

Smarter AI for All

AI solutions for the
energy industry

intel[®]

Get started with Intel AI in energy

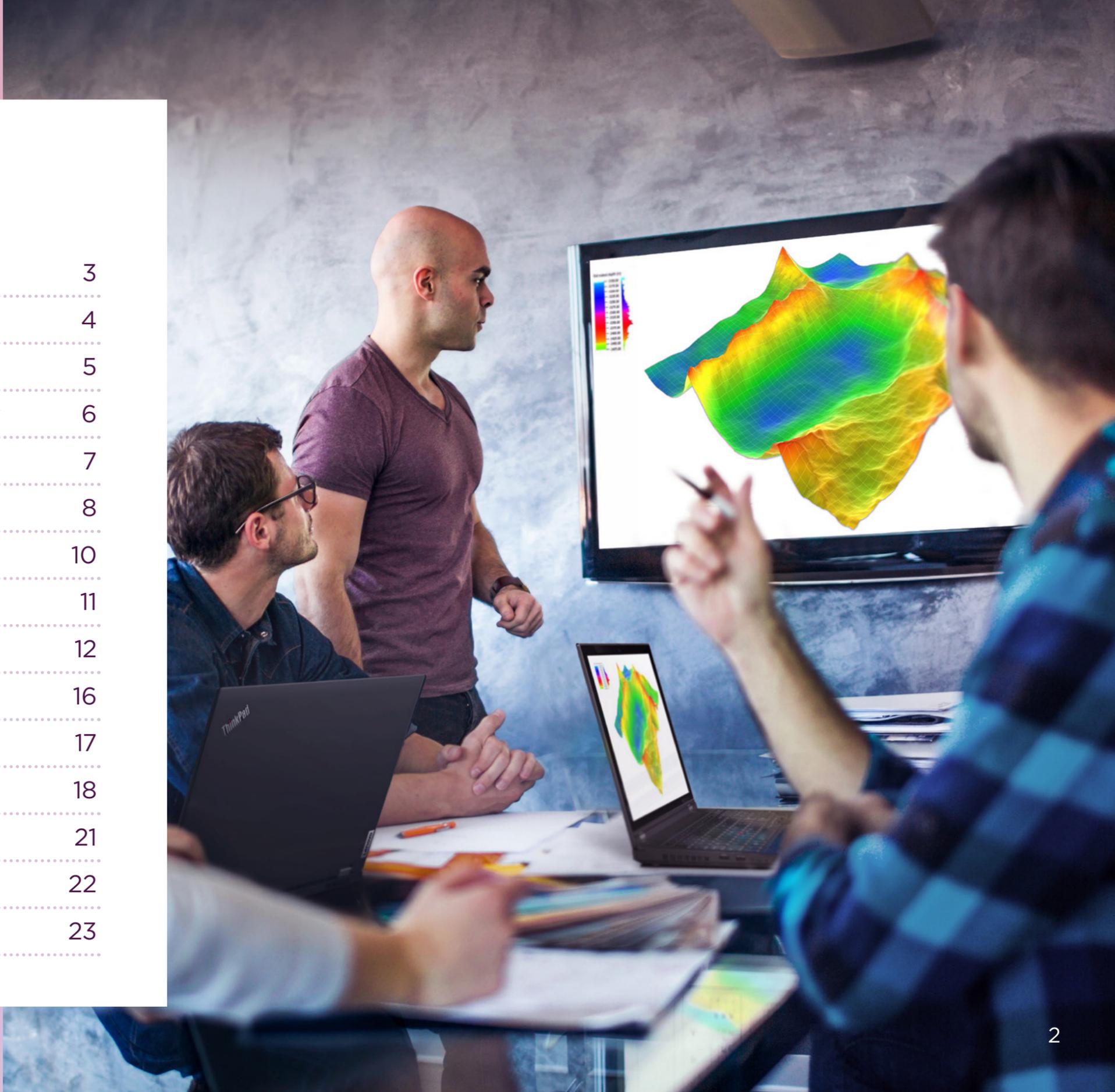


Smarter
technology
for all

Lenovo

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The future of AI in the energy industry

AI is helping to unlock new levels of efficiency, security, and adaptability across the entire energy industry. By leveraging AI across a modern data ecosystem, organizations can meet the challenges facing oil and gas production and delivery, renewables, and public utilities—including market volatility, regulatory compliance, supply chain uncertainty, safety, security, and sustainability.

Driven by data, combining AI with a robust infrastructure built out to the Edge, energy producers have a unique opportunity to drive down costs and risk while increasing user and customer satisfaction.

Our comprehensive AI products, solutions, as-a-service models, and a growing partner ecosystem, provide our customers with the greatest set of open choices—where and when they need it most.

Delivering AI with Lenovo

Implementation starts and ends with your business needs.

To be successful, organizations need a modern data ecosystem, robust AI-ready infrastructure, and purpose-built security integrated into all necessary endpoints. It's why we work with trusted specialist partners like Intel®, to bring connectivity across your IoT, OT and IT systems.

Together with these specialist ISV (Independent Software Vendor) partners, leveraging validated, tested AI solution designs, Lenovo and Intel can help you deliver secure AI solutions across your entire operation, from exploration, to extraction, to delivery and real-time insights across the supply chain.

Our technology enables precise control, cybersecurity, and instant data access, whether at the refinery, across the grid, or at the pump, with local and hybrid edge computing solutions.

