



Driving Bio Circular Economy With AI-Powered Energy Efficiency

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Introduction: Bio Circular Economy

Key Concept: Bio Circular Economy

The bio-circular economy integrates the circular economy and bio-economy, a sustainable development model built on renewable biological resources. It pursues efficient resource utilization, zero-waste production and eco-friendliness via technological and institutional innovation.

Global Trends

Globally, economies have been exploring this model for sustainable growth. In November 2022, the 29th APEC Economic Leaders' Meeting adopted the Bangkok Goals on Bio-Circular-Green Economy, setting clear targets for clean energy transition and energy resilience, guiding the Asia-Pacific region toward higher resource efficiency.

China's newly approved 15th Five-Year Plan also stresses resource conservation, circular economy development and waste recycling, with seven mentions of energy efficiency and targeted arrangements for key sectors.



Bangkok Goals on Bio-Circular-Green (BCG) Economy

Introduction: Bio Circular Economy

Energy Sector Practice

For the energy sector, the operational mechanism of the bio-circular economy lies in reducing greenhouse gas emissions through energy efficiency improvement and clean fuel substitution.

New Characteristics of Power System

Steady Growth of RE Proportion:

- ✓ Rapid consumption of flexible regulation resources
- ✓ Intermittency, randomness, volatility → harder system regulation
- ✓ Risks in local accommodation & inefficient utilization

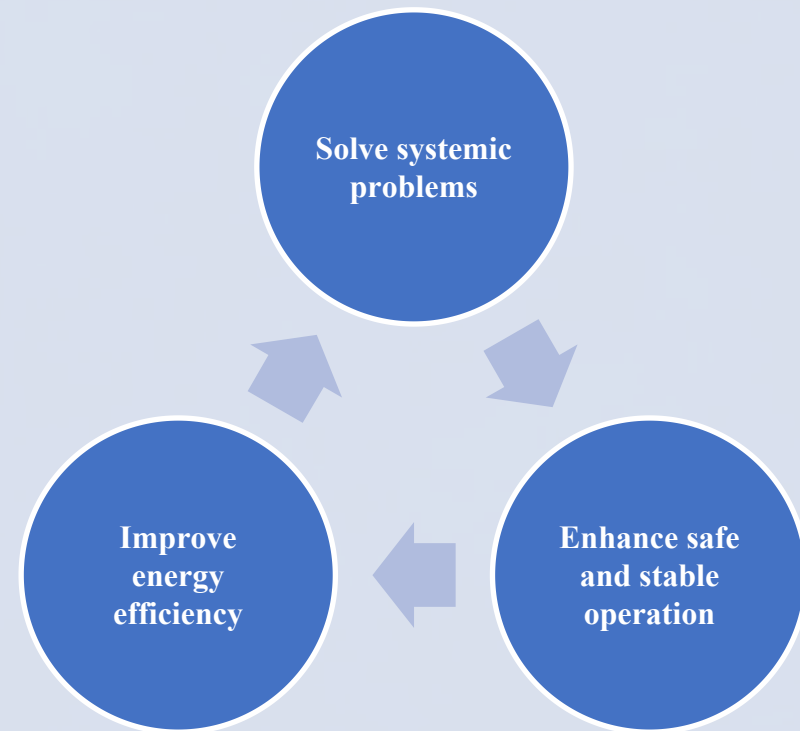
Dual-high characteristics becoming prominent

- ✓ High proportion of RE & power electronic devices
- ✓ Low inertia, low damping, weak voltage support

Expanded controllable objects & control scale

- ✓ From generation-dominated to source-grid-load-storage
- ✓ Exponentially growing control scale

Role of AI technology



Case 1: AI Improves Energy Dispatch Efficiency

Technology: Guangming Power Model

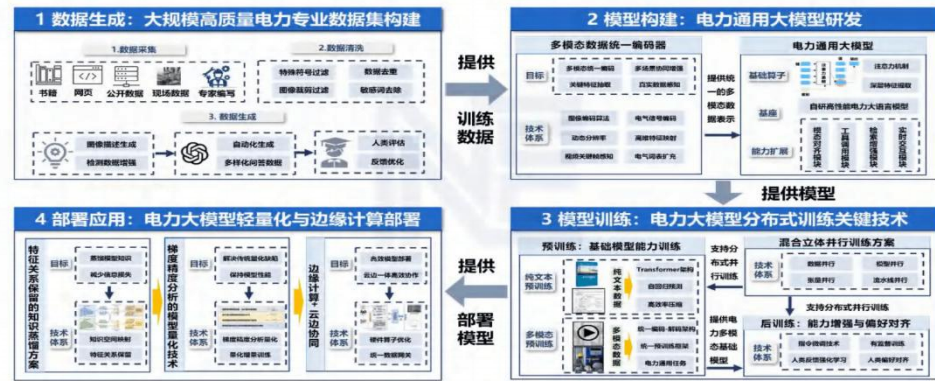
- ✓ Raises the update frequency of 48-hour ahead meteorological forecasts to once per hour.
- ✓ Conducts independent analysis and learning by combining expert experience, effectively improving the accuracy of load forecasting.



Outcome: Precise Load Forecasting

In the summer of 2024, it delivered load forecasting for seven extreme weather events with an average accuracy of **95.72%**, and hit **99%** accuracy for holiday load forecasting, strongly supporting reliable power supply.

