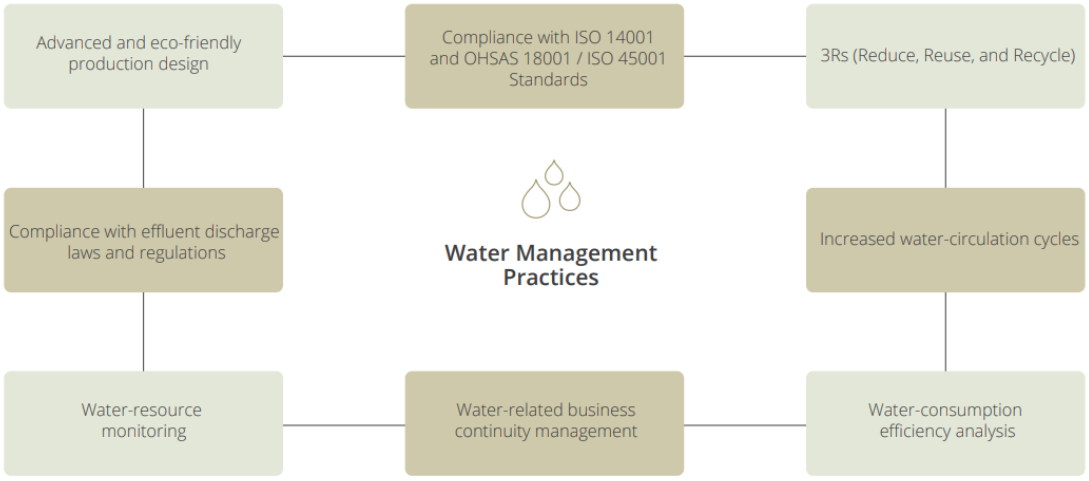
Water Risk Management

B.Grimm Power is dedicated to conserving and efficiently utilising water resources throughout our value chain, as well as planning and managing wastewater effectively. We collaborate with communities and external organisations to ensure continuous conservation of water resources. Recognising the risks of drought resulting from climate change, we conduct a risk assessment of water resources in the watershed to ensure that our operations do not impact community water access. We also promote the efficient use of water in the production process following the 3Rs principle (Reduce-Reuse-Recycle), which involves reducing water usage, reusing water, and reuse treated wastewater, such as increasing the re-circulation cycle of cooling water and utilising treated wastewater to replace some freshwater usage, to reduce consumption and minimise drawing water from public sources. In addition, we regularly check the quality of wastewater to comply with standards and does not negatively impact the environment and surrounding communities near the power plant.

Figure 1: B.Grimm Power's Water Management Practices



Source: B.Grimm Power

Corporate Water Management Policy

Our OHS&E Policy (Occupational Health, Safety and Environment Policy) includes a key commitment to always take environmental responsibility and quality of life in communities seriously. To create social value, we produce high-quality power and provide pioneering energy to our customers. Our people- and nature-centric policies enable us to conduct business compassionately. Prioritising environmental protection, we employ highly efficient power generation technologies, eco-friendly fuels, and advanced mechanisms to strictly control and reduce greenhouse gas emissions, waste generation and noise pollution. We have installed consequential systems to cut down our reliance on freshwater and use treated wastewater from other organisations in our production instead. Furthermore, we have a water-related business continuity plan and risk assessment mechanism in place. We also perform quality control on our treated effluent throughout the whole process to lessen our potential impacts on surrounding communities. We collaborate with stakeholders to identify water management best practices and cost-effective water management methods.

Water Risk Management

We recognise the critical importance of sustainable water management in our operations and across supply chain. As the largest private power producers in Thailand, we are committed to ensuring that our water usage is efficient, responsible, and sustainable. This commitment is reflected in our comprehensive water management programme, which addresses various aspects of water-related risks to safeguard our operations and the communities we serve. We follow several key approaches, including Dependency and Impact Risk Assessments, Water Stressed Areas Assessments, and Comprehensive Water Risk Assessments, detailed as follows:

Dependency and Impact Risk Assessment

At B.Grimm Power, understanding our dependency on water resources is crucial for maintaining the stability and efficiency of our power generation processes. Water is an essential component in various stages of power generation, including cooling, steam production, and equipment maintenance. Thus, assessing and managing our water dependency is a fundamental part of our risk management strategy. Therefore, our approach to assessing dependency-related water risks involves a comprehensive analysis of our water usage across all power plants. This analysis includes:

