Positive energy in the metaverse

A new era of efficiency

Voices of Change

From insights to action, the path to extraordinary value starts here.

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The world around us has undergone an incredible transformation, and the energy industry has embraced this metamorphosis to emerge safer, more efficient and focused on net-zero ambitions.

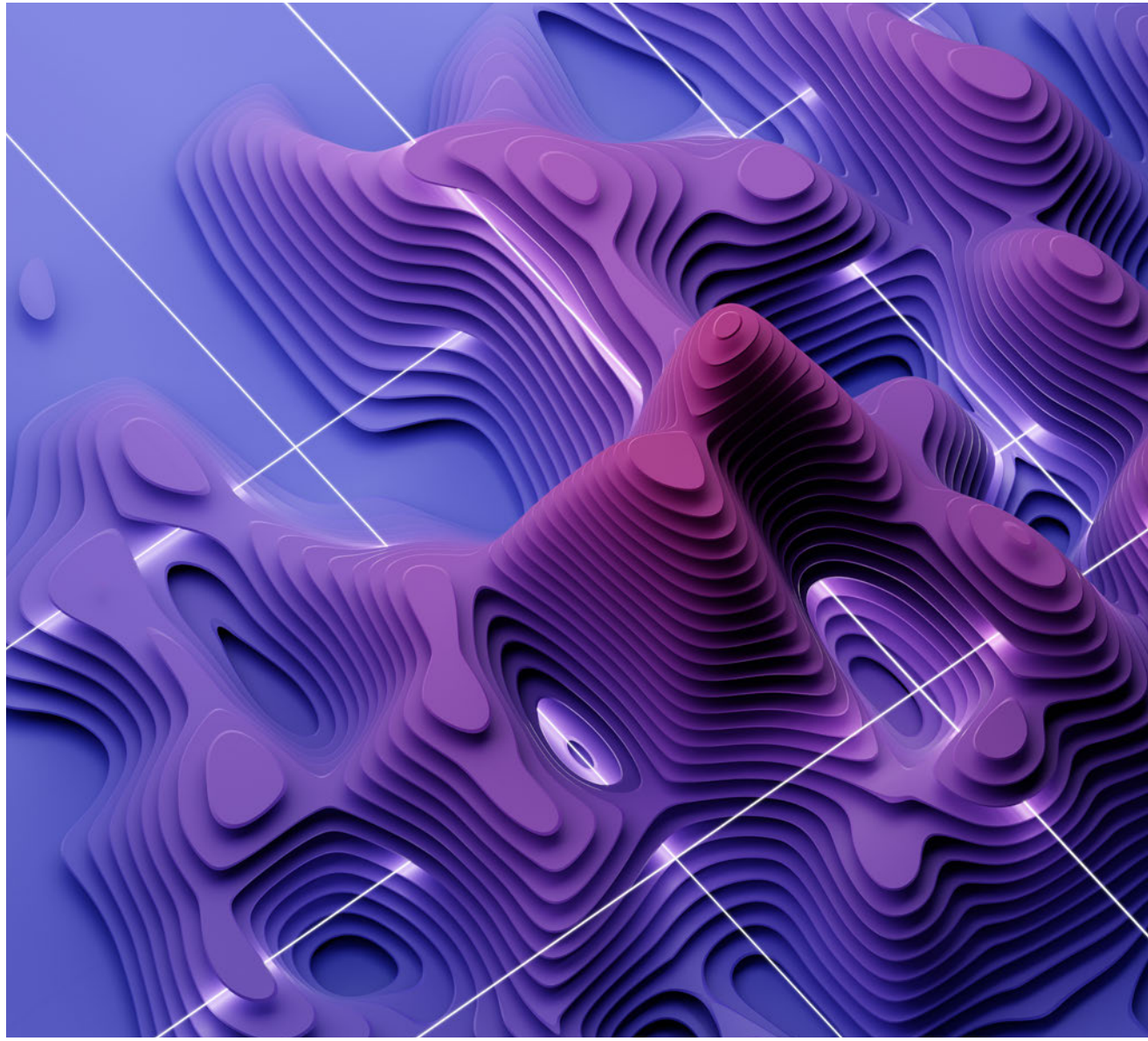
It has achieved this by adopting emerging innovative technologies, unlocking new opportunities which are shaping the future of the industry.

