WORLD BANK GROUP | KOREA GREEN GROWTH TRUST FUND | Ministry of Finance and Economy | SEJONG CITY

KGID 2026 SEJONG

Policies on Low-Carbon and Sustainable Agriculture in Korea

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Contents

1 6th Environment-Friendly Agriculture Plan – Vision and Core Goals

Vision: Sustainable agriculture in harmony with the environment

2030 Goals

Expand certified area twofold to foster environment-friendly agriculture
| Reduce chemical fertilizer and pesticide use to improve the agricultural environment

① Expand organic and pesticide-free farming area

'24 2.5%, 2% → '30 5%, 4%

- Expand direct payments
- Designate rice as a strategic crop

② Reduce chemical fertilizer use

'24 233kg/ha → '30 227kg/ha

- Expand soil testing and fertilizer prescription
- Link fertilizer sales with prescription info.

③ Reduce synthetic pesticide use

'24 10.0kg/ha → '30 9.0kg/ha

- Agricultural Environment Conservation Program
- Reduce input-use of conventional farms

Long-Term Goals

Advance environment-friendly agriculture to the level of leading countries by 2050

Indicator	Current ('24)	2050 Goal
Organic certified area	2.5% of total cultivated area, (37.6 thousand ha)	**20%**
Chemical fertilizer use	233 kg/ha	**199 kg/ha**
Synthetic pesticide use	10.0 kg/ha	**Transition to a pesticide risk management system**

1 6th Environment-Friendly Agriculture Plan – Strategy I: Fostering Environment-Friendly Agriculture

Fostering Environment-Friendly Agriculture	**Establishing a Stable Production Base**	1. Expand direct payments for environment-friendly agriculture 2. Expand support for organic farming materials 3. Promote clustering of environment-friendly agriculture and organization by crop type 4. Strengthen protection of environment-friendly farmland 5. Expand human resource support and provide training/dissemination of cultivation technologies 6. Establish a foundation for regenerative organic agriculture
	Expanding the Demand Base	1. Expand public demand for environment-friendly agricultural produce 2. Introduce consumer incentives for environment-friendly agricultural produce 3. Promote consumption of environments-friendly agricultural produce in restaurants 4. Expand the role of the environment-friendly agriculture promotion fund 5. Raise awareness of the value of environment-friendly agriculture 6. Strengthen consumer education
	Enhancing Distribution Channels	1. Expand distribution and sales networks 2. Foster the organic processed food industry 3. Strengthen international cooperation 4. Establish statistics on environment-friendly production and distribution
	Field-Oriented Reform of the Certification System	1. Strengthen a process-based certification system 2. Improve the certification labeling system 3. Link environment-friendly certification with low-carbon certification 4. Improve the organic farming inputs system 5. Foster certification bodies

1 6th Environment-Friendly Agriculture Plan – Strategy II: Improving the Agricultural Environment

Improving the Agricultural Environment	**Conservation of Farmland and Water Quality**	1. Expand farmland soil testing and fertilizer prescription 2. Promote open-field smart farming and precision agriculture 3. Strengthen water quality management 4. Expand and reform agricultural environment monitoring surveys
	Ecosystem Conservation	1. Expand and reform the Agricultural Environment Conservation Program 2. Expand the production and supply of microbial agricultural inputs 3. Develop and disseminate Integrated Pest Management technologies
	Carbon Reduction	1. Establish an incentive system for low-carbon agriculture 2. Develop and disseminate low-carbon agricultural technologies
	Management of Agricultural Waste and Livestock Manure	1. Resource recovery from agricultural by-products and Enhanced management of agricultural waste 2. Promote livestock manure recycling and Integrated crop-livestock system

2 1. Conservation of Farmland and Water Quality

❖ Expanding Farmland Soil Testing and Fertilizer Prescription

Expand the volume of soil testing: approx. 600,000 cases in 2024 → approx. 800,000 cases in 2030

- Implement a pilot project to mandate soil testing and fertilizer prescription
- Conduct the pilot project for farms of 10 ha or larger for three years, then expand it to farms of 5 ha or larger
- Reduce nitrogen fertilizer use by approximately **25%** through soil testing and fertilizer prescription