- Water Source Identification: We identify all sources of water used in our operations, including surface water, groundwater, and municipal water supplies. This helps us understand the availability and reliability of our water sources.
- Consumption Analysis: We conduct detailed assessments of water consumption at each power plant, mapping out water usage in cooling systems, boilers, and other critical processes. This helps us identify areas of high dependency and potential vulnerabilities.
- Geographic Risk Assessment: We consider geographic variations in water availability and the potential for water scarcity in different regions where we operate. This includes analysing local climate conditions, historical water data, and future projections.
- Alternative Water Sources: To mitigate dependency risks, we explore alternative water sources such as recycled water and treated wastewater. This reduces our reliance on traditional freshwater sources and enhances our resilience.

Moreover, we assess the potential impacts of our operations on local water resources to ensure minimal adverse effects on the environment and surrounding communities. Our impact assessments involve evaluating the quantity and quality of water discharged from our plants, as well as monitoring the ecological health of nearby water bodies. We use state-of-the-art monitoring tools and adhere to strict environmental standards.

Water Stressed Areas Assessment

B.Grimm Power conducts annual assessments of short- and long-term water scarcity risks, evaluating both water quantity and quality risks (Water Stress[1]) across our operating sites using the AQUEDUCT Water Risk Atlas developed by World Resources Institute. In 2024, it was found that 78.7 percent or 37 out of 47 B.Grimm Power's projects[2] were located in areas classified as high to extremely high water stressed. These projects accounted for 16.41 million cubic metres, or 77.37 percent of the total net freshwater consumption. They also contributed 88.2 percent of total cost of sales and services.

We view this as a key area to manage responsibly, and we have robust measures in place. All combined-cycle power plants operate in high water-stress areas, but we proactively reduce dependency on natural water sources by reusing treated wastewater from nearby industrial estates. We also apply internal water recirculation systems to maximise water use efficiency, such as increasing cooling-tower recirculation cycles. We also actively engage stakeholders through regular meetings with industrial estate operators and surrounding communities to understand concerns, jointly develop risk mitigation strategies, and plan future water demand management. We also prepare annual water scenario planning as part of our Business Continuity Plan (BCP), to assess external water source trends and establish emergency water supply plans, ensuring uninterrupted plant operations while safeguarding community access to water.

For other types of power plants, solar power plants consume only 0.03 cubic metres per megawatt-hour although 84.2 percent of solar power plants are located in high to extremely high water-stressed areas. Meanwhile, wind and hydropower plants are not situated in high to extremely high water-stressed areas. Nevertheless, we remain vigilant in monitoring water-related impacts across all types of power plants, recognising water as a vital operational input and a natural resource that must be preserved to ensure long-term sustainability.

[1]Water stress: "When withdrawals are greater than 20% of total renewable resources, water stress often limits development opportunities; withdrawals of 40% or more represent high stress. Similarly, water stress may be a problem if a country or region has less than 1,700 m^3 yr^{-1} of water per capita (Falkenmark and Lindh, 1976)." Source: IPCC Report 2002

[2]The scope of water scarcity risk assessment covers B.Grimm Power and its subsidiaries both in Thailand and oversea, representing 99.6 percent of total revenue. Exceptions include the Malacha Hydropower plant, which was invested in during the year. The scope of assessment excludes solar rooftop projects, as their water consumption is minimal and poses no material risk. It also excludes the LNG trading business, which commenced operations in Q3/2024.

