

AI in Energy



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Googles usage of AI in Energy



Energy

Decades of evolution.

First decade
Since 2003



Custom-built data centre

We custom built our first data centre and optimising across the whole stack, building the infrastructure for the future.

Second decade
Since 2017



100% Renewable energy

The electricity we use on an annual and global basis is **matched with renewable energy purchases**.

Third decade
By 2030



24/7 Carbon-free energy

On an hourly basis, in every location, we'll **run on carbon free energy** (CFE) sources.

Challenging

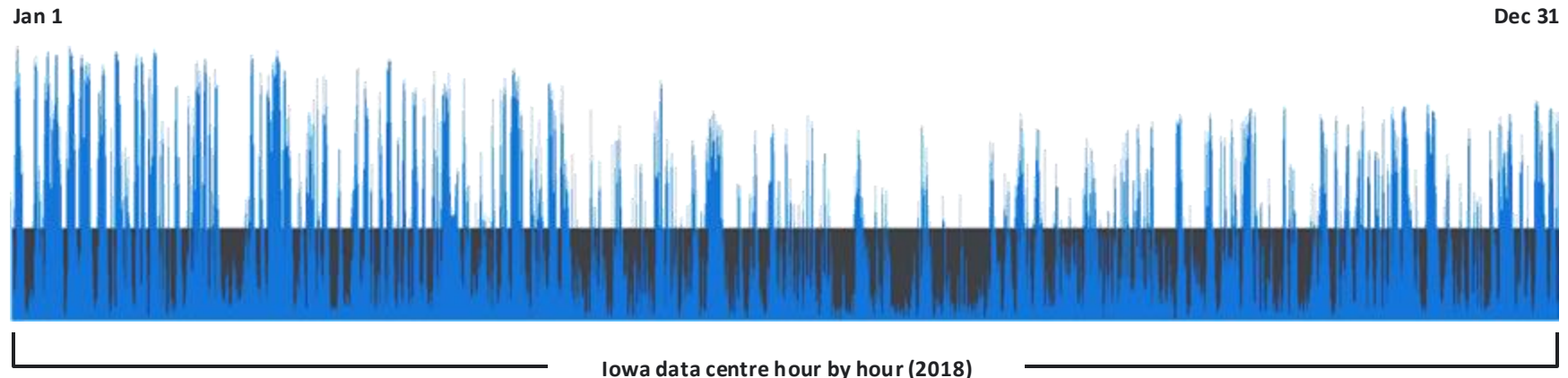


Most challenging



Beyond 100% renewable and 24/7 carbon free.

