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 decarbonisation

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

Changing 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 organisations in combating climate change and implementing decarbonisation is growing. Through their work, they can help organisations and communities achieve net zero emissions and decarbonise 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 decarbonising 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 decarbonisation 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 decarbonisation**, we examine how large energy consumers are taking responsibility for decarbonising 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 organisations.

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

Companies have an essential role to play in the fight against climate change. In our second article, titled A lightbulb moment for decarbonisation, 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 $3.5 trillion a year, January 2022.

attacks. Cyberattacks on these 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 behaviour 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 behaviour.

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 European Commission launched REPowerEU on 18th May 2022 in response to the disruption to the global energy market and the hardships caused by the Russian invasion of Ukraine. The plan, which is discussed in **Changing the game for energy transformation** is backed by financial and legal measures and aims to save energy, produce clean energy, and diversify energy supplies, in order to build the new energy infrastructure and system that is needed by Europe.

The energy industry is in a state of transformation as it addresses the challenges of climate change, security of supply and decarbonisation. 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 in line with the Climate Action Plan for Ireland. We hope that you will find these articles insightful and engaging and that they will stimulate new conversations and insights.

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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 centres 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 the 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 event at the conference. NZUP aims to match digital technologies with capital to reach 10,000 cities, scale up 100 digital prototypes and raise USD25bn 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

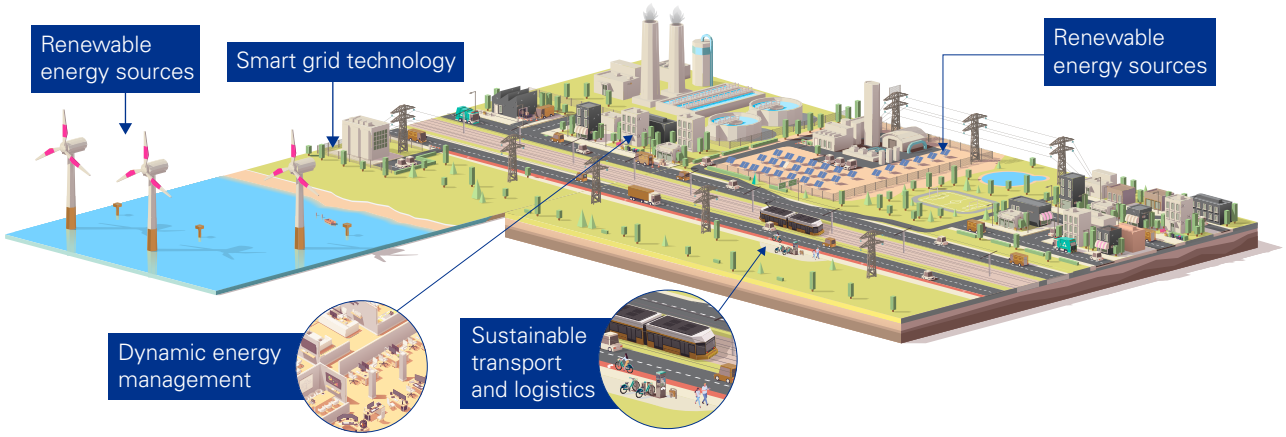
Opportunities for energy and utility companies

Cities tend to be more densely populated, which makes them ideal for experimentation and demonstration of decarbonisation 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 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 decarbonised energy. Several alternative energy sources are available to replace fossil fuels, including renewable electricity, district heat networks, biomethane and hydrogen. By modernising their infrastructure, energy companies can help their customers become more energy efficient and waste less.

Some energy companies have already committed to significant changes ESB announced a series of decarbonisation targets to achieve net zero emissions by 2040.[4] In ESB's net zero strategy, a commitment to a fivefold increase in renewable energy generation has been made which will see the production of 5000MW by 2030.

Gas Networks Ireland has committed to a cleaner energy future and is replacing natural gas with renewable gases such as biomethane.[5] Under the recently announced Sectoral Emissions Ceilings, Ireland's biomethane production is targeted to increase up to 5.7TWh.[6] Gas Networks Ireland is also establishing appropriate locations for the injection of indigenous green hydrogen which will support the development of Ireland's solar and offshore/onshore wind industries.

