# How AI-Driven Energy Forecasting Powers the Renewables Revolution

Read the eBook

# Introduction

Climate change is driving the need for reliable, efficient and appropriately distributed renewable energy. Climate change is affecting weather patterns, which in turn affects both demand for energy, and the production of alternative sources of renewable energy such as hydro, solar and wind.

As the climate changes, so does the regulatory landscape surrounding energy production. Renewables are gaining ground rapidly, and producers and distributors must stay abreast of evolving rules and regulations in the industry. There are multiple goals: to effectively implement new technologies, to ensure stability of the renewables enhanced grid and to increase cost savings across the board.

Accuracy in energy forecasting is key to a future powered by renewables, and crucial to making renewable energy options viable long term. The best path forward to accurate energy forecasting is AI and intelligent analytics, which can not only predict energy needs and production patterns, but help determine best practices for distribution and transmission in urban and rural areas.


Why renewables are so important ›

# Why renewables are so important

Energy demands keep rising across the globe. Even as machines become more energy efficient, new demands for energy arise, whether in developing communities or due to new technologies that pose enormous challenges to energy production.

The Energy Council notes that the fastest growing energy demand globally is in IT and data centres, which use an amount of power comparable to a small city. Data centres account for nearly 4% of Australia's total energy consumption, and make up nearly 10% of the world's energy consumption. They are anticipated to grow to consume a fifth of all the world's energy by 2025.

According to the Australian government, Energy is a major export. Australia produces about 2.4% of total world energy, exporting more than 75% of its energy output, worth nearly A$80 billion. Internally, coal accounts for approximately 75% of Australia's electricity generation, and coal and other non-renewable resources are strong compared to the rest of the globe.

That said, all non-renewable sources of energy are finite, and eventually they will be exhausted. The rate at which non-renewables are used will only increase over time, as world-wide consumption balloons.

Challenges surrounding renewables adoption ›

# Challenges surrounding renewables adoption

Variability issues pose some of the biggest widespread challenges to large-scale renewables implementation. A fluctuating demand can make it difficult to gauge production needs, while an inconsistent supply creates obstacles in the way of steady feed into the grid. This can make it difficult to provide the security of a stable energy infrastructure and restricts the adoption of renewables.

Overforecasting and under-delivery must be addressed as two sides of the same problematic coin to stabilise production and distribution. Ideally, solutions will prove capable of both accounting for variances in demand and supply, and balancing loads for uninterrupted service.

According to Energy Networks, distributed energy resources, while helping to meet increased demands by feeding extra energy into the grid, can also pose a risk of overload with legacy systems and infrastructure.

When weather events cause outages, or high production periods and low usage threaten to overwhelm networks, loads can be balanced and better distributed with strategic battery placement. An intelligent system should be able to divert demand and route energy effectively to the affected regions, tapping into stored energy sources located for maximum reach and efficiency.

Increasing accuracy in forecasting ›

# Increasing accuracy in forecasting

Artificial intelligence, machine learning and predictive analytics form the three foundational supports of data science in respect to renewable energy forecasting. Since accurate forecasting is a crucial part of making renewables a viable option in many regions, creating and refining models based on continually updating data streams from across the power grid is key.