- Carbon-free energy supply
- Gaps in carbon-free energy

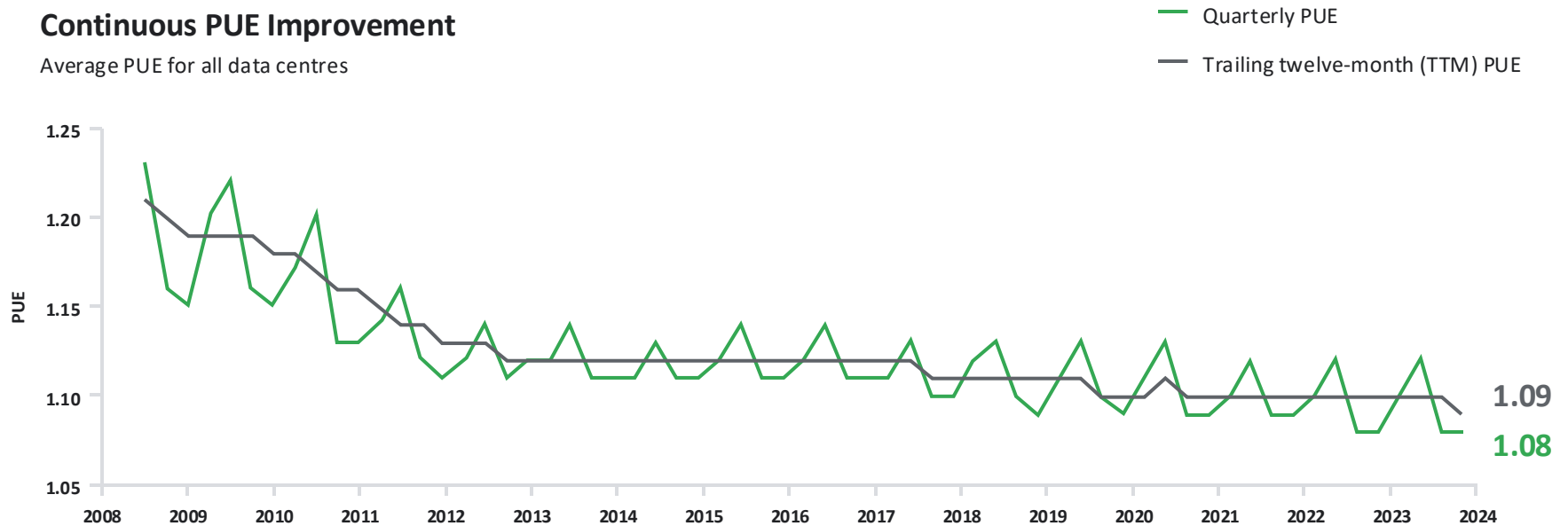




Improving efficiency with AI.

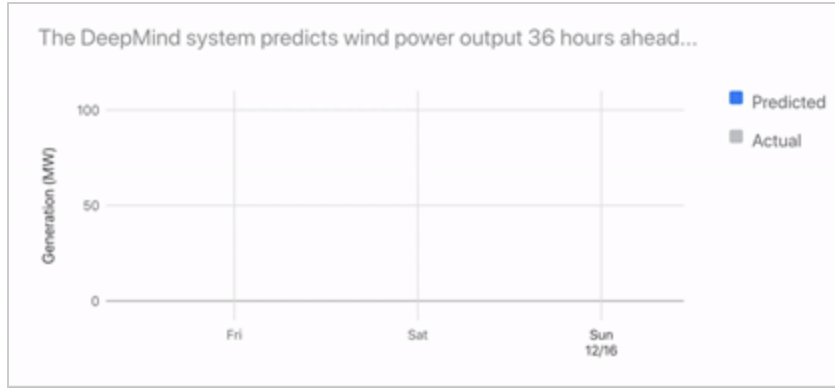
Continuous PUE Improvement

Average PUE for all data centres

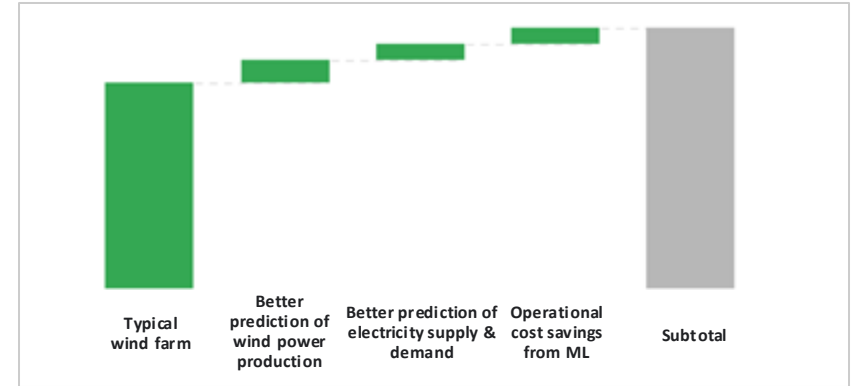


DeepMind and Google apply ML algorithms to 700 megawatts of wind power capacity in central US

ML boosted the value of our wind energy by ~20% ¹



Early results suggest ML can make wind power sufficiently more predictable & valuable *



Machine Learning can increase the value of wind energy



¹ [Machine learning can boost the value of wind energy](#)
*Illustrative results from 2018 Google/DeepMind field study



⚡ Energy

AI can reduce energy consumption in buildings by up to **20%**.

