

Water Management



Introduction



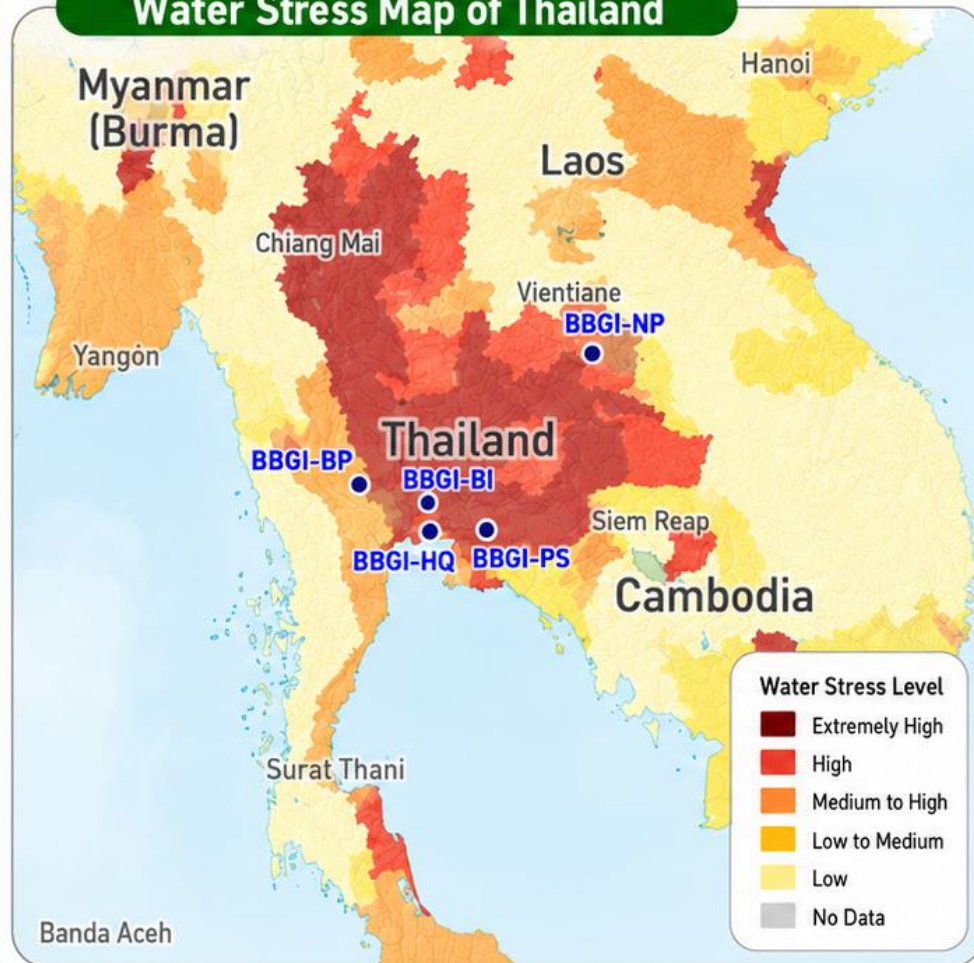
Sustainable development is a core pillar that drives ongoing operations across multiple dimensions for the benefit of all stakeholders. The Company places importance on efficient use of resources and minimizes negative impacts at every stage of the value chain. While maintaining a strong focus on product quality, **occupational health and safety, environmental protection, good governance, agriculture and industry, and economic development.**



With awareness of the importance of water as an essential resource for sustaining life, the Company has established a **water management** policy to ensure effective management. This is achieved through **reducing water use in the process as much as possible**, together with **monitoring and disclosing water-related data in a systematic manner**. These efforts reflect our ability to manage water resources sustainably, which is a key factor in maintaining competitiveness in the industrial sector, thereby supporting the country's long-term sustainable development goals.



Water Stress Map of Thailand



In addition, the analysis and comprehensive use of water-use data help the Company develop and improve its water resource management approach more effectively, resulting in reduced operating costs while also reducing the risk of shortages of high-quality water, which is a critical resource for the long-term sustainability of the business.



Based on the water stress assessment, it was found that almost all areas of Thailand experience high to extremely high water stress. The Company found that our businesses are located in areas at risk of water scarcity, as shown in the figure. The Group has 4 plants and 1 head office, totaling 5 locations. Of these, 2 locations are in areas of extremely high water stress (BBGI-PS, BBGI-BP), and 3 locations are in areas of high water stress (BBGI-HQ, BBGI-BI, BBGI-NP). The Company recognizes this risk and manages water carefully to avoid impacts on water sources, water resources, and water withdrawal that could affect surrounding communities and the environment.

