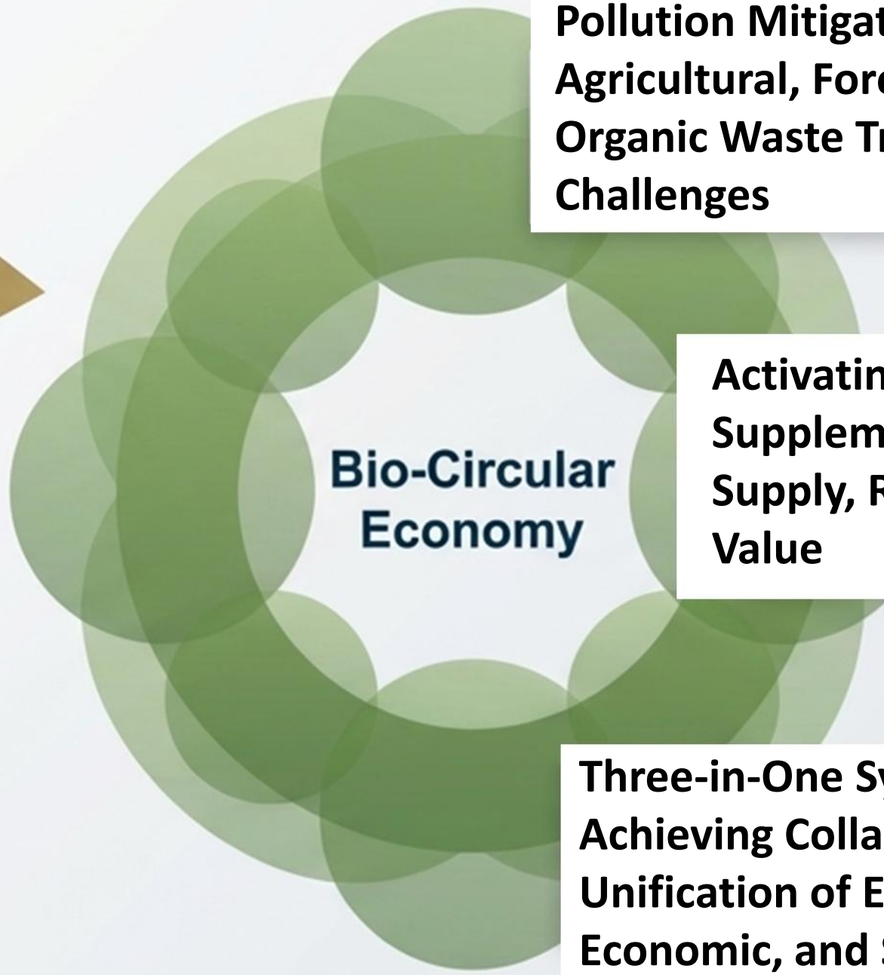
AI-Enabled Energy Transition

Integrating Bio-Circular Economy: China's Practices and Prospects in Low-Carbon Development

Global Consensus & Core Challenges: Finding Leverage Points Amidst Security & Emissions Reduction

Energy Security Assurance

Low-Carbon Emission Reduction Pressure



Pollution Mitigation: Resolving Agricultural, Forestry, and Organic Waste Treatment Challenges

Activating Existing Assets: Supplementing Clean Energy Supply, Reshaping Resource Value

Three-in-One Synergy: Achieving Collaborative Unification of Ecological, Economic, and Social Benefits

The Chinese Approach: “Dual-Drive Strategy” of Policy Guidance and AI Empowerment

Establish a Comprehensive Multi-Level System to Safeguard Industry Scaling

Implementation of the “Energy Law”: Develop Biomass Power Generation and Clean Heating Based on Local Conditions

Value Realization: Full Integration of Biomass Power Sites into Green Certificate Issuance and Direct Green Electricity Connection

Break Down Underlying Barriers Across all Links of the Energy System with Artificial Intelligence

Adhere to the Core Circular Principles of “Reduce, Reuse, Recycle”

Maximize the Overall Efficiency of Energy Production, Transmission, and Consumption Operations