Hybrid AI built on a hybrid infrastructure

Through a hybrid approach, Lenovo and Intel bring the right size and mix of AI models, devices, infrastructure, operations and expertise to your data across personal, enterprise, and public environments.

What's already happening with AI?

AI-enabled solutions are bringing advancement to exploration, production, electrical distribution, disaster response, and forecasting for greater productivity and responsiveness.

As with other industries, AI systems can also analyze vast quantities of data to provide actionable insights, allowing you to make more informed decisions about asset management, production processes, and logistics, driving overall operational resilience and agility.



increase in global energy use by 2050.¹



smart grid market growth projected through 2034.²



improvement in field productivity from AI-driven demand forecasting.³

How AI is having an industry-wide impact

Take a deeper look into how AI is already being used across the energy industry, and the many ways Lenovo can help drive industry innovation forward



Predictive maintenance:

Analyze usage stats, weather data, and historical maintenance records, to predict potential breakdowns before they occur.



Employee safety:

Monitor employee-machine interactions, ensuring adherence to safety protocols and reducing accident risk.



Cybersecurity:

Secure devices, infrastructure, and networks with Hybrid AI to protect sensitive data.



Oil and gas exploration:

Identify potential oil and gas reserves that may have gone unnoticed using traditional methods.



Renewable energy forecasting:

Utilize weather forecasts, historical generation data, and real-time conditions to predict how much renewable energy will be available.



Energy trading:

Optimize energy portfolios, simulate market scenarios, analyze trading floor sentiment, automate tasks, and adapt to changing market conditions.



Smart grids:

Manage smart electricity supply grids to detect and react to local changes in usage.



Energy storage:

Allows excess energy generated during peak times to be stored and used when renewable sources are not producing electricity.



of all data within an enterprise goes unused for analytics.⁴

Predictive maintenance using AI can

reduce downtime by up to **50%**

and

increase asset life by up to **40%**⁵

The challenges of implementing AI in the energy industry

Despite its vast potential, AI adoption in the energy industry has been hindered by various misgivings among key stakeholders.

Cybersecurity is a primary concern, notably the susceptibility of large language models to be hijacked and corrupted by bad actors. Model manipulation then can lead to potentially damaging exposure of sensitive business information as well as personal information.

Integrating AI into your existing operations, especially legacy infrastructures, also presents a significant challenge. Many IT departments suffer from a knowledge gap, lacking the internal expertise needed to move beyond initial AI pilots to full-scale implementations. They know that AI has the potential to transform operations, but they struggle with integration and deployment that's effective, secure, and within budget constraints.

Other difficulties implementing AI include:

- **Hardware complexity**
Unique hardware can make getting started and integration into existing hybrid infrastructure very costly
- **Lack of AI skills**
Depth of AI implementation skills are limited, constraining implementation, and ongoing maintenance
- **Weak data strategy**
AI systems are built on data. How will businesses manage sensitive data if they have unconnected data everywhere.
- **Responsible AI**
Business needs to ensure transparency, repeatability, as well as social fairness and environmental stewardship.
- **Data privacy**
Training AI systems requires large amounts of data, raising concerns about customer data privacy.
- **Regulatory compliance**
It is critical to stay up to date with evolving AI and industry regulations, including the EU AI Act, Digital Operational Resilience Act (DORA) and the EU General Data Protection Regulation (GDPR).



of organizations struggle to gain actionable insights from the data they collect. ⁶



of CIOs find it challenging to secure AI-related talent for their teams. ⁷



of organizations have yet to implement governance around responsible deployment of AI. ⁸

IT should leverage AI using teamwork

The widespread adoption of AI requires IT teams to move beyond traditional roles and become proactive digital advisors, yet many IT departments face a significant skills gap, lacking the necessary expertise in AI and data science.

Lenovo, as a trusted technology partner, can bridge the gap. We're the world's number one PC manufacturer by annual number of units shipped, and we understand the challenges of orchestrating a complex work force while meeting regulatory challenges across multiple geographies. All the while, we pay particular attention to the safety and security of the solutions we deliver. From automation and sustainable energy use to improving operational efficiency and deploying data-driven solutions, Lenovo can become part of your technology strategy team, wherever you are on your journey.

AI technology: a team approach

Building a scalable, secure, and sustainable technology stack that includes AI requires a holistic, team-based approach that involves key stakeholders, including division leaders, infrastructure, operations, software development, and data science.

In an industry driven by precision, quality and efficiency, the human touch is still essential, even as we embrace automation.



CASE STUDIES

Transforming energy delivery with AI

AI is proving its worth in the ways people have made the generation and delivery of global energy supplies safer, faster, and cleaner.

Specialized applications combine advanced technologies like computer vision and specialized AI models to enable real-time quality inspections, swiftly adapting to diverse scenarios without the need for extensive training. AI-driven forecasting is enhancing demand planning, power generation schemes, maintenance schedules, and worker safety.

These innovations are paving the way for more efficient operations and smarter decision-making. The following case studies showcase how these advancements are being applied in real-world scenarios.



Safety during offshore oil exploration

Offshore oil rigs, refineries, and processing facilities can be some of the world's most dangerous places. Having the ability to pair worker monitoring with AI allows managers to receive alerts if workers are in danger and can't reach out on their own. OSHA or other regulatory requirements can be programmed into AI APIs to ensure that workers adhere to governmental and environment relations. If workers are inside restricted perimeters of dangerous areas, they can receive notifications of potential hazardous situations before they end up in harm's way.

AI can also help monitor for any oil drilling platform anomalies, such as vibrations, to anticipate failures. Data can be continually collected and analyzed to determine how long rigs and lines can be used before they must be retired or if unscheduled maintenance should take place.

