



Muyuan Foods

Green and Low-Carbon Action Report in 2023



Muyuan Basic Law

I. Business purpose:

Produce healthy foods for society to improve the life quality of the public, helping people enjoy an abundant life.

II. Core values:

Create value and serve society; be upright both outside and inside, and advance social development. External value outweighs internal value; long-term interests outweigh immediate interests; the value of humans outweighs the value of things; common value outweighs individual value; social value outweighs profit value; and customer value outweighs production value.

III. Business selection:

Create substantial value instead of a bubble with our own strengths.

IV. Business principles:

Maximize social value. Never pass on costs, never shirk responsibilities, and never leave hidden dangers. Take beneficial but not harmful or controversial actions. Persist and never waiver in value creation. Never expect fluky profits or yield to selfish interests. Object to commercial bribery and refuse unearned or illegal gains. Never engage in speculation, tricking, or dispossession. Never engage in underhand money deals. Be strict in self-discipline, be brave to shoulder responsibilities, and pursue perfection.

V. Employee benefits:

Bring benefits for employees. We regard employees as family members, help them grow and build a career platform for helping them achieve self-fulfilment. We are determined to bring happiness to each employee and each family. Everyone can enjoy a happy life here.

VI. Customer benefits:

Make cooperation conducive to customers' interests. Never impose whatever you dislike on others, but showing towards others what you yourself would like. Always feel for others and treat others with honesty and sincerity. We take customers as brothers and help each other to realize fairness, uprightness, openness, and transparency in business progress and make true simple, worry-free, efficient and win-win cooperation.

VII. Social responsibility:

Put knowledge into action to benefit society. Achieve the simultaneous improvement of economic benefits, ecological benefits, and social benefits. Promote an environment-friendly and animal-friendly business pattern. Promote circular economy and cleaner production to reduce negative influence on the atmosphere. Upgrade continuously the standards of food quality and actively build an industrial ecology to promote sustainable development. Keep carrying out public welfare undertakings to support education and promote social and economic development.

VIII. Constant development:

Adhere to the values and construct a platform for sharing; keep pace with the times and explore the unknown; face challenges with courage and go beyond selves; be selfless and build Muyuan a long-lasting company.



Tribute to Pigs

A pig lives an ordinary life.

It comes to the world quietly and leaves quietly.

Everything it had had already been given when we see it gone.

A pig lives a great life indeed.

The spirit of the pig mirrors that of the Muyuan people.

A pig lives a dedicated life.

It sacrifices its life for the happiness of human beings.

Pigs prove to us that is another life that sustains one life; one life is sacrificed whilst another is benefited.

Muyuan people shoulder the lofty mission of producing pork foods and creating a high-quality life for the public. Just like pigs, we are ready to give everything we have to make people's lives better.

A pig lives a happy life.

Despite the sacrifice of its precious life, a pig does not care much about how long it lives or how much it eats but grows only big and strong, happily and quickly.

Pigs prove to us that is the quality rather than the length of life that matters. We should exchange the length of life for the quality of life without regrets, just like pigs.

A pig lives a philosophic life.

Whilst people are still thinking about the meaning of life and won't let go of fame and fortune, pigs have given a simple and clear answer, using their lives: the true meaning of life does not consist in how much you take, but in how much you can give to society and your fellow human beings.

So we cease to merely stand back discussing the meaning of life. We are determined to create value, with a mind full of more dedication and less scheming, like pigs.

We are grateful to pigs.

We raise pigs, but actually, it is the pigs that feed us.

To respect pigs is to respect ourselves and to praise pigs is to praise ourselves.

Let all of us, like pigs, be simple and happy to give and to make true a high-quality life!



About the Report

Muyuan Foods Co., Ltd. (hereinafter referred to as “Muyuan”, “Muyuan Foods”, “the Company” or “we”) hereby issues the Muyuan Foods Green and Low-Carbon Action Report 2023 to elaborate on its visions, actions, and achievements in terms of green and low-carbon meat production.



Report Availability:

The Report is available online and can be read and downloaded on CNINFO (www.cninfo.com.cn), a website accredited by the China Securities Regulatory Commission (“CSRC”) for information disclosure of listed companies, and the Company's website (www.muyuan-foods.com).



Standard of Report:

The preparation of the report, based on the industry background and highlighting the characteristics of the Company, strives to align with the relevant internationally accepted standards for the calculation of greenhouse gas emissions, with particular reference to the ISO 14064 International Standard, the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and the General Rules for Calculation of the Comprehensive Energy Consumption (GB/T 2589-2020).



Scope of the Report:

Unless otherwise specified, the Report covers Muyuan Foods Co., Ltd. and its subsidiaries during the period from January 1, 2023 to December 31, 2023. Description in some parts of the Report goes beyond the above scope.



Notes on the Report's Data:

The Report's data and information are all from internally collected data, public documents, green and low-carbon cases reported by subsidiaries and qualitative and quantitative questionnaires prepared for reporting. All numbers in the Report have been rounded.



Currency:

Unless otherwise specified, the amounts shown in this Report are all presented in RMB.

Contents

Muyuan Basic Law

Tribute to Pigs

Foreword

Chapter 1

Overview of Green and Low-Carbon Development

- Overview of 2023 Low-Carbon Performance
- Overview of 2023 Low-Carbon Actions
- Current Status of GHG Emissions
- GHG Accounting Boundary

Chapter 2

Green and Low-Carbon Practices

- Low-carbon Feed
- Biogas Utilization
- Crop-livestock Cycle
- Photovoltaic Power Generation
- Green and Low-Carbon Pork Production in Meat Plants
- Making Breakthroughs through Industry and Research Efforts
- Industry Promotion

Chapter 3

A Green and Low-Carbon Life

- Fully Implementing Green and Low-Carbon Practices
- Outlook



Foreword

Green and low-carbon development represents the new quality productive forces. Muyuan makes continuous efforts to explore a green and low-carbon development model in which environment-friendly and animal-friendly operations are promoted, circular economy is developed, clean production is implemented, atmospheric hazards are reduced, and food quality standards are continuously improved. By doing so, we aim to facilitate the construction of an improved industry ecology and boost the high-quality development of the pork industry.

In 2023, Muyuan addressed GHG emission concerns and carried out a series of actions to reduce carbon emissions in all its business chains. As a result, the overall carbon intensity decreased by 3.4% compared to 2022. Also, Muyuan started to focus on the carbon emission level in the whole industry chain, explore space for sustainable development, and foster new quality productive forces for the development of animal husbandry.

In 2023, Muyuan made efforts from the technological meta point and achieved breakthroughs based on underlying businesses. It promoted clean production, continued the exploration of applying renewable energy including solar energy and biotic energy in pork production, and developed and promoted the multi-scenario applications of new energy vehicles. Muyuan insisted on responsible production. It improved low-carbon pork production through technical innovation and further explored the low-soybean diet and exhaust purification technologies. In addition, Muyuan explored the underlying logic and launched a series of carbon footprint assessment work, contributing to producing green and low-carbon pork foods for the public.

In 2023, Muyuan held the Co-creation & Sharing Forum, advocating for the industry to practice green development by applying production methods that are green, low-carbon, circular, and sustainable, and create a pollution-free and low-carbon green farming model to produce quality-assured pork. Muyuan actively shared its carbon reduction technologies with peers to encourage low-carbon commitments and make the industry green together.

In 2024, Muyuan will continue to focus on its main business and provide the public with low-carbon pork as well as actively lead and work together with various parties to promote industry upgrading and create a green and low-carbon future.

Visions of low-carbon management

By 2025:

Carbon intensity for producing 1 kg pork cut by 2.5%
(Feed, farming and slaughtering included)

Increase the utilization of biogas by 50.6%;
Increase the installed capacity of distributed photovoltaic (PV) power generation to 50 MW;
Increase the installed capacity of biogas power generation to 10 MW;
Further optimize the energy structure and reduce the consumption ratio of fossil fuels; and
Widely apply soil testing for fertilizer use and increase the service area to 4.62 million mu of farmland (308,000 hectares).