Link fertilizer prescription information with fertilizer sales data

- Link fertilizer-use prescription data from Heuktoram with fertilizer sales data from NongHyup
- Promote future linkage with the Agrix system
- Develop a regional nutrient management system in the long term

Expand soil testing infrastructure and improve analytical capacity

- Currently, soil testing is conducted for only about **10%** of the plots requiring soil testing under the public-interest direct payment system
- Advance soil testing and analysis methods, including simultaneous analysis of soil phosphorus and cations and rapid soil analysis models
- Establish a basis for issuing fertilizer-use prescriptions for untested plots by introducing an AI-based fertilizer prescription system

2 2. Ecosystem Conservation

❖ Expand and Reform the Agricultural Environment Conservation Program

Conserve the agricultural environment by systematically managing and improving soil, water, ecosystems, and improving soil, water, ecosystems, and landscapes

- Structured as a five-year, region-based implementation program consisting of 44 activities *(individual: 26, collective: 18)*
- Due to limitations in identifying environmental improvement effects *(Kwak et al., 2023)*, the selection of new villages has been suspended

Area participating in agricultural environment conservation activities: 2025: 1,400 ha, 0.1% → 2030: 15,000 ha, 1%

- Support conventional farms' participation in low-input farming, soil erosion prevention, and ecosystem conservation activities
- Improve project effectiveness by excluding activities overlapping with other projects and easing restrictions on individual activities
- Improve budget efficiency by simplifying public contest screening and performance evaluation procedures and supporting activities from the first year

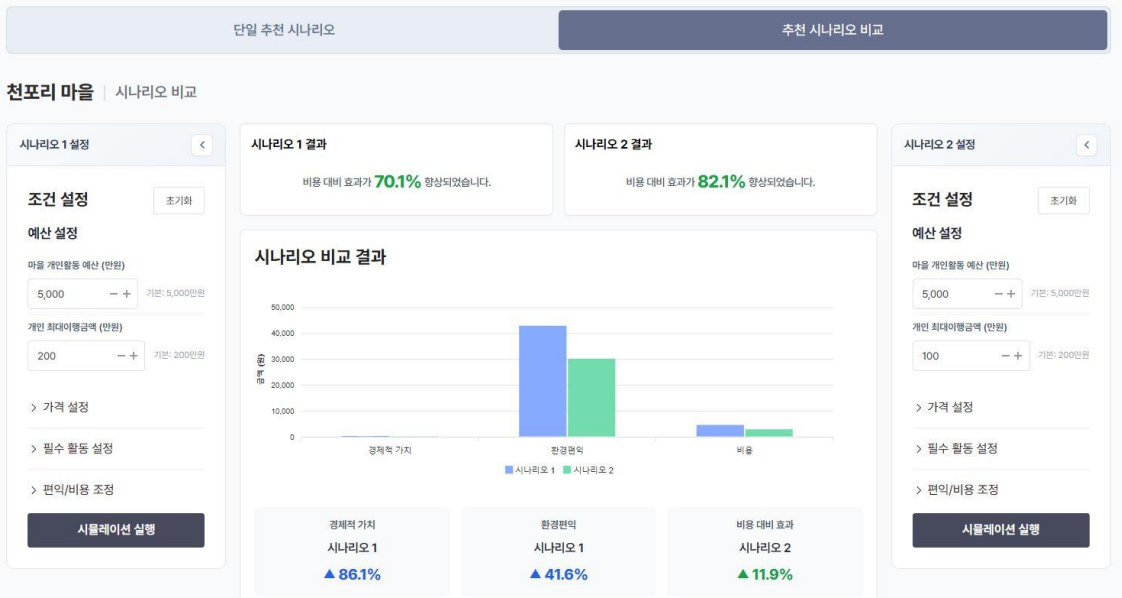
Establish an evaluation indicator and implementation monitoring platform *(Sung et al., 2025)*

- Develop a plot-level integer programming model, link it with APEX(-Paddy), and analyze environmental benefits by scenario
- Eligibility screening method: reflect the current status of agricultural environmental resources and the importance of implementation activities
- Subsidy payment system: introduce a partially results-based subsidy payment system
- Monitoring and evaluation: establish an indicator system covering plot sampling and environmental improvement effects