As part of its Brown to Green Sustainability Strategy, Bord na Móna is targeting an annual production of over 3TWh of renewable electricity by 2030.[7] The majority of this energy will be produced through onshore wind farms. Bord na Móna has also restored a total of 19,700 hectares of peatlands under the strategy with an ambition to restore over 73,000 hectares in total.

From Ireland's Climate Action Plan 2023 electricity accounts for 14.4% of Ireland's total GHG emissions.[6] To meet the required GHG reduction of 75% The Department of the Environment, Climate and Communications announced an increase in offshore and onshore capacity to 7GW and 9GW respectively, while 8GW of solar PV capacity is also listed as a key measure.

With the hydrogen transition underway, companies around the globe are rethinking how they transport, distribute, and store

4 Our Strategy (esb.ie)

5 Moving Ireland's energy (gasnetworks.ie)

6 gov.ie - Climate Action Plan 2023 (www.gov.ie)

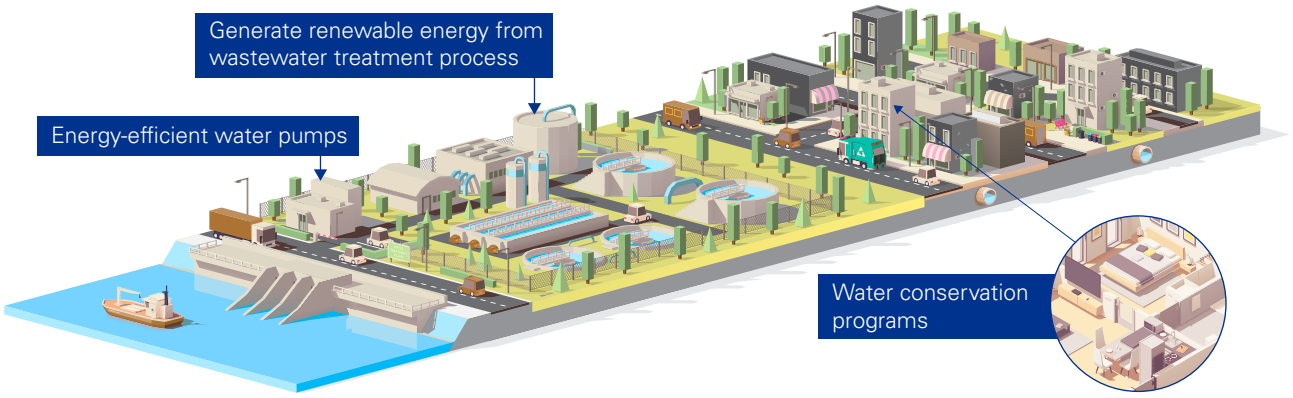
7 Bord na Mona - Rethink, Renew, Restore

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,[8] although hydrogen-powered vehicles are also being tested in urban environments.

Key metrics to deliver abatement in Ireland's Electricity sector outlined in Ireland's Climate Action Plan 2023 include, production of green hydrogen via 2GW offshore wind and incentivisation of non-firm demand to supply electricity at times of low wind or solar.[9] This could support partial-electrification of further hydrogen production. In Ireland, Gas Networks Ireland has developed a hydrogen test facility, which focuses on understanding the full potential of hydrogen in Ireland's gas networks and appliance compatibility with hydrogen blends[10]

A European Union program called Important Projects of Common European Interest (IPCEI) supports key strategic technologies and projects, such as hydrogen and battery production.[11] 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.[12] 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.[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.

Water utility company Uisce Eireann has launched a Water Stewardship programme which helps businesses lower their water use and operating costs while protecting the environment.[14] Medium and Large companies can engage in the programme, leading to less consumption of water and demonstrating a clear commitment to water conservation to all of their stakeholders

8 International Energy Agency, The future of hydrogen, June 2019

9 gov.ie - Climate Action Plan 2023 (www.gov.ie)