By 2030:

Carbon emission reduction management implemented throughout the pork production
Carbon intensity for producing 1 kg pork cut by 5%

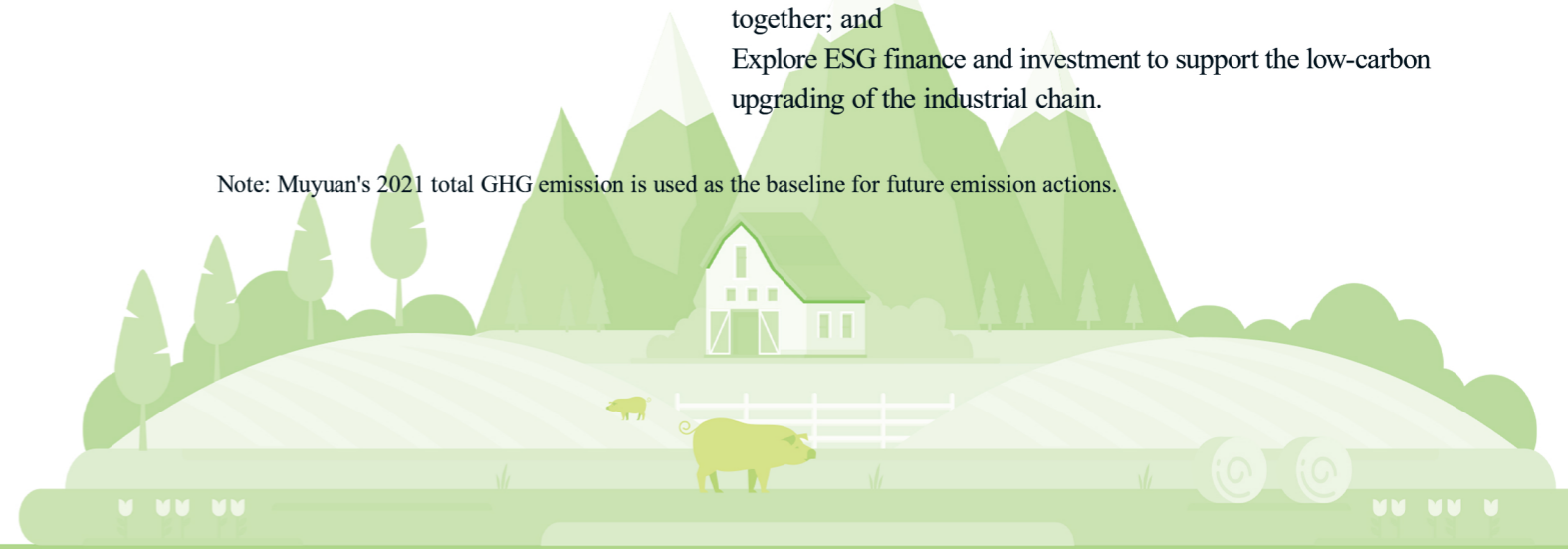
Increase the utilization of biogas by 348.9%;
Increase the installed capacity of distributed photovoltaic (PV) power generation to 10 GW;
Improve the utilization of manure and replace chemical fertilizer use by over 50%;
Experiment straw recycling to reduce GHG emission from farmland;
Launch the Muyuan Carbon Management Platform; and
Account individual carbon emission of employees and encourage employees to reduce personal carbon emission.

By 2050:

To limit the average global temperature increase to 1.5 °C by joint efforts of the whole society

Refine plans for energy saving, carbon emission reduction and sequestration continuously to achieve carbon emission reduction of the highest standard;
Carry out carbon emission reduction services in the upstream and downstream of the industrial chain to reduce emissions together; and
Explore ESG finance and investment to support the low-carbon upgrading of the industrial chain.

Note: Muyuan's 2021 total GHG emission is used as the baseline for future emission actions.



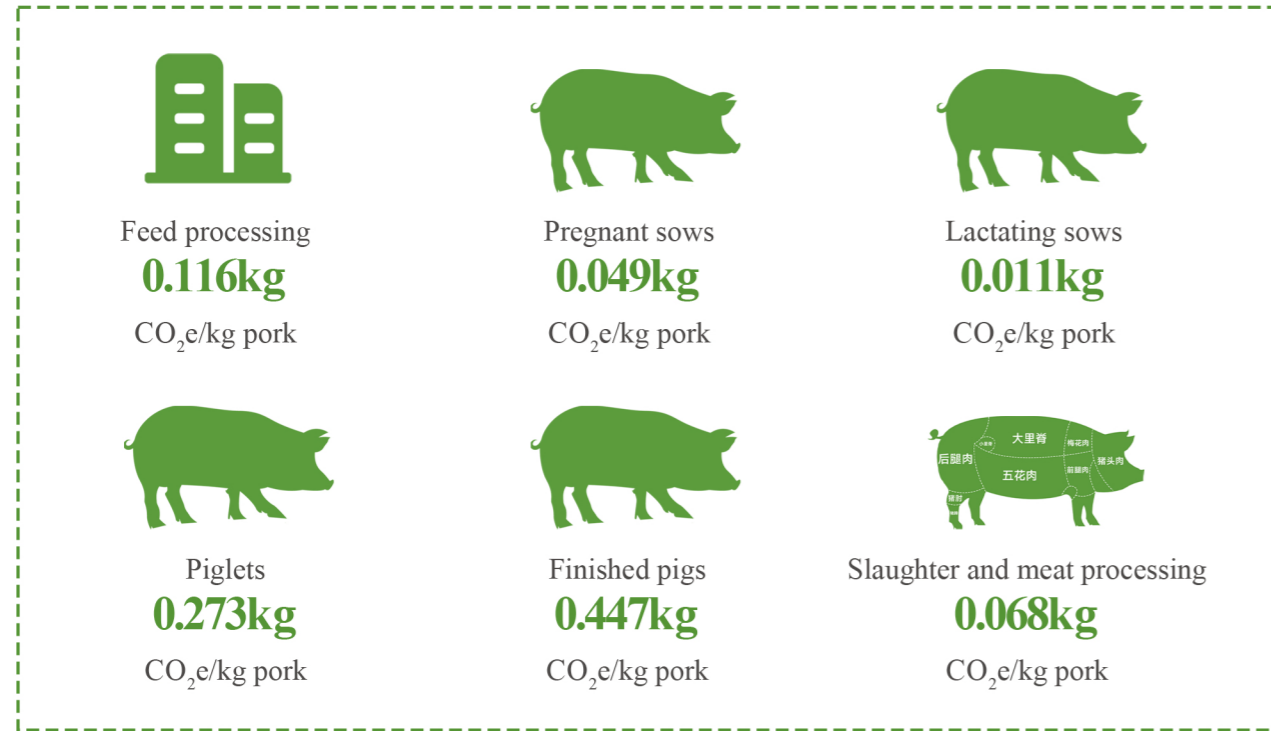
Chapter 1 Overview of Green and Low-Carbon Development



