KPMG

# Plugged In

**Power and Utilities Magazine**

Second edition

**Articles include:**

The role of energy and utilities in achieving net zero cities

A lightbulb moment for decarbonization

Energy companies can boost cyber security by monitoring behavior and changing culture

Inflation Reduction Act changes the game for energy transformation

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# Foreword

**Almost three quarters of global greenhouse gas emissions are attributed to energy consumption, including electricity, heating, and transportation.[1] The role of energy organizations in combating climate change and implementing decarbonization is growing. Through their work, they can help organizations and communities achieve net zero emissions and decarbonize their operations.**

For the energy sector to become net zero by 2050, US$3.5 trillion in additional capital expenditures will be required.[2] During this transition, energy companies will likely add new fuel sources to their energy mix, build new grid infrastructure, and implement energy storage systems to accommodate intermittent renewable sources. Additionally, they should become involved in energy efficiency and demand-side management initiatives for their customers.

The second edition of *Plugged In Magazine* examines a variety of ways in which energy companies can participate in efforts to slow climate change. This can include decarbonizing their assets and extending this to their customers and society at large, such as investing in new energy technologies and working with companies and communities that have set ambitious carbon reduction targets.

We open this edition with **The role of energy and utilities in achieving net zero cities**, which examines the impressive work that cities are undertaking to adopt new technologies and decarbonization techniques as well as the role that energy companies can play as sponsors in such initiatives. It also includes examples of how energy, water, and waste companies are working to reduce emissions worldwide. Additionally, the article discusses the KPMG Net Zero Urban Program, launched at COP27 last November, whose objective is to bridge the gap between sustainable technological solutions and capital through technology and partnerships.

Companies have an essential role to play in the fight against climate change. In our second article, titled **A lightbulb moment for decarbonization**, we examine how large energy consumers are taking responsibility for decarbonizing their activities. As KPMG specialists point out, such programs should be structured, continuous, aligned with business strategies, and undertaken with the active participation of those within such organizations.

With increased connectivity and interdependence among devices, systems, and data, the energy industry faces significant challenges, which increase the possibility of cyber threats and attacks. Cyberattacks on these

Companies have an essential role to play in the fight against climate change. In our second article, titled A lightbulb moment for decarbonization, we examine how large energy consumers are taking responsibility for decarbonizing their activities.

[1] Climate Watch, Historical GHG Emissions

[2] World Economic Forum, What's the price of a green economy? An extra US$3.5 trillion a year, January 2022.

systems could significantly disrupt the energy supply and damage physical infrastructure and the environment since they rely on numerous critical infrastructure systems. Our article **Energy companies can boost cyber security by monitoring behavior and changing culture** discusses how the sector can use industry best practices elsewhere to protect its computer networks and operational technology, particularly by employing systems to detect suspicious behavior.

Finally, we discuss specific government initiatives that aim to tackle climate change. Countries worldwide are taking action to support the transition to a low-carbon economy, resulting in a range of policies and regulations aimed at reducing greenhouse gas emissions, such as implementing carbon pricing mechanisms, renewable energy mandates, and energy efficiency standards.

The US government has focused on providing tax incentives and potential benefits to stimulate the development of new decarbonization technologies. As part of the 2022 Inflation Reduction Act, it is proposed that energy investments undergo a "radical shift" to achieve net zero emissions by 2050, which will require significant investments in renewable energy, energy efficiency, and electrification. In the **Inflation Reduction Act changes the game for energy transformation**, KPMG tax specialists examine how US-based energy facilities can take advantage of these laws, reviewing their global impact and the European Commission's Carbon Border Adjustment Mechanism.

The global energy industry is in a state of transformation as it addresses the challenges of climate change and decarbonization. There is still much to be done to achieve the ambitious targets set out in the Paris Agreement and to achieve net zero emissions by 2050. We hope that you will find these articles insightful and engaging and that they will stimulate new conversations and insights.

**Franceli Jodas**
Global Sector Lead, Power & Utilities
KPMG International

02

# The role of energy and utilities in achieving net zero cities

## Piloting new technologies and techniques in urban areas

By: Lyndie Dragomir, Karin Eggers, Lisa Kelvey, Anvesha Thakker and Jorn Verbeeck

**Humanity's road to net zero emissions runs through the city. More than half of us live in urban areas, a proportion expected to rise to two-thirds by 2050.[1] While cities only occupy 3 percent of the Earth's land area,[2] they produce more than three-quarters of greenhouse gas emissions and use more than three-quarters of natural resources.[3] But cities are also centers of government and business, which have always had the ability to innovate and change. Using these abilities, cities can lead the rest of the world towards net zero.**

In November 2022, KPMG launched the Net Zero Urban Program (NZUP) at COP27 climate change summit in Egypt. "We believe we have a societal role in helping our networks to convene, to connect, to partner with others, others who are equally as passionate as we are about accelerating climate action," John McCalla-Leacy, Head of Global ESG, KPMG International and Head of ESG, KPMG in the UK, told an audience at an UN Climate Change Global Innovation Hub event where KPMG launched the program. NZUP aims to match digital technologies with capital to reach 10,000 cities, scale up 100 digital enabler prototypes and raise US$25 billion in capital by 2030.

**NZUP aims to match digital technologies with capital to reach 10,000 cities, scale up 100 digital enabler prototypes and raise US$25 billion in capital by 2030.**

[1] United Nations, 2018 Revision of World Urbanization Prospects

[2] Socioeconomic Data and Applications Center (sedac), Gridded Population of the World and the Global Rural-Urban Mapping project

[3] Inter-Governmental Panel on Climate Change (IPCC), Climate Change 2022: Mitigation of Climate Change.

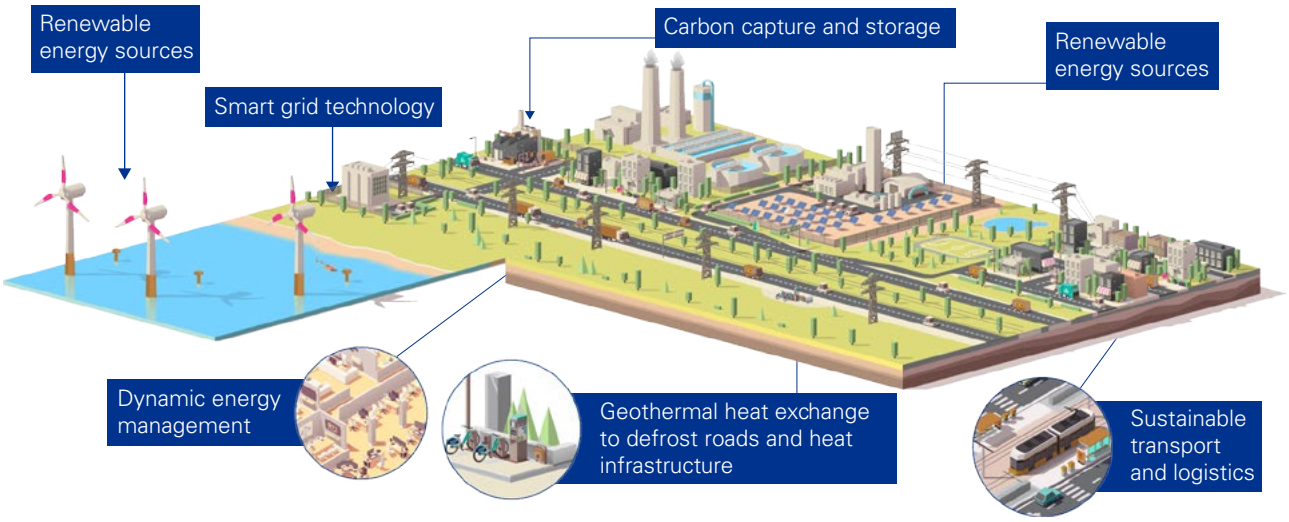
# Opportunities for energy and utility companies

Cities tend to be more densely populated and are **important asset and investment portfolios**, which makes them ideal for experimentation and demonstration of decarbonization projects relying on efficient and flexible utility networks. Energy and utilities have a critical role in helping cities achieve net zero.

They can develop products and services that will reshape future markets by leveraging urban ecosystems. This is particularly important given that utilities should consider investments that last for decades since today's projects and investments will likely run until and beyond 2050.

As they embrace a low-carbon future, invest in innovation, and partner with communities, they can help cities create a sustainable future and achieve their company's net zero goals.

## Energy




As cities move to net zero, energy companies have the best opportunity to contribute to this goal by providing them with **decarbonized energy solutions**. Several alternative energy sources are available to replace fossil fuels, including renewables, heat networks, hydrogen, and nuclear power. As a cost-effective and faster way to build a nuclear reactor, small modular reactors can help replace coal-fired power plants. By modernizing their infrastructure, energy companies can help their customers become more energy efficient and waste less.