TITLE	ISSUING AUTHORITY	MAIN CONTENT
Energy Law of the People's Republic of China	Standing Committee of the National People's Congress, the State Council	Encourage and support biomass energy development and utilization, promote related projects, and provide legal guarantees for bio-circular economy projects.
Guiding Opinions on Vigorously Implementing the Renewable Energy Substitution Action	The State Council	Focus on agricultural and forestry waste utilization, promote integration of bio-circular economy with new energy and rural revitalization, and improve rural smart energy level.
Rules for the Issuance and Trading of Green Electricity Certificates for Renewable Energy	National Energy Administration	Include biomass power generation in green certificate issuance, standardize trading processes, and expand green certificate application scenarios.
Basic Rules for Medium- and Long-Term Transactions of Electric Power in the Power Sector – Relevant Notice on the Special Chapter for Green Electricity Transactions	National Development and Reform Commission (NDRC)	Clarify green electricity trading rules and pricing mechanism, and promote normalization of intra-provincial and inter-provincial green electricity transactions.
Special Policies on Bio-Circular Economy in the Field of Agriculture and Rural Areas	Ministry of Agriculture and Rural Affairs	Support agricultural waste treatment, optimize biomass energy project layout, upgrade infrastructure, and promote integration of AI, new energy and bio-circular economy.

Scaled Practice: Building a Nationwide Circular Utilization System

By the end of 2025, China has comprehensively promoted the resource utilization of agricultural, forestry, and organic waste towards scaled development.

60

Key Cities Broadly Covered

Covers all provinces nationwide, forming replicable models.

47.43 Million

kW Installed Capacity

Scale of core biomass power generation facilities nationwide.

224.7 Billion

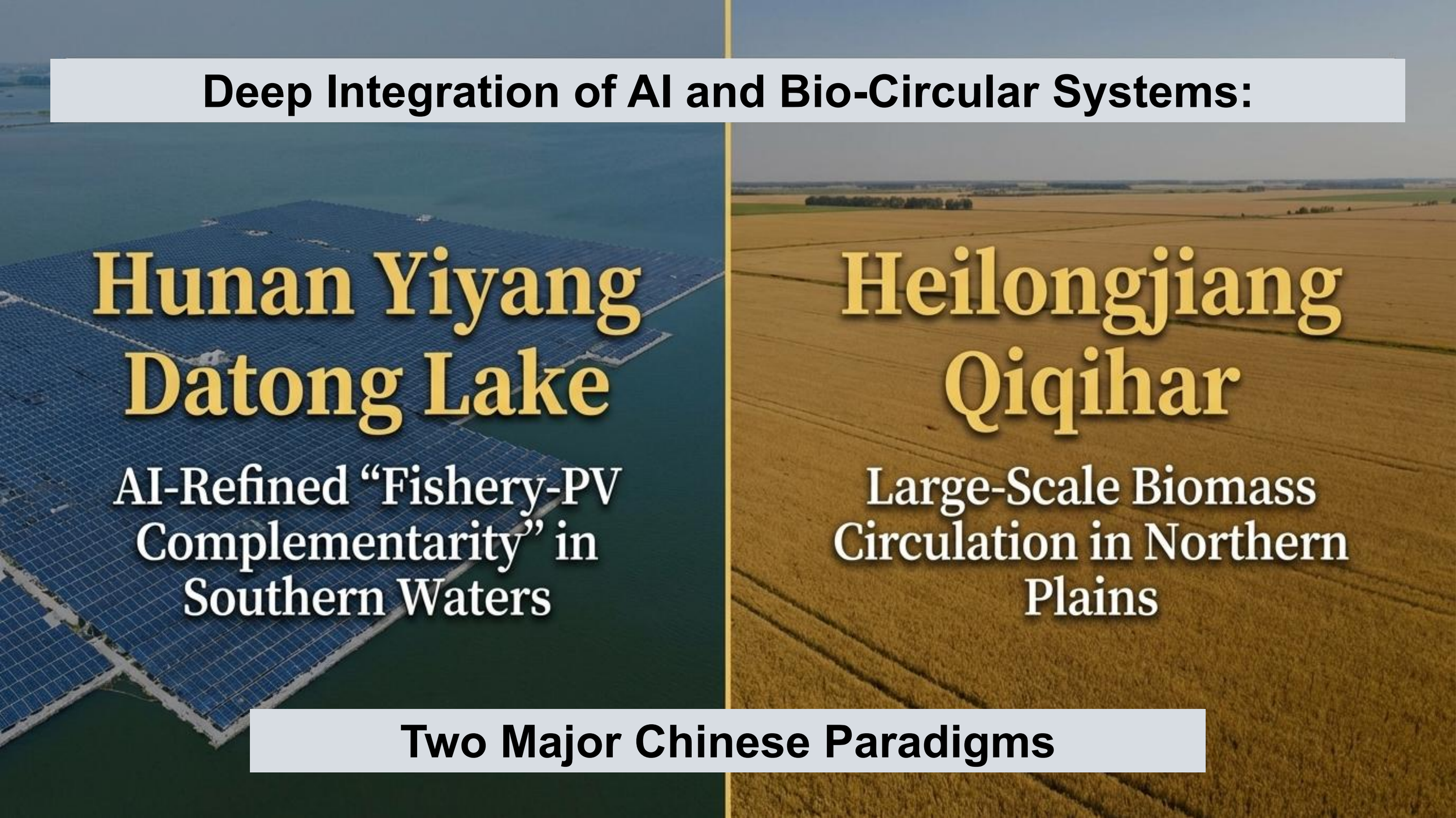
kWh Annual Power Generation

Efficiently outputs green electricity, revitalizing existing resources.

