

Energy Transition in Utilities

Accelerating the energy transition
toward a **net-zero emissions future.**





The plummeting price of renewables, increasing climate activism, sweeping regulatory mandates, and consumer demands for cleaner, more sustainable energy present enormous opportunities for the power sector—and no small number of challenges.

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Introduction

Accelerating the energy transition toward a net-zero emissions future

Energy providers are already implementing new business models, partnerships, and capabilities to decarbonize the energy system and meet increasingly ambitious targets and commitments. But so are new market entrants, from automakers to oil majors, who are all eager to tap into the electrify-everything (and cleanly) movement.

While many utilities have successfully greened their portfolios, making onshore wind and solar the most competitive form of energy in many markets and driving renewable levelized cost of energy (LCOE) to record levels, zero-emissions targets remain elusive. More action is needed—and urgently—to incorporate both decarbonized and decentralized sources of power onto the grid.

Challenges to transition

One of the most significant challenges to transition will be modernizing grid infrastructure away from one-way baseload energy with minority renewables to a system able to transact much more variable, decentralized, and disaggregated power.

Without fundamental commercial and operational capability development, it's unclear how much more renewables transmission system operators can absorb.

On the distribution side, more progress is needed on demand forecasting, given the interfaces across self-generating consumers, microgrids, transmission, and electric vehicle (EV) charging infrastructure.

New services will also be required in response to changing demand patterns enabled by energy management, distributed generation, and EVs. Utilities are well placed to serve as trusted intermediaries to customers, informing them about available support schemes and financing options, helping them make the best choices, and connecting them to relevant energy-efficiency and renewable solution providers.

While many utilities have successfully greened their portfolios, zero emissions targets remain elusive. More—and urgent—action is needed.

Putting people at the heart of the energy transition

Globally, utilities are making multibillion-dollar bets to respond to these challenges and tap into the myriad of opportunities the energy transition presents. To succeed, they must adopt a power model that's decarbonized, decentralized, digitized, and puts people at the heart of the strategy.



Provide **customers** with solutions that protect the environment and create sustainable futures.



Equip **employees** with data and digital tools that allow them to create a sustainable enterprise that benefits society.



Deliver predictable returns for **investors** that meet social and environmental considerations.



Partner with **regulators** to create a market environment that enables Net Zero.



We're here to help

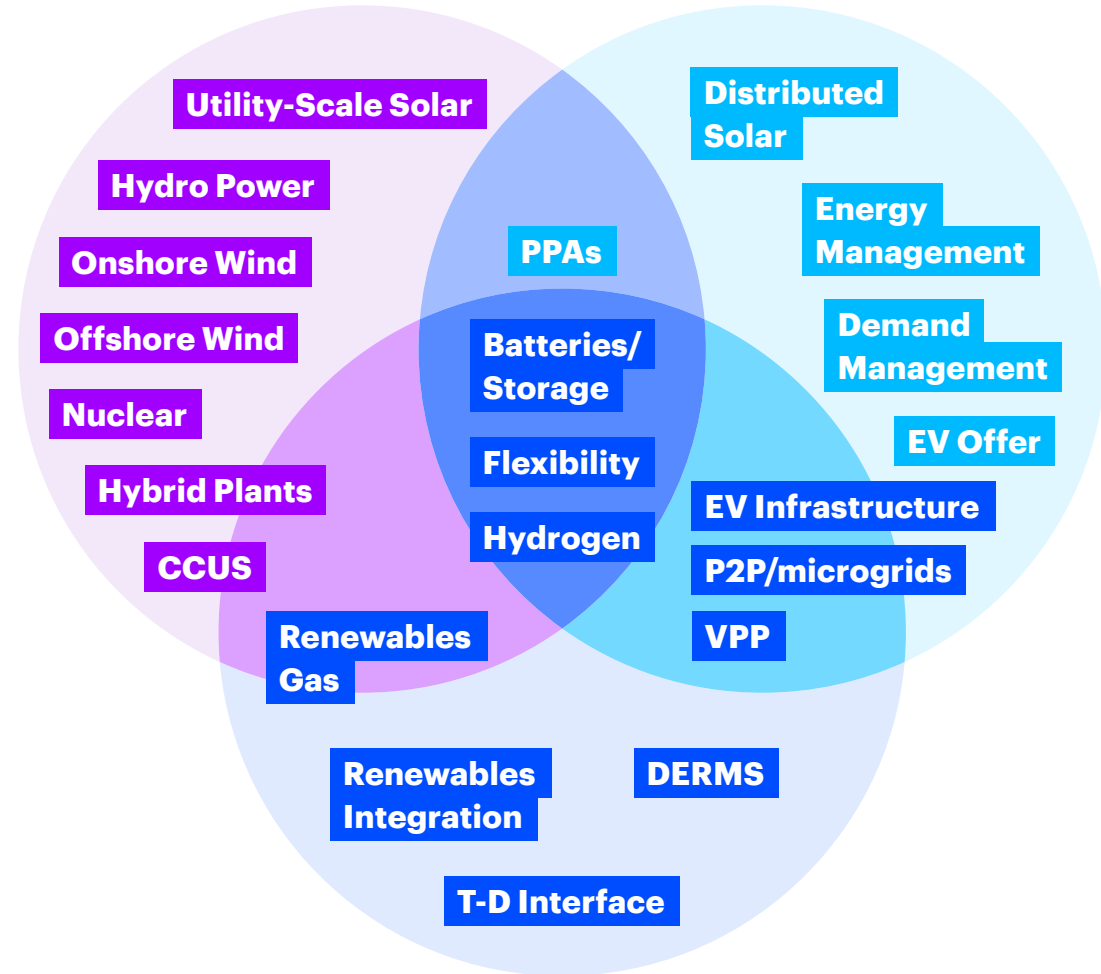
We've been on a journey with our clients for more than a decade to make zero-emissions energy industrialized, competitive, and ubiquitous. Our energy transition services span the energy value chain from generation, transmission and distribution, to energy trading and retail.