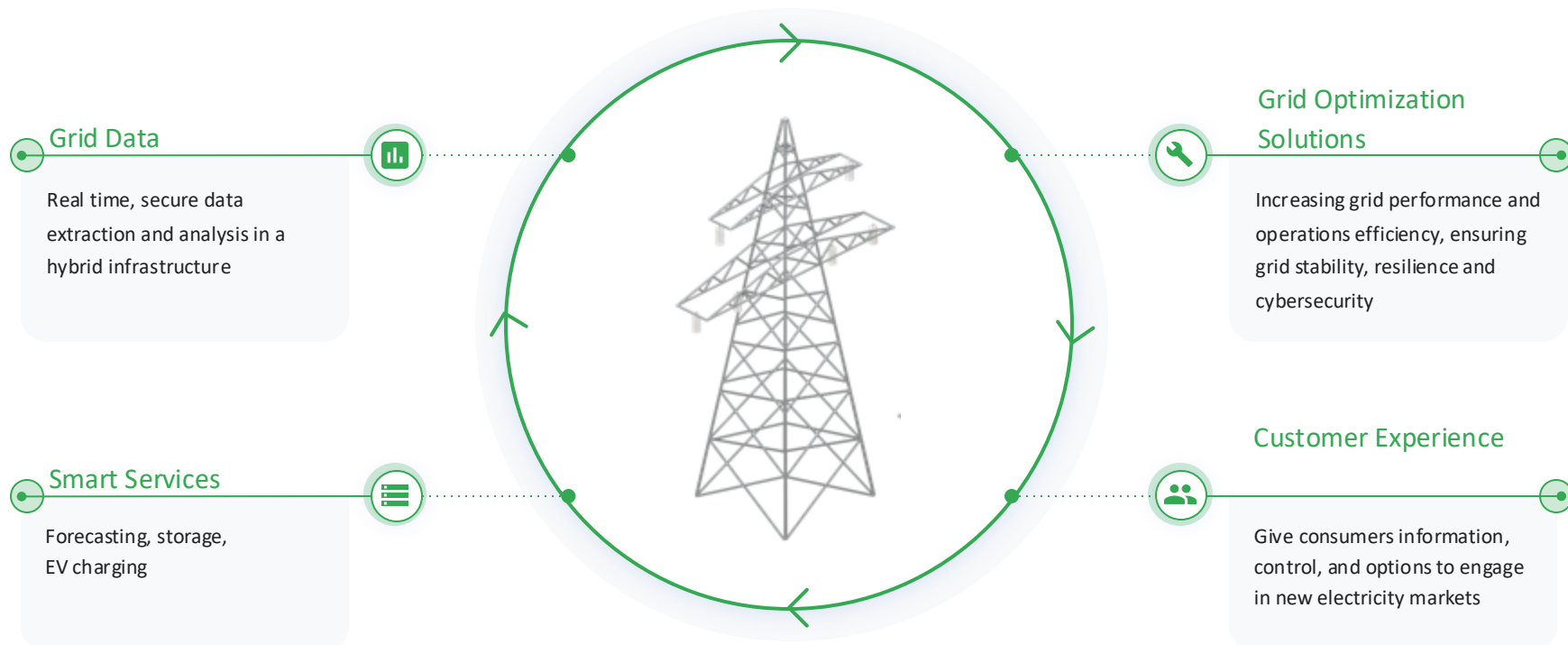
Source: [Vattenfall, 2023](#)

60% of new energy capacity globally is expected to come from Solar by 2030

This energy transition is critical to help keep global warming under 2°C by 2050*

**How does
Google help
Energy
companies
leverage our
research?**

Power and Utilities organizations are looking to build an intelligent and resilient grid for the next 100 years, driven by



Google Cloud is enabling an intelligent grid via four key solution areas



Forecasting

Techniques to predict future energy load and production needs to achieve demand and supply equilibrium



Trading

Trade renewable energy at the best possible price to reduce costs and provide cheaper energy to consumers.



Asset Optimization

Techniques to optimize performance and financial return of energy storage systems and optimal scheduling of distributed energy sources (DER)

Secure and Resilient Infrastructure

All of these are underpinned by Google Cloud's leading infrastructure and security

Solving for energy forecasting use cases



Wind energy generation forecasting

Combine historical, real-time and weather data to accurately forecast wind energy generation potential



Solar energy generation forecasting

Leverage geo data (e.g. satellite imagery) to better forecast solar energy generation potential



Grid load forecasting

Minimise forecasting errors by predicting grid supply and demand based on environmental and demand data



EV adoption forecasting

Identify the rate of EV adoption and use the information for grid planning and scheduling



Solving for energy trading optimization use cases



Day ahead trading recommendations

Optimal bidding strategy for the trading parties



Spot market trading recommendations

Determine best price for real time market based of supply and demand



Arbitrage for maximizing assets financial returns

Analyse both trading options for recommendation on which market to sell based on increased financial returns



Google Cloud Grid Intelligence solution for Trading



The problem: Can I improve trading by predicting and scheduling wind energy?