In-Depth Analysis: AI as the Super Brain of the "Source-Grid-Load-Storage" Full Chain

Core Value: Significantly improve overall system operating efficiency, achieving dual reduction of energy consumption and carbon emissions.

Deep Integration of AI and Bio-Circular Systems:



Hunan Yiyang Datong Lake

AI-Refined “Fishery-PV Complementarity” in Southern Waters

Heilongjiang Qiqihar

Large-Scale Biomass Circulation in Northern Plains

Two Major Chinese Paradigms

Case Study 1: Hunan Yiyang 190MW “Fishery-Solar Complementary” Integrated Ecosystem

Spatial Reshaping: Overhead Generation, Underwater Apeaculture

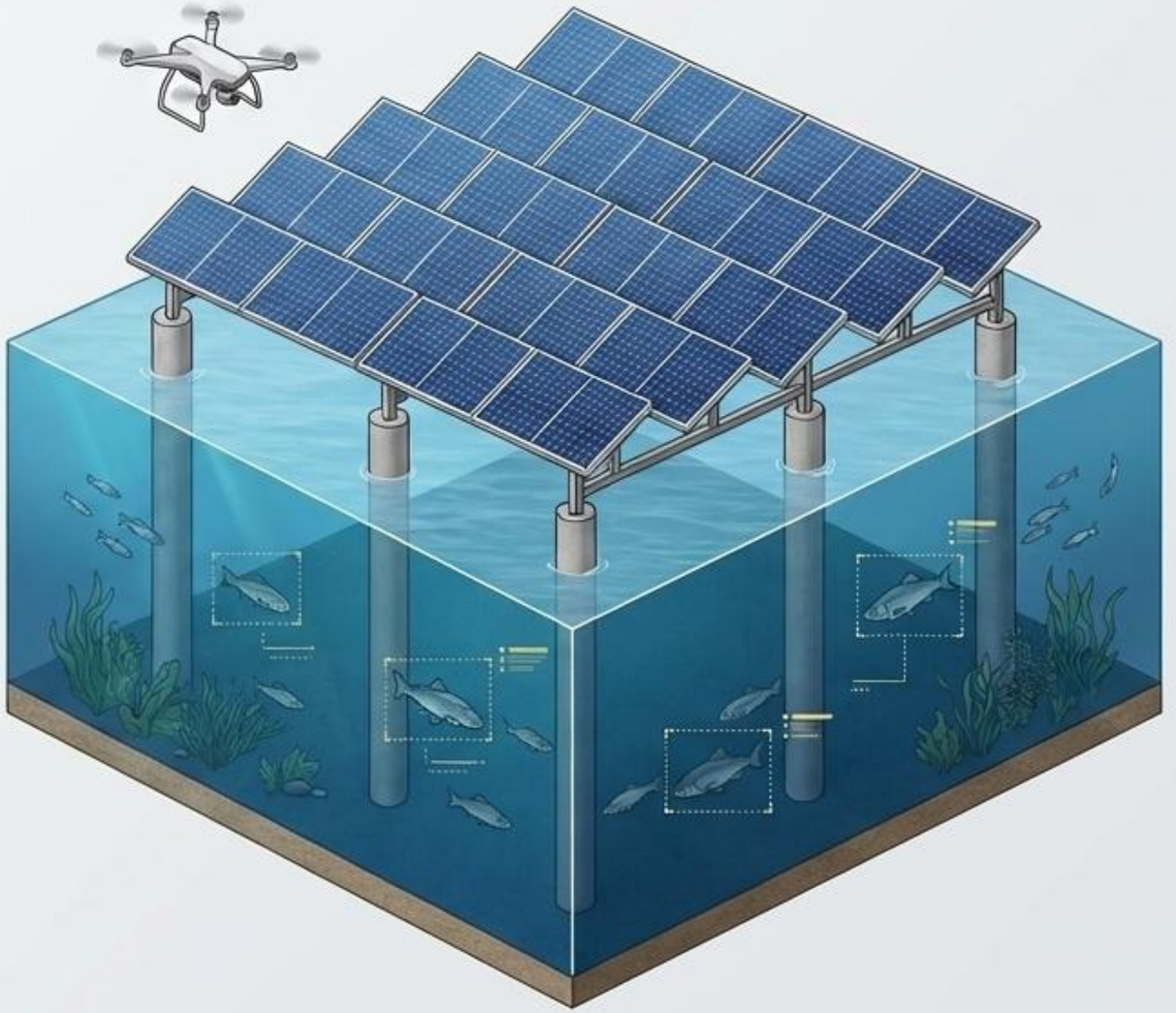
Scientiſically deploying photolvalic arrays over large water arrias, creating an innovative three-dimemtional integrated model.