And we work end to end, from strategy—helping make the business case for transition to picking the appropriate risk management and growth plays—to execution and operations.

Essential energy transition services topics

- Generation:** Renewables & Nuclear
- Retail:** Connected Energy
- Transmission & Distribution:** Network of the Future

PPAs: Power purchase agreements
VPP: Virtual power plant
CCUS: Carbon capture use and storage
P2P: Peer-to-peer
DERMS: Distributed energy resource management system



Renewable energy generation

Over the past decade, advances in wind and solar technologies have enabled renewable power generators to achieve unprecedented levels of performance and generation cost savings.


However, pressure remains to continuously drive down the LCOE and increase profit per MWh. Digitizing operations can be an OPEX game changer. Artificial intelligence (AI), machine learning and automation, along with big data and analytics, are increasingly being tapped to forecast power production, optimize the market and commercial interface, move to predictive maintenance for major components, enable competitive contracting models, streamline the spare parts supply chain, improve engineering design, and enhance workforce productivity.

Make renewable generation more dispatchable with digital and storage

Renewable wind generators are increasingly implementing digital wind hubs to improve production forecasting and reduce operating and maintenance (O&M) costs. These hubs are also being used to optimize generation from multiple wind farms, solar farms, and hydro plants.

In addition, digital platforms can increase dispatchability and control over the production profile, run assets in portfolios, add storage, or even combine different renewable technologies with different generation profiles into hybrid plants. Increased control and more dispatchable renewables also offer the potential for additional revenue from the growing demand for grid services.



A person wearing a hard hat and a high-visibility safety vest is walking away from the camera through a field of tall grass. In the background, several wind turbines are visible, with the sun rising directly behind one of them, creating a bright glow and lens flare. The sky is a clear, pale blue.

Integrating storage to improve the accuracy of production forecasting of wind “nowcasting” can reduce short-term production forecast errors by up to 50%.



Maximize margin/MWh through commercial and production optimization

Possibly the most important new opportunity for renewable players is margin optimization. Operations & Maintenance (O&M) managers play a key role when using digital technologies to analyze downtime and revenue and production lost, troubleshoot problems, prioritize work, plan major component repairs, and schedule maintenance.

Asset managers also contribute by assessing the financial trade-off between the unbalancing penalty and potential lost revenue and how curtailment and grid services fit into the equation. Equipping these teams with better tools and processes enables margin/MWh to become a key performance indicator in addition to energy availability and time-based availability measures.