Comprehensive Water Risk Assessment

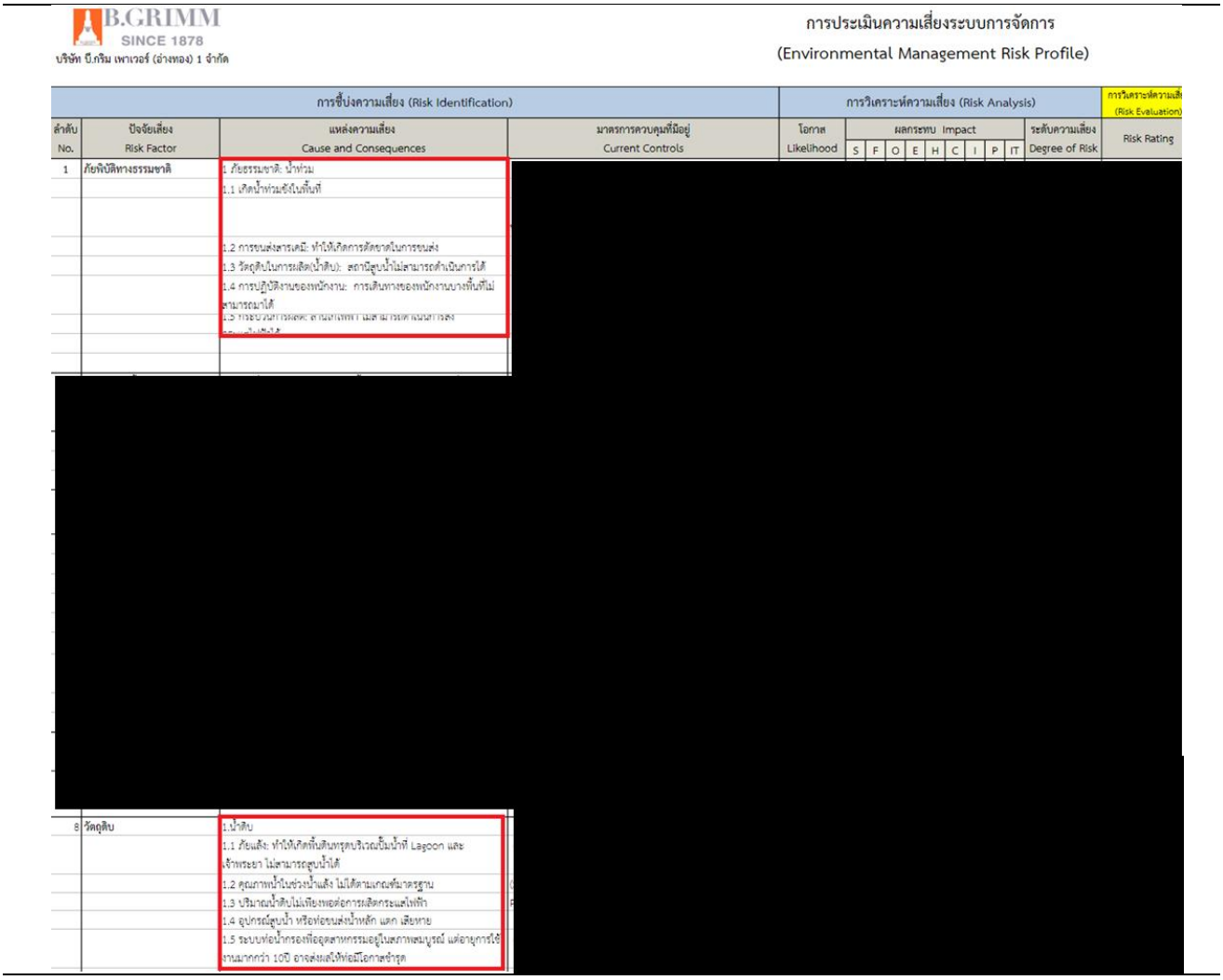
Our comprehensive water risk assessments encompass future water quantities, quality-related risks, potential regulatory changes, scenario analysis, and impacts on local stakeholders. These assessments ensure that we are prepared for any challenges that may arise, safeguarding both our operations and the communities we interact with. Our holistic approach to water risk management involves:

- **Future Water Quantities and Quality-related Risks:**

  We always track and monitor water availability and quality for all co-generation power plants to ensure operation continuity and minimise the water-related risks. The responsible functions are 1) the plant operation and 2) the contract management team and 3) risk management team. By these monitoring methods;

  - We monitor daily reports from the Smart Water Operation Center of the Office of Water Management and Hydrology, Royal Irrigation Department, Ministry of Agriculture and Cooperatives. The information in these reports helps us devise mitigation measures for water shortages.
  - We cooperate with industrial estates and government agencies closely to preserve water, maintain water quality and mitigate the impact and risk of potential water shortages, and we attend the meeting and cooperate on policy if needed for the unusual drought situation.
  - Our teams regularly monitor the water level and quality of upstream sources such as reservoirs and connected rivers, and the usual assessment will be brought to a bi-weekly operation meeting (with the management committee and all power plants.
  - We have a monthly assessment during the drought situation, a quarterly assessment during the normal situation together with an annual assessment for long-term forecasts. This would ensure that we can take action early and we will have sufficient water for our power plants to operate without interruption.