10 Gas Networks Ireland ensuring Ireland is hydrogen ready

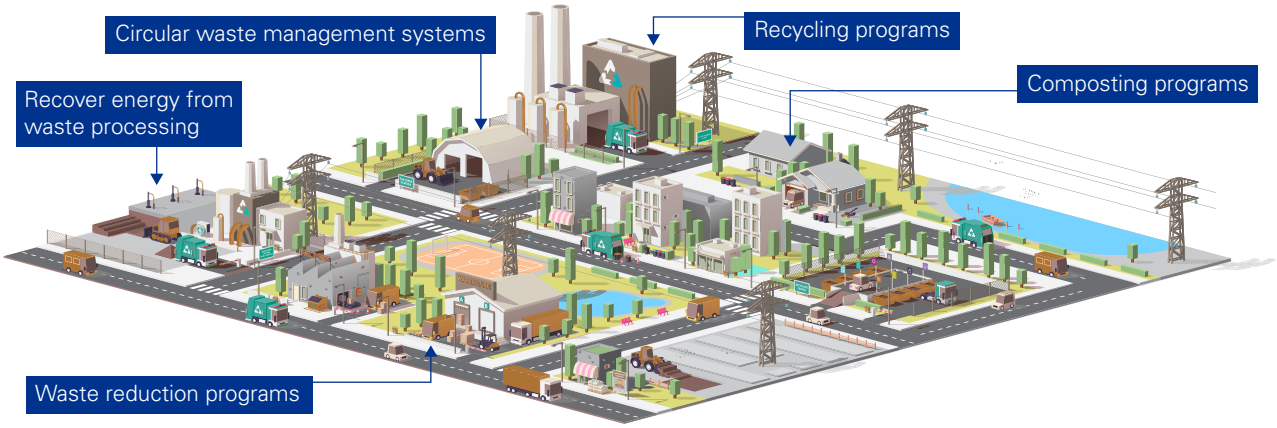
11 European Commission, Important Projects of Common European Interest (IPCEI)

12 Mission Innovation, Clean Hydrogen Mission

13 KPMG, Waste heat beneath our feet, 2023

14 Water Stewardship Programme | Conservation | Uisce Éireann (formerly Irish Water)

Waste



Waste management utilities can upgrade their vehicle fleets to cut emissions and work to reduce waste and increase recycling through customer education. They can recover energy from waste through anaerobic digestion, where organic matter breaks down in a sealed oxygen-free vessel to produce biomethane and organic fertiliser. 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.[15]

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.[16]

In Ireland the Department of Communications Climate Action and Environments publication 'Waste Action Plan for a Circular Economy', outlines 20 actions being taken to reduce waste from all industries.[17] Ambitious targets such as 60% of current Municipal Solid Waste being recycled by 2030 are set out in the policy. Ireland's Food Vision 2030 further highlights a commitment to the reduction of waste through the development of a National Food Waste Prevention Roadmap in order to halve per capita food waste by 2030.[18]

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."

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

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

[17] gov.ie - Waste Action Plan for a Circular Economy (www.gov.ie)

[18] gov.ie - Launch of "Food Vision 2030 - A World Leader in Sustainable Food Systems" (www.gov.ie) https://www.gov.ie/en/press-release/d1108-launch-of-food-vision-2030-a-world-leader-in-sustainable-food-systems/

Case study:

The European Union

Several policies and initiatives are being implemented by the European Union (EU) to achieve the region's decarbonisation and climate goals. 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.[19] The EU Taxonomy defines sustainable economic activities so investors can direct investments toward sustainable projects.[20]

The Carbon Border Adjustment Regulation (CARD), currently in development, is expected to create new incentives for companies to reduce their greenhouse gas emissions.[21] 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 decarbonisation 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. Ghent converted the Old Dockyards into a mixed-function neighborhood using heat, water, and nutrient loops that were previously closed.[22] The special-purpose investment vehicle allowed upfront investment in new technologies and future-proof investment.

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.[23]

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. Additionally, cities can participate in city networks such as the Global Covenant of Mayors for Climate and Energy, C40, Eurocities, ICLEI, and UCLG, which provide networking, technical assistance, and benchmarking opportunities on priority challenges facing cities throughout Europe.

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.

[19] European Commission, EU Green Deal.

[20] European Commission, EU Taxonomy.

[21] European Commission, Carbon Boarder Adjustment Mechanism.

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

[23] 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 others with potential need **scaling up in size or further innovation to make them viable**. In KPMG's view, the historical focus has been on financial gains at the expense of sustainable land use, 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.