Some energy companies have already committed to significant changes. US provider Xcel Energy has announced a series of decarbonization targets covering electricity, transport and natural gas, to be achieved partly through hydrogen and renewable natural gas. In November 2021, it set an overall aim of becoming a net zero energy company by 2050, with interim goals for reductions, including an 80 percent cut in natural gas emissions by 2030.[4] Los Angeles aims to use only renewable energy by 2045 while electrifying its buildings and transportation. Los Angeles Water and Power is collaborating with the National Renewable Energy Laboratory on a scientific-based project that would fulfill this goal while also improving the environment, health, and socioeconomics.[5]

As part of its sustainability plan, CPFL Energia in Brazil has invested in energy-efficient hospitals and low-income communities and made its operations digitally operated and sustainable. Around 200 hospitals are being supported with solar panels and low-energy LED lighting, while low-income communities are receiving low-energy lightbulbs, heat exchangers, and solar heaters.[6]

[4] Xcel Energy, Xcel Energy commits to net zero carbon goal by 2050, 2021

[5] National Renewable Energy Laboratory, LA100: The Los Angeles 100 percent Renewable Energy Study and Equity Strategies

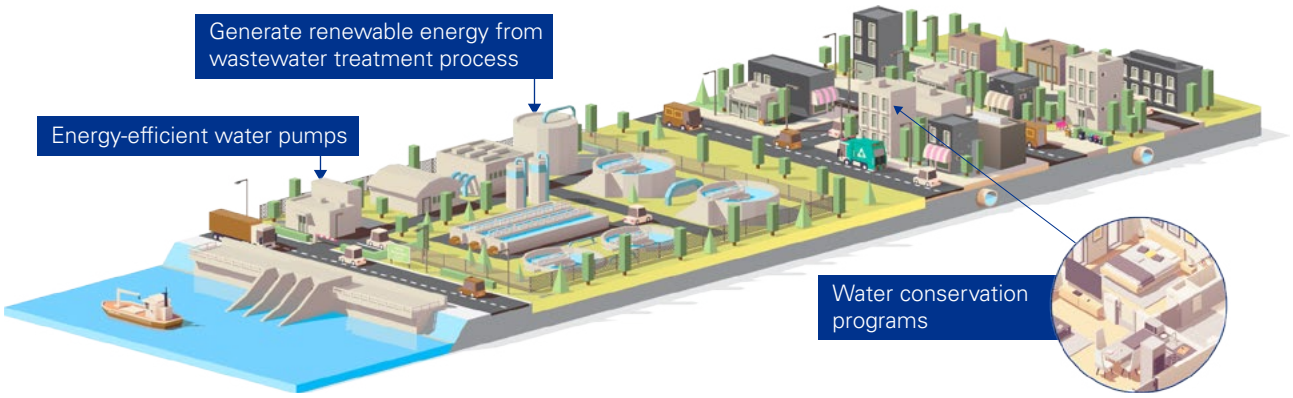
[6] CPFL Energia, ESG practices, October 2020

With the **hydrogen transition underway**, companies around the globe are rethinking how they transport, distribute, and store hydrogen. Moreover, they are researching how to make energy production more sustainable, including the fuel sources used for electrolysis and the mix of fuels. Today, hydrogen investments are primarily focused on port and industrial sectors,[7] although hydrogen-powered vehicles are also being tested in urban environments.

To reduce the sector's carbon footprint, the National Hydroelectric Power Corporation in India has signed two agreements to pilot green hydrogen technologies in Ladakh. In addition to developing a roadmap for future development of green hydrogen and reducing carbon emissions.[8] These two pilot projects should also provide local youth with long-term opportunities for employment in the hydrogen economy.[9]

A European Union program called Important Projects of Common European Interest (IPCEI) supports key strategic technologies and projects, such as hydrogen and battery production.[10] As part of a clean hydrogen program by Mission Innovation, the end-to-end costs of producing clean hydrogen are expected to be reduced to a tipping point of two dollars per kilogram by 2030.[11] Through these programs, funding and other resources are provided to promote the development and deployment of technologies to accelerate the EU's transition to a low-carbon economy.

## Water




Water utilities can improve the energy efficiency of their equipment and promote water conservation through education and incentives for more efficient use. They also have opportunities to generate energy and become more efficient. In January 2023, UK water utility Thames Water and KPMG in the UK published research on how heat in wastewater, such as from showers and washing machines, could be recovered and used in city heat networks, a technique already used at more than 500 locations worldwide.[12] For example, 95 percent of all properties in the city of Uppsala are supplied by district heating, including since 1981 heat recovered from treated wastewater.[13] The research found that Thames Water, which provides water to and takes wastewater from 15 million customers in London and southeast England, could supply around one million homes with heating and hot water based on wastewater heat recovery.

[7] International Energy Agency, The future of hydrogen, June 2019

[8] The Print, NHPC to develop green hydrogen-based projects in Ladakh, July 2022.

[9] Economic Times, LG requests NTPC to prepare hydrogen roadmap for Ladakh, February 2022.

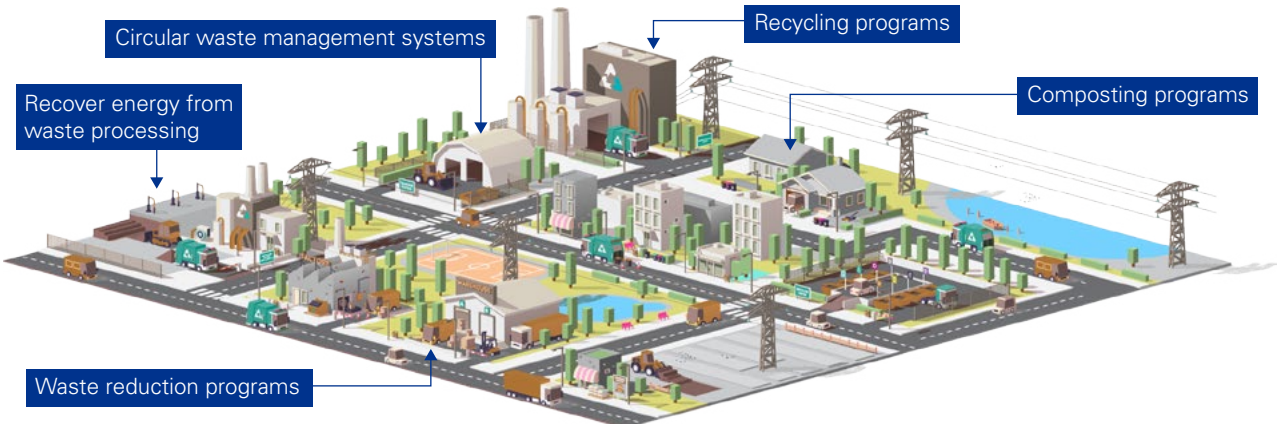
[10] European Commission, Important Projects of Common European Interest (IPCEI).

[11] Mission Innovation, Clean Hydrogen Mission

[12] KPMG, Waste heat beneath our feet, 2023

[13] Thames Water Utilities Limited, Who we are, 2023/

## Waste




Waste management utilities can upgrade or retrofit their vehicle fleets to cut emissions and work to reduce waste and increase recycling through customer education and new circular economy business models. They can recover energy from waste through anaerobic digestion, where organic matter breaks down in a sealed oxygen-free vessel to produce biogas and fertilizer. France-headquartered water and waste utility Suez calculated it avoided greenhouse gas emissions equivalent to 3.8 million tons of carbon dioxide in 2021 through energy-from-waste and material recovery across its global operations.[14]

In the US, the Solid Waste Authority of Central Ohio and partners have established 'Save more than food, an awareness campaign that aims to contribute to the authority's goal of halving food waste in the area by 2030 by encouraging people firstly to prevent food waste, then donate it where possible, then recycle it as animal feed, compost or for industrial use rather than sending any to landfill.[15]

As part of its zero-waste program, Pune Municipal Corporation (PMC) in India has developed solutions with SWaCH waste pickers for handling wet garbage, including composting and modular biogas, which reduces landfill methane emissions by reducing organic waste thrown into landfills and collecting e-waste and directing valuable materials to the recycling chain, thereby reducing the quantities of waste.[16]

Energy, waste, and water management should be considered critical components of cities' efforts to achieve net zero energy. Their use and provision of data will be crucial in helping to balance systems by steering supply and demand. This could be done by ensuring continuity for essential activities, including transport and healthcare. Achieving net zero also depends on utilities working together, such as water companies requiring decarbonized electricity.

> "Waste management utilities can upgrade or retrofit their vehicle fleets to cut emissions and work to reduce waste and increase recycling through customer education."

[14] SUEZ, Sustainable Development ambitions and commitments 2023-2027,

[15] Solid Waste Authority of Central Ohio, Save more than food

[16] SWaCH Cooperative, 2023.

**Case study:**

# The European Union

Several policies and initiatives are being implemented by the European Union (EU) to achieve the region's decarbonization and climate goals. One of the initiatives under the EU Green Deal requires the EU to generate 32 percent of its energy from renewable sources by 2030 as a roadmap for becoming climate-neutral by 2050.[17] The EU Taxonomy defines sustainable economic activities so investors can direct investments toward sustainable projects.[18]

The Carbon Border Adjustments Mechanism Regulation (CBAM), currently in development, is expected to create new incentives for companies to reduce their greenhouse gas emissions.[19] Additionally, the EU Mission: Climate-Neutral and Smart Cities initiative is being launched to support over 100 cities in their transition to climate neutrality by developing and implementing integrated solutions for energy, mobility, and digital technologies and provides collaborators with funding, technical assistance and capacity building support.

Several European Investment Bank and EIB programs have provided additional funding, including the City Climate Finance Gap Fund, multisector loans, and URBIS. Also, in the early nineties, the European Bank for Reconstruction and Development (EBRD) was established to assist countries transitioning to open market economies. These policies and financing opportunities have led companies to invest in offshore wind and hydrogen, accelerate decarbonization in steel and life sciences, and accelerate smart cities.

Innovative finance models have become increasingly dependent on digital technology, grid-wide or district-level energy efficiency platforms, dashboards for company energy performance, or open-source data. The Belgian City of Ghent converted the Old Dockyards into a mixed-function neighborhood using heat, water, and nutrient loops that were previously closed.[20] With the special-purpose investment vehicle, upfront investments can be made and long-term returns can be earned.