Enable teams to drive value with a new digital architecture

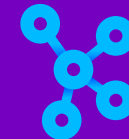
Accenture's Renewable Hub assets for wind, solar, and hydropower are a suite of accelerators, data and process models, and tools that can help drive down LCOE and improve profit per MWh through:



End-to-end visibility of projects and portfolios



Production forecasting accuracy improvements



Maximized remote intelligence and control center capability



Alarm analysis and prioritization



Predictive maintenance



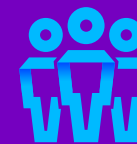
Supply chain visibility to manage, track, and reduce the cost of logistics and spare parts



Troubleshooting

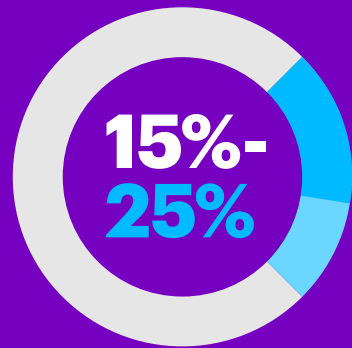


Lost production analysis



Workforce effectiveness

Digital wind hub



Reduction in cost/
MW for manpower
(third-party services
and own staff), logistics,
parts and supply chain



Production
improvement
through reduced
controllable losses

Wind

In wind, our digital hub provides a real-time work environment, driving maximum value from assets and reducing costs across the operation.

Solar

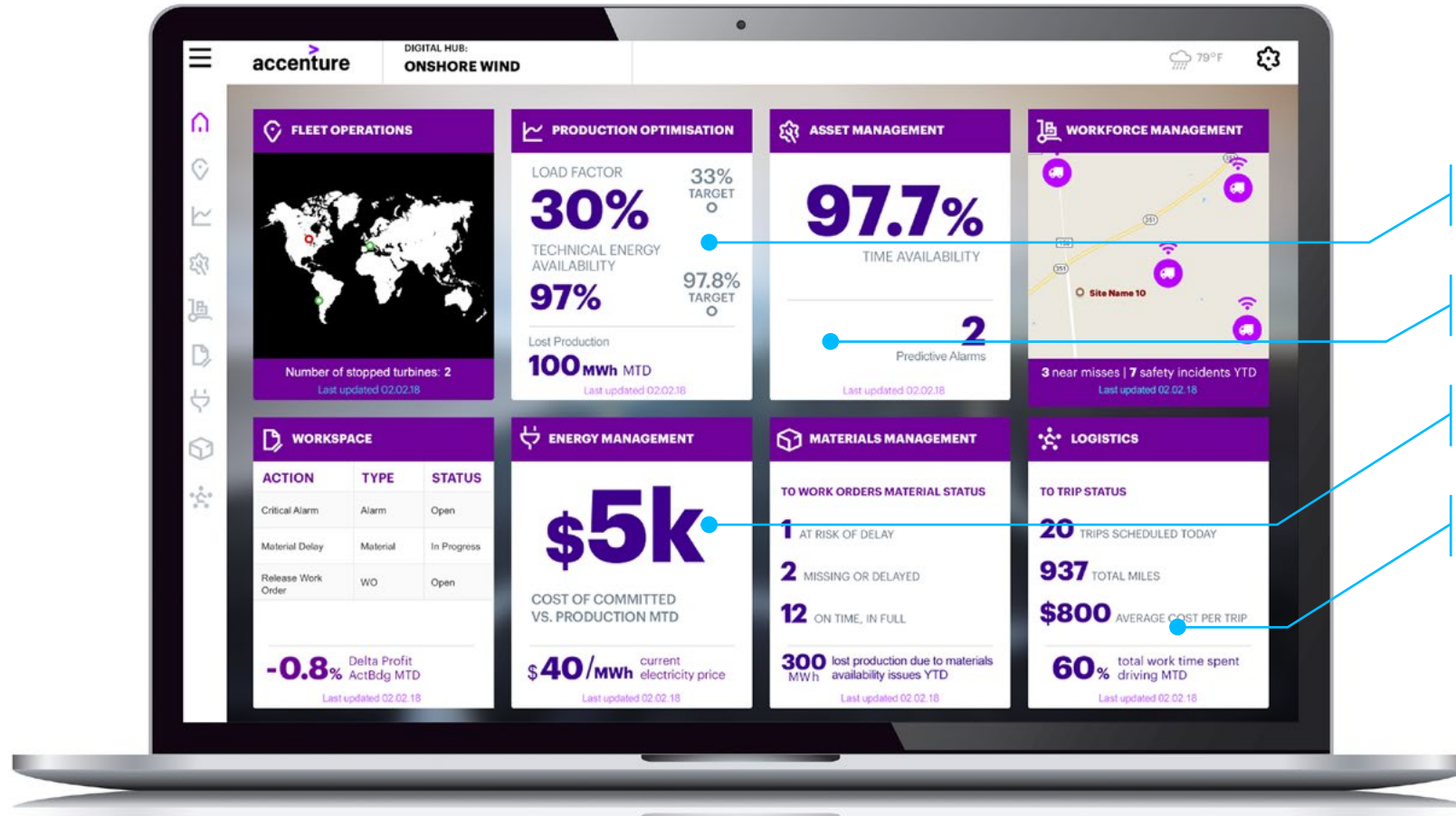
In solar, we have also deployed a digital platform to achieve end-to-end visibility of projects from development through construction. Through our solar hub, we've enabled visibility of bottlenecks across the supply chain while providing a platform where employees can collaborate.