However, the industry is still faced with the daunting task of navigating a continued complex ever-changing landscape.

By leveraging a blend of the physical and digital world through the metaverse, energy companies can deliver a safe, sustainable and innovative future that will **drive evolution, then revolution** across the sector.

Delivering growth through a digital core

As adoption of the metaverse grows, it's crucial to understand its implications and the opportunities created within the energy industry. Over the past decade, many energy companies have begun foundational technology deployments, on which their future will be built.



It's part of a strategy to develop a strong digital core that drives growth and optimizes operations.

Over the next decade, the industry will enhance this foundation by continuously integrating many more innovative technologies such as digital twins and generative artificial intelligence (AI).

In **Accenture's 2023 Technology Vision survey**, 99% of energy executives agreed that investments in emerging technologies will help their organizations remain resilient on the global stage. These new technologies will accelerate the reinvention of the energy industry to successfully navigate the energy transition. Embracing innovation will empower efficiencies across the value chain and support the shift to clean energy while helping customers adopt cleaner, more sustainable fuels.

These technologies include both the familiar and the futuristic. They include cloud, edge, digital twins, generative AI, blockchain, augmented reality (AR) and virtual reality (VR) – and more. These are part of what we call the **Metaverse Continuum**, which will define the next era of digital transformation. Energy leaders must understand what parts of their business will transform by deploying the technologies encompassed in this continuum.

Revolutionizing new realities through experiences and ownership

There are three evolutions within the internet which will impact this revolution. **Spatial Experiences** – an emerging version of virtual environments that provide a sense of space and belonging, **Digital Ownership** – shared infrastructure that is distributed enabling trust and security, and accelerating content development through **Generative AI**. These enable us to create new realities by intelligently fusing people's digital and physical world to amplify experience, engagement, and productivity.

Spatial Experiences are being enabled by tools such as digital twins – digital replicas of physical products, systems or processes – that create a visual way of working.

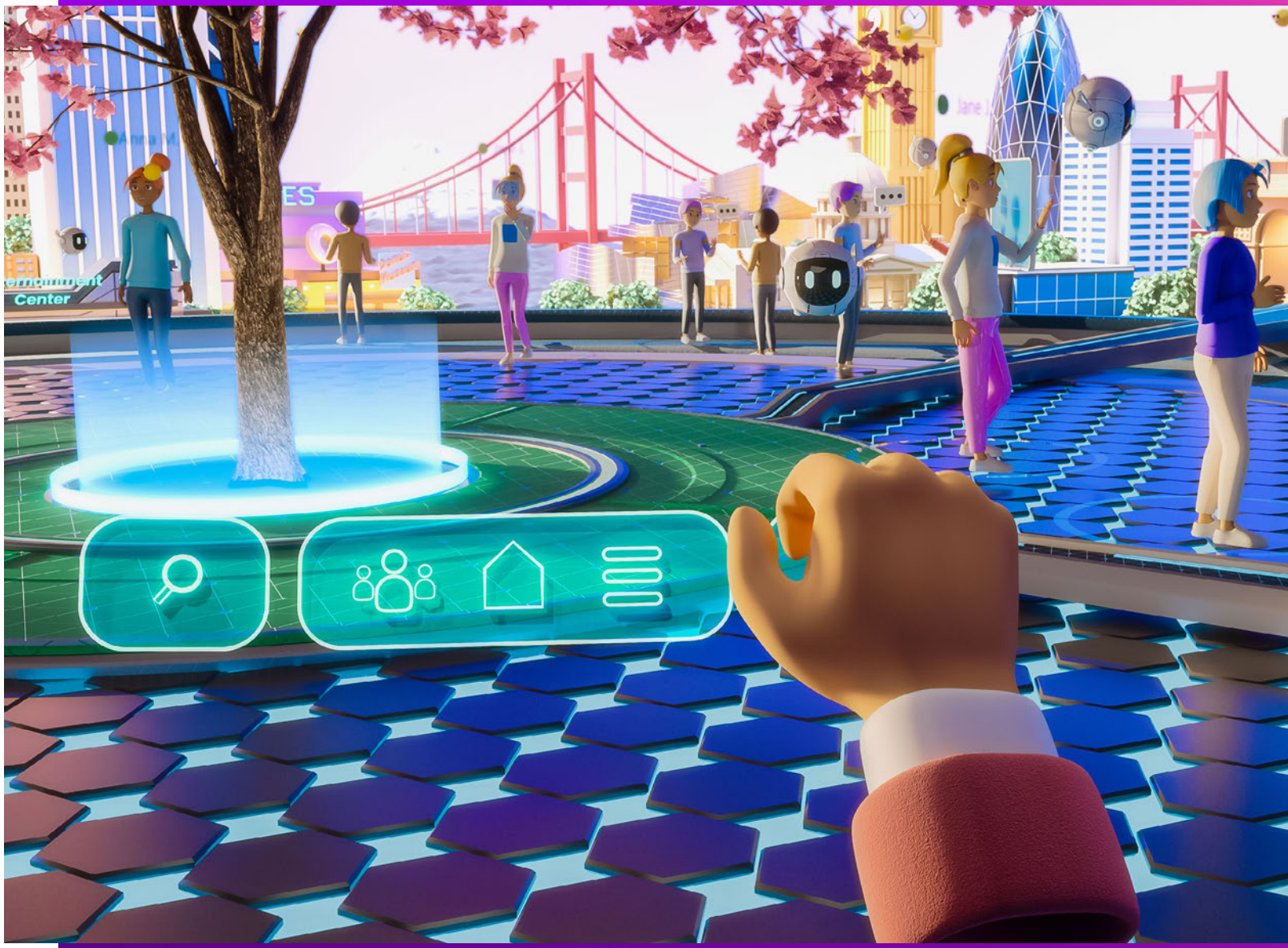
User experience will be enhanced through the real-time rendering of photorealistic environments, true-to-life virtual physics, AI and real-time 3D creation tools.