New partnerships can also occur across national boundaries, even though many demonstrations occur in urban areas. By building on previously different perspectives and approaches, several utility companies in the Netherlands, Germany, and France have recently agreed to cooperate on improving water quality, adaptation, stormwater management, and water awareness.[21]

There continue to be opportunities to combine public needs, private sector involvement, and innovative solutions. In addition to investing in customer engagement, European utility companies should consider partnering with universities and small start-ups and open innovation labs to develop innovative solutions.

**One of the initiatives under the EU Green Deal requires the EU to generate 32% of its energy from renewable sources by 2030 as a roadmap for becoming climate-neutral by 2050.**

[17] European Commission, EU Green Deal.

[18] European Commission, EU Taxonomy.

[19] European Commission, Carbon Boarder Adjustment Mechanism.

[20] Europa, Ghent's circular approach is turning its Old Dockyards brownfield into waterfront housing.

[21] World Waternet, Waternet, Berliner Wasserbetriebe and SIAAP sign agreement to intensify collaboration, July 2021.

# A look at the Net Zero Urban Program

There are many solutions already available for cities to use, but those with potential need **scaling up in size or further innovation to make them viable**. KPMG's view is that historically, there has been too much emphasis on financial metrics and not enough concern for sustainable land use and local community needs and well-being. We need innovative, ambitious solutions that scale and speed up the transition to net zero to bridge the missing middle.

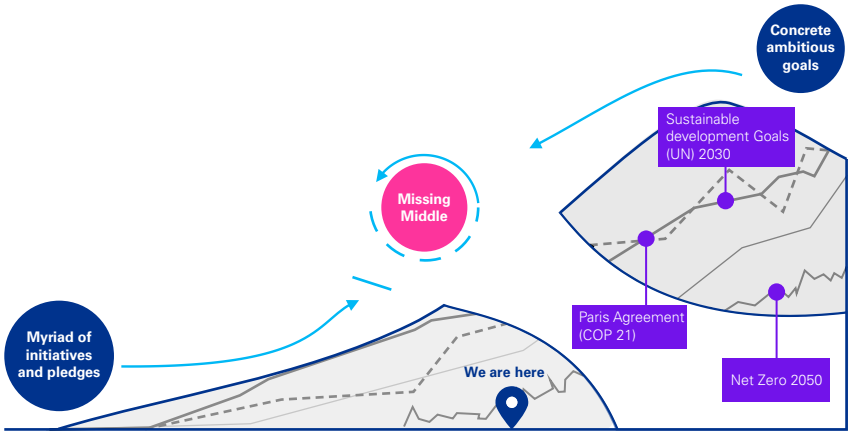
It is the mission of the NZUP to bridge the gap between challenges, solutions and capital through technology and partnerships. Through the program, solutions can be paired with capital to advance solutions. In order to achieve this, new business models, joint investments, integrated long-term planning, and more partnerships between the public and private sectors will likely be needed, where utilities can act as connectors. To address these challenges, the NZUP considers the major sources of greenhouse gas emissions, including power, heat, transportation, and industry, as well as specific urban factors, such as passive carbon emissions from buildings and infrastructure.

The NZUP **translates priority sector challenges into replicable and investable business cases**, identifying solution providers and financial models to demonstrate, pilot, and scale up innovative solutions. As well as connecting capital to solutions for the initial sector challenge, the program focuses on correlating sector challenges to achieve a more integrated approach and a better return on investment in both the short and long term. This reduces risk, and lower costs enable the program to improve market entry. Through NZUP, the value of urban assets is harnessed, emerging technologies are enabled, and new markets are identified for innovative approaches. It also examines the effect of policy and finance innovation on removing barriers and creating levers for change between the public and private sectors.

More generally, utilities have a considerable contribution to make by making their services more flexible and tailored. They deliver services that address basic needs across urban environments but have generally done so in standardized, large-scale ways. New technologies mean they can now offer flexible services more tailored to their customers' demands. This may lead them to decentralize and provide new services, such as for those not connected to their grids or through the recovery of waste heat, particularly in new urban and industrial developments.

Providing more flexible and tailored services will likely require utilities to better gather and analyze data. Using sensors and other monitoring devices, along with analysis that draws on artificial intelligence, can help energy and water utilities improve their understanding of flows in their networks, including spikes and troughs in demand. Using such monitoring, utilities can look for leaks and discharges more effectively, thus fixing problems before they occur.

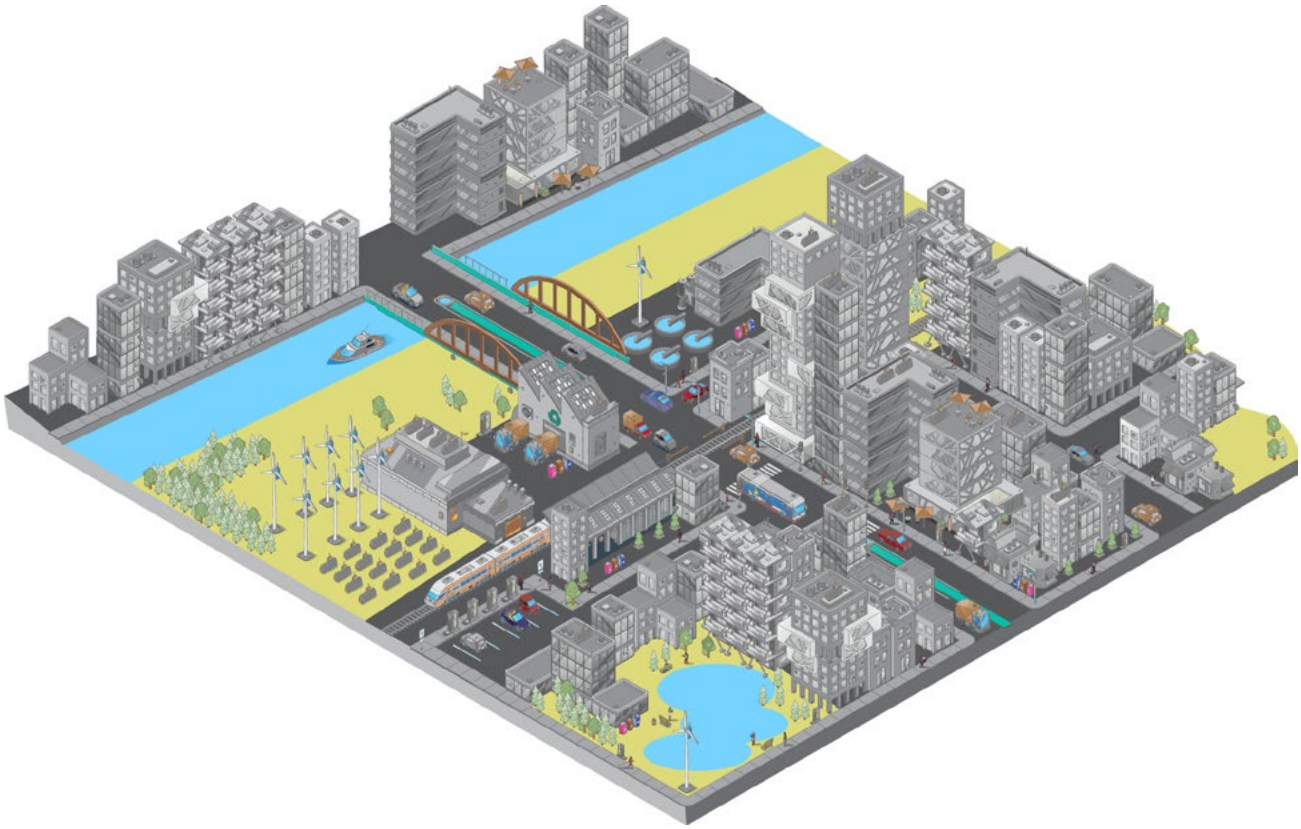
## The Missing Middle




Inspired by International Architecture Biennale Rotterdam (IABR), The Missing Link between the wealth of initiatives and the ambitions objectives, 2017

> **It is the mission of the Net Zero Urban Program to bridge the gap between sustainable technological solutions and capital through technology and partnerships.**