2. Ecosystem Conservation

❖ Example of Running a Village Recommendation Scenario on the Impact Assessment Platform

Environmental Improvement Effects of the Recommended Scenario Compared to the Baseline



Map Visualization

2 3. Management of Agricultural Waste and Livestock Manure

❖ Strengthening Resource Recycling and Management

Agricultural by-products: Develop carbon-neutral resource recycling technologies and establish a circular utilization system

- Develop biochar production technologies and expand their use by promoting registration as organic agricultural materials
- Develop and establish a regional resource circulation system for agricultural by-products centered on organic farms

Agricultural waste: Expand collection facilities and operate intensive collection periods for proper disposal

- Expand communal collection sites: 10,553 sites in 2024 → 13,000 sites in 2030
- Intensive agricultural waste collection periods: February–April; November–December
- Encourage proper disposal of agricultural waste plastic in rural areas by providing collection compensation payments

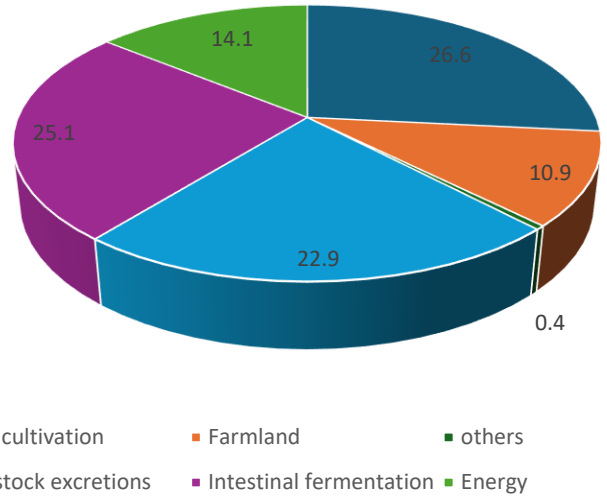
Promote livestock manure recycling and integrated crop-livestock system

- Establish regional livestock manure resource circulation plans and create three special zones for integrated crop-livestock circular agriculture
- Address odor issues by applying of high-quality compost and liquid manure and strengthening supervision of maturity management
- Operate crop-livestock circulation consultative bodies (reviewing direct payments for crop-livestock circulation)
- Support facilities and equipment for conversion into solid fuel and biochar

3 Carbon Reduction Roadmap for 2050

❖ Reduction Roadmap

< Picture> Greenhouse Gas Emission Structure in Agriculture(2022)



Reduction Roadmap

- Announcement of strategies for promoting carbon neutrality for agricultural products (2021.12.27)
- **585.8 million tons of CO2eq by 2030 and 824.3 million tons of CO2eq reduction by 2050 in agricultural and livestock industries**

〈Table〉 Reduction roadmap for 2050 carbon neutrality

Unit: Thousand Ton(CO2eq)

Reduction method		Index	Reduction amount	
			2030	2050
Non-energy	AWD	% of intermittent irrigation area over 2 weeks(%): 61.1 in 2050	474	474
		Percentage of shallow irrigation in rice field area(%): 10 in 2050	66	66
	Farmland	Nitrogen fertilizer input(kg/ha): 115 in 2050	267	268
		Supply rate of biochar soil improvement agent(%): 9 in 2030, 10 in 2050	58	65
		% of manure input reduction for Farmland(%): 33 in 2030, 35 in 2050	1,683	1,936
	Enteric Ferm.	Distribution percentage of low-methane feed over 2 years old(%): 30 in 2030, 100 in 2050	121	402
		Nitrogen reduction in manure compost(%): 13.2 in 2030, 13.2 in 2050	630	673
	manure	Energy and purification treatment ratio(%): 33 in 2030, 35 in 2050	2,058	2,355
	Improve Prod.	The rate of livestock reduction due to dietary changes(%): 10.2 in 2050	-	995
		Smart livestock shed penetration rate(%): 30 in 2030, 50 in 2050	389	579
		Percentage of alternative foods(%): 4.4 in 2030, 15 in 2050	63	200
Energy	Energy	Reduction rate of kerosene by high-efficiency energy facilities(%): 9 in 2030, 50 in 2050	14	41
		Reduction rate of demand for diesel/kerosene in agricultural machinery(%) 10/5 in 2030, 100/50 in 2050	35	190
Total			5,858	8,243

3 Carbon Reduction Effect of Organic Farming

❖ Develop and Disseminate Low-Carbon Agricultural Technologies

Kim et al. (2025) found that organic farming reduced total greenhouse gas emissions by approximately 36.9% compared to conventional farming.