Digital twins have the power to revolutionize operational efficiency. They replicate the performance of individuals, physical assets and processes in a virtual environment, assisting scenario planning for an energy company's entire infrastructure. They also facilitate virtual collaboration and learning for customers and employees. Extended reality (XR) interfaces and advanced digital assistants enable innovative new interactions with the digital world.

In tandem, Digital Ownership is developing quickly. It allows people to carry their identities, money and objects with them throughout the digital world.

It is driven by Web3, a user-led cultural movement that emphasizes ownership and transparency in products and services. These values will be increasingly important when designing for the energy transition.

Digital Ownership can exist without the Spatial Experiences, and vice versa—but only together do they help energy companies realize their full value.



Generative AI will further accelerate the design and content development, creating value from speed to market. Combined, they will create a new spectrum of digital worlds, realities and business models, where new sources of value will be found.

These technologies will deliver immense benefits to the energy industry. Accenture's 2022 Business Futures Research found that energy industry executives with some form of metaverse strategy expect 4.3% of their revenues to come from metaverse-enabled products and services by 2025.

Our Tech Vision 2023 revealed that:

72%

of executives in the energy industry believe that primary metaverse technologies are already inspiring their organization's vision or long-term strategy.

97%

of energy executives agree the convergence of digital and physical worlds over the next decade will transform their industry.

AI + Materials and energy innovation

Energy executives report **AI (87%)** and **materials and energy innovation (61%)** are inspiring their organizations' vision or long-term strategy.

AI + Intelligent digital twins

Energy executives anticipate significant increases in the resources (time, money, human capital, etc.) their organization dedicates to **AI (63%)** and **intelligent digital twins (35%)** in the next 3 to 5 years.

How energy companies can unlock value with the metaverse

Spatial Experiences, Digital Ownership and Generative AI augment an organization's existing core enterprise software and functions. We reviewed metaverse-related activations announced by 13 leading Energy companies globally to understand how they are innovating with the Metaverse Continuum of technologies.

Our analysis of around 80 such activations of these companies shows that value plays related to Industrial metaverse are the most common, followed by enterprise. 69% of companies are innovating around Spatial Experiences and 31% around Digital Ownership.