## The Net Zero Urban Program



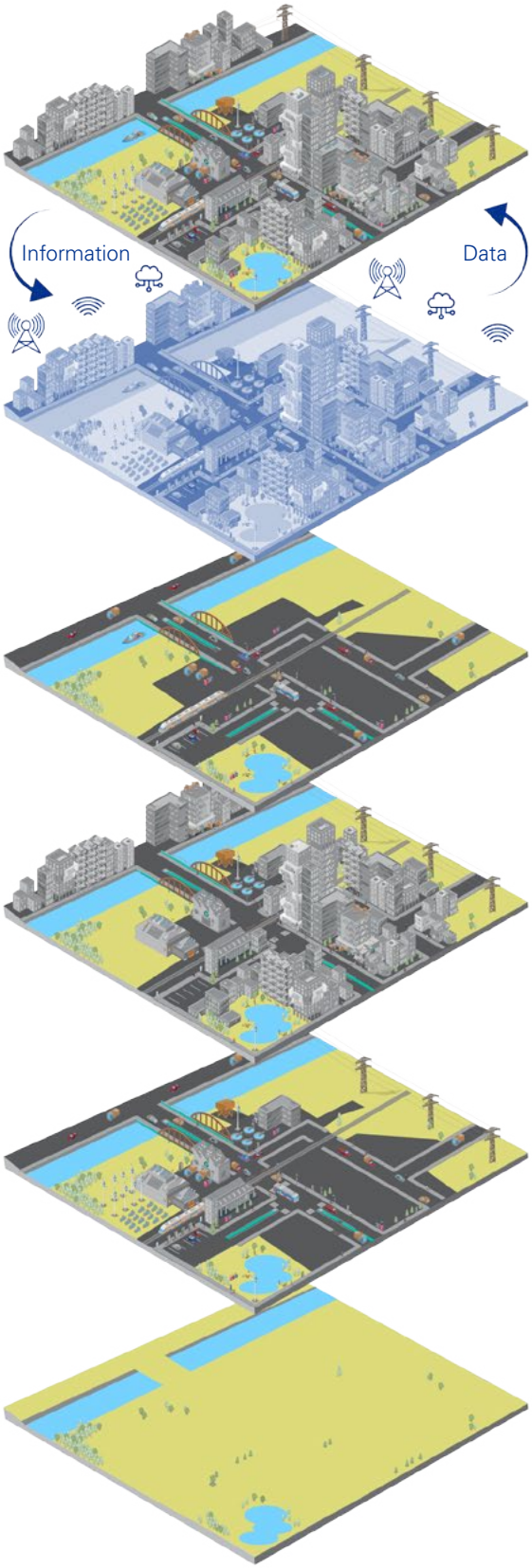
**Data** can also be applied to understand how much 'embodied carbon' materials and services contain. Utilities can also benefit from making better use of external data, such as from meteorological agencies to improve assessment of flooding risks, and from greater sharing of their own, such as opening access to their sensor data (while ensuring compliance with regulations on privacy and competition), helping to stimulate innovation.

**Digital twins** — virtual representations of parts of the physical world — are a powerful technology for understanding data by combining it visually with geographical information. They help users to make decisions faster such as by comparing different outcomes. Power and water flows can be better understood if they are visualized as a function of where they are used, for example as a function of city blocks and districts.

As a result of digitalization and more functional insight, new creative finance models have become increasingly popular, whether they integrate grid-wide or district-level energy efficiency platforms, energy performance dashboards, smart home apps, or open-source data platforms. With tokenization, assets and services can be represented by digital tokens, which allows smaller investors to become involved in projects while also improving the transparency of investment opportunities. The use of digital enablers can also provide insight into circular strategies, energy, such as heat networks, riothermia and aquathermia, and material recovery, such as wastewater treatment.

**Procurement** gives public authorities, including city governments, the ability to steer and shape markets. Still, it would benefit from a more open dialogue with utilities, including what is feasible and affordable in tackling the most complicated sustainability challenges. Cities can provide opportunities to test and demonstrate how the public and private sectors can work together to decarbonize urban environments, such as tailored heat networks, biothermal energy generated from decomposing organic material or advanced sewerage systems that can reclaim materials such as phosphorus.

## Digital Twin Application




- **Digital Twin**
- **Digital layer**
- **Mobility**
- **Buildings**
- **Infrastructure**
- **Terrain**

**Layer 6: Digital twin**
Simulation is carried out using data from Layer 5.

**Layer 5: Data input and digital layer**
Data is collected from layers 1–4 from sensors, the internet of things, connected devices, etc., in order to manage and monitor the systems and services.

**Layer 4: Mobility**
The movement of people and goods within the city.

**Layer 3: Buildings**
The city's current buildings.

**Layer 2: Infrastructure**
The basic physical and organizational structures and facilities of the city including highways, transit, airports, water supply, wastewater treatment, solid waste management, and transmission and distribution of energy.

**Layer 1: Terrain**
Basic information about the city and its terrain.

# Infrastructure investors

To move to net zero, cities should expand their work from individual buildings to projects covering whole neighborhoods and districts, such as new low-carbon transport. In many cases, this will require external funding from infrastructure investors, which means creating projects they can invest in. Cities aiming to attract such investment should consider the following five Ds:

## Decision-making

Cities should streamline and accelerate the feasibility stages of projects, such as through digital twin technology, to allow investors to understand their projects better, allowing them to make decisions more quickly and on a budget.

## De-risking

Risk plays a significant role in any investment decision. By creating small-scale demonstrator projects that demonstrate that concepts can be implemented, these costs can be reduced, thus increasing the likelihood of investment. Utility companies can be instrumental in establishing these, particularly in their own areas. For example, Northumbrian Water in the UK uses FIDO AI's leakage analysis technology, a finalist in the 2021 KPMG Private Enterprise Global Tech Innovator competition. By offering guarantees and insurance to investors, cities can also reduce the financial risks they face.

## Distributing

It is also possible to reduce the risks associated with individual projects by sharing them. The higher risks associated with the initial project can be offset by the lower risks associated with the subsequent projects if cities aggregate individual projects into programs and seek investment for the entire collection.

## Data

In addition to providing investors with more evidence to help them make informed decisions, cities should collect and share data on projects openly. Organizations in the energy and utility sectors can contribute to this initiative by sharing their own data.

## Delivery

In addition to improving productivity and boosting investor confidence in project duration and cost, modern construction methods and standardization of components, including steel columns and beams, wall panels and electrical systems, will enable them to be implemented faster, more efficiently, and more environmentally friendly.

Low and middle income countries have a great deal of potential for investment in new infrastructure. Electricity distribution networks, for instance, can be designed to handle fluctuating flows due to connecting many small renewable energy generators. If investors lack experience investing in a country and are less sure about working there, they can address this by aggregating several projects and using techniques, such as World Bank's Project Preparation Facilities,[22] that standardize the early stages of project development.

[22] World Bank Blogs, Preparing bankable infrastructure projects, 2017

# The low and middle income countries challenges

Low and middle income countries are predicted to have a much faster rate of urbanization than the rest of the world.[23] Approximately 759 million people worldwide lack access to electricity,[24] and currently, 70 percent of urban populations in these countries countries do not have adequate access to municipal services, such as water and sanitation.[25] It will be essential for low and middle income countries to prioritize providing sufficient physical infrastructure, such as power generation, transmission and distribution systems, water and sewage pipelines, and sustainable transportation infrastructure, to cope with the rapid urbanization that is predicted to occur.

A significant challenge for cities in low and middle income countries is the need for more integrated planning and resourcing for infrastructure projects. A lack of funding and access to advanced technology dramatically limits their ability to invest in renewable energy, energy-efficient buildings and transportation systems, and waste management infrastructure. Due to constraints in capital, technical capacity, and the supply chain of low carbon options, such as the difficulty of obtaining critical raw materials, high-end technology, or critical grid elements to cope with intermittency such as batteries, cities in low and middle income often need more time to implement their net zero programs. Skills gaps also contribute to delays in developing the expertise required to implement and manage these technologies in some countries. There are opportunities for such cities to improve training and skills development for workers, making them more innovative and resilient to climate change and its impacts.

Cities in low and middle income countries can also collaborate with those in the high income countries. For example, cities that cannot afford extensive data collection will have difficulty creating their own digital twins. However, they can use the data from comparable areas to help them model workable scenarios. In contrast, cities in low and middle income countries can use the growing needs for new urban areas to build efficient integrated solutions right by design. It is, therefore, possible for these cities to be constructed in a carbon-neutral manner from the ground up, for instance, by using solar power to desalinate water on site rather than connecting to the grid.

In India, several cities have implemented solar programs aimed at developing greener, smarter cities fueled by renewable energy sources and energy efficiency measures.[26] Through these programs, solar power is expected to be adopted more rapidly, power shortages should be reduced, air quality should be improved, and fossil fuels and imported energy should be reduced. State-owned power utilities in India have successfully aggregated the need for grid-connected solar rooftops from various end users, including institutional, government, corporate, and residential, and invited bids from suppliers.[27] Due to demand aggregation, the adoption of solar in cities has been accelerated by enabling competitive pricing and overcoming various implementation and financing challenges.

> “A significant challenge for cities in low and middle income countries is the need for more financing and resources for their infrastructure projects.”

[23] United Nations, Why population growth matters for sustainable development, 2022.

[24] United National, Sustainable Development Goal 7, Ensure access to affordable, reliable, sustainable and modern energy for all.

[25] UN Habitat for a Better Urban Future, World Cities Report 2022: Envisaging the Future of Cities, 2022.

[26] Government of Haryana, Development of Solar Cities in Haryana.

[27] India Brand Equity Foundation, India’s ‘Green city’ campaign, February 2021.

**Case study:**

# Chile

Chile has significantly adopted alternative energy sources over the past several decades. Approximately 25 percent of the country's energy is derived from hydroelectricity, biofuels, and waste, while wind and solar power will account for 5 percent.[28] In addition to generating electricity, green hydrogen can also be produced through the country's abundant wind and solar resources.

Chile presented a national hydrogen strategy in November 2020 to become a world leader in this field,[29] and several pilot projects and international collaborations are already underway to produce green hydrogen on a large scale. By shifting to more renewable energy sources, the country plans to close half of its coal-fired power plants by 2025, which will reduce 80 percent of its CO2 emissions by 2026.[30]

As part of its efforts to improve social well-being, Chile has also implemented several environmental transportation projects. In Santiago, electric buses link more than 55,000 people living along the Santa Rosa corridor.[31] A key benefit of the electric buses is that they can help decarbonize the city's transportation system, reduce local air pollution, a major contributor to health problems, and provide commuters, who often spend two hours or more in buses each day, with a more comfortable journey.