Overview of 2023 Low-Carbon Performance

Compared to 2022, carbon intensity in 2023 **cut by 3.4%**

Carbon intensity for producing 1 kg pork was **0.964kg CO₂e**

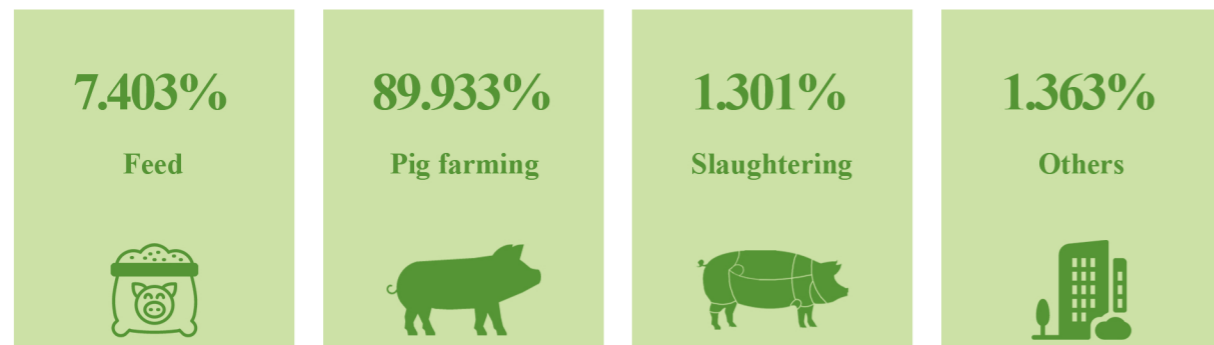


Feed GHG emission intensity: **0.026kg CO₂e/kg feed**

Pig farming GHG emission intensity: **75.589kg CO₂e/pig**

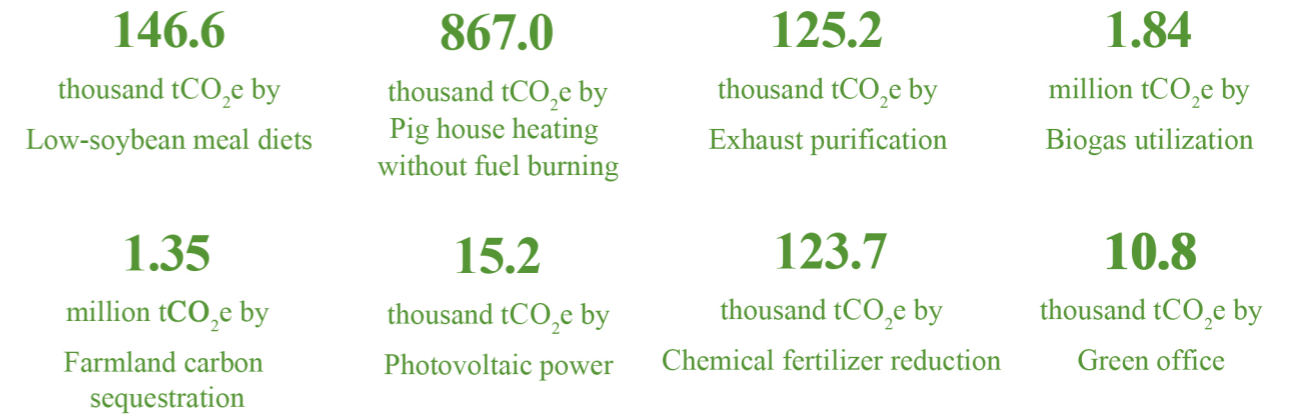
Pig slaughtering GHG emission intensity: **0.068kg CO₂e/kg pork**

Emission percentages by major segments

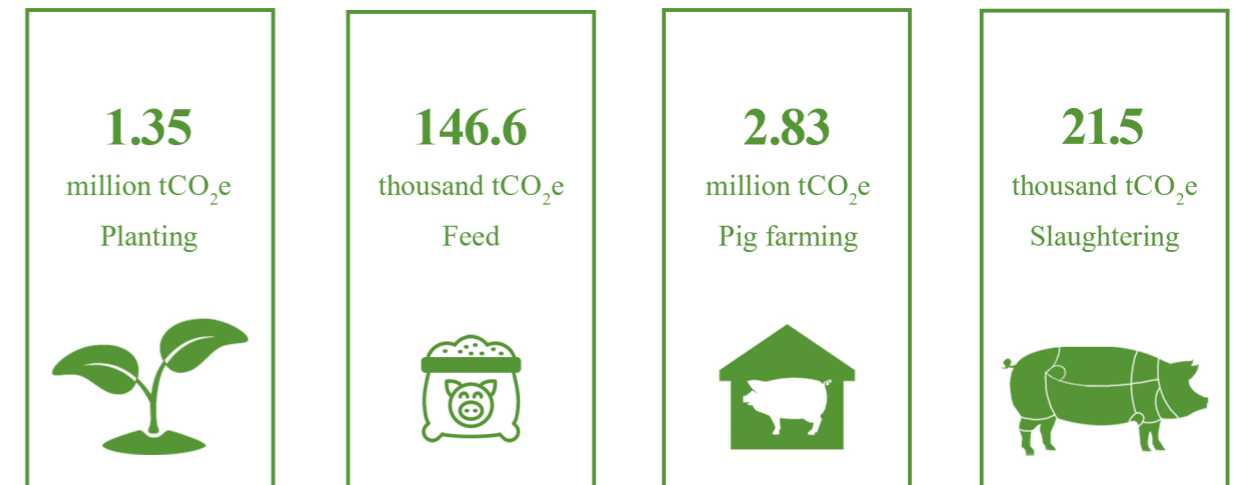


Overview of 2023 Low-Carbon Actions

2023 emission reduction highlights



Emission reduction values by segments in 2023



Through the production model of “fully independent farming, whole chain covering, and intelligent operation”, Muyuan has formed a whole pork industry chain that integrates feed processing, pig farming, and slaughtering. The accounting covers the GHG emissions from the entire industrial chain that includes feed processing, pig farming, slaughtering and meat processing, as well as waste disposal and utilization.

Current Status of GHG Emissions

Carbon emission reduction performance in the past 5 years

Accounting period	2023	2022	2021	2020	2019	2018
Total carbon emission (Million tCO ₂ e)	7.98	7.30	5.91	2.59	1.28	1.14
Carbon emission reduction (Million tCO ₂ e)	3.31	3.20	2.51	0.90	0.46	0.44
Net carbon emission (Million tCO ₂ e)	4.67	4.10	3.40	1.70	0.81	0.70
Carbon intensity for producing 1 kg pork (kgCO ₂ e)	0.964	0.998	1.049	/	/	/

Note: The emissions were also controlled from the sources by taking measures such as low-soybean diet, pig house heating without fuel burning, and photovoltaic power generation. If the emissions reduction from these parts, which was 1.03 million tCO₂e in total, and the reduction from the production process are included, the total carbon emission reduction in 2023 would be 4.34 million tCO₂e.

The accounting covers Scope 1 and Scope 2 emissions.

Scope 1 (Direct GHG emissions):

1. Carbon dioxide emissions directly from the combustion of fuel used by the company, such as natural gas and oil;
2. Methane emissions from intestinal fermentation of pig herds;
3. Methane and nitrous oxide emissions from manure treatment.

Scope 2 (Indirect emissions):

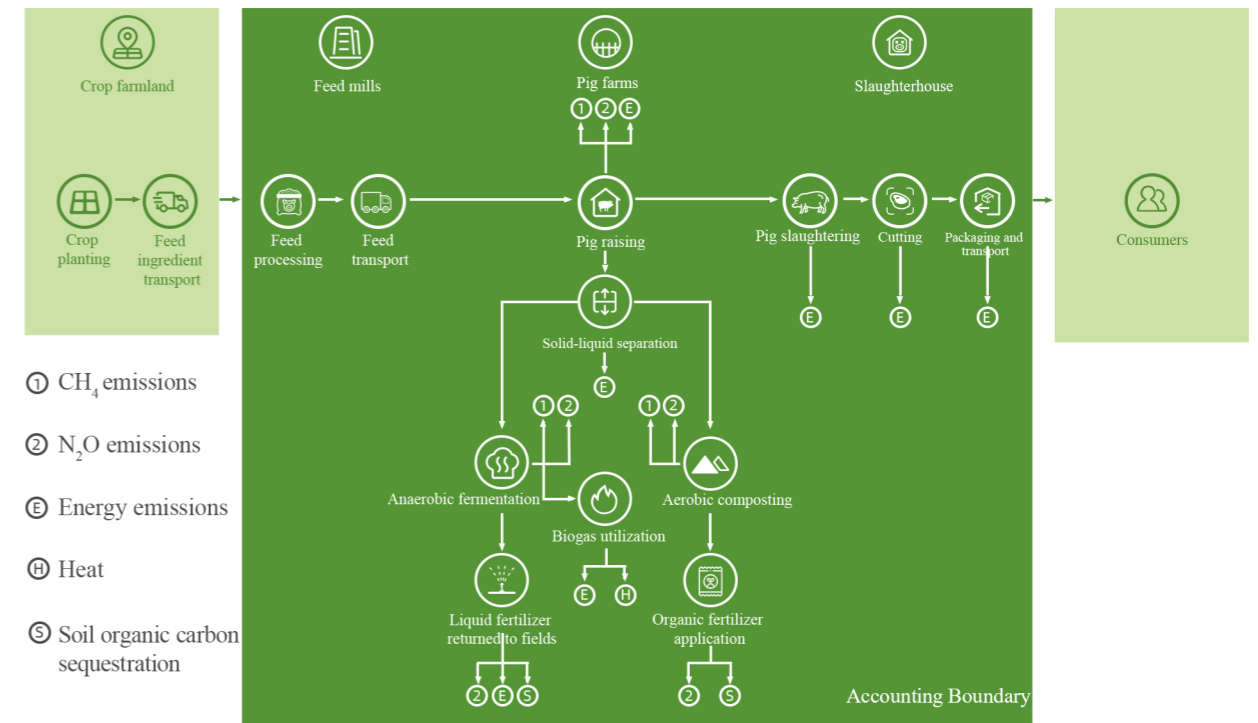
GHG emissions from the production of purchased energy such as the electricity purchased by the company.