Metaverse Value Plays for the Energy Industry

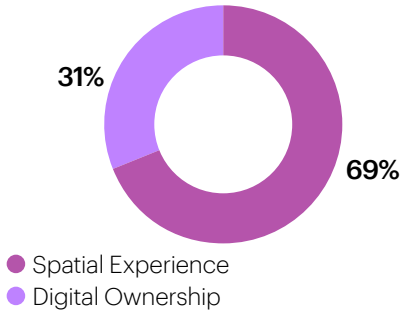
Segmentation of initiatives by category, %

Industrial
62%

Enterprise
25%

Customer
13%

Segmentation of initiatives by type of interaction, %



Leading use cases Energy companies are exploring

Industrial
- Digital twins, design and simulation
- Tamper-proof supply chains

Enterprise
- Immersive learning, training and sales
- Assisted operations and maintenance

Customer
- Augmented navigation and product demos
- Immersive socializing, exploration and gaming

Examples of activations

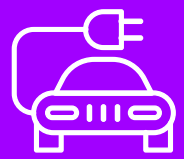
Petrobras is implementing digital twins to replicate all its refineries in order to conduct predictive maintenance and analysis.[1]

Phillips 66 Humber Refinery introduced a VR training suite capable of recreating life-size, life-like refinery environments.[2]

Marathon Petroleum introduced a new virtual reality tour of two major facilities in Texas, allowing users to get a glimpse of what operations are like.[3]

Early adopters are already generating significant value, especially in four areas: sustainability, operational efficiency, developing the future workforce, and customer experience.

Sustainability



Drive towards sustainability and net-zero targets by enabling a responsible metaverse.

Operational efficiency

Give managers superpowers to see their whole operation and make real-time decisions—from anywhere.

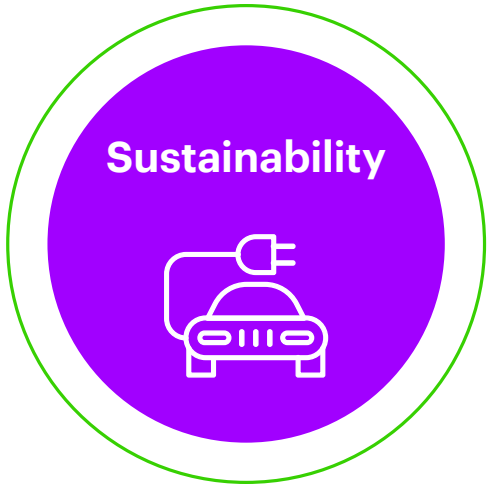
Decrease the time it takes to establish and run capital projects with immersive environments.

Future workforce

Train team members from around the globe in a safe environment without the need to be onsite.

Customer experience

Enhance interactions with products and services and make convenience stores more... well, convenient.



Sustainability is driving significant change in the industry's core products, and the metaverse is accelerating this positive change.

Energy companies are focused on lowering their own operational carbon footprint as well as generating low and no-carbon products like sustainable aviation fuel (SAF), hydrogen and carbon capturing technologies. These reinventions supply the market with tokenized energy credits and cost-reducing activities, allowing customers to meet their net-zero targets.

Real-time detection of methane leaks and fugitive emissions can be reduced by capturing visual images that can feed into an immersive collaboration room with recommendations from AI-analyzed data captured with others in the ecosystem.

Companies can collect historical data across the value chain using blockchain to gain a comprehensive understanding of where the greatest opportunities for improvement are in an organization. Additionally, organizations can create XR-based training to better inform employees on how they can increase their sustainability awareness, collaborate on actions they can take to improve meeting targets and reduce travel.