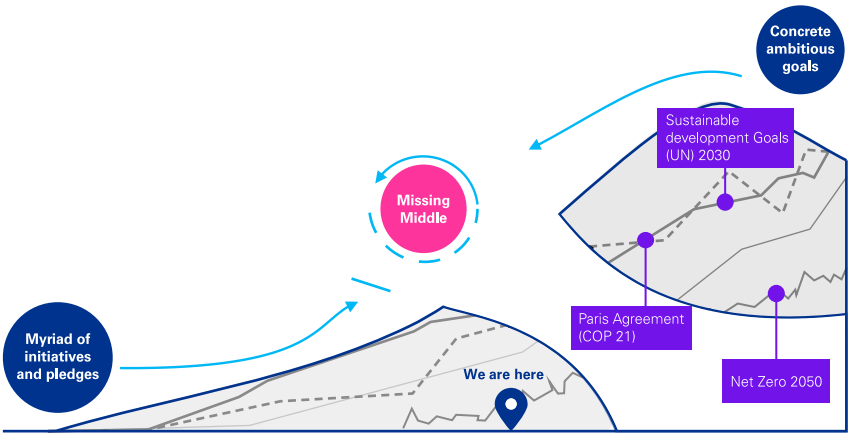
It is the mission of the NZUP to bridge the gap between sustainable technological solutions and capital through technology and partnerships. Through the program, digital solutions can be paired with capital to advance solutions. In order to achieve this, new business models, joint investments, integrated 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 decentralise 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 analyse 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

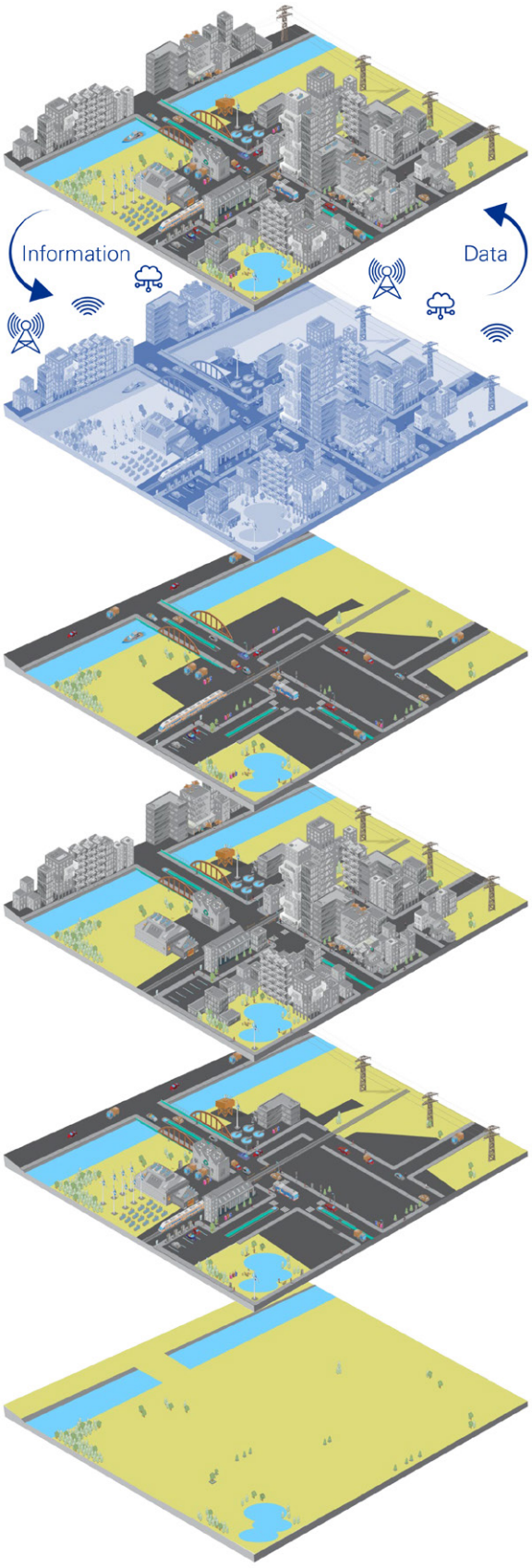
Data can also be applied to understand how much 'embodied carbon' materials and services contain. Utilities can also benefit from making better use of external data, such as from meteorological agencies to improve assessment of flooding risks, and from greater sharing of their own, such as opening access to sharing of 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. It is often easier to understand flows of power and water through visualisation of where they are being used, such as city blocks and districts.