Scope 3 (All other indirect emissions):

Indirect emissions from the activities in the company's value chain, consisting of both its upstream and downstream activities:

1. The consumption of purchased and sold products;
2. Supplier emissions;
3. Packaging;
4. Employees' business travel.

GHG Accounting Boundary



This inventory covered the Scope 1 and Scope 2 GHG emissions within the organizational boundary and reporting boundary of Muyuan in 2023, including emissions from pig enteric fermentation, waste disposal and energy consumption. The GHGs involved in this inventory are: CO₂, CH₄, and N₂O.

References:

- ① ISO 14064-1:2018 Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals;
- ② The GHG Protocol: A Corporate reporting and accounting standard;
- ③ ISO 14064-3:2019: Greenhouse gases — Part 3: Specification with guidance for the verification and validation of greenhouse gas statements; and
- ④ Other applicable laws, regulations and relevant standards.

Selection of emission factors:

- ① The 2006 IPCC Guidelines for National Greenhouse Gas Inventories issued by the United Nations Intergovernmental Panel on Climate Change (IPCC) in 2006;
- ② General rules for calculation of the comprehensive energy consumption (GB/T 2589-2020) implemented from April 1, 2021;
- ③ China Energy Statistical Yearbook 2019;
- ④ Electricity CO₂ Emission Factors 2021 released by the Ministry and Ecology and Environment and the National Bureau of Statistics of the People's Republic of China in April 12, 2024; and
- ⑤ Other authoritative references.

The GHG emissions from Muyuan during the period (natural year 2023) were inventoried according to the above standards and literatures. The GHG emissions activity data strictly conform to the quality requirements for the relevant primary and secondary activity data. All processes strictly follow the requirements of ISO14064-3 standard.

Chapter 2

Green and Low-Carbon Practices



Low-carbon Feed

Low-soybean meal diets

Soybean meal consumption percentage in 2023

5.7%

YOY change

-1.6%

Social average level

13%

Equivalent to a soybean saving per pig

31.20kg

Nitrogen emission reduction in 2023

80 thousand tons

GHG emission reduction

146.6 thousand tCO₂e

In 2023, Muyuan continued to increase R&D investment in the low-soybean meal diet technology. The total investment reached 65.0645 million yuan. Based on its research of optimal nutritional needs of pigs of different breeds, growth stages, and types, Muyuan combined high-concentration and low-concentration amino acid diets in proportion based on the frequency conversion mixing technology to determine standardized nutritional ratios and dynamically adjusted them to meet the nutritional needs of pig herds as well as facilitate the reduction of soybean meal consumption and nitrogen emissions. Muyuan worked with Westlake University to promote the R&D and industrialized application of synthetic biology technologies and facilitate soybean meal consumption reduction and substitution. It's expected to reduce soybean consumption by 20 million tons in future pig farming. In addition, Muyuan took new steps in implementing the "Skynet" project for pig disease prevention and control. It innovatively developed equipment for intelligent feeding, environmental control, patrol inspection, etc to enhance precision pig health management in each pig unit and each pig, thus improving pig farming efficiency and the conversion efficiency of grain resources.



Localized procurement of raw materials

19.88 million tons of local grains in total were purchased in 2023

An increase of **4.87%** on year-on-year basis

52.56% of soybean products are purchased from sources certified for sustainability

Grains purchased locally account for **88.78%** of the total procurement in 2023

Following the principles of fairness, equity, openness, and transparency, Muyuan expanded local raw material procurement and contributed to the development of the community economy. In 2023, the soybean products purchased by the company from suppliers certified for sustainability reached 52.56%, and the percentage is expected to increase to 70% by 2025.

Green transportation

565 new electric transport vehicles came into service in farms

By multimodal transportation, a transportation volume of **1.57 million tons** of grains by trucks was reduced

A cooperation involves **300** new energy vehicles at Zhoukou Port (a transportation hub) was in plan

35.1 thousand tCO₂e of GHG emissions were reduced

We replaced fuel vehicles with electric vehicles in farms to reduce fossil fuel consumption and promote low-carbon transportation. We also expanded the covering range of green transportation, enhanced transportation management, and optimized transportation routes to implement dedicated point-to-point transportation and improve the full load rate. Our haul distance exceeded 500 km. We increased the proportion of multimodal transportation and reduced cross-region transportation by truck.



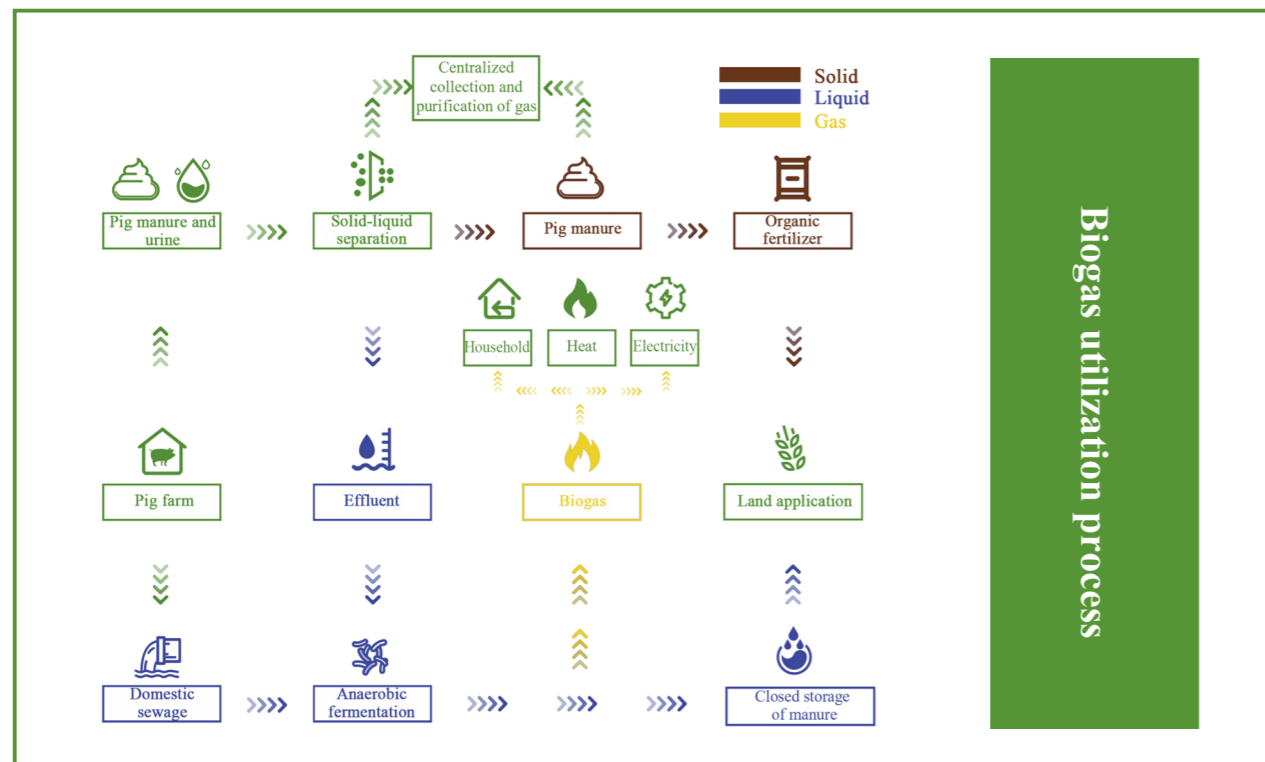
94.41%
Rate of raw material purchased in bulk

99.99%
Rate of feed purchased in bulk

21.54
million tons
Feed distribution

Biogas Utilization

New biogas utilization projects	Biogas utilization in 2023	Equivalent to saving natural gas
30	34.45 million m³	22.39 million m³
Biogas power generation projects	Accumulated installed capacity	Maxi. annual generating capacity
11	16.25 MW	84.24 million kWh



This biogas utilization project adopts the medium-temperature anaerobic fermentation technology. Pig manure and urine from farms and pre-treated straws are collected and mixed regularly for anaerobic fermentation. The biogas generated is purified and then transported to the utilization end. The biogas digestate is separated into solid and liquid. The solid part will be further fermented and used as organic fertilizer and the liquid will enter the storage tank for secondary fermentation and then be used as fertilizer in farmlands. This technology has an insulation system to stabilize the reaction temperature within the required range for medium-temperature anaerobic fermentation.