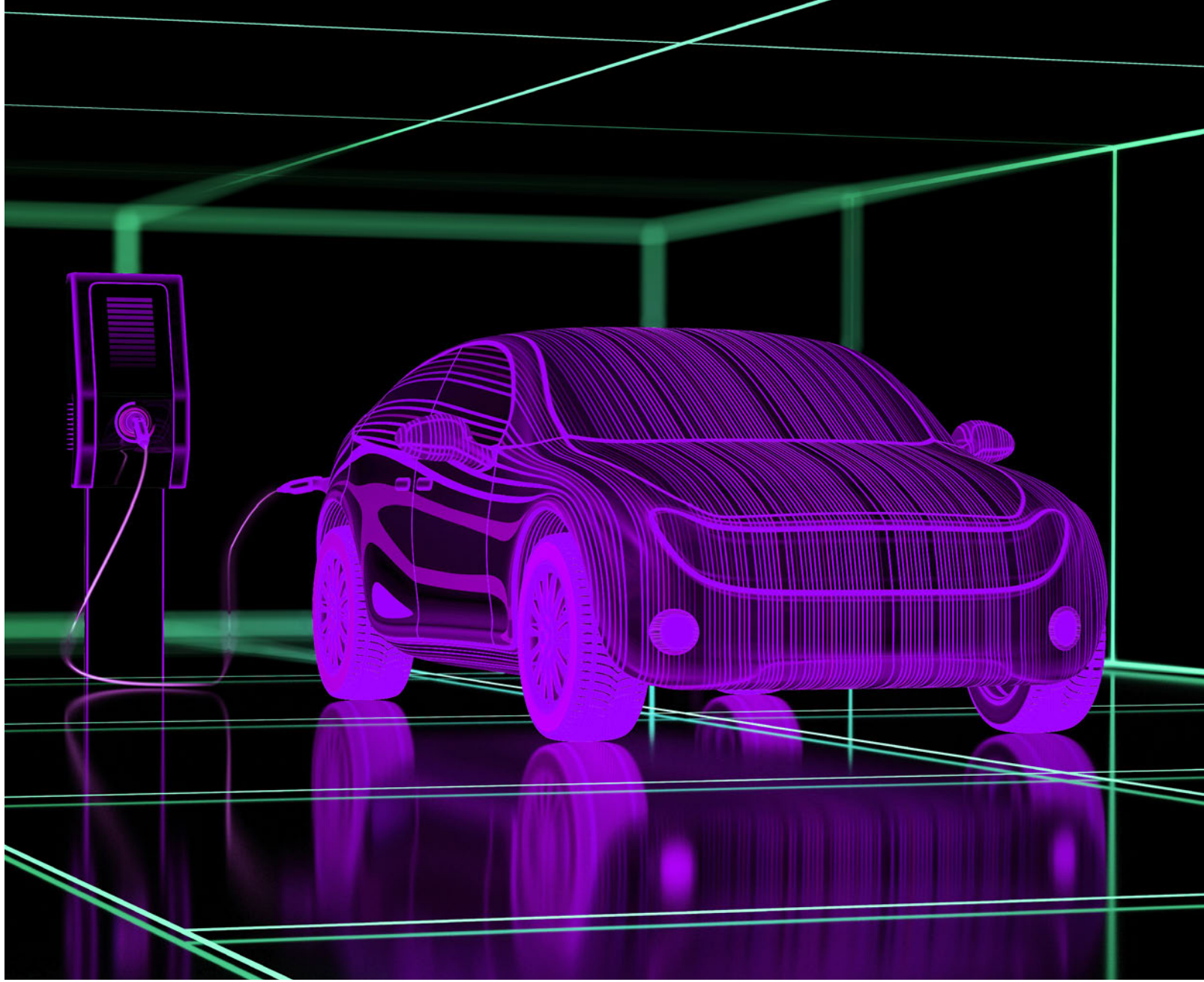
An opportunity area for the industry is investing in a carbon market infrastructure to become more efficient, all while cutting costs. Several challenges in this area include lack of transparency and market inefficiencies due to a fragmented carbon market where offsets are manually tracked and measured or double counted.

Many offsets in the market also face challenges due to greenwashing, which is causing the over saturation of invaluable credits. However, with the emergence of electric vehicles (EVs) the demand will only increase. This is an opportunity for a blockchain-based carbon marketplace to automate the lifecycle of an offset including registration, data collection, verification and retirement. This will provide greater visibility on what climate action project the project developer used for each offset available in the market.

Energy companies are partnering with Accenture to address sustainability opportunities by leveraging the metaverse.

Shell and American Express Global Business Travel launched one of the world's first blockchain-powered digital book-and-claim solutions for scaling SAF. The Avelia platform is the largest SAF book-and-claim pilot, offering around 1 million gallons of SAF—enough to power almost 15,000 individual business traveler flights from London to New York.[4]

Similarly, **Gestore Servizi Energetici (GSE)**—whose programs incentivize renewable energy sources—developed two blockchain solutions that will reduce Italy's carbon emissions. Its EV Mobility Service Platform encourages the use of EV charging stations powered by green energy. It also uses blockchain to track green energy sources from origin to consumption, making it easier to measure sustainability progress.[5]



Industrial solutions like enterprise collaboration and digital twins can supercharge core operational processes.