As a result of digitalisation, 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 tokenisation, 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 decarbonise urban environments, such as centrally-run neighborhood 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 organisational 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. Organisations 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 standardisation 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.

Developing 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[24], that standardise the early stages of project development.

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

The developing world challenges

The developing world is predicted to have a much faster rate of urbanisation than the rest of the world.[25] Approximately 759 million people worldwide lack access to electricity,[26] and currently, 70% of urban populations in developing countries do not have adequate access to municipal services, such as water and sanitation.[27] It will be essential for developing countries to prioritise 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 urbanisation that is predicted to occur.

A significant challenge for cities in the developing world is the need for more financing and resources for their 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 the developing world 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.

Developing world cities can also collaborate with those in the developed world. 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 real-world scenarios. In contrast, developing world cities have the advantage of being able to build new infrastructure rather than retrofitting existing infrastructure. It is, therefore, possible for developing world 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.[28] 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.[29] 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.”

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

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

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

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

[29] 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.[30] 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,[31] 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% of its CO2 emissions by 2026.[32]

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.[33] A key benefit of the electric buses is that they can help decarbonise 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,[34] 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.”

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

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

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

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

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

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 organisations stand and what needs to be done in the future.

Let's accelerate net zero together.

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03

A lightbulb moment for decarbonisation

How strategic energy management can help operationalise 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 organisations. Understanding and planning for the likely implications of decarbonisation 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] In Ireland, The Irish Government's Climate Action Plan 2023 pledges to achieve the legally binding target of reducing emissions by 51% by 2030.

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 recognising the need for climate commitments, less than 1% 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 optimise operations, organisations should identify strategies to translate their goals and plans into action. A strategic approach to energy management can be beneficial as it allows organisations to decarbonise 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 operationalises 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 organisations. Understanding and planning for the likely implications of decarbonisation 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.

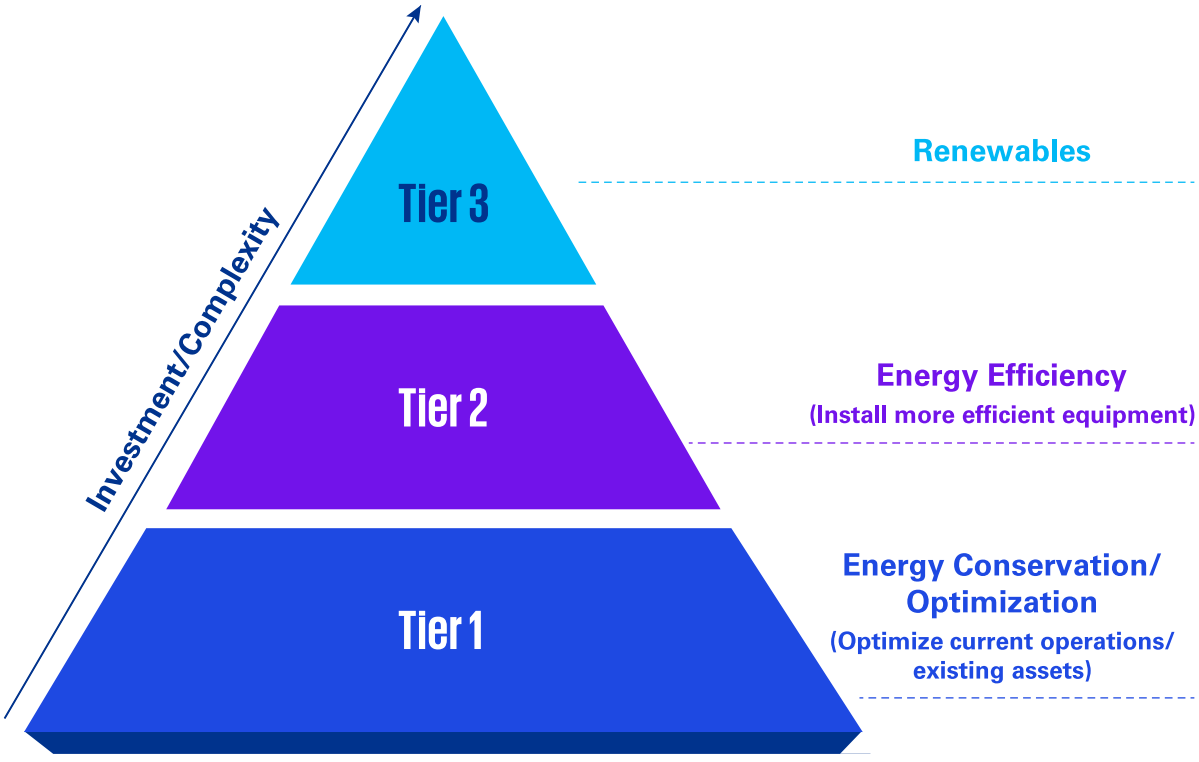
5 American Council for an Energy-Efficient Economy, Halfway there: energy efficiency can cut energy use and greenhouse gas emissions in half by 2050, 2019.