Energy transportation security

Utilizing AI for pipeline security helps ease the workload on human inspectors and helps protect the environment from mishaps and sabotage. Through analysis of camera footage and drone footage, AI routines can detect leaks, then schedule preventative maintenance.

Using AI regulation of vehicles that move in/out of storage depots helps facility managers detect and prevent bad actors from entry. And by using AI for facial, license plate, and behavior pattern recognition, operators can secure access to sensitive areas.

Retail fuelling stations

Employing AI at the retail end of the energy delivery chain helps ensure the safety of customers dispensing fuel by monitoring for spills and leaks while also improving the customer experience with smart displays and optimized customer loyalty programs. Inside retail mini marts, AI can monitor customers and decrease inventory shrinkage, integrate with point-of-sale systems and assist with maintaining stock levels, stock quality, and merchandising.

Lenovo simplifies AI for the energy industry

Lenovo's vision of Smarter AI for All simplifies adoption and brings AI innovation to everyone. In collaboration with Intel, through our Hybrid AI model, we ensure AI is delivered seamlessly, responsibly, and securely to personal, enterprise, and public environments across the entire energy sector.

We bring AI to your data where and when you need it most, delivering AI-powered solutions wherever your organization needs full control, cybersecurity, and real-time access to data. We also deliver AI-powered solutions at your data centers, providing high performance computing power, availability, scalability and seamless cloud integration.

Hybrid AI needs hybrid infrastructure. This starts with client devices and Edge computing, all the way to public and private cloud. Through a Hybrid AI approach, we bring the right size and mix of AI models, devices, infrastructure, operations, and expertise to your data across personal, enterprise and public environments.

In line with the unique demands at every stage of energy production and distribution, Lenovo brings a hybrid approach that can blend on-premises and cloud-based processing.

Together, Lenovo and Intel enable a broad portfolio for hybrid AI, data center, cloud, edge, and PC. With Lenovo supporting the adoption of AI into their technology stack, stakeholders across the energy industry can advance sustainable, data-driven strategies, improve operational efficiency, and maintain compliance.



Our Hybrid AI model brings innovation to everyone



Personal

AI PCs enable engineers and designers to leverage AI for simulations, process optimization and real-time analytics. Teams are also empowered to perform strategic sales and marketing analysis locally—all while keeping data private. We call this **AI for You**.

With Lenovo and Intel, AI is:

- **Personalized:** Utilize AI to refine production processes, optimize machine settings, and tailor workflows to specific requirements.
- **Enhanced:** Automate routine tasks like inventory checks and machine diagnostics, freeing up staff to focus on more strategic, value-added activities..
- **Protected:** Fortify digital and physical infrastructure with advanced, predictive security measures, robust threat detection, cyber-resiliency, and loss prevention systems. Safeguarding data and preventing theft or unauthorized access.



Enterprise

Lenovo can help you securely develop, fine-tune, deploy and scale AI solutions (AI apps, agents, tools, models) on-premises, using enterprise data, policies, and governance compliance such as GDPR and the EU AI Act across multiple devices. With Lenovo, your solutions can be:

- **Innovative:** Drive innovation with Lenovo's leading AI-ready hardware, providing rapid insights that enhance production efficiency, optimize factory layouts and inform smarter decision making.
- **Transformative:** Transform life and work with enhanced innovation and productivity through scalable and smart AI-powered solutions, infrastructure, services, and support.
- **Responsible:** Apply Responsible AI principles to your AI adoption ensuring the integration of secure, ethical and sustainable AI-powered solutions.



Public

Leverage cloud AI with remote monitoring, predictive analytics, and open-source frameworks, optimizing production costs while driving innovation and driving efficiency.

- **Custom build, design and delivery:** Develop AI-powered solutions tailored to your needs, boosting performance, maintaining compliance, and helping to reduce costs for long-term growth and competitive advantage.
- **Safeguard technology excellence:** Make sure your technology stack is robust, reliable, and performs consistently to minimize downtime, reduce errors, maintain business operations, and build trust.
- **Deliver exceptional outcomes:** Incorporating better-designed, more intuitive AI-powered solutions into your operations leads to enhanced user experiences, adoption rates, and greater satisfaction.

The Lenovo AI portfolio

Building a scalable and sustainable AI architecture

Lenovo understands the challenges firsthand—and we have active experience in leveraging AI to drive operational efficiency, boost staff productivity, and ensure compliance with safety standards, regulations, and government policies.

Instant AI-driven productivity

Working together with Intel; Lenovo AI PCs, workstations and AI-ready infrastructure provide the technology backbone required to power AI-based solutions. The latest Intel processors are designed to accelerate high performance and efficient AI processing; enhancing employee productivity and driving real-time decision-making across every touchpoint.

Lenovo Edge AI servers, devices, and ISV-based solutions transform operations across your entire operation.

Lenovo ThinkStation P Series

Powered by Intel® Xeon® Scalable processors

High-performance workstations which are powerful, ISV-certified, energy-efficient and highly versatile. Provide the power and reliability designers and engineers need, including for the most complex workloads like generative AI and digital twin development.



ThinkStation PX

Lenovo ThinkPad X1 2-in-1

Powered by Intel® Core™ Ultra processors

The ThinkPad X1 2-in-1 Gen 10 Aura Edition combines the versatility of a laptop and a tablet, with AI-driven features that adapt to user preferences and improve efficiency.