电力大模型全流程关键技术体系



Case 2: AI Enhances Renewable Energy Forecasting



Technology: CloudPangu Model

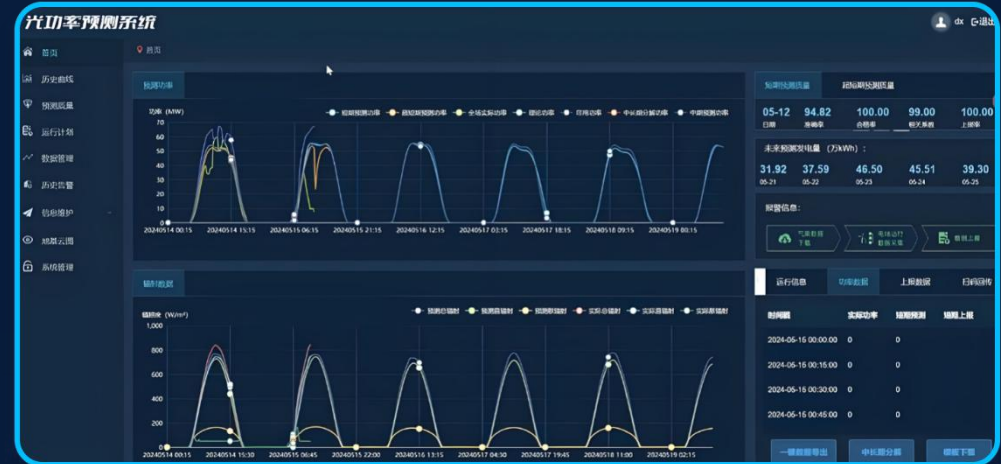
Integrating official meteorological data to build dedicated models for wind, solar and seasonal precipitation, releasing hourly regional forecast data.



Outcome: Efficiency & Accuracy

Improves meteorological forecasting accuracy by **15%** & wind power generation forecasting by **10%**, effectively raising renewable energy production efficiency.

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Key Value Metrics



meteorological forecasting

+15% Accuracy



wind power generation

+10% Accuracy

Solve Intermittency

Increase Utilization

Case 4: AI Cuts Industrial Energy Consumption

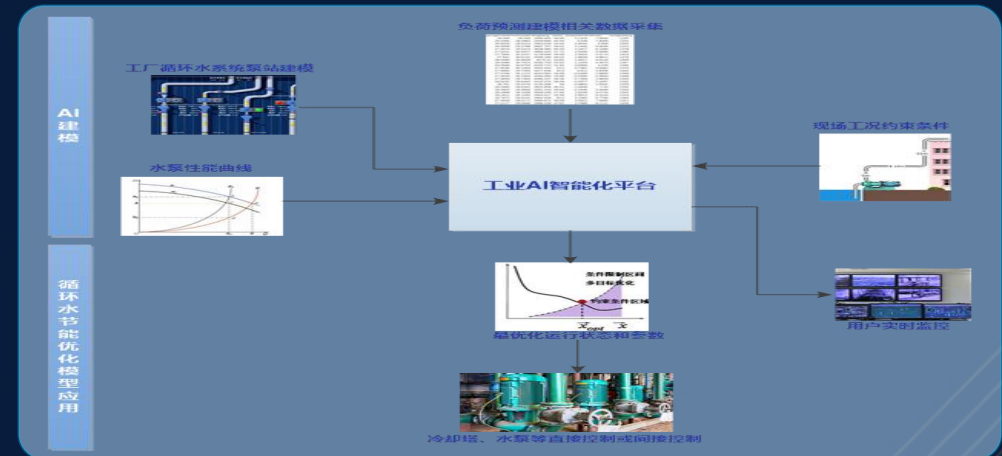
Technology: Industrial Model

A steel enterprise in China launched an industrial circulating water energy-saving large model to tackle high energy consumption. The model analyzes real-time data from over 2,000 monitoring points to optimize operation parameters.



Outcome: Reduce Energy Consumption

For iron-making cooling pump units, it identified system flaws and put forward optimization plans, cutting the unit's power consumption by **56.3%** and saving over **1.39 million** kWh of electricity annually.



Summary and Outlook: AI Driving a Sustainable Future



AI's Role

- ✓ **Production:** Improves renewable energy consumption and traditional energy operation efficiency.
- ✓ **System:** Acts as a "digital brain" to ensure grid stability and optimize resource allocation.
- ✓ **Consumption:** Reduces industrial and building energy use via refined management.



Challenges

- ✓ **Energy Concerns:** Global data centers account for 1.5% of electricity use, expected to double by 2030.
- ✓ **Solutions:** Promote green power consumption in data centers and realize coordinated development of computing and power systems.



Outlook

- ✓ **Model Upgrade:** Shift from passive adaptation to active prediction, minimize energy loss, lower energy costs.
- ✓ **Collaboration:** Deepen regional cooperation, build a safe, efficient, green and sustainable future together.

“Technological innovation is the core driver of energy transformation. Let us work together to create a beautiful tomorrow of sustainable development.”

The background is a dark blue field filled with a complex network of glowing blue lines and nodes. The lines are thin and connect various points, creating a web-like structure. Some lines are thicker and more prominent, forming a central, curved shape that resembles a stylized 'U' or a bridge. The overall effect is one of digital connectivity and data flow.

Thank You