Solution: Grid Intelligence for trading

Better forecasting and scheduling of wind energy using AI/ML

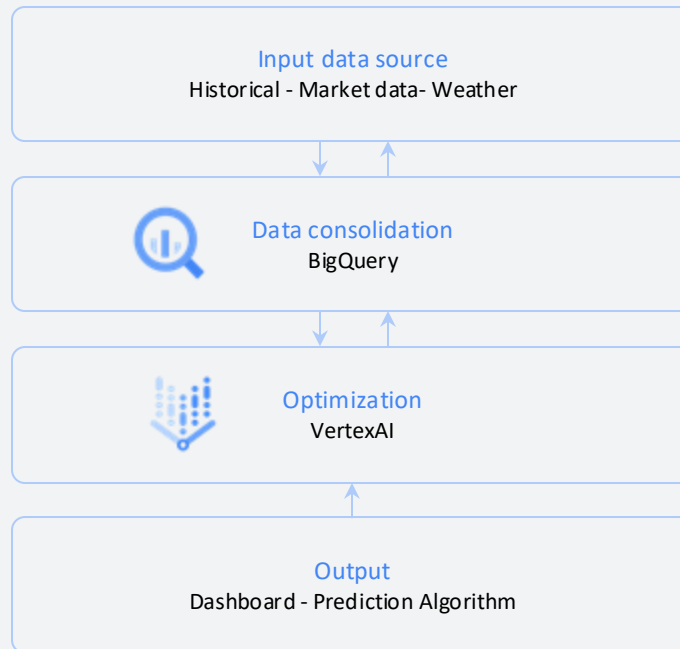
Recommendations to optimize the financial return from bidding into the wholesale electricity market



Results:

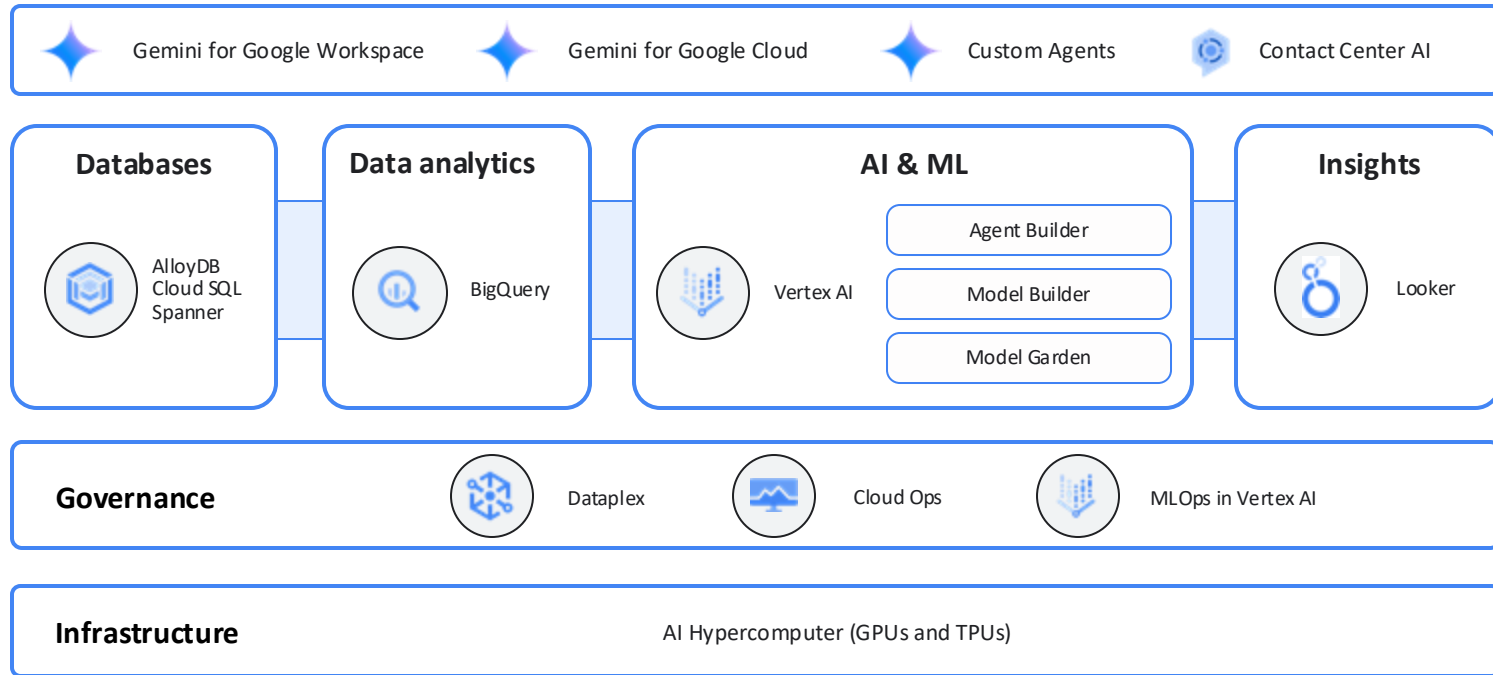
1. Better results than 100% day-ahead ISO
2. 20% more revenue from wind energy trading

Solution Overview:



**What does our
customers do
with the
technology?**

A unified platform from data to deployment and for all your predictive, generative, and agentic needs



Customer Voices

AES fights climate change with AutoML Vision



Demonstration

NotebookLM



Thank you!