The country is facing a significant water shortage, particularly in the northern regions of the country, as the country has faced drought for several years attributed to climate change, as well as the over-extraction of water resources. A water rationing system was introduced in Santiago in April 2022,[32] and some communities throughout the country rely on trucks for water delivery. A combination of strategies will be required for the water shortage to be addressed, including water governance, investment in desalination, and water reuse and recycling promotion.

> **“In addition to generating electricity, green hydrogen can also be produced through the country's abundant wind and solar resources.”**

[28] International Energy Agency, Chile, Key energy statistics, 2020.

[29] Chilean Government, The Chilean Government presents a national strategy to convert Chile into a global leader in green hydrogen, 3 November 2020

[30] MercoPress, Chile on track to phasing out coal as source to generate electricity, 2021

[31] Enel, Santa Rosa corridor starts operating with 107 new electric buses, benefiting more than 55,000 Metropolitan Region residents, January 2023

[32] Reuters, Chile announces unprecedented water rationing plan as drought enters 13th year, April 2022

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# A call to collaborate

In collaboration with KPMG firms, cities and businesses are developing strategies that identify barriers and enablers and creating action plans to overcome them. Developing net zero urban environments requires the collaboration of cities, utilities, innovators, investors, and citizens. KPMG believes that cities are uniquely positioned to make a significant impact on this goal. The Net Zero Urban Program is a call to action to come together.

The energy and utility industry can provide cities with resilient, integrated, and future-proof infrastructure. With the help of NZUP, cities and businesses can accelerate and scale the innovation necessary to achieve net zero. KPMG professionals are contributing through research, including the Net Zero Readiness Index and Net Zero Readiness Spotlight: Cities, and participating in climate change discussions like COP27. This can help assess where cities and organizations stand and what needs to be done in the future.

Let's accelerate net zero together.

03

# A lightbulb moment for decarbonization

## How strategic energy management can help operationalize net zero efforts

By: Karen Beullens, Michael Deane, Amanda Arajuo Moreira Queiroz and Manpreet Singh

**Climate change and energy security pose a high current and future global risk that requires urgent action. Meeting global targets will require macro and microeconomic transformation, led by fundamental business model changes for public and corporate organizations. Understanding and planning for the likely implications of decarbonization will be crucial in meeting increasing pressure from consumers, employees, investors, lenders and governments. An example of such governmental pressure is the European Union (EU) Green Deal and, more specifically, its Energy Efficiency Directive and Renewable Energy Directives, which call for at least a 32.5 percent improvement in energy efficiency and for renewable energy to make up at least 32 percent of power usage in the EU, both by 2030.[1]**

As of March 2021, at least 20 percent of the world's 2,000 largest public companies have already made net zero commitments, and many others will follow.[2] Despite more companies recognizing the need for climate commitments, less than 1 percent of companies have disclosed against all 21 key indicators that constitute a credible climate transition plan.[3] Significant efforts to reach these commitments will need to be made around energy. Energy use accounts for nearly three-quarters of all greenhouse gas emissions globally, with industrial energy use accounting for around one-quarter.[4] Improvements in energy efficiency alone could significantly reduce global emissions and energy needs, with research suggesting that United States emissions could be halved by 2050 through such work.[5] To fulfill climate commitments and optimize operations, organizations should identify strategies to translate their goals and plans into action. A strategic approach to energy management can be beneficial as it allows organizations to decarbonize while also achieving potentially substantial energy and cost savings, which is particularly crucial in a time of high and volatile energy costs. In this scenario, KPMG firms have been helping clients using Strategic Energy Management (SEM) which operationalizes energy efficiency across their portfolio of facilities.

Meeting global targets will require macro and microeconomic transformation, led by fundamental business model changes for public and corporate organizations. Understanding and planning for the likely implications of decarbonization will be crucial in meeting increasing pressure from consumers, employees, investors, lenders and governments.

1 KPMG, Renewable Energy and Energy Efficiency Directives: European Parliament gives the greenlight, September 2022

2 Energy and Climate Intelligence Unit and the University of Oxford, Taking stock: A global assessment of net zero targets, March 2021

3 CDP, Are companies developing credible climate transition plans?, February 2023.

4 Our World in Data, $CO_2$ and greenhouse gas emissions, emissions by sector, 2020

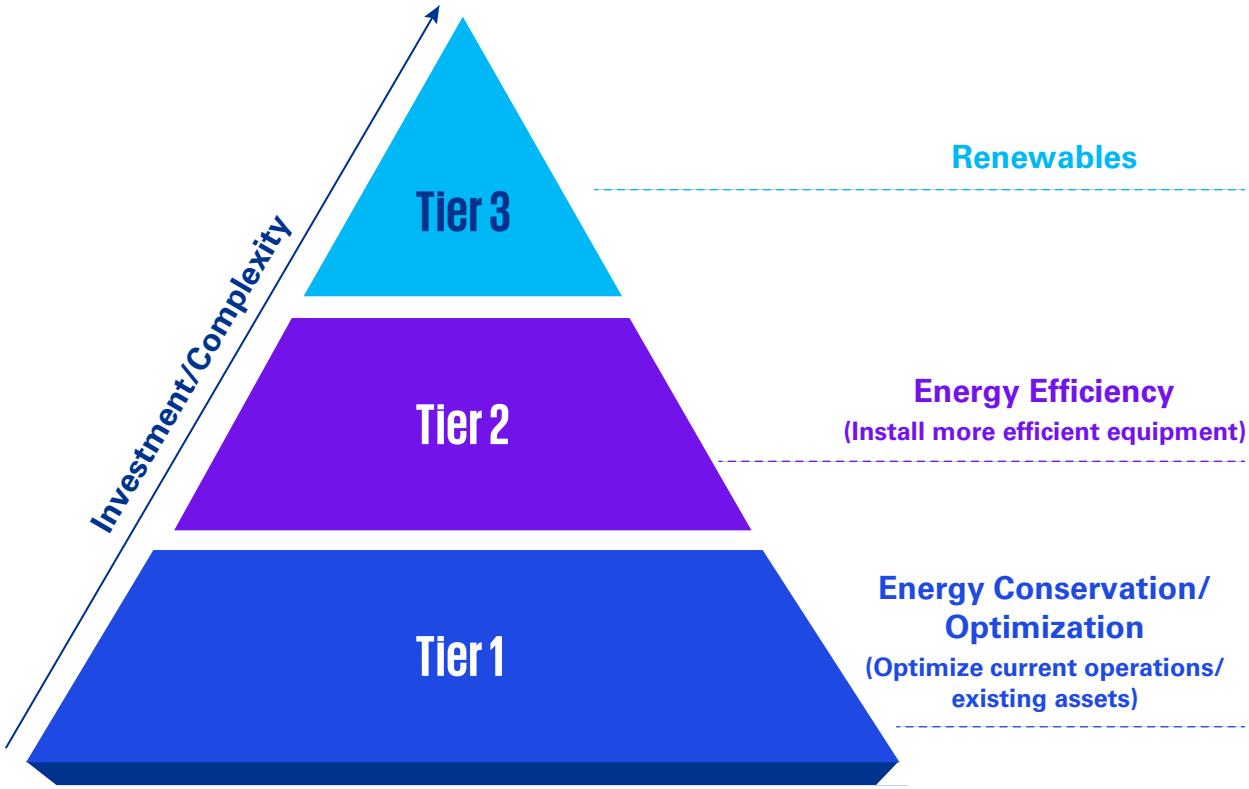
5 American Council for an Energy-Efficient Economy, Halfway there: energy efficiency can cut energy use and greenhouse gas emissions in half by 2050, 2019

# Aims and advantages of SEM

SEM is a holistic continuous improvement framework that enables organizations to adopt a culture of energy efficiency and decarbonization. This reduces energy consumption and costs and cutting scope 1 emissions from sources owned or controlled by the organization and scope 2 emissions from the generation of purchased electricity, steam, heating and cooling consumed.

SEM is based on three tiers of interventions that involve increasing investment levels and complexity. By working on each tier simultaneously, an organization can speed up the process of energy reduction and decarbonization. Approximately 5 percent of savings can be achieved annually through optimizing current assets in tier 1.[6] These savings can be unlocked quickly, allowing teams to achieve further improvements across tier 2 by upgrading equipment, then tier 3, by implementing renewable energy. The benefits of adding renewable energy assets can be significantly negated if there are still ways to optimize energy consumption, such as running indoor lighting, heating or air conditioning at night or powering motors when they are not required.

> “SEM is a holistic continuous improvement framework that enables organizations to adopt a culture of energy efficiency and decarbonization.”




[6] Northeast Energy Efficiency Partnerships, The potential of strategic energy management to contribute to state decarbonization goals, 2021

# Thinking strategically about energy

Most organizations are understandably focused on their core businesses rather than on the energy consumption of their activities, so SEM aims to 'piggyback' on existing initiatives and actions by integrating an energy efficiency mindset into everyday operations. SEM brings an organization's prioritized facilities into a collaborative network or cohort and works with them using a structured approach to help adopt a continuous improvement process for energy management and efficiency. The process includes a series of group workshops, one-on-one engagements with each facility, and technical support designed to achieve the following objectives:

- Instilling organizational commitment by setting goals for savings at corporate and facility levels. Securing executive sponsorship leads to higher accountability, better allocation of resources at each facility to energy management activities and a robust governance model.
- Identify 'energy champions' at both corporate and facility levels, then build cross-functional teams around them with the support of executive sponsors. This can help enable groups to exchange knowledge and take responsibility for implementing SEM.
- Building a performance monitoring and tracking system based on relevant and detailed data tracking initiatives' actual return on investment. Organizations can use this to track performance and identify opportunities for savings on a corporate, facility and equipment level.
- Establishing a long-term continuous and systemic improvement process that can identify, track, prioritize and implement energy-saving opportunities. These can relate to changes in behavior, improvements to processes or the installation of new and more energy-efficient equipment.
- Ensuring that energy-related targets are aligned with overall business objectives and goals, and decarbonization targets.