Aims and advantages of SEM

SEM is a holistic continuous improvement framework that enables organisations to adopt a culture of energy efficiency and decarbonisation. This reduces energy consumption and costs and cutting scope 1 emissions from sources owned or controlled by the organisation 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 organisation can speed up the process of energy reduction and decarbonisation. Approximately 5 percent of savings can be achieved annually through optimising 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 optimise 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 organisations to adopt a culture of energy efficiency and decarbonization.”



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

Thinking strategically about energy

Most organisations 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 organisation'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 organisational 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. Organisations 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, prioritise 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 decarbonisation 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 organisation 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 behavioural 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 organisation 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]

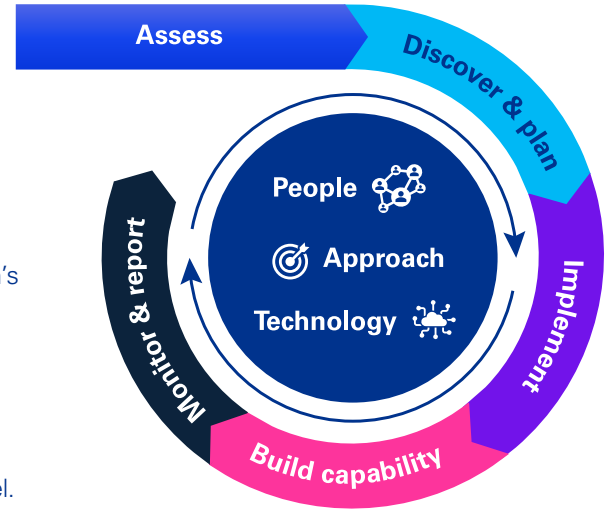
Such changes brought by SEM can be reinforced when they generate **additional non-energy benefits**. When equipment and assets operate more efficiently, they typically require less maintenance which saves on costs as well as reduces safety incidents. For example, low-energy LED lighting typically requires 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 organisations to strategically optimise their technologies, processes and people to improve energy efficiency and to decarbonise. Underpinned by active governance, stakeholder engagement, organisational 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 organisation's maturity at a corporate and facility level and its decarbonisation and energy efficiency ambitions is critical. This stage also involves benchmarking and prioritising 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 optimisation, 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 prioritised 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 organisation.

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 organisation's energy and decarbonisation targets.

5 **Monitor and report:** with control, monitoring and reporting systems in place, the organisation 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 optimisation, low-cost capital and renewable-based measures that can be implemented at a fast pace. In the first year, organising targeted workshops on areas including energy monitoring and modeling, performance tracking and how to engage the organisation 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 organisation's maturity and needs and be combined with other decarbonisation 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 organisational 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 organisation 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 organisations and work together to provide a customised approach to organisations 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, organising targeted workshops on areas including energy monitoring and modelling, performance tracking and how to engage the organisation through employee events and activities will be essential.”**

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04

Energy companies can boost cyber security by monitoring behaviour 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 organisations 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 behaviour.