ThinkPad X1 2-in-1

Lenovo ThinkPad X1 Carbon

Powered by Intel® Core™ Ultra processors

The ThinkPad X1 Carbon integrates AI-driven features like Microsoft Copilot, allowing users to automate tasks and enhance productivity effortlessly.



ThinkPad X1 Carbon

OIL AND GAS EXPLORATION

Data analytics

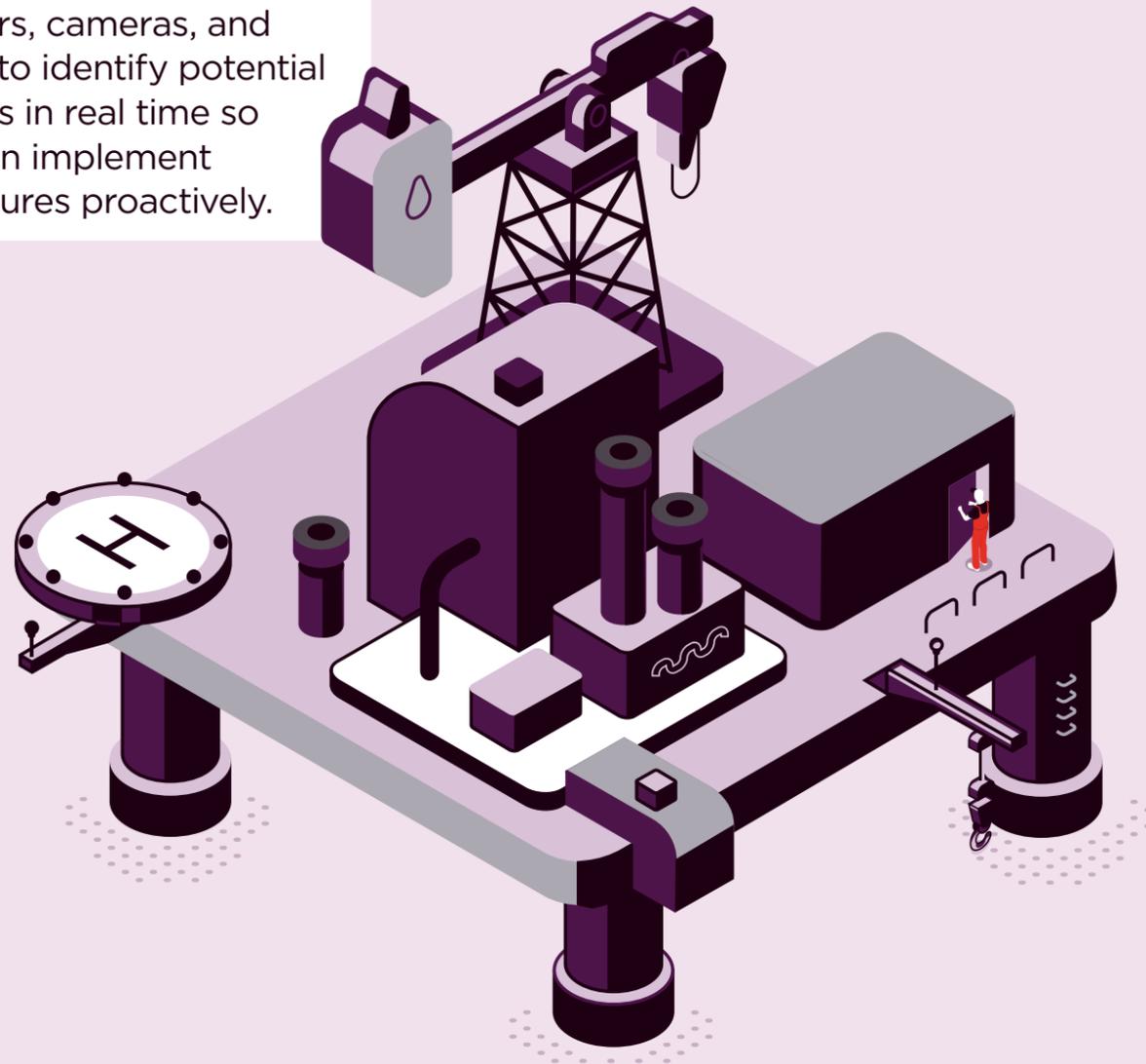
AI-powered data analytics are used to ingest and process geological and seismic data available to identify patterns and correlations that humans may overlook.

Environmental monitoring

Monitor emissions, water usage, and other environmental factors in real time, to ensure compliance with regulations and identify opportunities for reducing waste and improving energy efficiency.

Workplace safety

AI-powered systems can analyze data from sensors, cameras, and employee input to identify potential hazards and risks in real time so organizations can implement preventive measures proactively.



OIL AND GAS RETAIL

Customer experience

Understand customer preferences and behaviors through data analytics and customer insights. Using virtual assistants, and smart POS devices, retailers are enhancing customer service, providing instant responses to inquiries, and improving engagement.

Retail operations

Ensure customer safety at refuelling stations by monitoring for spills and leaks at the pump. Inside convenience marts, AI can assist with reducing shrinkage, maintaining stock levels, stock quality and freshness, and optimizing merchandising based on purchasing data.

ENERGY DISTRIBUTION

Maintenance

Monitor equipment and infrastructure conditions in real time by utilizing machine learning algorithms and advanced analytics. The data collected from sensors and IoT devices can detect vegetation intrusion and predict when a piece of equipment is likely to fail, allowing for timely maintenance.