Summary of the Group's Operating Locations



5

Total Locations

The Group has
4 plants and 1 head office,
totaling 5 locations.



2

Locations
Extremely High
Water Stress

BBGI-PS, BBGI-BP



3

Locations
High
Water Stress

BBGI-HQ, BBGI-BI, BBGI-NP



Assessed through the World Resources Institute
(<https://www.wri.org/aqueduct>)



Effective
Water
Management



Reduce
Water Scarcity
Risk



Avoid Impacts on
Communities and
the Environment



Build Long-Term
Business
Sustainability





Guidelines for Water Risk and Water Security Management

“ Due to the nature of BBGI's business operations as a biofuel producer (Biofuel: Biodiesel and Ethanol), the Company needs to rely on agricultural raw materials and supply chain management, which are vulnerable to climate variability and water-related risks, particularly floods, droughts, and the El Niño and La Niña phenomena, which may affect the quantity and quality of raw materials, as well as water security in the production process. The Company has integrated these issues into Water Security Management at both the corporate and plant levels (Site-Specific Water Management Plan), covering all 4 production plants. The key approaches are as follows:



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1)

Water Risk Monitoring and Assessment (Water Risk Monitoring & Early Warning System)



- Monitor water levels in reservoirs and main dams located near plant areas on a regular basis



- Assess the situation in areas at risk of water scarcity (Water-Stressed / Water-Scarce Areas)



- Analyze trends in the impacts of climate variability to support production planning

2)

Stakeholder Engagement in At-Risk Areas (Stakeholder Engagement in Water-Stressed Areas)



- Coordinate collaboration with business partners and operators in the same area to establish water management measures during periods of water scarcity



- Coordinate with relevant government agencies at the local level to ensure proper and transparent implementation, receive information on the water situation, and jointly establish sustainable water management measures



Expected
Outcomes



Reduce risks from
climate variability and
water scarcity



Enhance water security
in the production process
continuously



Support sustainable and
environmentally friendly
business operations



Build collaboration with
stakeholders for long-term
sustainable water
management



Water Management and Drought Response Guidelines

Collaboration Across All Sectors for Water Security in All Operating Areas

The Company recognizes the risks to water resources that may arise from drought conditions and has therefore established water management guidelines for each operating area, through collaboration with government agencies and partner companies within the Complex, in order to maintain operational continuity and reduce water quantity risks to a manageable level.



1 Collaboration with Relevant Government Agencies



Nam Phong Plant (BBGI-NP):

Coordinate with the Nong Wai Water Delivery and Maintenance Project and Ubol Ratana Dam (Electricity Generating Authority of Thailand). Nong Wai Weir is the main water diversion point supplying the plant. Discussions and continuous monitoring of the water delivery plan are carried out with government agencies to ensure water allocation is aligned with the basin water distribution plan.



Bo Ploi Plant (BBGI-BP):

Closely discuss and monitor the water situation with the Royal Irrigation Department and local authorities, both in terms of water distribution management policy and joint water-use planning, with coordination covering both agencies overseeing the water system and agencies responsible for the Bo Ploi area.



Phanom Sarakham Plant (BBGI-PS):

Coordinate with the Ratchaburi Irrigation Office and the Chachoengsao Provincial Groundwater Resources Office to monitor the available water volume in Khlong Rabom Reservoir and Khao Mai Kaeo Reservoir, as well as the amount of groundwater available, in order to plan water use in line with the available water resources.

2 Drought Response Plans and Measures for Each Plant



Nam Phong Plant (BBGI-NP):

Located in an area receiving water from Ubol Ratana Dam, which regularly releases water for agriculture into the Nam Phong River, together with Nong Wai Weir serving as the main water diversion point under the water delivery plan. As a result, the security of the water source is at a high level. The Complex's water use is low compared with the overall allocated water volume.



Bo Ploi Plant (BBGI-BP):

Under the Complex's water management approach, an additional reservoir excavation project is being considered to store water for use during the dry season, supporting water use across the entire Bo Ploi Complex, which comprises a sugar mill, a power plant, and an ethanol plant.



Phanom Sarakham Plant (BBGI-PS):

Improve existing groundwater wells and drill additional groundwater wells to enhance the security of backup water sources and support production operations during periods when surface water is limited.

3 Collaboration with Partners within the Complex in Drought Management



Some of the Company's plants are located within complexes together with partner companies. Therefore, water is jointly managed at the complex level to improve the efficiency of water resource use.



Nam Phong Plant (BBGI-NP):

The group power plant is responsible for the central utility system of the Complex, with sufficient capacity to supply all plants within the Complex, including the Company's plant.



Bo Ploi Plant (BBGI-BP):

Implement a surface water reduction project at the Complex under the 3R policy (Reduce / Reuse / Recycle), and coordinate with government agencies overseeing the water system in the area.