UK government-sponsored research has shown that implementation rates of energy efficiency projects are around 13 percent regardless of project costs and payback periods, but that sustained commitment to change can improve this rate.[7] Therefore, setting up a structured approach which is backed by people at various levels within an organization is key to establishing change.

[7] UK Department of Energy and Climate Change, Research to assess the barriers and drivers to energy efficiency in small and medium sized enterprises, 2014

# Successes in energy-intensive industries

SEM is a **people-centered approach empowered by data and technical insights** to drive behavioral or operational changes, educating employees about energy efficiency and how they can improve it through process and maintenance practices.

One gas infrastructure company that ran a two-year SEM program in a number of its plants found that low-cost and no-cost changes to processes and staff behavior saved both maintenance and fuel costs as well as cutting carbon emissions, improving the performance of some operating processes by around 30 percent.[8] The changes also made the plants easier to operate and increased their uptime.

Focusing on improving the **energy efficiency mindset** across the organization ensures that implemented changes are followed-through. A construction materials producer that implemented SEM at two plants found it could change pump timers and lower the temperature of its natural gas-powered outdoor aggregate heating pads by a few degrees. Most importantly, the company used awareness campaigns/ engagements to remind employees to find energy savings, leading them to turn off equipment when not in use, including conveyor belts, motors, lighting and computer monitors. At one of the company's sites, energy efficiency measures cut the use of natural gas per unit of production by nearly 25 percent.[9]

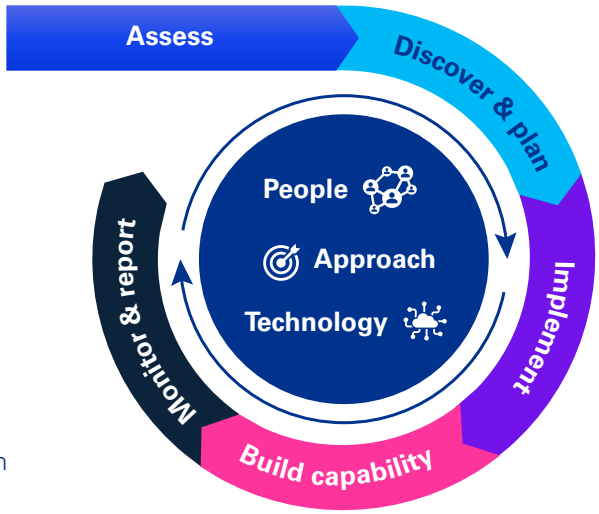
Such changes brought by SEM can be reinforced when they generate **additional non-energy benefits**. When equipment and assets operate more efficiently, they typically require less maintenance which saves on costs as well as reduces safety incidents. For example, low-energy LED lighting typically requires less maintenance than conventional lighting, offering both efficiency and safety advantages in facilities with difficult-to-reach locations.

[8] University of Alberta, Energy Efficiency Alberta

[9] ibid

# How to get started with SEM

SEM enables organizations to strategically optimize their technologies, processes and people to improve energy efficiency and to decarbonize. Underpinned by active governance, stakeholder engagement, organizational change, project planning, risk mitigation and reporting insights, SEM is based on an iterative and continuous cycle of improvements across five key pillars:




**1** **Assess:** at the initial stage, evaluating an organization's maturity at a corporate and facility level and its decarbonization and energy efficiency ambitions is critical. This stage also involves benchmarking and prioritizing facilities based on energy use and carbon footprints, assessing data collection maturity and creating a monitoring and reporting deployment plan on a portfolio, facility, and significant energy user level.

**2** **Discover and plan:** this stage identifies energy measures involving optimization, equipment replacement and renewable energy by using insights from the Assess stage with data analytics, reviews, and onsite energy scans/ audits. It also involves reviewing financing, tax, regulation and government policies, as it is often the case that energy efficiency and renewable measures are eligible for incentives and tax benefits. It then sets a prioritized short-to-long-term implementation plan and facility and business-wide targets that align with external objectives.

**3** **Implement:** the critical components of this stage are program, project, change, data and performance management. It involves assigning responsibilities, particularly to energy and program managers, to ensure that they work with broader teams and take responsibility for putting the energy efficiency measures into practice. Implementation teams should be cross-functional and consist of approximately five to six people from operations, marketing and finance, and executive committee members to act as key sponsors across the entire organization.

**4** **Build capability:** as core teams are built, communication and engagement plans should be implemented to ensure that progress is shared company-wide, enhancing accountability. A cross-functional project team should be well-placed to look for changes that deliver energy efficiency, educate staff on how efficient work can have other benefits, celebrate an SEM program's successes and share its best practices. Capacity building and cultural enablement also help and upskill staff to contribute to reaching the organization's energy and decarbonization targets.

**5** **Monitor and report:** with control, monitoring and reporting systems in place, the organization has a better overview of both internal factors and progress, as well as external developments that affect the performance of the SEM program, providing better reporting insights.

In the first year of an SEM program, it is typical practice to work through one iteration of this cycle, with the first six months designed to generate early savings based on an energy and opportunity scan to identify optimization, low-cost capital and renewable-based measures that can be implemented at a fast pace. In the first year, organizing targeted workshops on areas including energy monitoring and modeling, performance tracking and how to engage the organization through employee events and activities will be essential. Given all these steps, it is key to note that SEM is a flexible approach that can be adapted to an organization's maturity and needs and be combined with other decarbonization levers such as carbon offsets, circularity, and power purchase agreements.

In summary, SEM involves technical and engineering changes, but its main focus more comprehensive systemic organizational changes. Among the best ways to reduce carbon emissions and use energy with greater efficiency is to work with people to change business strategies, practices and processes, and KPMG is ideally positioned to support clients in achieving this.

## How can KPMG help

In addition to our extensive experience in asset and organization transformation, tax, risk, policy, and financial management, KPMG's SEM programs offer several distinct advantages. With the support of our network, we can identify specialist organizations and work together to provide a customized approach to organizations while remaining agnostic.

In addition to the SEM delivery model, we work with preferred providers who offer energy monitoring and performance monitoring services. A variety of technical engineering companies can be selected based on the client's preferences and the sector they operate in. In addition, KPMG has the option of coordinating or implementing SEM engagements based on client preferences.

> **“In the first year, organizing targeted workshops on areas including energy monitoring and modeling, performance tracking and how to engage the organization through employee events and activities will be essential.”**

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04

# Energy companies can boost cyber security by monitoring behavior and changing culture

**As operational technology integrates with other systems, it needs better protection**

By: Ronald Heil, Jayne Goble, Angela Leggett and Walter Risi

**Until recently, a typical energy utility generated electricity from a few large power plants. It may have had millions of customers, but it measured their use with occasionally checked mechanical meters. Now, many such utilities also draw on many smaller-scale renewable sites, including surplus production from domestic customers and manage those customers through smart meters that provide a constant stream of data. Meanwhile, some energy companies that previously sold only to businesses are turning themselves into utilities by adding domestic customers, including oil and gas-focused groups trying to diversify.**

Companies building domestic supply businesses are taking on new involvements in people's lives with a more significant impact if their systems fail. These changes tend to increase the number and scope of a company's relationships, often adding individuals and smaller organizations that are less likely to have adequate cyber security. In short, it can dramatically increase their 'attack surface' — the total number of virtual locations through which someone could access, change or extract data. Overall, many such companies are taking on the virtual equivalent of moving from defending a few prominent forts to securing many cities, villages and individual buildings.

These increasing risks can be further heightened since utilities tend to have less sophisticated cyber security than their peers in other industries. However, this creates opportunities for the sector to make significant improvements by adopting what is already in use elsewhere. An example of such sound practice is to shift from trying to control what is happening in their digital systems to monitoring them for suspicious behavior.

"Companies building domestic supply businesses are taking on new involvements in people's lives with a more significant impact if their systems fail."

# From control to monitoring

Many energy companies have approached cyber security in the past by trying to control everything. This might have worked once, but it is not realistic when handling complex relationships with millions of customers. Instead, energy companies should consider the security models used by modern technology-based companies aiming to monitor systems and networks intelligently rather than controlling them. In terms of physical security, the revised approach is less like imposing military control on an area than policing it.

A behavior-based approach means looking for unusual activity rather than specific signatures of malicious threats, such as already-known patterns or indicators of compromise, like the code of a software virus. The problem with the latter is that cyber attackers are skilled at taking on the identities of innocent parties, such as cloud software providers. It is more complicated — although not impossible — to disguise malicious digital behavior. These behaviors include looking for ways to get into systems, entering them, navigating within them to find valuable data, extracting it and then leaving or destroying the system afterward. If someone climbs into an office building through an open window and heads for where the valuables are stored, they are worth investigating, even if they look like someone with a staff card.

Threat detection systems that use machine learning — automated analysis of large amounts of data — are an excellent tool for effectively monitoring behavior. This is because they can spot subtle patterns that people may overlook. These could include a new sequence of communication that takes place at 2am every Sunday between a company system and one in a foreign country or an employee who appears to be running a corporate server from a desktop computer. Behavior, rather than known indicators, provides clear grounds for suspicion in both cases.