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 hundreds of thousands 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 behaviour-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 behaviour. These behaviours 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 behaviour. 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. Behaviour, 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 centre (SOC). It also makes more sense to use threat detection systems to undertake passive analysis of normal behaviour 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. Irish based KPMG's EMA Cyber Leader, Dani Michaux believes 'As energy companies push technology further out into their networks along with the convergence of IT and OT, the cyber threat landscape widens.' 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.

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 organisations 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 organisations 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.

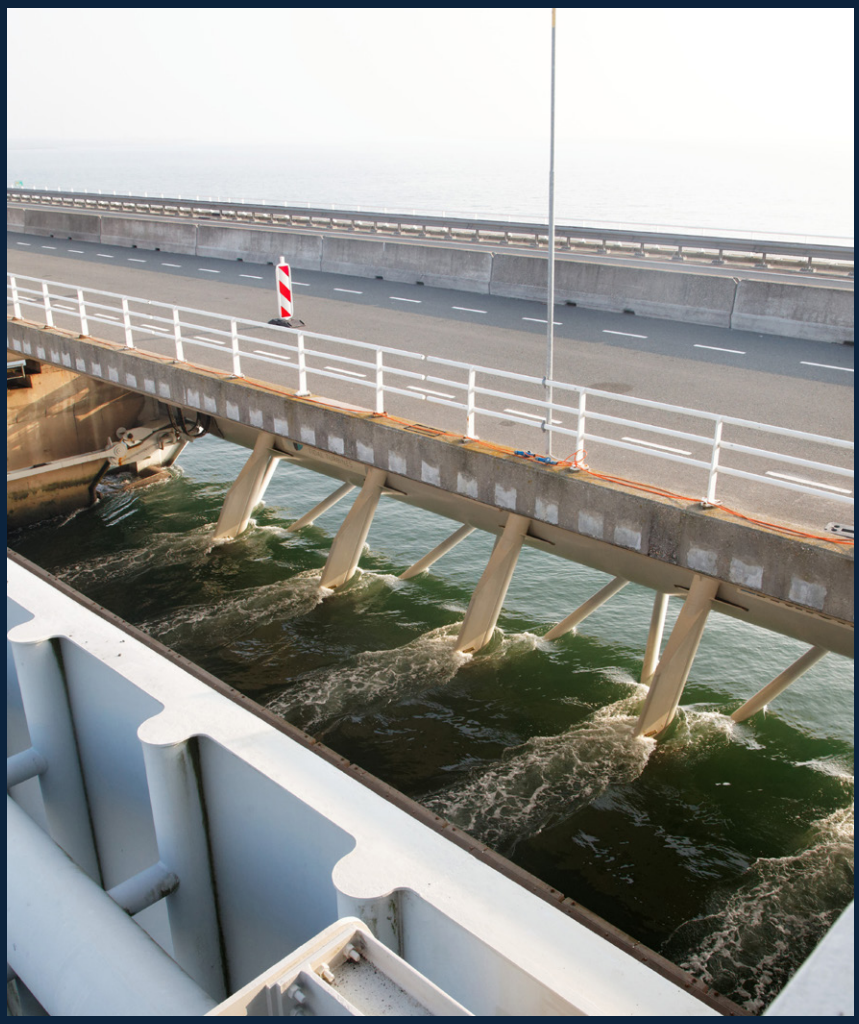
KPMG firms can help utilities strengthen cyber security in several ways, including tailoring threat detection to make it work much more efficiently. Security systems generate a lot of noise, data and false alerts. Still, these can be reduced through adjustments based on a business's specific priorities and critical processes. KPMG professionals can assist clients with such optimisation 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 specialised 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 Hydra 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 prioritising of cyber threats meant the company dramatically reduced the time needed to investigate threats and now re-sponds faster to any that are identified.

As part of Vectra's service, it monitors certain behaviours, 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.

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.

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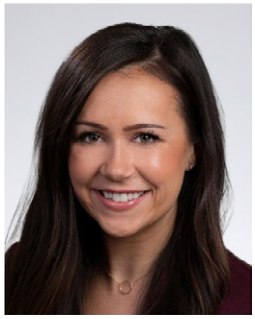
Jayne Goble, PhD leads KPMG's UK OT and IoT team and has over fifteen years' experience working with a range of global clients to oversee and deliver a variety of capital projects, ranging from responding to critical security failures of national infrastructure, to deployment of interception and intelligence platforms.