Hydropower

We work with leading hydro operators to apply advanced analytics and automation to improve hydro operations. We also help them strengthen hydro's role in supporting wind and solar growth through flexibility and balancing services to the grid or integration of technologies in hybrid plants.

Nuclear

We help leading nuclear power plant operators implement digital solutions to improve asset performance and workforce productivity; and apply advanced analytics such as AI/machine learning to optimize nuclear plant operations.



Digital wind hub

Production optimization with advanced powercurve analytics

Asset analytics and predictive maintenance and scheduling integration

Integrated energy management and commercial optimization

Logistics tracking, planning, and optimization

Connected energy retail

Customers are not only demanding more sustainable solutions from their energy providers, but also taking on more active roles as both consumers and producers of energy.

These trends open huge opportunities for energy retailers, who are well positioned to deliver a new connected energy experience for customers and become energy service companies.

Deliver more value to customers through new zero-emissions energy services

There is good reason to give consumers what they want. Future earnings growth will likely come from new zero-emissions energy services, including:

Behind-the-meter and community-based offerings to manage distributed energy resources to help energy consumers and communities achieve sustainable, manageable, and efficient energy with rooftop solar, storage, electrified heating, energy-efficiency measures, and energy management solutions.

eMobility solutions such as EV charging infrastructure, charging services, and data integration services across charging operators, automakers, service providers, and utilities.

Flexibility services enabling energy providers to leverage the interconnection of devices such as smart meters, smart thermostats, smart EV chargers, smart heat pumps, and residential and commercial energy management systems and their data—creating value from energy portfolio optimization, system balancing, and grid congestion, and constraint management for everyone across the new power model.

Maintain a competitive edge over new market entrants with bundled services

As energy providers expand their connected energy service offerings, bundling zero-emissions energy with commodity will create competitive advantage with customers. Integrating attractive energy commodity, solar and storage, eMobility, energy management, and flexibility services can help boost customer satisfaction, increase customer stickiness, and drive loyalty and price tolerance.



Reinvent customers' connected energy experience

As consumer demand for renewables and zero-emissions solutions grows, many customers feel overwhelmed by too many choices, not enough information, concerns about cost and financing options, and uncertainty about data use and privacy. We can help tackle these challenges and accelerate the time to market for zero-carbon energy solutions such as EV charging, distributed energy resources (DERs), and flexibility.



