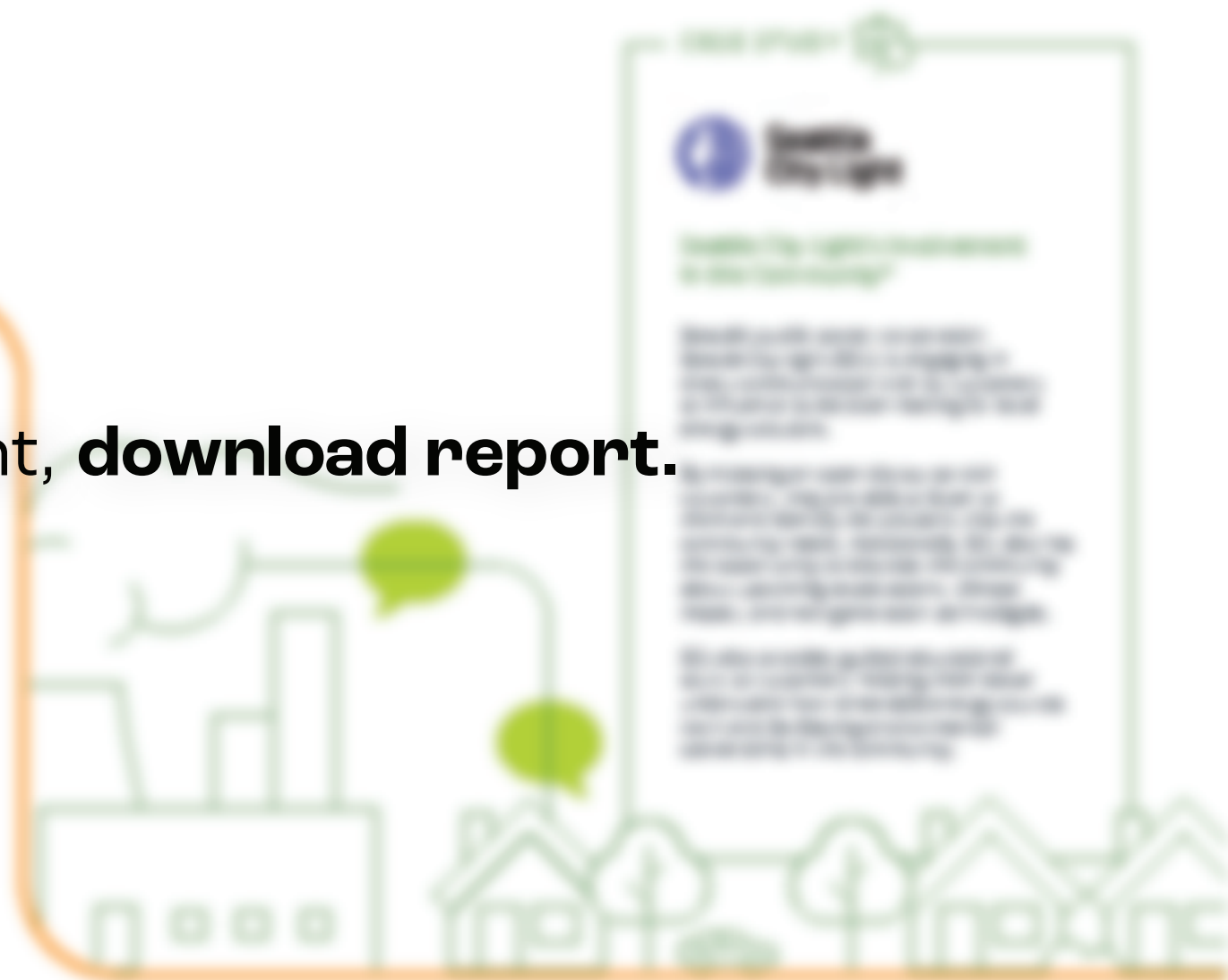
03 Establish Community Outreach

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It is important for utilities to be proactive in building a community outreach program.

One of the most important ways to build a community outreach program is to establish a community outreach committee. This committee should be made up of representatives from the utility, the community, and other stakeholders.

The committee should meet regularly to discuss the utility's outreach efforts and to develop a plan of action. The committee should also be responsible for monitoring the utility's outreach efforts and for reporting back to the community.



04

Support Technology Transitions

Support technology transitions by providing resources, training, and technical assistance to help businesses and organizations adopt new technologies and improve their operations.

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- Provide resources and training to help businesses and organizations adopt new technologies and improve their operations.
- Offer technical assistance to help businesses and organizations troubleshoot technical issues and optimize their systems.
- Develop and implement policies and procedures that support technology transitions and ensure data security and privacy.

Download Report

View Content

Support Technology Transitions

05

Encourage the Small Utility Model

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06

Act Now

With climate-related disasters rising at an alarming rate, climate change has evolved from being a phenomenon to a global emergency.

To achieve net-zero by 2050, global CO₂ emissions need to decrease by 38% by 2030 relative to 2020 levels. But in 2021, CO₂ emissions rose by 6% to their highest level ever.³⁴

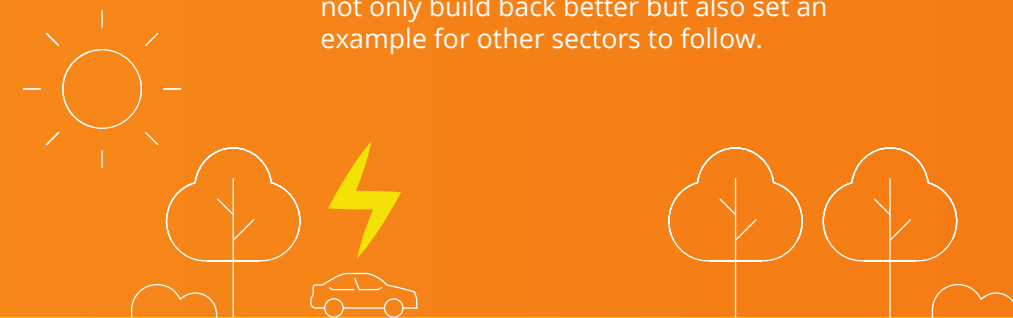
While the obstacles to utility decarbonization have been decades in the making, the transition to net-zero will only happen if utilities continue to drive the process. The faster the transition, the closer the world will be to a sustainable ecological economy.

Proactive utilities will not only be spearheading decarbonization but will also be well-positioned in the new energy marketplace of the future. As utilities embark on this journey, the support and collaboration of multiple stakeholders across the board are going to be essential for the successful execution of their decarbonization goals.

Toward Brighter Possibilities

In this new era of energy, we face a momentous opportunity for U.S. utilities to disrupt the status quo and become the flag bearers of this massive economic and cultural shift toward achieving net-zero emissions—and create a brighter future for us all.

By championing industry-wide improvements, reshaping the customer experience, and pioneering effective net-zero emission solutions, utilities can not only build back better but also set an example for other sectors to follow.



The road to net-zero carbon emissions will be truly revolutionary.