Worker safety

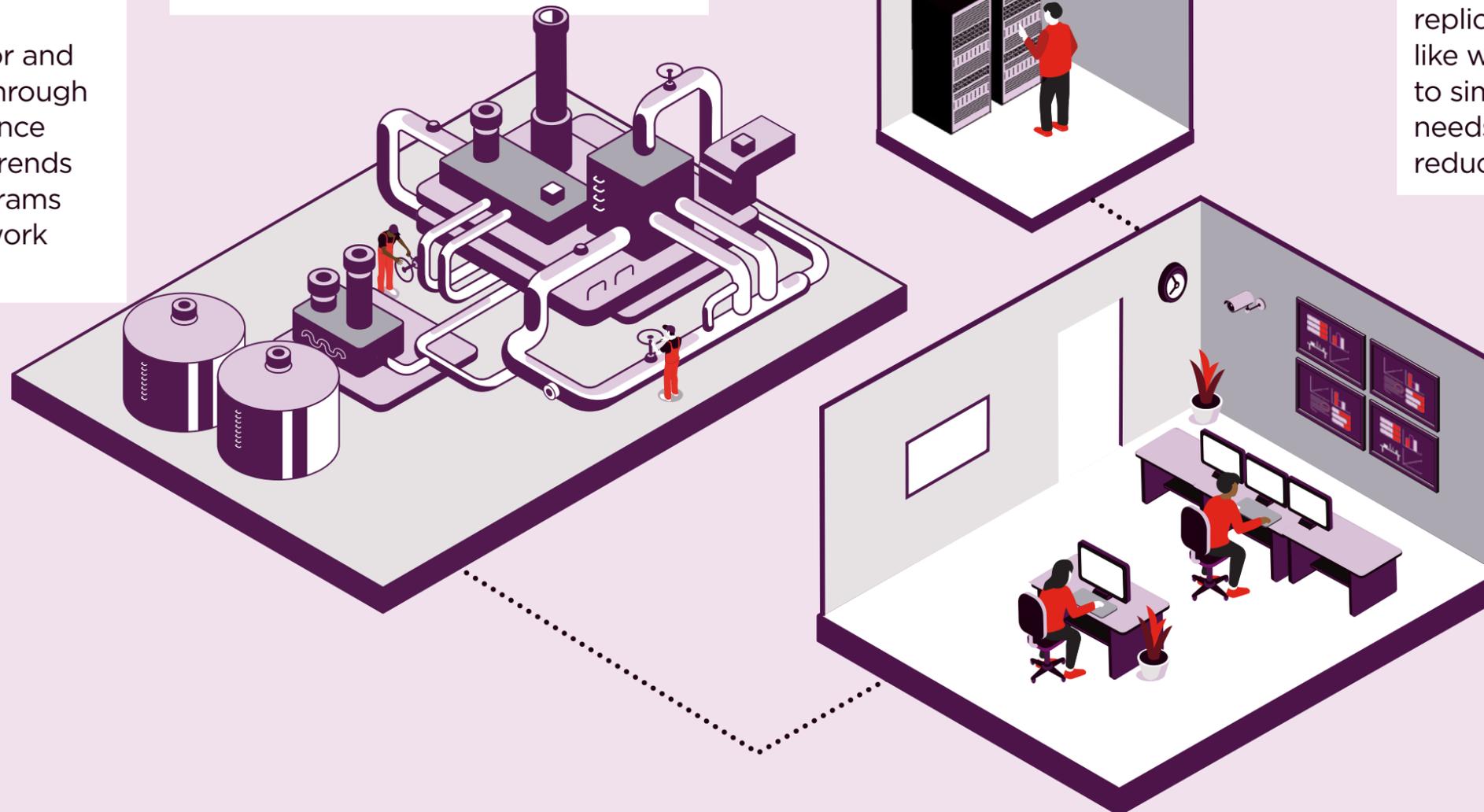
Keep tabs on worker behavior and provide real-time feedback through AI analytics, ensuring adherence to safety protocols. Identify trends and implement training programs to mitigate risks, for a safer work environment.

Substation safety and security

Detect unauthorized intrusions and monitor worker safety using AI-based video analytics to reduce potential incidents.

Supply chain optimization

Analyze supplier performance and identify potential risks in the supply chain by using AI to assess supplier reliability and quality metrics.



RENEWABLE ENERGY

Sustainability

Identify opportunities for reducing waste and improving energy efficiency across your entire operation.

Process automation

Streamline repetitive and time-consuming tasks across various departments, from finance to supply chain management, reducing human error, increasing accuracy, and freeing up employees to focus on more strategic initiatives.

Digital Twins

Using AI and virtual reality to create replicas of power generation sites like wind turbines, allowing utilities to simulate and predict maintenance needs, optimize performance, and reduce downtime.

Scalable AI infrastructure

Lenovo's AI-ready infrastructure delivers scalable, high-performance computing to support a wide range of AI applications, from advanced data analytics to real-time processing.

Lenovo ThinkEdge

Powered by Intel® Xeon® Platinum processors

Purpose-built platforms like ThinkEdge SE350 V2 and ThinkEdge SE450 for compute-intensive and latency-sensitive applications, including predictive maintenance to mitigate risk, and improve safety, quality control, and productivity.



ThinkEdge SE450

Lenovo ThinkSystem

Powered by Intel® Xeon® Scalable processors

High-performance servers like ThinkSystem SR650, optimized for deploying and training AI and models, handling large datasets. Providing highly reliable, scalable, high-performance that significantly accelerates AI and GenAI.