- Both humic substances and MAOM *(mineral-associated organic matter)* were 14% and 13% higher, respectively, in organic fields than in conventional fields, indicating a stronger soil carbon stabilization effect

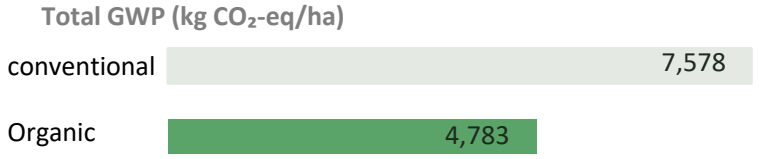
Han et al. (2020) found that soil carbon storage under organic farming was approximately 23% higher than under conventional farming

Kim et al.(2025)

Rice–Onion Paddy-Upland Rotation System

Emission Reduction

-36.9%



Han et al.(2020)

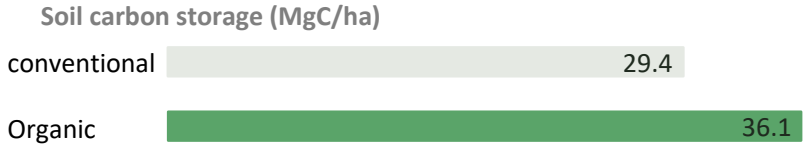
Organic and Conventional Rice Cultivation

Carbon Storage

+23.0%

+6.7 MgC/ha

Increase in soil carbon storage compared to conventional farming



3 Low-Carbon Agricultural Policies in Korea

❖ Policies Frameworks

Voluntary Greenhouse Gas Reduction Program in Agriculture and Rural Areas

- The program encompasses activities such as monitoring and evaluating greenhouse gas reduction performance at the farm level and providing incentives through government-supported purchase mechanisms.
- Incentives are provided at a rate of **KRW 10,000 per metric ton of CO_2 reduced**, for a period of up to three years

The External GHG Reduction Program under the Emissions Trading Scheme

- The ETS external projects provide support for the preparation of project design documents (PDDs), capacity-building training for project participants, and other activities related to project registration and monitoring.
- Greenhouse gas reductions achieved through these projects are certified, and the resulting credits can be traded on the emissions trading market.

The Low-Carbon Agricultural Produce Certification System

- Support is provided for certification consulting, auditing, and other activities that facilitate certification acquisition and market distribution of agricultural products produced using low-carbon agricultural technologies
- Such technologies include the use of pesticides, fertilizers, agricultural inputs etc.

3 Carbon Reduction

❖ Establishing an Incentive System for Low-Carbon Agriculture

Reduce agricultural greenhouse gas emissions

(2035 NDC: 53–61% reduction; agriculture, livestock, and fisheries: 27.5–29.3% reduction)

- From 25.6 million tons CO_2eq in 2024, reductions of 27.5% *(5.6 million tons CO_2eq)* to 29.3% *(6.1 million tons CO_2eq)* are required

Establish a foundation for low-carbon agriculture, including carbon-neutral direct payments and carbon credits

- National Policy Task No. 68 of the current administration proposes the new introduction of a carbon-neutral direct payment system (currently the Low-Carbon Agriculture Program)