Highlights: Exploring ways to utilize biogas

① Biogas boiler

Biogas utilization in 2023: **26.11 million m³**
 In-operation biogas boiler projects: **91**
 New projects: **30**
 Total natural gas saving: **15.67 million m³**

② Biogas power generation

Biogas utilization in 2023: **8.34 million m³**
 Self-built projects: **11**, EPC projects: **9**
 Total installed capacity: **16.25 MW**
 Total power generated: **16.68 million kWh**

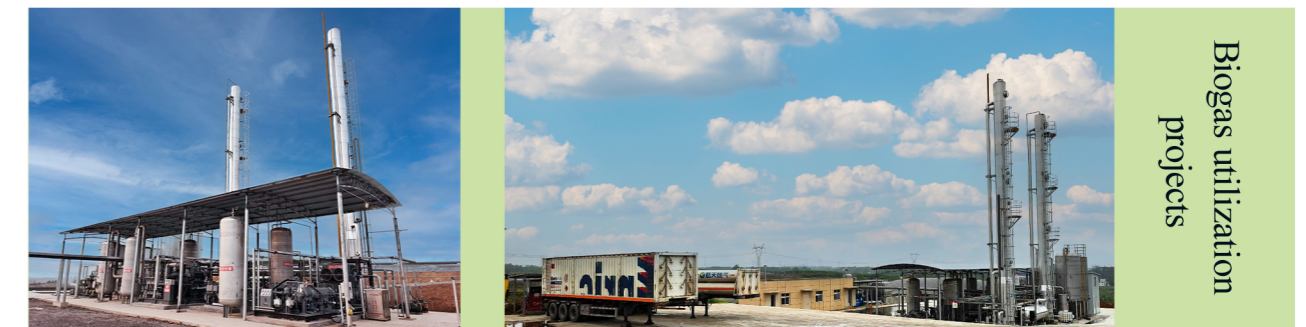
③ Biogas purification

The construction of the pilot project completed in 2023
 Expected production of bio-natural gas in 2024: **3.85 million m³**

At the biogas purification facility constructed and independently operated in Neixiang Muyuan Complex (2.1 million pigs), biogas is purified into bio-natural gas and then transported to nearby gas-consuming units. To ensure safe and stable utilization of the purified bio-nature gas, Muyuan worked with a third-party gas company and explored a new cooperation model under which the gas is transported to nearby feed mills for utilization, addressing the impact of unstable methane concentration in biogas. Muyuan pursues win-win results and aims to boost the green development through cooperation in renewable energy projects.

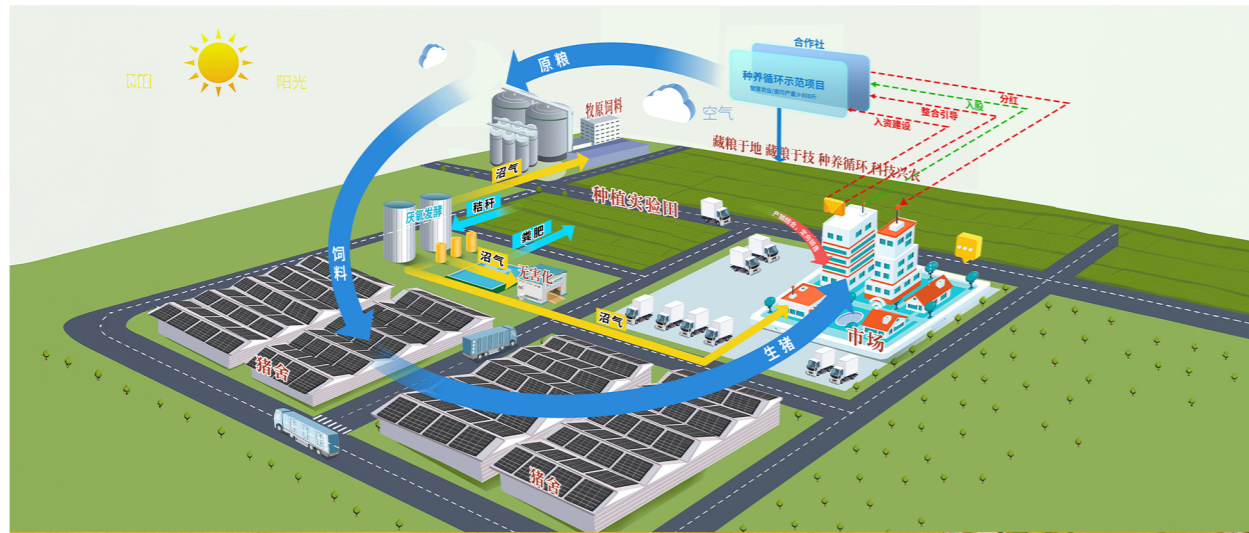
Biogas utilization management

Muyuan adhered to the principle of green development. By continuously exploring biogas utilization models in farms, Muyuan adopted methods such as biogas boiler, biogas power generation, and biogas purification to utilize biogas from a single farm or several farms, which improved the clean energy utilization rate and facilitated carbon emission reduction. To improve the biogas utilization database for making comprehensive analyses, all farms utilizing biogas were installed with gas flowmeters. Besides, an all-round monitoring system was established to prevent biogas leakage.



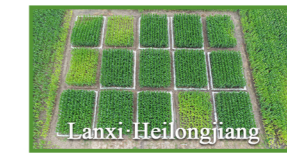
Crop-livestock Cycle

- Area of manure fertilizer application: **4.52 million mu (301,380 ha)**
- Famer income increase: **352.27 yuan/mu (5,284.05 yuan/ha)**
- Area of improved saline-alkali land: **229,500 mu (15,300 ha)**
- Area of desertification control: **88,200 mu (5,880 ha)**
- Total soil carbon sequestration: **1.35 million tCO₂e**
- Soil carbon sequestration per market pig: **21.83 kgCO₂e**
- Chemical fertilizer reduction: **146,800 tons** equivalent to a GHG emission reduction of **123,700 tCO₂e**

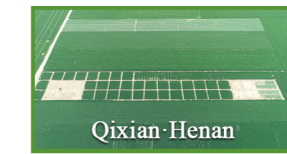


A farm can be built as a circular economy. MUYUAN adopted waste-reduced production, harmless waste treatment, waste resource utilization, ecocycling, and other methods and made continuous technological innovation and improvement of standards to build a circular economy model that features mutual benefits between pig farming and crop planting. Through this model, MUYUAN realized an intergrated crop planting and pig farming cycle, developed modern agriculture with improved resource utilization efficiency, and supported the green, low-carbon, and sustainable development of agriculture and husbandry.

Exploring more efficient resource utilization



Black soil protection; Efficient liquid fertilizer utilization; Exploring element cycles in crop farming; and implementation of carbon and nitrogen reduction projects.



Rotation of wheat and corn on alkaline soil; Safe utilization of liquid fertilizer; Continuously improved saline-alkali land of **229,500 mu (15,300 ha)**



Liquid fertilizer utilization in the rotation of wheat and corn; Exploring element cycles in the whole process of pig farming.