ThinkSystem SR650

Lenovo ThinkAgile

Powered by Intel® Xeon® Scalable processors

Integrated systems like ThinkAgile HX650, offering pre-configured servers, storage, and networking to streamline AI adoption and deployment.



ThinkAgile HX650

Lenovo High-Performance Computing (HPC):

Supercomputers are increasingly vital in for energy suppliers to process large datasets, optimize supply chain operations, and perform real-time consumer behavior analysis. Lenovo is the world's #1 supercomputing provider, according to TOP500.org¹⁰. Available as a Service, TruScale for HPC combines Lenovo's reliable technology with fully managed, predictable billing and flexible scaling to meet constantly changing business needs. With industry-leading technology and global HPC architects and experts, we take a customer-centric approach to deliver HPC solutions that best meet the evolving needs of the entire energy sector.

Neptune® Liquid Cooling

AI technology requires more system power than ever, putting an increased strain on energy demands. Lenovo's Neptune® Liquid Cooling enables performance without compromise, reducing energy consumption by up to 40% while providing maximum performance and reliability of critical AI systems, ensuring that these systems can operate optimally without overheating or downtime.



The pace of change

Lenovo is passionate about responsible AI practices, offering end-to-end protection and support for your hybrid AI stack.

Our Responsible AI Committee, AI Innovators Program, and flexible Everything-as-a-Service solutions ensure secure, compliant, and sustainable AI expertise, wherever it's required:

AI Center of Excellence

The Lenovo AI Center of Excellence (AI CoE) is designed to help customers put AI to work for their organizations quickly, cost-effectively and at scale, with use cases that bring AI from ideation to reality. Lenovo makes incorporating AI into your technology stack easier for you by providing workshops, proof of concepts, benchmarking, and performance optimization. Together, with our global partner ecosystem, we help reduce time to value and minimize risk. Lenovo has strategically positioned AI data scientists, solution architects, engineers, and industry consortiums worldwide.



Lenovo AI Innovators program

Lenovo has a comprehensive partner strategy that brings together best-in-class Independent Software Vendors (ISVs) for AI software, hardware and solutions. We have over 50 AI Innovators in the program, providing more than 165 solutions. In the AI Innovator program, we provide access to our AI Discover Labs and a collaborative platform where partners can develop, deploy and validate their AI solutions with the support of cutting-edge tools, resources and expertise.

- Find specific enterprise AI solutions for energy producers
- Execute proof of concept and comply with Lenovo's Responsible AI guidelines
- Train your own data without risking confidentiality