New Business Models

Our strategy and consulting teams identify and co-create new profitable business models and strategies, in addition to:

- Go-to-market strategies
- Customer segmentation
- Business capabilities fit/gap analysis
- Organizational design
- Operating models



Zero-emissions Energy Solutions

We can help design and launch simple, personalized, and affordable products and services that customers want, underpinned by:

- Behavioral consumer research
- Experience and service design
- Customer journey mapping
- Experimentation
- Rapid prototyping
- A/B user testing
- Precision marketing
- Digital sales support



Advanced Analytics and AI

Our robust tools and processes can help identify prime locations for public EV charging infrastructure, target customers for zero-emissions energy solutions, and improve energy management, through:

- Energy consumption and production forecasting
- Energy consumption optimization
- Demand response
- DER aggregation
- Smart charging/storing



Innovation at Scale

Our experienced architects can help design, deliver, and scale platform solutions for zero-carbon customer solutions, including:

- Functional and technical architecture design
- Platform fit/gap analysis
- EV charging technology selection support
- Energy management
- Virtual power plant (VPP) platform design, development, configuration, integration
- Operations support



Operational Managed Services

To support delivery of zero-carbon solutions, we offer operational support to manage customers' energy consumption and performance against sustainability targets:

- Historical analysis
- Predictive algorithms
- Customer targeting and trend analysis
- Delivery of energy control towers
- Business process outsourcing
- Public EV infrastructure planning and deployment support
- EV charging customer support services
- Partner and vendor management support
- Digital sales execution

Energy network of the future

Grid network infrastructure represents a critical success factor of the energy transition.

How quickly it's modernized will either accelerate or stymie progress as markets move from one-way, baseload networks with centralized production to two-way, variable sources of energy from renewables and DERs. And while the optimal approach to integrating renewable assets will differ by market and by world region, transmission and distribution operators will have multiple renewable integration options.

Enable operators to integrate renewables and DERs into the grid

Transmission and distribution operators will have plenty of options for integrating scaled renewables and smaller distributed resources. For example:

System Operations

Changing the rules for generation scheduling and dispatch; including wind forecasts, reliability requirements for participants, and interconnections with external areas.

Markets

Changing the rules on how the markets operate to better match variable renewable generation and increased connectivity across market.

Load

Demand-side management with automated response times within seconds to minutes.

Flexible Generation

Using renewable assets, in combination with conventional generation, with flexibility to follow load.

Storage

Implementing technologies to absorb energy when its value is low and release energy when needed.

Networks

Expansion of the transmission and distribution network and connectivity across markets.

Scale renewables integration with digital.

Network operators will need additional skills, tools, and capabilities to optimally integrate renewables and efficiently manage the transition. Not only will demand management become more complex, but product development and use of the ancillary services markets will become more critical. Digital capabilities using data, analytics, AI, machine learning and automation will support this inevitable shift.

Drive more value with a Distributed Energy Resources Management System

There is an increasing number of resources being connected at the distribution level (such as, rooftop solar, EVs, behind-the-meter batteries, heat pumps, micro combined heat and power (CHP), home energy efficiency systems) that need to be managed by network operators.

Implementing a digitally enabled distributed energy resource management system (DERMS) increases the visibility, control and optimization of DERs while driving economic, environmental and grid benefits. DERMS allows operators to:

- Leverage analytics to measure efficacy of DER usage to provide feedback
- Incorporate DERs in planning and create processes to enroll customers and streamline interconnections
- Aggregate groups of DERs and optimize for minimization of energy losses
- Increase awareness of where and what DERs are on the grid and forecast flexibility
- Control a variety of DERs