Phanom Sarakham Plant (BBGI-PS):

Use its own water sources (surface water from government reservoirs and groundwater) to manage water risks independently in coordination with relevant government agencies.

Water Consumption Reduction Targets

Efficient Water Use Strategy

- The Company has both short-term and long-term plans to improve water-use efficiency based on the 3R principles: Reduce, Reuse, Recycle, and is studying approaches to significantly reduce water use. A target has been set to reduce water use (surface water, groundwater, and municipal water) per unit of product by 5% in 2025, with a long-term target of 10% by 2030. All targets are compared against the 2020 base year, in which water use (surface water, groundwater, and municipal water) per production volume was 6.83 million liters per million liters of production.

3R Principles

Reduce



Reduce water use

Reuse



Reuse water

Recycle



Recycle water



Target for Reduction in Water Use per Unit of Product



- Therefore, in 2025, the Company has set a target to reduce water use (surface water, groundwater, and municipal water) per production volume to 6.56 million liters per million liters of production.





Group Water Use Reduction Plan

The Company has implemented a group-wide water use reduction plan through the following projects:



1.

1. Project to Increase Alcohol Fermentation Concentration



- 1.1 Ethanol plants using cassava as a raw material have implemented improvements in two areas: (1) changing the raw material from fresh cassava to cassava chips, which increases the starch percentage and reduces the sand percentage in the raw material. These changes in raw materials affect water use in the production process. (2) improving the fermentation process, which makes the production process more efficient and allows more starch to be converted into sugar. Both of these improvements increase the alcohol fermentation concentration, thereby reducing water use in the fermentation process and also reducing the amount of steam used.
- 1.2 Ethanol plants using molasses as a raw material have also improved the fermentation process, making the production process more efficient and enabling greater conversion to sugar. This increases the alcohol fermentation concentration and can likewise reduce water use.



Therefore, across the projects at the two plants, total water use can be reduced by **162,113** cubic meters per year.

2.

2. Project to Maximize the Beneficial Reuse of Water from the Production Process



- 2.1 The plant uses a high volume of water in the production process, especially in the fermentation tank washing stage, which uses process water and increases water costs and wastewater treatment costs. A study found that wastewater from distillation (Spent Lee) can be reused to replace process water in the washing stage without affecting production process quality or equipment safety.
- 2.2 The project replaces water used in the production process, specifically in washing and fermentation, with hot water generated from steam condensation and returned for reuse in the system (Condensate Return). This can reduce the use of water from external sources, improve water-use efficiency, and reduce the volume of wastewater requiring treatment, in line with the principle of efficient resource use.



Therefore, the project to maximize the beneficial reuse of water from the production process can reduce water use by a total of **153,300** cubic meters per year.



In summary, in 2025 the Group can reduce total water use by **315,413** cubic meters per year.



Summary of Water Use Performance and Compliance

1 Water Use in 2025



In 2025, the Company recorded total water use of

3,503
million liters

(3,502,643 cubic meters)

Equivalent to an average water use intensity of **5.56** liters per liter of product

2 Performance Comparison



Compared with the water use per unit of product of **5.56** liters per liter of product against the Company's target of **6.56** liters per liter of product, the Company performed **15%** better than the target. Compared with the previous year, 2024, which was 5.80 liters per liter of product, this represents a **4%** decrease from last year.

 Water Use per Unit of Product 5.56 liters per liter of product	 Target 6.56 liters per liter of product	 Better than Target 15%	 Decrease from Previous Year 4%
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3 Compliance



In 2025, the Company had no cases of non-compliance with permits, standards, and regulations related to water quality.



Water Use Data and Water Use Intensity per Unit of Product

Committed to effective water resource management for sustainable business operations



 Water Use Management	2023	2024	2025
 Total Water Use (cubic meters)	2,705,690	3,172,991	3,502,643
 Surface water (cubic meters)	2,047,984	2,515,105	3,043,983
 Groundwater (cubic meters)	657,568	657,739	458,561
 Municipal water supply (cubic meters)	138	147	98

 Water Use Intensity per Unit of Product	2023	2024	2025
 BBGI Group (million liters of water use per million liters of product)	6.22	5.80	5.56
 Biodiesel (million liters of water use per million liters of product)	1.15	0.95	0.74
 Glycerine (million liters of water use per million liters of product)	3.73	3.79	3.82
 Ethanol (million liters of water use per million liters of product)	16.09	13.91	12.19



* The BBGI Group has disclosed water withdrawal reporting in accordance with GRI Universal Standards. Further details are available in the Environmental Statistics
<https://www.bbgigroup.com/th/sustainability/environment-dimension>