Figure 2: Examples of co-generation power plants' environmental management risk profile (with water related risks in red frames)



B.GRIMM SINCE 1878

บริษัท บี.กริม เพาเวอร์ (อ่างทอง) 1 จำกัด

การประเมินความเสี่ยงระบบการจัดการ

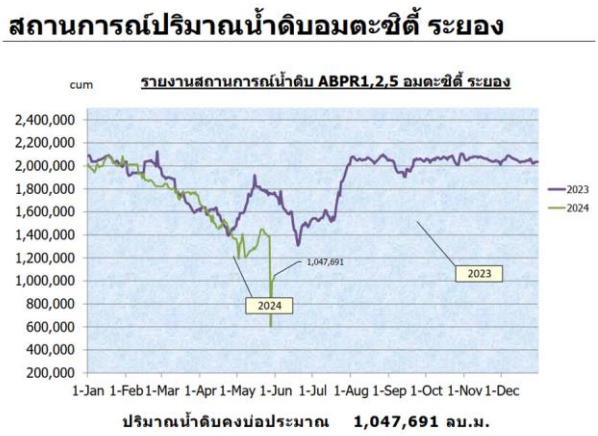
(Environmental Management Risk Profile)

การชี้บ่งความเสี่ยง (Risk Identification)				การวิเคราะห์ความเสี่ยง (Risk Analysis)										การวิเคราะห์ความเสี่ยง (Risk Evaluation)
ลำดับ No.	ปัจจัยเสี่ยง Risk Factor	แหล่งความเสี่ยง Cause and Consequences	มาตรการควบคุมที่มีอยู่ Current Controls	โอกาส Likelihood	ผลกระทบ Impact								ระดับความเสี่ยง Degree of Risk	Risk Rating
					S	F	O	E	H	C	I	P	IT	
1	ภัยพิบัติทางธรรมชาติ	1 ภัยธรรมชาติ: น้ำท่วม 1.1 เกิดน้ำท่วมขังในพื้นที่ 1.2 การขนส่งสารเคมี: ทำให้เกิดการตัดขาดในการขนส่ง 1.3 วัตถุดิบในกระบวนการผลิต(น้ำดิบ): สถานีสูบน้ำไม่สามารถดำเนินการได้ 1.4 การปฏิบัติงานของพนักงาน: การเดินทางของพนักงานบางพื้นที่ไม่สามารถมาได้ 1.5 ระบบท่อน้ำกรองที่ออุตสาหกรรมอยู่ในสภาพชำรุด	[redacted]											
8	วัตถุดิบ	1.น้ำดิบ 1.1 ภัยแล้ง: ทำให้เกิดพื้นที่นาทรุดบริเวณปั๊มน้ำที่ Lagoon และเจ้าพระยา ไม่สามารถสูบน้ำได้ 1.2 คุณภาพน้ำในช่วงน้ำแล้ง ไม่ได้ตามเกณฑ์มาตรฐาน 1.3 ปริมาณน้ำดิบไม่เพียงพอต่อการผลิตกระแสไฟฟ้า 1.4 อุปกรณ์สูบน้ำ หรือท่อขนส่งน้ำหลัก แตก เสียหาย 1.5 ระบบท่อน้ำกรองที่ออุตสาหกรรมอยู่ในสภาพชำรุด แต่อายุการใช้งานมากกว่า 10ปี อาจส่งผลให้ท่อมีโอกาสชำรุด											