Ecological Protection Lake Ecology Zero Impact

Fully adopting prefabricated pite technology for complex geology to protect the aquetic environment.

Value Stacking: High Value-Added Synergy

Cultivating solar panels beneath high-quality aquaculture, energy and modern agriculture, perfect integration.



Intelligent Core: AI's Integration Across the “Generation-Aquaculture-Storage” Value Chain

AI-Driven Precision Aquaculture Management

Mechanism: HD Video Surveillance + Multi-parameter Sensors + AI Image Recognition Technology.

Optimization: Intelligent fish health assessment, eliminating reliance on extensive "experience-based" methods. Improves survival rates, reduces waste at the source, and enables a closed-loop biological cycle.

AI-Optimized Solar O&M

Mechanism: Automated Cleaning Systems + Vision-AI Drones for Comprehensive Inspections.

Optimization: Automated cleaning based on weather and cleanliness conditions; rapid module fault detection. Increases O&M efficiency by over 3x, substantially lowering energy consumption and labor costs.

AI Coordinated Dispatch for Source-Grid-Load-Storage

Mechanism: Intelligent Control Center performing real-time analysis of multi-dimensional data on power output, load, and demand.

Optimization: Precise regulation of PV output and energy storage charge/discharge cycles. Achieves "self-generation and self-consumption of green energy, with efficient grid feed-in for surplus," driving the high-efficiency operation of new energy systems.

Comprehensive Benefits: Building a Win-Win Benchmark for “New Energy + Agricultural Circularity”

Environmental Benefits (Annual Contribution)

- Power Generation: **252 Million kWh**
- Standard Coal Saved: **80,000 Tons**
- CO_2 Emissions Reduced: **190,000 Tons**
- SO_2 Emissions Reduced: **1,546 Tons**
- NOx Emissions Reduced: **878 Tons**

Social & Economic Benefits

- Collective Income Growth: Drives Over **$430,000** in Average Annual Income Growth for 12 Surrounding VIllage Collectives
- High-Quality Employment: Creates Hundreds of Jobs in PV O&M, Smart Inspection, and Precision Aquaculture
- Regional Empowerment: Forms a Replicable Ecological Synergy Model for the Hunan Lake Area

Case Study II: Heilongjiang Qiqihar Biomass Integrated Energy Base

Leveraging the resource advantages of a major agricultural province to build a domestic leading-scale biomass circular economy base.