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05

Changing the game for energy transformation

By: Julie Chapel, Carlo Franchina, Nicole de Jager and Glenn Todd

REPowerEU: affordable, secure, and sustainable energy for Europe

On 18th May 2022, the European Commission presented the REPowerEU plan in response to the disruption to the global energy market and the hardships caused by the Russian invasion of Ukraine. The plan, which is backed by financial and legal measures, aims to save energy, produce clean energy, and diversify our energy supplies, in order to build the new energy infrastructure and system that is needed by Europe.

REPowerEU is the European Commission's plan to reduce Europe's reliance on Russian fossil fuels before 2030 accelerate Europe's transition to green energy and increasing the European Union's energy system resilience. "85% of Europeans believe that the EU should reduce its dependency on Russian gas and oil as soon as possible to support Ukraine."

In order to finance REPowerEU, investments of €210 billion will be required between now and 2027. This will be needed to phase out the import of Russian fossil fuels, which are currently costing European taxpayers nearly €100 billion per year. Additional EU funding will be provided by the Recovery and Resilience Facility (RRF). EU members states are to add a REPowerEU to their own Recovery and Resilience Plans so investments can be channelled to REPowerEU priorities, and the necessary reforms be made. The remaining RRF loans, currently worth €225 billion, and new RRF grants funded by auctioning of Emission Trading Systems allowances, currently worth €20 billion and held in the Market Stability Reserve, can be used by member states.

REPowerEU contains both short term measures and medium-term measures completed before 2027 that are based on diversification, energy saving, and the acceleration of clean energy. Renewables are the cheapest and the cleanest energy source available. It can be generated domestically, reducing our need for energy imports. A transition to clean energy will aid in lowering energy prices over time. The European Commission is proposing to increase the EU's 2030 target for renewables from the current 40% to 45%. The REPowerEU Plan would bring the total renewable energy generation capacities to 1,236 GW by 2030, in comparison to the 1,067 GW by 2030, which was previously envisaged under Fit for 55 for 2030. As part of the REPowerEU plan, the EU Solar Energy Strategy aims to bring online over 320 GW of solar photovoltaic newly installed by 2025, over twice today's level, and almost 600 GW by 2030. These frontloaded additional capacities displace the consumption of 9 bcm of natural gas annually by 2027. In addition to this an investment in a hydrogen accelerator to build 17.5 GW by 2025 of electrolysers which will fuel EU industry with homegrown production of 10 million tonnes renewable hydrogen. The plan also aims to provide a modern regulatory framework for hydrogen. The Commission is also proposing an increased ambition on energy savings by raising the EU-wide energy efficiency for 2030 from 9% to 13%.

Long-term partnerships with international partners are to be built upon to boost renewable energy and increase energy efficiency around the globe by cooperating on green technology and innovation. The new EU Energy Platform, initiated in April 2022, will play a key role in pooling demand, coordinating infrastructure use, negotiating with the international partners, and preparing for joint gas and hydrogen purchases.

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 prices in the exporting country.

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 is 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, organisations must provide this product-specific information and the authorised declaration. A non-EU company will also be required to implement carbon accounting to track embedded emissions associated with these products and to have them independently verified 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.

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.

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06

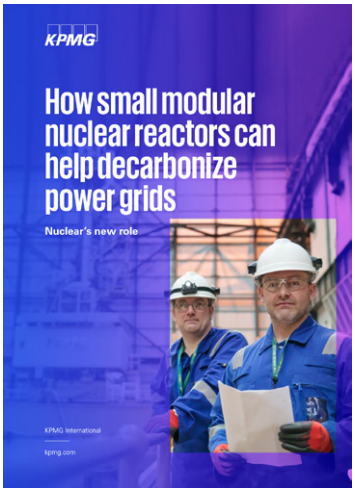
KPMG's Global Energy Institute

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 Decarbonisation 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 Decarbonisation 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 decarbonisation 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 Decarbonisation 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 decarbonisation 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 Decarbonisation Center recognized as a 'change agent' for the future

KPMG's global climate change and decarbonisation 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 organisation'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 decarbonisation projects.

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