Exploration of liquid fertilizer formula utilization technology and element cycle for growing sugar cane/ orah mandarin on latosol in South China



Exploration of liquid fertilizer utilization, element cycle and safe fertilizer application in the rotation of rice and wheat on salty soil in coastal regions



High-yield planting method of rice-wheat rotation on neutral soil



Exploration of safe liquid fertilizer utilization and efficient planting for wheat-corn rotation on acid soil

In 2023, we launched several agricultural demonstration projects, with a total scale of 98.6 thousand mu (6,573.33 ha), and established 7 agricultural R&D bases to promote sustainable agricultural development and the cycle of crop planting and pig farming.

The R&D bases were established mainly to explore the utilization methods of returning manure fertilizer to farmlands in various regions, for various crops, and under various climate conditions, committing to safe and sustainable manure utilization. We developed manure fertilizer application models in light of actual local conditions to improve crop production efficiency and soil quality. In addition, we will focus on the efficient utilization of manure resources to reduce the use of chemical fertilizers, mitigate negative impacts on the environment, improve the ecological level of the crop-livestock cycle, and improve crop yield and quality. The efficient utilization of manure fertilizer not only reduces inputs from farmers but also enhances the sustainability and increases the economic benefits of agriculture.

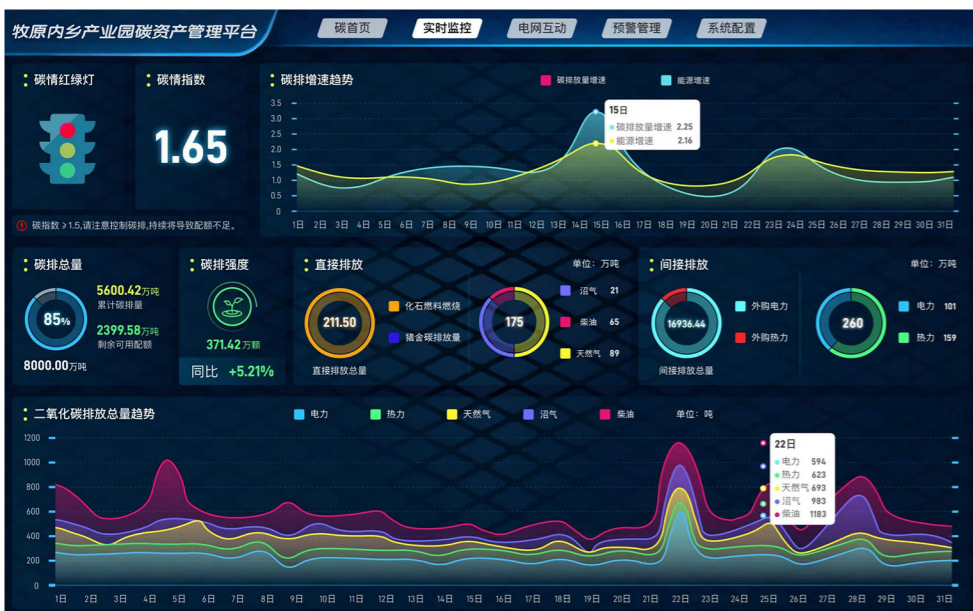
In addition to these R&D bases, we also focused on the implementation of crop-livestock cycle demonstration projects. By constructing the crop-livestock cycle model that features mutual benefits between pig farming and crop planting, we explored efficient methods of manure utilization. This model will have a good circular effect and promote the development of agriculture and animal husbandry. We also actively implemented large-scale planting demonstration projects to drive intensive and modernized agriculture development. We integrated resources and technologies to fully replace chemical fertilizers with manure fertilizer. This measure will cultivate soil fertility and help farmers reduce investment and increase income, facilitating rural revitalization.

Photovoltaic Power

Newly installed capacity of photovoltaic (PV) power generation in 2023: **117.4 MW**
 Cumulative installed capacity of distributed PV power generation in 2023: **207.9 MW**
 Cumulative electricity generated in 2023: **36.88 million kWh**
 Green power for self consumption: **27.06 million kWh**
 GHG emission reduction: **15,236 tCO₂e**

Smart grid enables efficient replacement of each kWh with green power

Muyuan adopts a new power operation model that integrates power source, grid, load, and storage, referred to as “source-grid-load-storage integration”. By collaborative planning, this model is able to realize the maximum utilization of energy resources. It may take various interaction forms such as source-source complementation, source-grid coordination, grid-load interaction, grid-storage interaction and source-load interaction to enhance the power system's capability of keeping dynamic power balance in a more economical, efficient, and safer way. Based on the traditional grid, a smart grid is formed by the high-degree integration of communication technology, information technology, and control technology. With the support of the basic system of the power grid and these technologies, it can adapt to the large-scale connection of clean and renewable energy, and enhance the resilience of the power grid. Through the integration of information technology, communication technology, and the power grid, the safety, stability, and supply reliability of the power grid are greatly improved, effectively avoiding the occurrence of large-scale cascading faults and reducing losses caused by power outage. Thanks to the smart grid, large-scale renewable energy can be transported across regions, over long distances with large capacity, low loss, and high efficiency, and the power exchange capacity between regions can be significantly improved.



· Real-time online monitoring ensures timely and accurate risk feedback
 · Energy consumption data visualizes the green power in use



No. 30 Farm of Leizhou Muyuan

In 2023, a PV power generation project in No. 30 Farm of Leizhou Muyuan was officially put into operation. The project is located in the farm in Leizhou, Zhanjiang, Guangdong, with an installed capacity of 5.34 MW. During this reporting period, the project achieved an annual power generation of 5.34 million kWh and reduced carbon dioxide emissions by 2,517.81 tons.



No. 5 Farm of Suiyang Muyuan

In November 2023, a PV power station in No. 5 Farm of Suiyang Muyuan was delivered with a capacity of 2.779 MW. During this reporting period, the project achieved an annual power generation of 890 thousand kWh and reduced carbon dioxide emissions by 567.09 tons.

Green and Low-Carbon Pork Production in Meat Plants

In 2023, Muyuan Meat reduced GHG emissions by 21,481 tCO₂e



Work outcomes

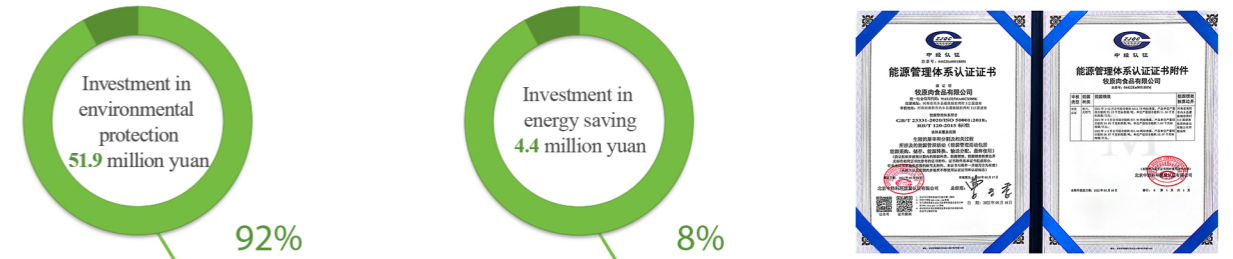


Muyuan Meat adheres to green development, and continuously strengthens green management and model innovation. It has built a green manufacturing system for the entire industry chain in accordance with standards such as GB/T36132 “General Principles for Assessment of Green Factories”. The company has been committed to building ecological and intelligent modern factories, and implementing the concept of green industrial development so as to realize green transformation and upgrading based on the national requirements of “intensive land use of plants, harmless raw materials, clean production, waste recycling, and low-carbon energy”. In 2023, Muyuan Meat Co., Ltd. was successfully certified as a national-level “Green Factory”.