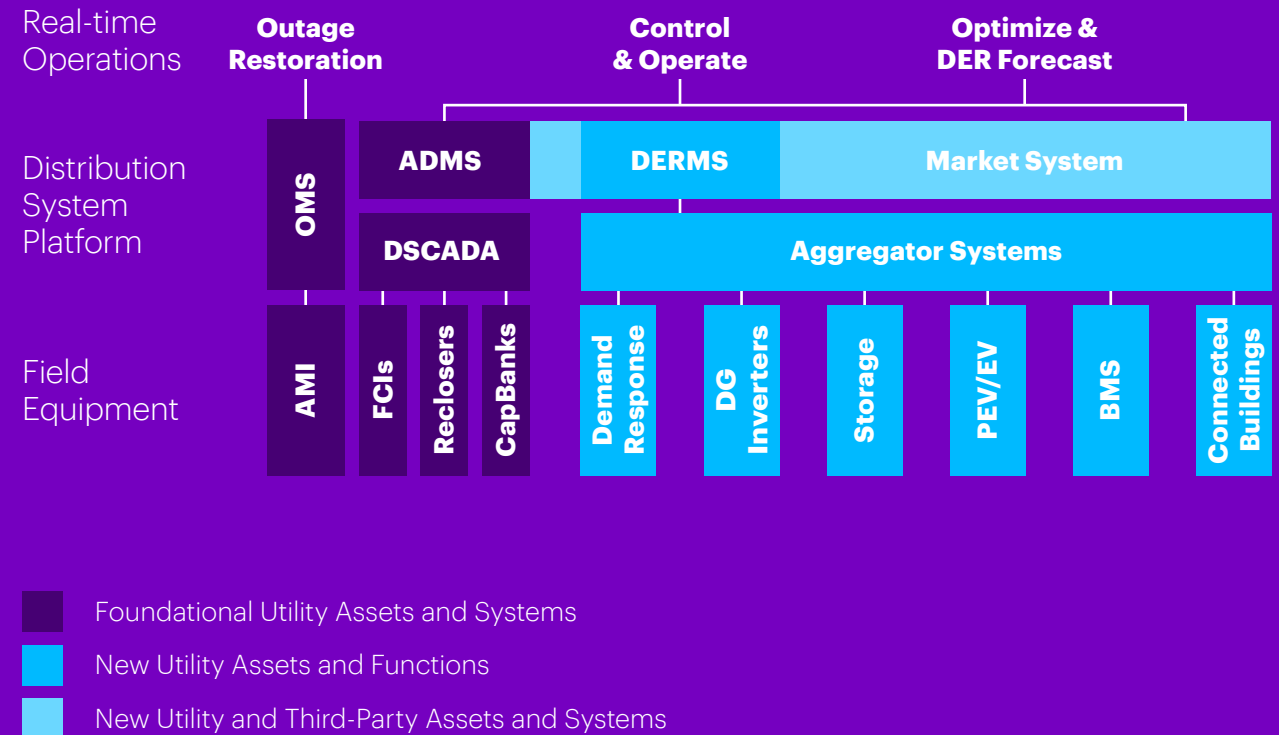
At Accenture, we help our clients design and build the energy networks needed to scale renewables and DER—and meet the urgent demands of the energy transition.

Our DER-focused work includes developing DER strategies, roadmaps, business and technical requirements, helping select the right DER technology mix, and implementing DERMS. We also help our clients with demand response design and implementation, renewable resource balancing, virtual power plant enablement, and overall optimization of the grid. In addition, we have supported North America clients in the development of a viable, integrated, efficient, and operational Distribution Platform as shown on the next page.

We have a proven approach to DERMS implementations that includes a use case- and business case-driven assessment phase, a planning phase for the architecture and technology selection, and implementation phase. Our methodological approach, coupled with in-house expertise and partner solutions, has driven key outcomes, including:

- Modernization of grid operations platforms
- New operating models and attendant digital capabilities required to manage DER-rich networks
- Successful short- and long-term grid modernization strategies and roadmaps

Distributed Energy Resource Systems Framework



Beyond the electricity system

For more than a decade, Accenture has been helping clients accelerate the energy transition and put people at the heart of their strategies towards net-zero emissions.

We combine deep industry expertise with digital marketing, operations, technology innovation, and a diverse partner ecosystem to deliver comprehensive services that can transform core operations and deliver and scale new business models for future, sustainable growth. Our capabilities cover the full power value chain from renewable generation and trading, to transmission and distribution, to energy retail, helping our clients transform themselves and lead in the energy transition as well as deliver on a purpose-driven agenda.

We are going through a similar energy transition journey ourselves, having cut our per-person emissions in half since 2007 and pledging to use 100% renewable energy across our global operations by 2023. We're the largest professional services firm globally to have committed to science-based absolute CO₂ reduction by 2050. So when we advise clients on urgent, viable transition, we do so with credibility.

From the innovative work our people do every day to the partnerships we develop around the world, we're using our intimate understanding of technology and its impact on people to help transform society at scale with a focus on the triple bottom line: people, purpose-driven profit, and planet.

Electrification can only go so far. Net Zero also requires tackling demand sectors not easily met through electrification—such as heating, industrial high-pressure processes, and heavy-duty transport. Greening the gas network through the blending of renewable gas and hydrogen also has untapped potential.