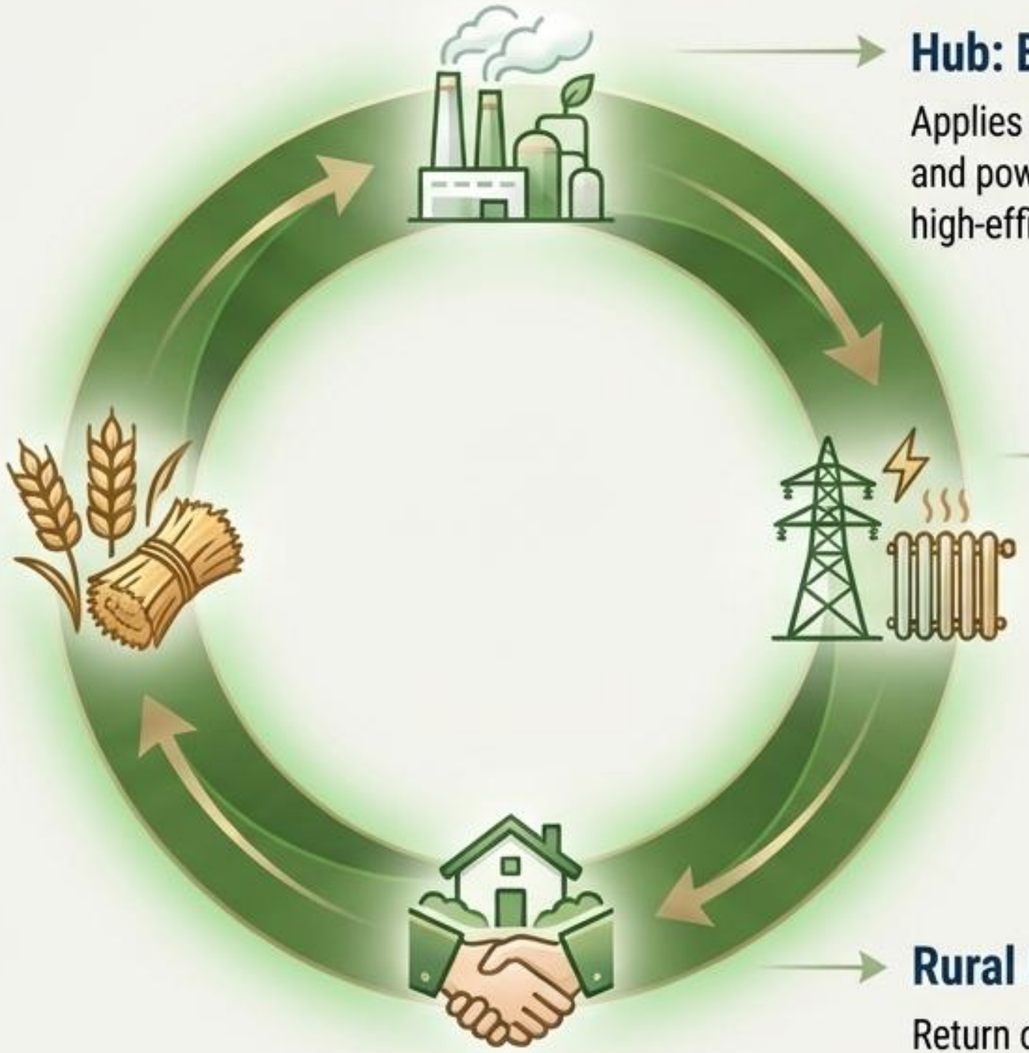
Core Pain Point: Persistent Environmental Pollution

Address the serious environmental pollution and resource waste caused by concentrated straw burning and improper stacking stamking.

Breakthrough Path: Full-Chain Closed-Loop System

Precisely match resource characteristics and build a complete industrial workflow of "Collection - Shredding - Transportation - Consumption".

The Biomass Circular Economy Flywheel in a Macro Perspective



Hub: Efficient Conversion

Applies advanced biomass combined heat and power (CHP) core technology to achieve high-efficiency energy conversion.

Input: Turning Waste into Wealth

Annually processes and consumes up to 3 million tons of straw, fundamentally solving regional pollution hazards.

Output: Massive Energy Supply

Green Electricity: Annual output of 2.5 billion kWh.
Clean Heating: Heating area reaches 10 million square meters, covering multiple districts and counties.

Rural Revitalization:

Return of capital and employment, reshaping the rural economic base.

Deep Giveback: Enhancing Regional Energy Security and Driving Rural Revitalization

Tier 1: Environmental Protection

Carbon Reduction & Energy Conservation

Annual CO2 Emission Reduction: **266,800** tons

Reduced Standard Coal Consumption: **600,000** tons

Tier 2: Economic Empowerment

Economic Empowerment

Direct Increase in Farmer Income: **USD 115 Million**

New Local Tax Revenue: **USD 35 Million**

Tier 3: Livelihood Guarantee

Livelihood Security

Job Creation: **1,500** direct jobs, **3,500** indirect jobs

Poverty Alleviation: Lifted over **1,000** impoverished households out of poverty

Dual-Track Approach: The Chinese Practical Logic of Adapting to Local Conditions

Hunan Yiyang Model (South)

Core Driver	Micro-Space Reutilization & AI-Enabled Ultra-Precision Management
Applicable Scenario	Regions with Dense Water Networks & Relatively Limited Land Resources
Model Summary	"New Energy + AI Central Hub + Modern Integrated Agriculture"

Heilongjiang Qiqihar Model (North)

Core Driver	Massive Macro-Resource Consumption & Large-Scale Logistics Circulation
Applicable Scenario	Major Agricultural Provinces with Abundant Waste & Central Heating Needs
Model Summary	"Waste Treatment + Massive Energy Supply Guarantee + Rural Revitalization"

Common Foundation: AI Scheduling Optimization Empowerment System | Maximizing Ecological & Carbon Reduction Benefits | Community & Rural Wealth Sharing

THANK YOU FOR LISTENING