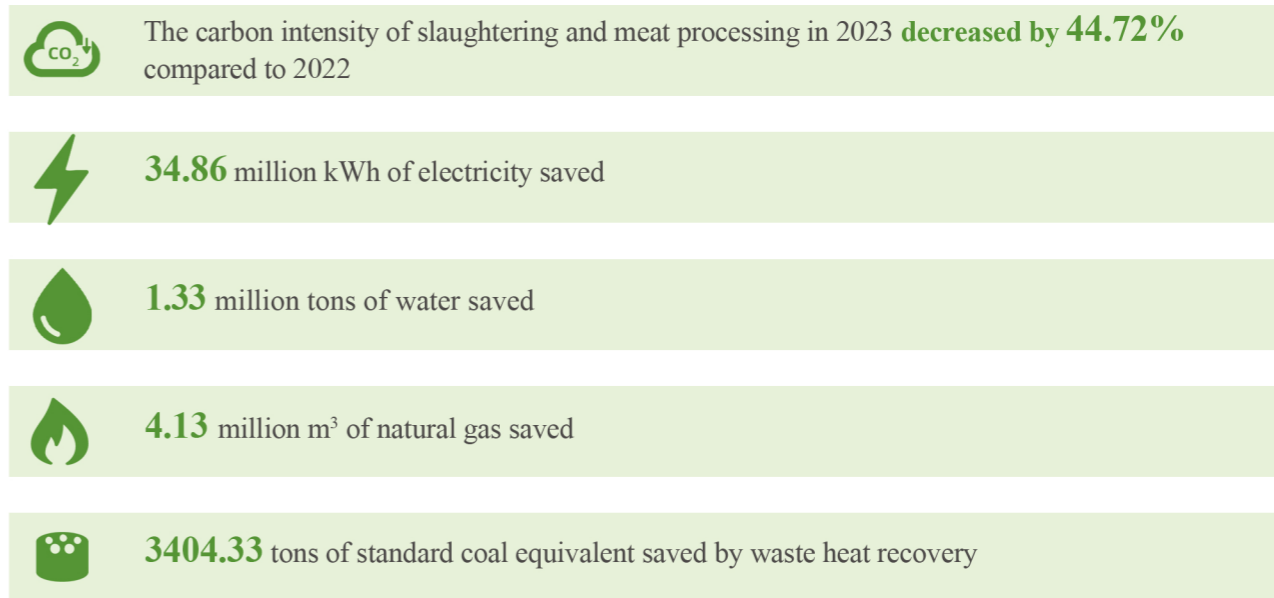
Environmental protection and energy-saving projects

In 2023, a total of 56.30 million yuan was invested in environmental protection and energy-saving renovation projects.



Muyuan Meat continuously conducts GHG inventory in the process of pork production. It persistently improves energy efficiency, reduces GHG emissions, and minimizes the environmental impacts of its production operations through the establishment of an energy management system and innovative environmental protection technologies.

10 innovative R&D projects for energy-saving renovation; a solid waste utilization rate of **99.9%**



Making Breakthroughs through Industry and Research Efforts

Muyuan has been conducting in-depth research to make technological breakthroughs and promote enterprise development through technological innovation. It's exploring the establishment of a complete pork production system to improve production efficiency and product quality, and boost the low-carbon and green upgrading of the industry.

Close cooperation between the industry, universities and research institutes, and end-users



Muyuan has established and continuously improved a low-carbon indicator database with data samples collected from 217 counties/districts in 103 cities across 24 provinces/autonomous regions in China. The foundation for green pork production is laid through the analysis of tens of millions of indicator data.

Researchers in Muyuan have published “Research on the Application of Liquid Digestate for Wheat-Based on Risk Factor Evaluation” in *China Biogas*, “Scale pig farm ammonia emission reduction technology - intelligent ammonia reduction shed” in *China Animal Industry*, and “A systematic review of life-cycle GHG emissions from intensive pig farming: Accounting and mitigation” in *Science of The Total Environment*, etc.



Muyuan is committed to building a research and exchange platform for green pork production. During the 2023 Muyuan Open Days, Muyuan held an Environmental Protection Technology Seminar and invited nearly 100 industry professionals and experts to discuss green and low-carbon pork production.



2023 Muyuan Open Days · Parallel Chat - Environmental Protection Technology Seminar



Participation in a key special project under the “Intergovernmental International Cooperation on Science and Technology Innovation”

In 2023, Muyuan participated in the “Research and Demonstration of Synergetic Emission Reduction Technology for Greenhouse Gases and Ammonia in Pig Farming”, one of the key special projects under the “Intergovernmental International Cooperation on Science and Technology Innovation”, and conducted in-depth research on “Research and Demonstrative Application of Source Emission Reduction Technology and Equipment for Pig Farming”. Muyuan and the Institute of Environment and Sustainable Development in Agriculture of the Chinese Academy of Agricultural Sciences (IEDA·CAAS) jointly conducted project experiments, mainly focusing on the unclear impacts and characteristics of GHG and ammonia emissions in pig houses, as well as the severe pollution caused by gas emissions. They studied the impact of manure management and ventilation in pig houses on GHG and ammonia emissions, developed the automatic manure removal technology based on robot recognition, established a demonstration site for synergetic emission reduction technology of GHG and ammonia throughout the whole industrial chain in pig farming, and evaluated the effect of carbon reduction.

Participation in the formulation of GHG emission accounting and verification standards



In 2023, Muyuan actively participated in the formulation of three standards: RB/T 125-2022 “General rules for greenhouse gas emission verification in cultivation and breeding enterprises (organizations)”, RB/T 126-2022 “Technical specifications for greenhouse gas emission verification in animal farming companies”, and RB/T 095-2022 “Guidelines for accounting for the greenhouse gas emission of crops”. It provided a large amount of actual operational data, and offered practical and feasible suggestions for accounting methods in these standards based on its rich experience. These standards provide the industry with a unified framework for GHG emissions accounting and facilitate the green transformation of the industry. In addition, it actively participated in discussions on verification and technical specifications, and proposed multiple specific verification suggestions based on the characteristics of GHG emissions from animal farming companies. In the future, Muyuan will continue to adhere to the concept of sustainable development, strengthen cooperation with all parties, and jointly promote the continuous improvement of GHG emission management levels.

Innovation-driven development

Muyuan is continuously optimizing its innovation mechanism and constructing an innovative R&D system. Relying on big data, it accurately identifies the difficulties in pork production that hinder it from satisfying customer needs and launches targeted technology R&D to remove these difficulties. Muyuan consistently broadens its R&D field and deepens research levels, innovates green pork production technology with enhanced ability, and thus promotes green and sustainable development in the industry.



Application innovation platform for green, low-carbon, and environmental protection technologies

According to environment and policy requirements in different regions, Muyuan innovates and develops green and low-carbon technologies, promotes new environmentally friendly treatment processes, and optimizes existing processes to meet the needs of green and low-carbon production.

Innovative R&D Platform of Muyuan Group

Through this platform, Muyuan investigates the leading-edge and key common technologies in the industry. It also studies, introduces, further develops and re-innovates various domestic and foreign technologies.

Open platforms for exchange among enterprises, universities and research institutes

These platforms include Westlake University - Muyuan Joint Research Institute, HAU Muyuan Joint Industrial Research Institute of Animal Husbandry, Green and Low-Carbon Technology Service Station, and National Science and Technology Innovation Alliance of Agricultural and Rural Peak Carbon Emission and Carbon Neutrality.

Industry Promotion

Participation in piloting a green and low-carbon technology service station for animal husbandry

In 2023, Muyuan, as the master organization for a new service station, participated in the pilot work for a green and low-carbon technology service station for animal husbandry in Neixiang, Henan, to explore new models of green and low-carbon technology services, and further promote the green and low-carbon work of animal husbandry with a focus on the recycling of livestock and poultry manure.

This manner of development is a sure path to promote the high-quality animal husbandry. As part of the technical support committee for livestock and poultry waste recycling and the expert group for green and low-carbon technology services for animal husbandry, Muyuan actively participated in the platform construction. Fulfilling the role to the best of its ability, Muyuan helps build a good ecosystem that covers enterprises, universities, and research institutes, and jointly build the service station as a center for applications of scientific and technological results, for trials of new technologies and products, for demonstrations of good technologies and products, and for promotion of mature technologies and products, to promote the green and low-carbon transformation and upgrading of animal husbandry.