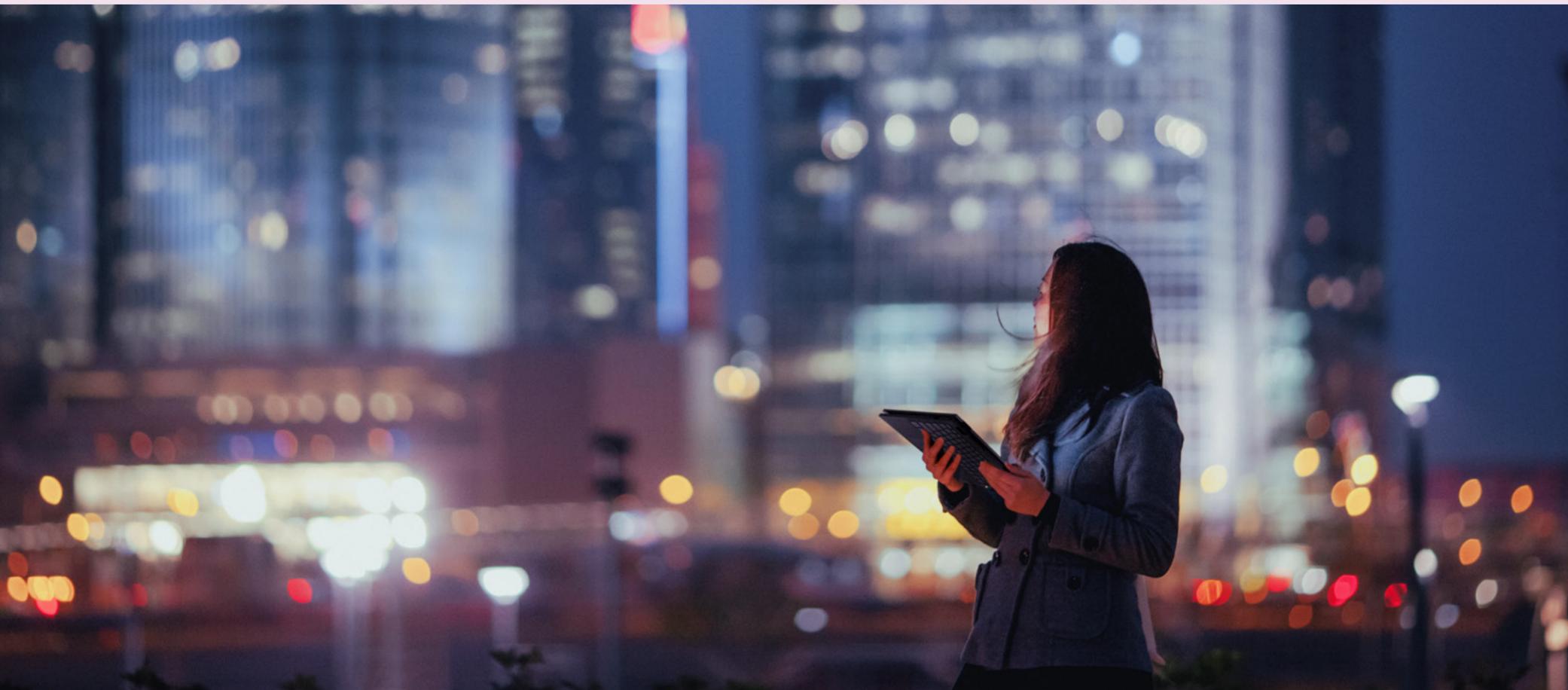
Services powered by AI

Lenovo AI Fast Start: Helps you quickly prove the business value of use cases on Personal AI, Enterprise AI and Public AI platforms within weeks, Lenovo AI Fast Start gives you access to AI assets, experts and partners that will help you rapidly build use cases with your own data and tailor it to the unique needs of your business, maximizing relevance in real-world environments and speeding progress to deployment at scale.

Lenovo TruScale Device as a Service (DaaS): Provides comprehensive, scalable Smarter AI devices and frees up valuable IT resources with a predictable subscription-based model—all from a single trusted partner. TruScale DaaS allows for quicker upgrades without upfront costs so energy providers can future-proof their technology investments and remain competitive.

Lenovo TruScale Infrastructure as a Service (IaaS): Unlock the advantages of on-premises infrastructure with the flexibility of a cloud-like experience. Lenovo offers tailored solutions for hybrid and multi-cloud environments, infinite storage, and high-performance computing (HPC).

Our new TruScale GPU as a Service boosts HPC with advanced workload orchestration and usage metering, optimizing AI GPU resources for maximum productivity and availability. Combined with Asset Recovery Services, assets can be securely recycled, reused, or repurposed in an environmentally friendly way to maximize value. In an era of rapid advancements in AI and GenAI hardware and software stacks, this flexibility is crucial. Lenovo provides clients with the broadest range of deployment options.



AI grounded in security

In addition to accuracy, explainability, and transparency, security is a cornerstone of AI integration in business processes.

This includes adhering to guidelines such as the EU AI Act, as well as ensuring data privacy and information security. Unlike traditional IT systems, AI solutions must be built on a foundation of strong governance and robust security measures to be responsible, ethical, and trustworthy.

Lenovo's security-by-design approach establishes this foundation, ensuring AI solutions are secure from the component level, where the Intel vPro® platform enables advanced hardware protection, through our Supply Chain Assurance capabilities. Our commitment to AI security is reinforced by our Global Security Organization, the appointment of our Chief Security & Artificial Intelligence Officer (CSAIO), and our participation in initiatives like the Joint Cyber Defense Collaborative.



Put the right foundation in place

Lenovo's security by design approach provides the foundation for responsible AI solutions. Lenovo ThinkShield has you covered at every layer, starting with Supply Chain Assurance to protect your devices from the component level up. It also safeguards your devices from threats below the operating system, all the way to keeping data secure between the operating system and the cloud. And through our partnership with Intel, diverse AI workloads are further secured from data center to edge.

This approach includes:

- Lenovo ThinkShield Zero-Trust practices to secure devices, infrastructure and networks
- Hybrid AI that balances on-premises and cloud processing to protect sensitive data
- Partnerships with leading security vendors to create a robust ecosystem
- Lenovo-owned and controlled manufacturing, so we can ensure security is built in every system and component
- Embedded governance, driving security across products and services to maintain a vigilant focus on customers' safety
- Lenovo experience and expertise prioritizing innovation, continuously earning our customer's trust

The foundation of responsible AI

To safeguard AI driven applications, AI adoption must be grounded in security. Lenovo's multi-layered approach provides the foundation for responsible, ethical, and secure AI solutions, built upon correct and up-to-date governance.

The Lenovo Responsible AI committee covers a wide array of challenges in the AI space. It makes sure AI is legal, ethical, fair, privacy-preserving, secure, and explainable.

The six pillars of Responsible AI at Lenovo are:

1. Diversity & Inclusion
2. Privacy & Security
3. Accountability & Reliability
4. Explainability
5. Transparency
6. Environmental & Social Impact



Delivering intelligent sustainability

We understand that what's better for people is also better for business, which is what drives every decision and investment we make.

Lenovo sustainability services include robust offerings to help energy producers achieve their sustainability goals. Lenovo Asset Recovery Service (ARS) helps extend device ROI with premium warranty, support offerings, and hassle-free disposal.

Our innovative Neptune™ Liquid Cooling technology reduces energy consumption by up to 40%, supporting eco-friendly data centers, while addressing the growing concern of AI powered consumption.¹¹ Lenovo's CO2 Offset Services allow our customers to offset their device's carbon footprint.

We also go further with the Lenovo Intelligent Supply Sustainability Analytics (LISSA) tool, which enables transparent monitoring of supply chain sustainability. We ensure all Generative AI solutions enabled by Lenovo undergo a responsible AI review including advising customers on how to setup their own responsible AI review and stay compliant.