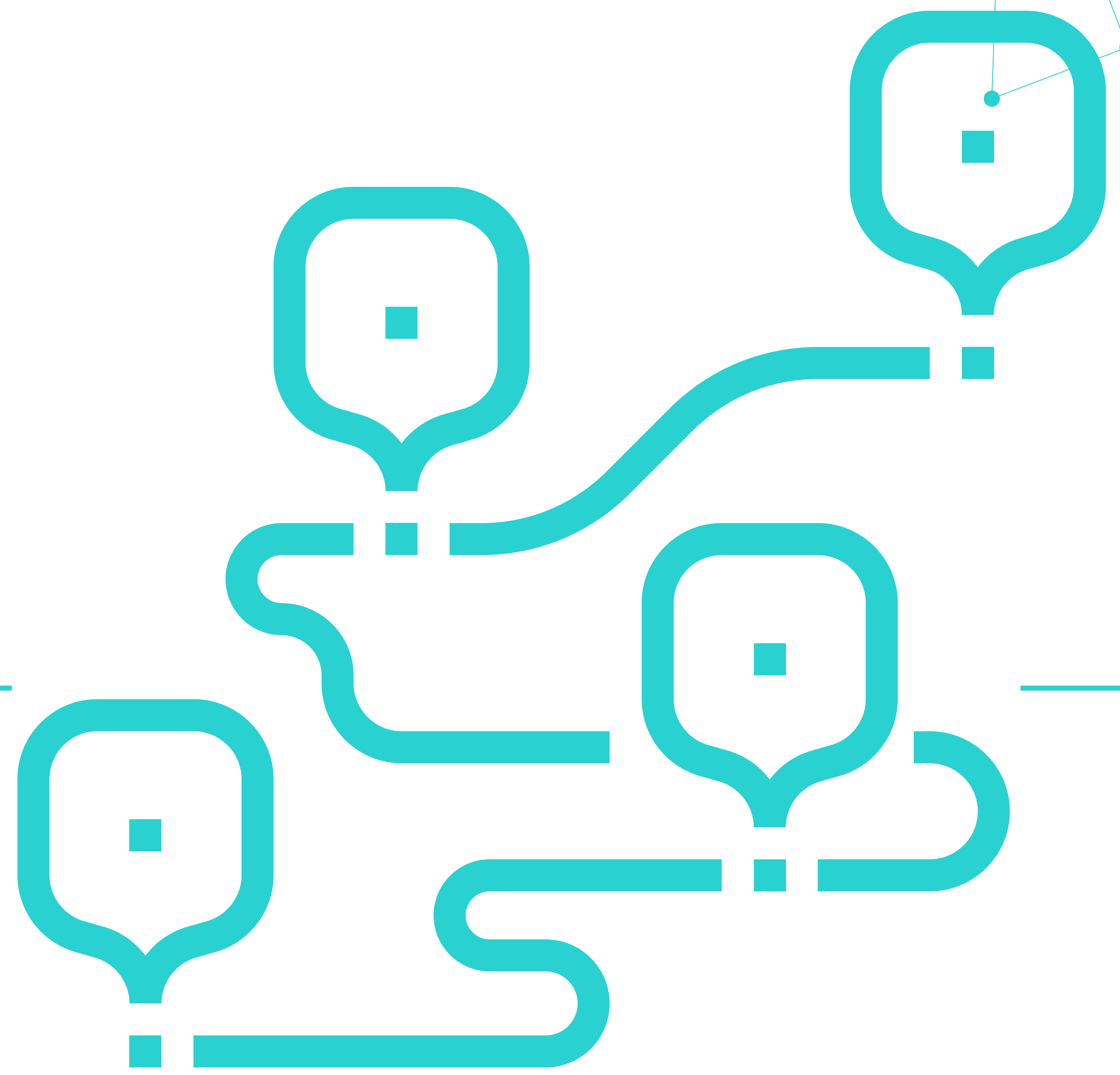
Incoming data may be streamed from sensors inside equipment such as smart meters, from sensors on connected consumer or corporate devices, or from third parties who are responsible in some form for transmitting, distributing, or selling renewable power.

Modeling can be utilised to help build clearer pictures of a region's energy demand over time, with highest use parameters clearly defined and a range of anticipated energy needs determined. These models can be continually updated, refined and made more accurate through AI-driven analytics. On the flip side, energy production can be more accurately forecasted using AI models, with historical data supplemented by frequent updates as renewables roll out region after region.

Between the two types of models (forecasting demand and forecasting supply), power microgrids can be planned and developed to service Australia's more rural areas with steady, dependable energy that is cost-effective, efficient and increasingly disruption-proof.