# Protecting operational technology

As well as applying to information technology (IT), these approaches can also help protect operational technology (OT), the specialist equipment used to monitor and control physical industrial processes. OT is increasingly connected to networks, allowing those managing plants to manage them more efficiently and gather data much faster, but it can also make it more vulnerable to cyber attacks.

Compared with IT, threat detection systems need to be used in slightly different ways than in OT. One reason is that OT networks tend to change less often than IT ones, such as because a specific industrial process, is only required once every few months, making monitoring systems more prone to sounding false alarms based on what appear to be unusual events. This can be addressed by managing OT security locally at large plants, so there is awareness of irregular but legitimate operations rather than through a remote security operations center (SOC). It also makes more sense to use threat detection systems to undertake passive analysis of normal behavior rather than actively stress-test OT networks, given the consequences of failing OT systems can include damaged industrial equipment or safety incidents.

Despite their differences, IT and OT are gradually converging, such as applying advanced analytics to industrial processes. This is also true of Industrial Internet of Things (IIoT) devices, which gather data that allows analytics to improve maintenance, efficiency, and sustainability work, including efforts to avoid polluting accidents. As with OT, the use of IIoT can increase cyber risks. The long-term strategies involve cultural and technical changes, such as giving responsibility to manage OT to chief technology officers, charging chief information security officers with managing risks across IT, OT and IIoT and considering cyber security an integral part of all transformational projects.

> “OT is increasingly connected to networks, allowing those managing plants to manage them more efficiently and gather data much faster, but it can also make it more vulnerable to cyber attacks.”

## Managing regulatory requirements

Cultural change is also required by organizations to recognize that cyber security needs careful attention to its governance, regulation and compliance. Technology can support this in the shape of integrated risk management (IRM) tools which help monitor and manage the work of meeting regulatory requirements and act as a store for the evidence they require. In the United States, industry-specific regulators, including the North American Electric Reliability Corporation and Federal Energy Regulatory Commission, need to be assured that cyber risks are managed, as do economy-wide regulators, including the National Institute for Standards and Technology and those checking compliance with the Sarbanes-Oxley Act. Modern IRM tools can also track incidents and vulnerabilities, providing organizations with real-time information.

Some regulators, including the United Kingdom's Office of Gas and Electricity Markets (Ofgem), consider the security of supply and network resilience when reviewing price controls for companies that run energy networks and infrastructure, with cyber security an increasingly important aspect of this. KPMG professionals can advise regulated companies on how to ensure their regulatory economics and cyber security specialists work to include allowances for the costs of improved digital security in business plans.

"Technology can support this in the shape of integrated risk management (IRM) tools which help monitor and manage the work of meeting regulatory requirements and act as a store for the evidence they require."

## Reducing utility vulnerabilities

Utilities play an essential role in society. A cyber attack on an oil refinery that causes it to shut down for a few hours might only be noticed once its owner makes an announcement. But suppose the same attack on an energy utility causes a power cut. In that case, this will be seen by thousands or millions of people almost immediately, in some cases with severe consequences for safety and wellbeing. Unfortunately, this means that utilities are attractive targets for hackers backed by hostile nations who aim to disrupt societies rather than extract financial ransoms.

KPMG firms can help utilities strengthen cyber security in several ways, including tailoring threat detection to make it work much more efficiently. Security systems generate a lot of noise, data and false alerts. Still, these can be reduced through adjustments based on a business's specific priorities and critical processes. KPMG professionals can assist clients with such optimization work, enabling alerts that are higher in accuracy and fewer in number, which in turn helps to save time and cost. This is partly based on in-house security testing, which is used to refine such tailoring over time. KPMG firms also have a global network of operational technology specialists, and alliances with specialized OT security vendors, which can help utilities worldwide better protect their infrastructure from cyber threats. KPMG firms can support better governance, regulation and compliance work through the use of IRM tools and advice on how cyber security can impact issues, including regulatory cost allowances.

# How Hydro Ottawa improved its cyber security

Hydro Ottawa, a power utility serving more than 300,000 business and residential customers in Ontario, Canada, has used Cognito, an automated threat management service provided by Vectra, since 2016. Previously, the utility's technologists spent a lot of time hunting for threats manually. Implementing Vectra's automatic detection, scoring and prioritizing of cyber threats meant the company dramatically reduced the time needed to investigate threats and now responds faster to any that are identified.

As part of Vectra's service, it monitors certain behaviors, including reconnaissance attempts, attempts to install remote access tools, and attempts to extract data, the last of which Hydro Ottawa has set up specific alerts for. The utility has also used the service to take pre-emptive steps, such as changing the configuration of specific devices on its network to eliminate vulnerabilities.

As well as monitoring its corporate systems, Hydro Ottawa is planning to use Vectra to protect some of its operational technology (OT) including its supervisory control and data acquisition (Scada) systems. Rather than looking at components used for specific industrial processes, the system will monitor the overarching systems used to control these at level 2 and above of the Purdue reference model used to describe OT systems. In particular, Cognito will focus on the perimeter between OT and the company's IT environment, and unless attackers have physical access to facilities, they would have to breach this digital perimeter to reach OT systems.

Aside from monitoring, Hydro Ottawa uses threat information from Cognito to help it conduct internal audits and implement standards, including the National Institute for Standards and Technology's cybersecurity framework.

*Vectra has an alliance with KPMG in the Netherlands.*

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05

# Inflation Reduction Act changes the game for energy transformation

## A look at the energy-related tax provisions

By: Julie Chapel, Carlo Franchina and Glenn Todd

**Following many months of negotiation between branches of the United States government, on 16 August 2022, President Joe Biden signed the Inflation Reduction Act (IRA) into law. Although, as the name suggests, it includes measures that aim to reduce inflation, it also contains a significant package of tax incentives and benefits designed to support the US in tackling climate change. These cover how it produces energy and other measures, such as encouraging decarbonization through carbon capture and promoting the use of electric vehicles. In September, President Biden described the IRA as "the most aggressive action ever… to confront the climate crisis and increase our energy security."[1]**

The Act's energy industry measures are numerous and, in several cases, innovative, with new mechanisms that allow tax credits to be sold to unrelated third parties or settled through direct payments from the government. Some tax incentives are linked to the location of projects and suppliers, workers' pay and the development of apprenticeship programs. This article will focus on a small number of tax changes that create opportunities and challenges for energy companies with US operations.

## New 'direct pay' tax credits for hydrogen, CCS and advanced manufacturing production

The IRA provides specific support for producing clean hydrogen and carbon capture and sequestration (CCS) through new 'direct pay' tax credits. These are settled directly by the federal government, allowing users to obtain a refund of any credit amount above tax liability for a five-year period. Alternatively, the credits can be sold to unrelated third parties.

The size of these credits can vary significantly based on several factors, including how efficient energy technologies reduce greenhouse gas emissions. For example, the full base credit is available only for clean hydrogen processes that generate less than 0.45 kilograms of carbon dioxide equivalent greenhouse gases ($CO_2e$) for each kilogram of hydrogen.

Those in the next range, which generate 0.45 to 1.5 kilograms of $CO_2e$, are eligible for just a third of this credit.[2] Other factors that aim to support local economies and workers across the US, discussed below, will also have significant impacts on a project's tax credits.

Refundable and transferable direct pay tax credits look highly attractive. Their introduction will likely lead to growing investment in these areas, including from overseas, helping energy companies seeking financing for such projects. There may also be secondary benefits, as increasing numbers of smaller energy production sites will require more investment in transmission grid infrastructure to support their energy distribution.

[1] The White House, Remarks by President Biden on the Passage of H.R. 5376, the Inflation Reduction Act of 2022, September 2022.

[2] KPMG, "Inflation Reduction Act" Tax Law Changes Special Report, August 2022.

But there are challenges, given the innovative nature and complexity of these new tax credits. Third parties purchasing them will be taking risks, meaning they will need to undertake due diligence and may need to buy insurance. The risks involved mean that tax credits will trade at a discount although the size of the discount rate is currently highly variable. Moreover, many questions remain regarding the market's liquidity for trading credits, and potential participants are proceeding cautiously. The Internal Revenue Service has yet to publish details of how transferability and the direct pay of tax credits will be administered, with fuller guidance expected later this year.

Under existing law, to qualify for the investment and production tax credits, construction of energy generation facilities would have to start by the end of 2024. As defined by an annually published government table, all technologies producing zero or negative greenhouse gas levels will be eligible for these new technology-neutral credits beginning in 2025. The phaseout of these credits will begin at the earliest in 2034 or two years after the government determines that US electricity production will emit less than one-quarter of the greenhouse gases from 2022.

> **"Moreover, many questions remain regarding the market's liquidity for trading credits, and potential participants are proceeding cautiously."**

## Buy American, support localities

Many of the measures in the IRA also include increased credit rates designed to boost the US economy and its workforce, as well as specific local economies affected by the energy transformation. Specifically, the domestic content increase incentivizes the production of energy components nationally, requiring projects to be composed of certain levels of American-made components. The measures covering workers are also national in scope, although partly based on local conditions. In general, to qualify for the highest 'bonus' credit rate, projects beginning construction in 2024 will be required to use apprentices for at least 15 percent of total hours of employment, up from 12.5 percent in 2023.[3] They will also have to pay 'prevailing wages', an existing set of pay levels published by the Department of Labor on the average salary of similarly-employed workers in a locality. These requirements have not previously been used to determine tax credits.