The combination of metaverse, digital identity, digital twins, AI, cloud and edge improves visibility into operating models, processes and systems. Digital twin-based simulations optimize operations across the value chain, from simulating models to asset management to enabling boundless collaboration across geographies and companies.

Digital twin allows designing and running scenario-based asset management models that can be tested and refined prior to execution in the physical world. The results could identify new production processes, a more efficient layout and new asset designs, as well as enable predictive maintenance and real-time remote monitoring. Accenture showcases how we enable real-time 3D collaboration with NVIDIA's Omniverse using a Microsoft Teams meeting featuring Live Share to reduce time between decision-making, action and feedback.[6]

The data can be captured in a blockchain-based equipment passport, which is captured in the digital identity of an asset. This digital passport can provide materials and equipment traceability, historical maintenance data and asset ownership automating asset management. Shell is using blockchain to trace the provenance of renewable energy certificates and to create digital passports that track the lifecycle of its industrial equipment.[7]

As the industry diversifies into renewables generation, hydrogen, biofuels and carbon capture and storage, technologies like decentralized digital identities, digital twins and AI will create a complete operational overview and optimize assets based on real-time conditions.

In the field, XR brings proximity to disparate teams and enhances remote working. It enables an onshore expert to see what an offshore engineer sees. They can stand side by side in a virtual world to rapidly resolve issues that previously took days to fix due to the requirement of onsite travel.

Supply chain transparency is critical to resiliency and collaboration. It gives energy companies a competitive edge, because those with deep visibility into their value chains make more strategic decisions. **Accenture's Intelligent Control Tower** increases visibility into supply chains.[8] Multiple layers of data, from procurement to delivery, can be viewed with a virtual assistant. It offers a new approach to engage with supply chain data and interact with network partners. Moving the command center and control tower into virtual spaces will enable ecosystem-wide collaboration.

Forcefield uses Web3 technologies to improve the transfer of ownership for commodities.[9] The blockchain-based platform provides the security of title transfer between the buyer and seller. Traceability of ownership can eliminate fraud, provide supply chain transparency and protect ownership.

bp's digital transformation is improving efficiencies in asset inspections and streamlines access to data. Its new immersive technologies have removed data silos, cut travel between sites and enabled timely decision-making. It gains further efficiency through clear and validated site-based information, collected in part through its field workers' wearables.[10]

Despite the great value in incorporating operational efficiency with these technologies, there are many challenges in this space. Some challenges include inconsistent data standards for 3D data, hardware limitations that can hamper rendering and difficulties with asset organization. **Accenture's 3D Continuum Engine** was developed with this in mind, providing a multi-tenanted 3D content catalog, built-in version control, multiple file formats, and is compliant with 3D model standards, GLB and USDZ.

A hybrid digital workplace enables companies to reimagine the employee experience, especially around education, collaboration and training.

Immersive experiences can revolutionize the industry's current ways of working. A connected employee experience would be enriched with new possibilities, and many existing workforce challenges can be addressed.

Training is especially an important use case in the energy industry, which suffers from a skills shortage and struggles to recruit and retain talent. Each time a seasoned employee leaves, the industry loses valuable experience. Many of these laid-off workers are moving on to other sectors, forcing the industry to increase its reliance on agency workers more than ever, with many working in some of the most extreme conditions on Earth.

XR can help bridge the knowledge gap by accelerating employee upskilling. This includes new joiner onboarding, power-skills training and creating a safe space to practice complex and hazardous scenarios that might be more dangerous in the field. The virtual approach reduces the overall cost of training, while the immersive experience increases engagement and retention.

Virtual learning is more engaging, and the neuroscience proves it. In traditional methods—like instructional videos or web content—employees are solitary, passive observers. Research shows that learners forget 70% of training content within 24 hours and 90% in a month.[11] In immersive learning, skills are practiced in real-time alongside other staff. Learners are 3.75x more emotionally connected to content, they retain 75% more information and are 275% more confident to apply the skills they learned. A virtual space also provides a safe environment for trainees to practice tasks repeatedly until they are perfected. XR creates a new horizon for workforce collaboration, where the center of gravity shifts to the digital world.