We're here to help with your transition



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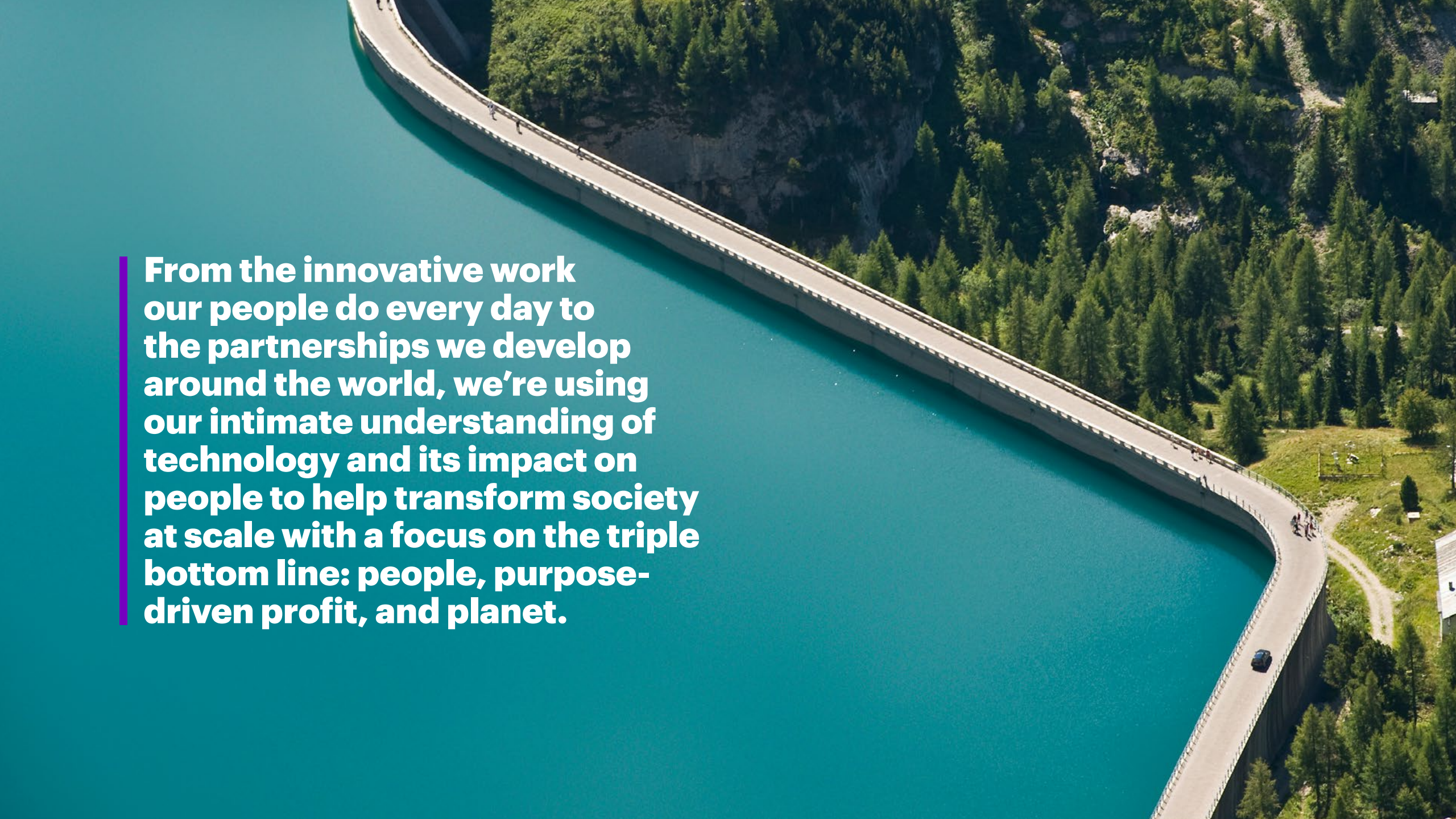
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About Accenture

Accenture is a leading global professional services company, providing a broad range of services in strategy and consulting, interactive, technology and operations, with digital capabilities across all of these services. We combine unmatched experience and specialized capabilities across more than 40 industries—powered by the world’s largest network of Advanced Technology and Intelligent Operations centers. With 509,000 people serving clients in more than 120 countries, Accenture brings continuous innovation to help clients improve their performance and create lasting value across their enterprises.

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