Sharing Muyuan's green and low-carbon development practice

We shared our case titled "Green and Low-carbon Technology Application Case in Pig Farming" in the Collection of Excellent Cases of Enterprise Green and Low-carbon Development Practice published by China Enterprise Confederation in 2023. In this case, we shared our experience on energy saving & emission reduction, resource recycling, and new energy development & utilization, etc., specifically, the technologies and measures in reducing emissions of nitrogen, ammonia, and methane, as well as energy conservation and waste heat recovery. Besides, we also put forward short-, medium- and long-term ideas and plans on green and low-carbon actions.

Together with clients, partners, and consumers in the upstream and downstream value chain, Muyuan hopes to promote innovations in all aspects, including environmental protection, social responsibility, and organizational governance, and work together to create a low-carbon, green, beautiful, and sustainable future!



Promoting waste gas purification technology in the industry



We upgraded the waste gas purification process of the air outlet in a 80,000-head farm of Guangxi State Farms, achieving ammonia emission reduction.



Muyuan's technology and process of purifying waste air from pig houses were promoted by Jiangsu General Animal Husbandry Station to enhance the capacity and level of odor reduction and control in livestock and poultry farming, improve the farming environment and the level of green and healthy farming, and promote the high-quality development of animal husbandry.

Sharing Muyuan cases of carbon resource management and application

At the 17th National Symposium on Composting Technology and Engineering, Muyuan gave a presentation titled "Muyuan's Practice in Carbon Resource Management and Application" regarding to low-carbon & emission reduction and organic waste recycling. Together with domestic and foreign experts, scholars, and business representatives, we discussed the bottleneck problems in the treatment and utilization of organic waste in urban and rural areas in China in order to promote the healthy development of industries related to the recycling and treatment of livestock and poultry manure and farmland manure application in China, facilitate the progress in national development strategies such as peak carbon and neutrality goals, ecological conservation, and rural revitalization, and practice the concept of low-carbon and green development.



Carbon neutrality services

Muyuan has provided carbon offset services with a total achievement of over 3,500 tons for three companies to help achieve the carbon neutrality goal.



Chapter 3

A Green and Low-Carbon Life



Fully Implementing Green and Low-Carbon Practices

Muyuan is actively building a green, environmentally friendly, low-carbon and sustainable office environment. By continuously sharing the energy-saving management concepts, we promote the green office practice starting with daily details.

In terms of green office, we advocate paperless office, optimize every process, adopt energy-saving equipment, and also encourage our employees to build energy-saving habits to jointly promote the practice of green office.

In terms of green life, we call for a low-carbon lifestyle and encourage employees to use more environmentally friendly products and less disposable items, join the “empty plate” campaign, and actively participate in garbage classification and environmentally friendly public welfare activities to enhance their environmental awareness.

In terms of green travel, employees are encouraged to choose low-carbon means such as public transportation, cycling or walking to reduce the use of private cars, and charging facilities are built to promote the use of new energy vehicles. Through these measures, the concept of “green and low-carbon” can be internalized in the mind, externalized into practice, and further transformed into conscious action by our employees. With green actions becoming a daily habit, we can jointly build a low-carbon future.

Green office

In 2023, we fully implemented electronic signatures and reduced paper printing, and were honored with the title of “Corporate Pioneer in ‘Carbon Reduction through e-Signature’ in 2023”. The number of contracts signed through Fadada e-signature was about 300,000 in 2023, with a total carbon reduction of 51.95 tCO₂e.

(This calculation is based on the carbon reduction calculation model co-developed by Fadada, China Beijing Green Exchange, and Enterprise Green Development Institute.)

300 thousand

contracts signed electronically

51.95 tCO₂e

total emission reduction



In 2023, Muyuan implemented the paperless office approach, fully adopting online submission of logs and intelligent form filling, which significantly reduced the consumption of paper and effectively saved environmental resources. In addition, it actively used online methods such as video conferencing and teleconference for system training and business communication, which significantly reduced carbon emissions from transportation and the consumption of meeting supplies. The implementation of these measures has already achieved significant environmental results, laying a solid foundation for building a green, low-carbon office environment.

68.7 thousand tCO₂e

GHG emissions reduced by the end of 2023

(The carbon reduction data is measured and certified by China Beijing Green Exchange.)

Green Life

Muyuan had planned to install a set of photovoltaic power generation systems on the roof of the office buildings in Nanyang headquarters, with a total capacity of 2.3MW. The installed capacity has reached 1.49MW, and started electrical power generation in April 2023.

As of December 31, 2023, on-grid energy was 678,700 kWh and self-consumption was 626,700 kWh. PV power has been widely used in the headquarters.



92.34%

PV power self-consumption rate

626,700 kWh

self-consumption power

“Empty plate” campaign reducing carbon emissions by an average of 39 g/meal

—Data source: Carbon Generalized System of Preferences Platform, Green Partnership of Industrial Parks in China



“Empty plate” campaign

Muyuan Group has included the implementation of “empty plate” campaign into the Muyuan Group Employee Code of Conduct. The Code requires that all employees should actively follow the requirements of the “empty plate” campaign, practice thrift and oppose waste, no matter in internal or external business activities (such as going out for investigation and reception). We established a joint assessment mechanism for diners - catering service attendants - chefs, and built a chat group of “empty plate” for public information management.

For each meal, a “table host” is appointed to guide diners order dishes according to demand, promote the “empty plate” culture, and encourage everyone to follow the culture. Before the meal, the table host shall pay a deposit which will be returned to him/her if all dishes are eaten up, otherwise, the deposit will be deducted based on how much was wasted. The company’s restaurants consider the reasonable dish arrangement and quantity of each serving when designing menus to meet various needs of employees while reducing waste. Secondly, through publicity and education to raise staff awareness of avoiding food and beverage waste, and to cultivate the habit of food saving. In addition, employees are encouraged to supervise each other during meals and jointly create an atmosphere of “empty plate”.

Muyuan has promoted the concept of empty plate not only inside the company but also to external business events. Whether it's going out for a visit or receiving visitors, Muyuan always requires employees to practice the “empty plate” concept and refuse waste.

Outlook

Creating value, serving society

Unswervingly abiding by our core values, we make efforts from the meta point to achieve breakthroughs in the underlying businesses, continuously promote organizational upgrading, improve management systems, and explore the new path of sustainable development, to make pork production a pioneer representative of the new quality productive forces.

Unity of knowledge and action for the benefit of society

A farm is a circular economy. We actively promote new planting and farming models which are green and low-carbon, integrate ourselves into the construction of agriculture and rural areas to boost rural economy development, help farmers gain harvests, achieve mutual prosperity between villages and enterprises, and promote rural revitalization.

Co-creation and sharing for common development

Muyuan actively promotes the green and low-carbon upgrading of the whole industrial chain and innovates pork production process and technology. In addition, through open exchange and cooperation, Muyuan proactively shares carbon reduction technologies, resources, and strategies to jointly build an industrial ecosystem and bring some green for the industry.

Following the pattern of green and low carbon development

Finding opportunities and driving forces from green development and promoting green development and lifestyles are the trends of the times and development and will be the basis for people's livelihood. This will also surely lead to a civilized path of productive development, affluent living and ecological well-being.

Working together for a better future

Green and low-carbon concepts will be rooted in people's hearts and transformed into a more solid, thicker and brighter undertone of our better life. Let's work together to make our homes more beautiful, livable and harmonious.



Appendix

Dear readers,

Thank you for reading this report. In order to constantly secure green and low-carbon progress, enhance our management and deliver a higher quality report, we sincerely invite your comments on this report.

- Do you think this report provides the information you need to know?
Yes Neutral No
- Do you think this report comprehensively reflects the company's social and environmental performance?
Yes Neutral No
- Do you think this report can fully respond to the expectations and demands of the Company's stakeholders?
Yes Neutral No
- Do you think the quantitative information disclosed in this report is objective, fair and effective?
Yes Neutral No
- Do you think this report is coherent and easy to understand?
Yes Neutral No
- Do you think the layout design of this report helps you understand the relevant information?
Yes Neutral No
- Please feel free to share any additional comments, suggestions, or feedback below.



QR code for online survey



Better pork we serve, better life you enjoy

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