Top 10

Lenovo's ranking in the 2024 Gartner Supply Chain Top 25.⁹

Since 2017, Lenovo has invested more than

\$1.7 billion
into AI.⁹



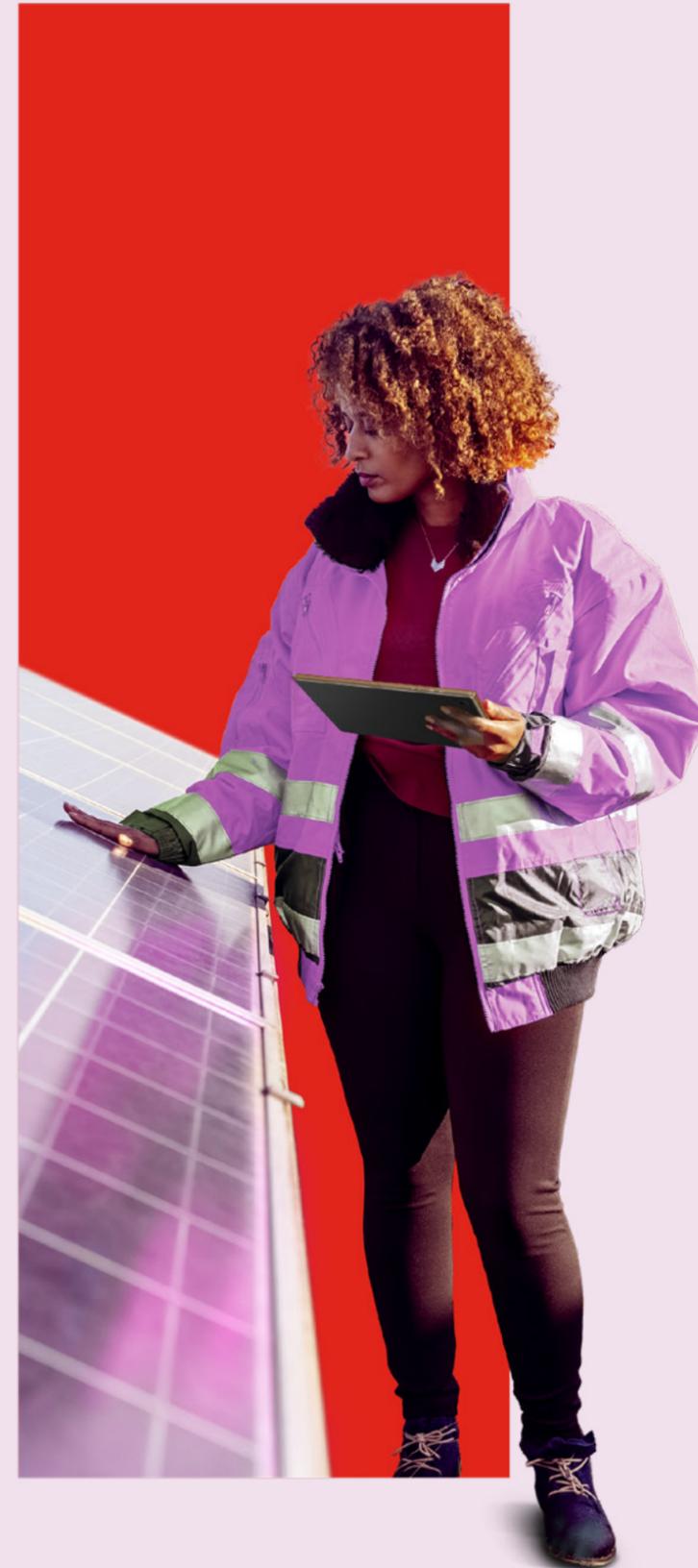
Get started with AI for All

Incorporating AI into your technology stack begins with a thorough assessment of your current capabilities and challenges. You'll need to have a robust data strategy, identify your operational challenges, and focus on the quick wins that enhance production efficiency and improve quality control, then rapidly move beyond proof-of-concept.

Lenovo can support your AI initiatives at every stage. Once we understand your unique requirements, we delineate your desired outcomes, evaluate your data readiness, implement critical milestones, and pilot a use case. Once we demonstrate proof of value and ensure your organization is set up for success, we will provide you with the tools, knowledge and expert guidance required for robust and reliable AI adoption.

Our AI Services cover five critical phases: AI Discover, where we identify how AI can create value for your organization; AI Advisory, which assesses your AI readiness and defines strategic plans and roadmaps; AI Fast-Start, focused on designing and building AI elements; AI Deploy & Scale, implementing secure, scalable, and tailored Hybrid AI solutions; and AI Managed, which ensures continuous optimization.

Visit www.lenovo.com/energy-solutions



Why Lenovo?

You can trust Lenovo to empower your business with intelligent technology, driving innovation and growth in a secure and scalable way.

Unlock your fullest potential by incorporating AI and intelligent solutions designed to enhance production quality, strengthen supply chain resilience, and accelerate time-to-market for innovative products. From devices and edge computing to infrastructure, servers, storage, and services, Lenovo delivers a complete, sustainable, and secure solution tailored to your needs.

Get a trusted partner. Discover Smarter AI for All.

Contact your Lenovo representative today.

1. US Energy Information Administration, October 2021
2. Global Market Insight, January 2025
3. AI Utilities: Top 15 Use cases & case studies in 2025, AIMultiple Research, Feb. 2025
4. The Tech Debt Toolkit, Forrester, 2024.
5. Predictive maintenance Deloitte's Approach, Deloitte, 2022.
6. Forrester Consulting (Commissioned by Epicor) study, 2024.
7. IDC and Lenovo, 2024, CIO Playbook 2024.
8. PwC, 2023, Emerging Technology Survey
9. Gartner, "Supply Chain Top 25 for 2024"

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The Intel logo is displayed in a blue, lowercase, sans-serif font. A registered trademark symbol (®) is located at the top right of the word "intel".

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in energy

**Smarter
technology
for all**

The Lenovo logo is a vertical red bar with the word "Lenovo" written in white, uppercase, sans-serif font.