The most localized incentives are extra credits for facilities placed in what the Act calls an 'energy community.' These locations include brownfield sites, areas that have or have had certain levels of employment or local tax revenue from fossil fuels and above-average unemployment, or areas that have seen a coal mine close after 1999 or a coal-fired power plant shut down after 2009.

The incentives for domestic production are likely to mean more manufacturing in the US. This should help US-based energy utilities by shortening supply chains and making the delivery of equipment such as solar panels more reliable and quicker. But compliance is likely to be a key challenge in meeting the apprenticeship and prevailing wages requirements, with the latter requiring companies to have access to pay rates used by contractors and other third parties working on projects.

[3] KPMG, "Inflation Reduction Act" Tax Law Changes Special Report, August 2022.

# International impact

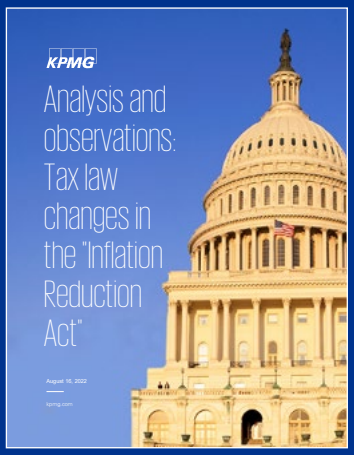
The IRA looks set to make the US, at present the world's second-largest emitter of greenhouse gases, into a global leader in tackling climate change. However, by offering incentives for producing goods and minerals either domestically or by countries with a free-trade agreement, the legislation also looks likely to impact international providers of products required to decarbonize energy production worldwide.

In many respects, the IRA creates direct competition between China and the US, including for goods required by power utilities. It provides tax incentives for the American production of power storage batteries, wind turbines, solar panels and geothermal heat pumps, and the mining of lithium and nickel used in some of these. China is currently the world's biggest manufacturer of these products and dominates battery and associated mineral supply chains.[4] Despite the IRA, it seems likely that the global supply chains for renewable energy generation and batteries will run through China for some time, and utilities should watch to see how China's government reacts to US legislation.

As a result of the demands EVs put on grids, there may be an impact on the production of electric vehicles (EVs). According to the Act, final assembly must happen in North America, and 50 percent of EV batteries and battery content must come from the US or a free-trade partner by 2028. These partners include Australia and Canada but exclude major vehicle manufacturers such as France, Germany, Japan and the United Kingdom. Some of these countries have viewed the Act as an attempt to shift EV production from other countries to the US. However, the US government is willing to work to resolve this issue, with European and American officials meeting in December to discuss an agreement on the measures.

Other countries look set to benefit from the IRA. The Mineral Council of Australia believes the country's lithium, copper, cobalt and nickel miners have a significant opportunity to support the US in moving to clean energy, given Australia's free-trade agreement with the US. However, the Act's incentives could only divert capital away from Australia's efforts to develop its green hydrogen industry if its government introduces policies that support continued investment.

## Additional insights




## How can KPMG help

KPMG firms can assist companies in navigating the new rules in various ways. In addition to providing technical analysis and modelling to evaluate the comparative benefits of new credit programs, KPMG professionals are assisting with considerations surrounding new provisions and options, such as transferability, as well as documenting and managing apprenticeships and prevailing wage requirements. Contact a KPMG Energy Leader for more information.

[4] U.S. Department of the Interior, Mineral Commodity Summaries 2022, March 2022

# The EU's Carbon Border Adjustment Mechanism

Author: **Nicole de Jager**, Senior Tax Manager — Global ESG Tax (EU Green Deal & Decarbonization), KPMG in the Netherlands

The European Union (EU) has dedicated itself to sustainable development and has set a very ambitious target of becoming the first climate-neutral continent by 2050. One of the milestone targets towards this goal is the introduction of an EU Carbon Border Adjustment Mechanism (CBAM), which will come into effect on 1 October 2023. CBAM will operate by imposing a charge on the embedded carbon content of certain imports. This is equal to the charge imposed on the production of domestic goods under the EU Emissions Trading System, with adjustments being made to this charge to consider any mandatory carbon price effectively paid in the country of origin that is recognized by the EU, and free allowances provided under the EU ETS to facilities producing competing goods.

In the early stages of CBAM's implementation, the most affected industries will be those with high carbon intensity, such as the energy industry. Among the immediate, direct impacts are the possible increase in import prices for covered products, such as electricity and hydrogen. In addition, there may be an increase in secondary goods that contain components of these products. Vehicle manufacturers, for example, may purchase fuel cells for electric vehicles containing higher-priced hydrogen imported from abroad. Upon importation, EU organizations are required, from 1 October 2023, to fulfill reporting obligations and from 1 January 2026, to register as authorized declarants and start purchasing CBAM certificates.

A non-EU company will be required to provide product-specific embedded emissions information and, from 1 January 2026, have the embedded emissions data verified by an independent, accredited verifier if they wish to sell products covered by CBAM to the EU.

The energy industry value chain is very complex, interlinked and diverse. Its products are used in and supplied to all sectors of the economy. As CBAM is applied to this industry, its effects will be felt in other sectors and industries as well. There will be a direct impact on energy companies' supply and value chain, resulting in higher costs and increased pressures on the industry.

## Climate Policy Advisory

In these rapidly changing global environments, KPMG has a worldwide network of professionals that assist companies with understanding policy evolution in destination countries and optimizing business and ESG strategies. KPMG firms can assist your business in understanding the evolving climate-related regulatory landscape, including incentive measures and helping companies understand the risks and opportunities of such changes.

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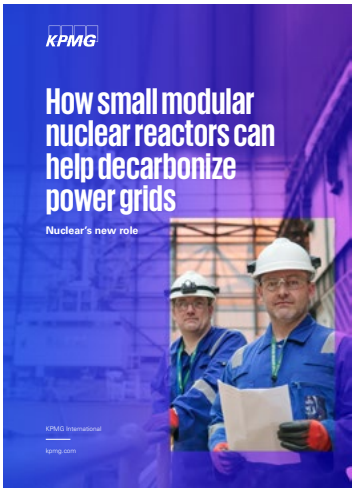
# KPMG's Global Energy Institute

**The KPMG Global Energy Institute (GEI), launched online in 2007, is a worldwide knowledge-sharing platform detailing insight into current issues and emerging trends within the Power & Utilities and Oil & Gas industries. The GEI helps shed light on key topics ranging from upstream volatility, midstream constraints, industry consolidation, shifting customer demands and new technologies, alternative and renewable energy, smart grid technology and transformation, and evolving regulatory and statutory requirements, as well as financial reporting and tax updates.**

The GEI interacts with its over 40,000 members through various channels, including webcasts, publications and white papers, podcasts, events, and quarterly newsletters. The institute works with member firm clients, external alliance partners and the global KPMG network of energy experts to analyze the most pressing challenges facing the industry and develop practical strategies for an increasingly complex energy environment.

A complimentary GEI membership is an effective way for energy executives to gather the latest information on industry trends and help meet their continuing education requirements. Members receive early alerts and invitations to thought leadership, studies, events, and webcasts about key industry topics.

To receive timely updates and insights relevant to the energy industry, become a member of the KPMG Global Energy Institute today by visiting kpmg.com/energy.





# KPMG Climate Change and Decarbonization Center

One of the most significant risks of our lifetime is climate change, which requires our utmost attention and immediate action. Taking climate goals into account means reducing risks and seizing opportunities to be at the forefront of the transformation to a net-zero world and achieving those goals.

The KPMG Global Climate and Decarbonization Center was established to provide leading climate strategies and advice to member firm clients. We are not simply consultants. To achieve a low-carbon future, KPMG professionals are committed to working collaboratively with clients.

KPMG firms' climate risk and decarbonization specialists can assist you in achieving your climate goals by providing:

## 1 Climate policy and incentives advisory

KPMG professionals can assist your business in understanding the evolving climate policy landscape, including incentive measures and the risks and opportunities associated with such changes.

## 2 Decarbonization pathways to net zero

From emissions measurement to implementation, monitoring, and reporting, we can assist you with gaining strategic foresight and operational value during your decarbonization journey. Several options are available to support these activities, including renewable energy procurement, energy efficiency, circular economies, and supply chain management.

## 3 Climate risk

We work with clients to identify physical and transition risks based on different scenarios.

## 4 Low carbon financing and investment opportunities

We advise clients on the financial and investment aspects of the low carbon agenda, which include raising funds and identifying investment partners and merger and acquisition opportunities.

Annually, KPMG firms are identified as leaders across many key analyst reports that affect clients' most pressing business challenges.

### KPMG named a global Pacesetter (a leader among innovators) in Digital Transformation & Digital Services

ALM Intelligence recognized KPMG Internaiotnal as a digital 'pacesetter' in the 2022–2023 report: "Digital Transformation & Digital Services." According to ALM, pacecetters are market leaders who effectively connect the dots between technology, process, and people, to deliver outstanding client outcomes. Additionally, the report notes "KPMG's focus for clients is on creating digitally-enabled business capabilities, building the tactical building blocks that serve as the foundation for the strategic — the business model."

### KPMG Climate Change and Decarbonization Center recognized as a 'change agent' for the future

KPMG's global climate change and decarbonization advisory services have received a highly positive assessment in an analyst's report from Technology Business Research, Inc (TBR), a leading independent market, competitive and strategic intelligence firm. Alongside acknowledging KPMG's investment in a range of tools and its broad-ranging set of technology and alliances, TBR praised the organization's "new investment concept" — Net-Zero Equity. This initiative seeks small investments on a large-scale basis from ordinary citizens to be funneled into high-risk yet direct and impactful decarbonization projects.

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