Energy companies are already deploying virtual training to enhance the talent experience. All these use cases are part of a large utility's digital transformation, developed by Accenture. The utility company's ~70,000 employees are empowered in a meaningful and immersive way, managing the transition into a future-ready, data-driven and fully digitized company. They are not alone.

ExxonMobil has launched an immersive learning environment for its field workers, based on XR technologies.[12] Shell has also developed a similar experience for deepwater training.[13]

Accenture's Nth Floor metaverse experience covers everything from onboarding, learning, collaboration and wellness to town halls and resource groups.[14] As of July 2023 we've onboarded 250k new joiners through One Accenture Park—our virtual campus that is part of the Nth Floor. Previously, new employees said the onboarding process was overwhelming, impersonal, did not connect to Accenture's purpose and values, and messaging was inconsistent. Since the launch of One Accenture Park, 95% of new employees believe the experience is positive, and finish the course with a strong sense of Accenture's purpose. Onboarding survey results reveal new joiners have a strong understanding of Accenture's work in the metaverse (4.55 out of 5).

Many industries are blending physical and digital touchpoints to create purposeful, value-adding and frictionless products, services and experiences.

In the retail industry, 3D commerce creates a new way to buy, driving customer acquisition and retention. Energy companies can learn from leading retailers, both directly in service stations and indirectly, when designing new products and services. It will be an area of strong growth for the energy metaverse, with 65% of energy industry executives most interested in exploring use cases relating to customer products or experiences.[15]

Many have already made initial investments. By reframing Web3 technologies to help solve unmet customer needs, our clients are developing new revenue streams. Tokenization creates new forms of social, functional and emotional value for customers, increasing brand loyalty and engagement.

Energy companies can use Web3 technologies to redefine loyalty and reward programs. Gamifying post-purchase customer interactions can raise awareness of a company's dedication to sustainability. For example, companies can create non-fungible tokens (NFTs) to plant carbon-reducing trees. Consumers can be given the option to share socially after every fuel fill-up or battery charge creating an opportunity for community engagement.

XR can enhance the digital customer experience as well. For example, energy companies can create interactive 3D digital replicas of physical products or services which gives loyal brand fans a way to feel more connected to those products and services, from retail consumers to large industrial companies.

Chevron is one of the first energy companies to investigate the value of virtual customer engagement.[16] In 2022, it applied for metaverse-related trademarks to offer branded NFTs.

Shell is developing several Web3 and blockchain-based applications to help it navigate the energy transition. Blockchain-enabled traceability in energy supply chains helps customers understand where their energy comes from. Shell is using blockchain to trace the provenance of renewable energy certificates and to create digital passports that track the lifecycle of its industrial equipment.[17]

Where to start your journey towards a more sustainable, immersive and innovative future

There is no better time than the present to start your metaverse journey. According to the IEA, in 2022 the industry's profits jumped to $4 trillion from an average of $1.5 trillion over recent years.[18] **Now is the time to invest in the industry's future.**

Every energy company's journey will be unique, and this is why we embrace the term "continuum." The metaverse is not one single strategy or technology, but a continued evolution of connected experiences. Each innovation will add value to your investment in a sustainable and resilient future. No matter where you are in your metaverse continuum journey, you will quickly unlock the value and benefits of these new technologies.

Energy companies can move forward by keeping three key rules in mind:

01

Be creative, and keep it simple

Explore an experience to inspire your creativity. Prioritize experiences that can bring value to your organization by tying initiatives to strategic objectives. Go back to the basics and build upwards with creativity at the core.

02

Start small and focused

Don't try to boil the ocean. Start with use cases that can be easily measured to demonstrate value to your organization and gain executive sponsorship to move ahead.

03

Engage with early building blocks

Target areas quickly yet thoughtfully. Early engagement engenders long-term trust and delivers a competitive edge.

The Metaverse Continuum defines the next era of the industry's digital transformation.

In the end though, it comes down to people. As the continuum evolves, it will encourage an ecosystem of players to work toward common goals that swiftly change the world, much like the internet of the past.

Although the internet modernized how the world does business and transformed how humans interact, it did so in two dimensions and often asynchronously. With more immersive, intelligent, collaborative and real-time experiences, the Metaverse Continuum promises to revolutionize the industry, creating positive energy for all.

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