Why accurate forecasting is crucial ›

# Why accurate forecasting is crucial to making renewables viable long term



Accurate forecasting and predicting, delivered by AI-powered modeling and data analysis can assist not only in meeting current demands for grid stability, but help Australia retool for the future of renewables. Infrastructure must be reimagined, diversified and distributed to maximise the advantage of multiple energy sources and balance loads effectively.

AI-powered forecasting can be utilised to make decisions around battery usage and placement, adjusting microgrid loads to improve local and nationwide stability, and deliver maximum benefits from renewable power generation.

The placement and resulting value of these batteries as well as distributed energy sources (DERs) can be improved with AI optimisation techniques. As each asset in the grid is placed, it can be positioned and optimised based on modeling to provide maximum benefit. These location choices will be instrumental in the ability to accurately and consistently meet specific demands and load. Charging/discharging batteries in anticipation of weather events can provide major improvements to grid stability and reduce the amount and associated cost of batteries required.

By utilising AI for asset placement and optimisation, power distributors can reduce the chance of outages and mitigate the stresses associated with variable supply and demand.

Scenario planning with AI and machine learning can predict future events and create disaster plans for uninterrupted power delivery even in remote areas.

By taking full advantage of microgrid capabilities, communities can simultaneously reduce the environmental impact on the communities around them in case of localised failure and better able to recover thanks to DERs.

Benefits of AI ›

# Benefits of AI for modern energy suppliers

AI-driven energy forecasting doesn't just benefit energy consumers. Energy suppliers can enhance their offerings, increase revenues and more easily comply with regulations by implementing AI and analytics into their networks. As new infrastructure is designed and built and microgrids continue to be rolled out across the country, battery placement and optimisation delivers cost-savings in distributing power reserves for faster recovery after an outage.

Image analysis can be used to define and identify areas where vegetation poses a hazard to existing power lines and structures, allowing efficient dispatch of workforces to manage threats across vast rural regions.

DER integration and management allows consumer devices to be harnessed to benefit entire communities, allowing customers to be a part of their local energy solution. This also provides a way to reduce costs associated with supplying remote communities, while delivering a viable way to build insulated grids that can withstand common disruptions without total service failure.

Metering analysis can help forecast demand and predict when spikes will occur, allowing resources to be placed strategically to protect grid stability and deliver a high quality energy experience. Fluctuations in service can be kept to a minimum.

Workforce optimisation is possible when energy grids are stable. Lack of constant crisis leads to a more structured workload, allowing more time to be directed toward improving infrastructure and planning new rollouts; a predictive rather than reactive approach to production supply, and distribution.

Outage predictions allow for better, more effective, and faster response when power disruption looms, allowing companies to divert power as needed, restore power swiftly and, in some cases, avert an outage completely.

The future of AI ›

# The future of AI-driven energy forecasting

According to the Australian Sustainable Development Goals, universal access to affordable, reliable and modern energy services is a major target for the year 2030. The Australian Government's Department of Industry, Science, Energy and Resources, notes that the goal to meet 33,000 gigawatt hours of additional renewable energy by 2020 has been achieved, and that goal remains an annual target until 2030.

In addition to helping achieve goals set for clean power, AI-driven energy forecasting can also lead the way to higher cost-efficiency and lower risk of grid outages, while advancing Australia toward its goals for electrified transportation and a climate resistant infrastructure.

The environmental impact of power production, distribution and consumption can also be reduced and mitigated going forward.

SAS Energy Forecasting software can maximise revenue generation and minimise uncertainties, providing a reliable, AI-powered path to better, more accurate load forecasting. Contact our experts for more information today.

Why SAS? ❯

# Why trust SAS?

SAS has over four decades of experience working with energy utility organisations bringing new insights to the toughest challenges, and new ways of working that transform and disrupt. We are the quiet innovators, whose solutions enable organisations to mitigate risk, optimise performance and accelerate the detection and research of a whole range of investigations. Our solutions are used by energy utility organisations across the globe to focus on AI energy forecasting, distributed energy sources and more. Where investigations are your core activity, SAS is the solution to trust.

## Accelerate investigations

See exactly how we can help your team deploy the power of AI.

Learn more