Low-Carbon Agriculture Program in the Crop Sector

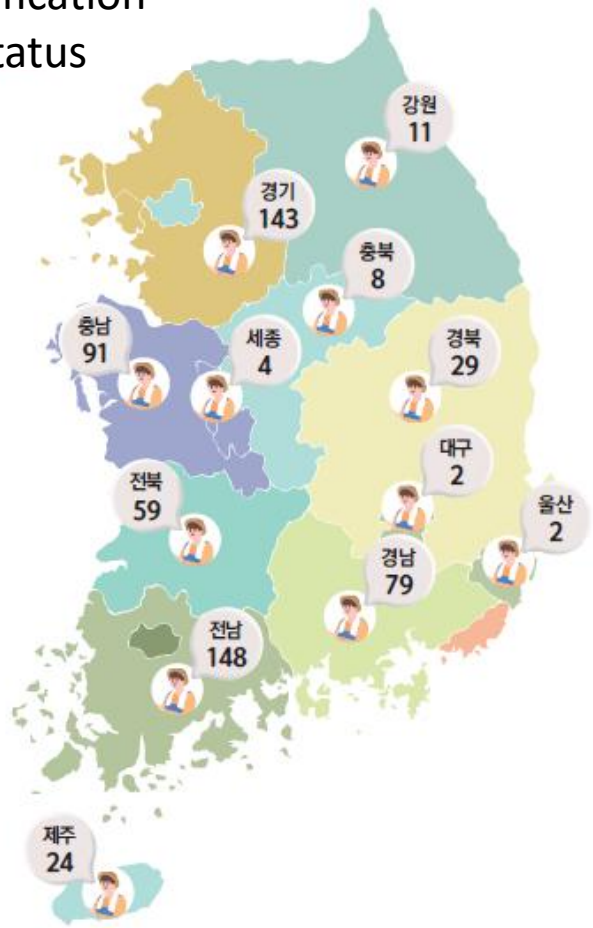
Field	Practice	Payment Rate	Payment Amount
Crop	Alternate Wetting and Drying (mid-season drainage, intermittent drainage)	150,000 KRW/ha	Payment rate × Participating area (ha))
	Shallow Intermittent Irrigation	160,000 KRW/ha	
	Biochar Application	364,000 KRW/ha	
	Autumn Plowing	460,000 KRW/ha	

Source: Ministry of Agriculture, Food and Rural Affairs.

3 Carbon Reduction - Livestock

❖ Develop and Disseminate Low-Carbon Agricultural Technologies

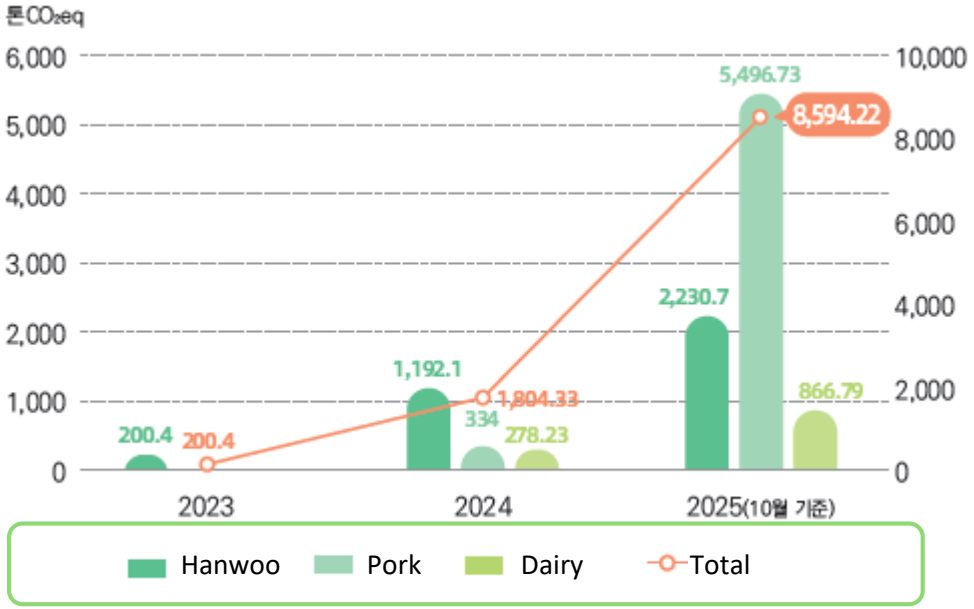
Certification Status



600 livestock farms certified

- Increased from 71 farms in 2023, 261 farms in 2024
- Pork: 291, Hanwoo: 147 farms, Dairy: 162 farms
- Jeollanam-do(148) and Gyeonggi-do(143) accounts almost half of total

10,598.95tCO2-eq GHG Reduced through the program



Thank you so much