Source: B.Grimm Power

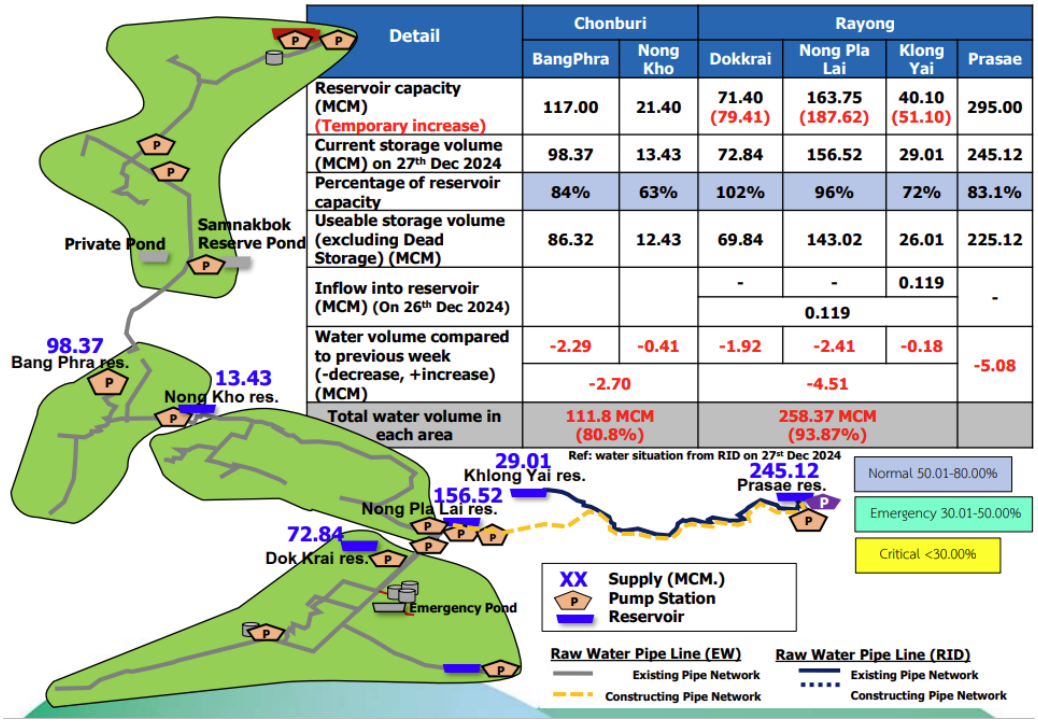
Figure 3: Sample of our water monitoring tools

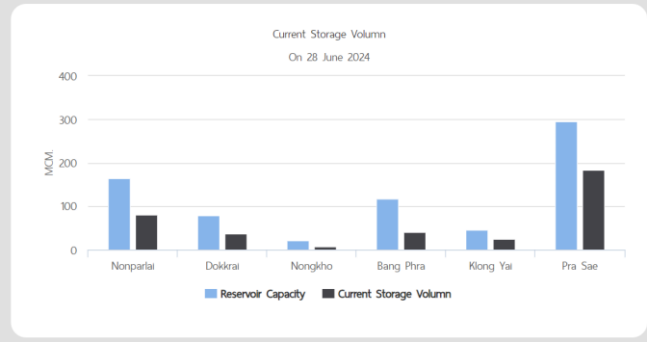
AMATA WATER

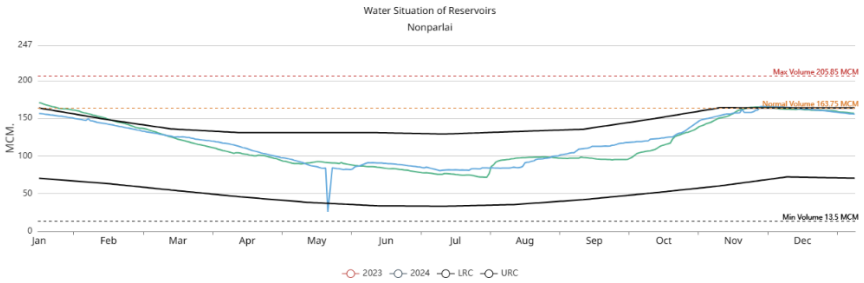


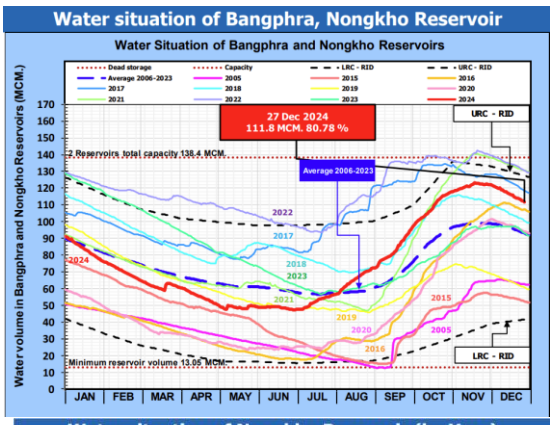
Overview of water situation in Rayong-Chonburi area on 27th Dec 2024

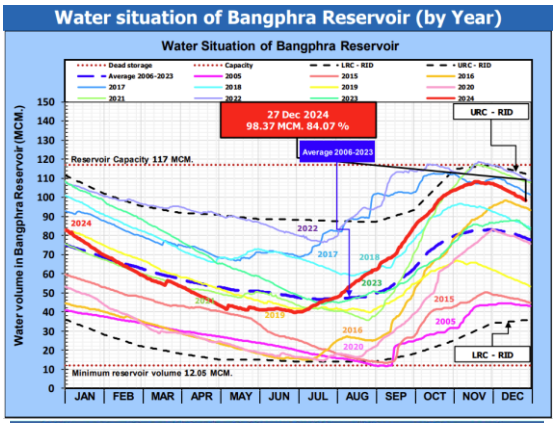
Detail	Chonburi		Rayong			
	BangPhra	Nong Kho	Dokkrai	Nong Pla Lai	Klong Yai	Prasae
Reservoir capacity (MCM) (Temporary increase)	117.00	21.40	71.40 (79.41)	163.75 (187.62)	40.10 (51.10)	295.00
Current storage volume (MCM) on 27th Dec 2024	98.37	13.43	72.84	156.52	29.01	245.12
Percentage of reservoir capacity	84%	63%	102%	96%	72%	83.1%
Useable storage volume (excluding Dead Storage) (MCM)	86.32	12.43	69.84	143.02	26.01	225.12
Inflow into reservoir (MCM) (On 26th Dec 2024)			-	-	0.119	-
			0.119			
Water volume compared to previous week (-decrease, +increase) (MCM)	-2.29	-0.41	-1.92	-2.41	-0.18	-5.08
	-2.70		-4.51			
Total water volume in each area	111.8 MCM (80.8%)		258.37 MCM (93.87%)			

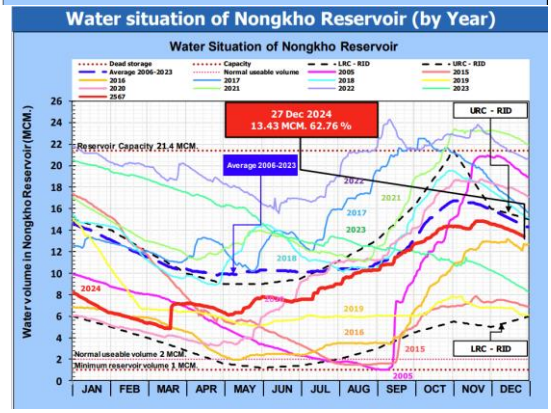


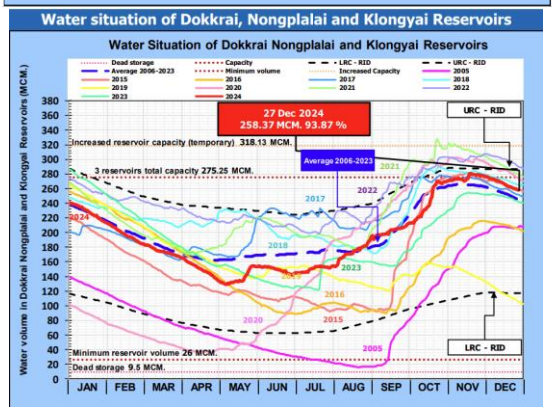






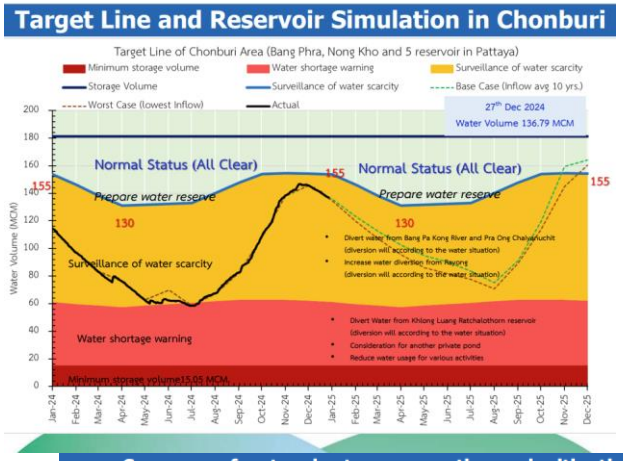


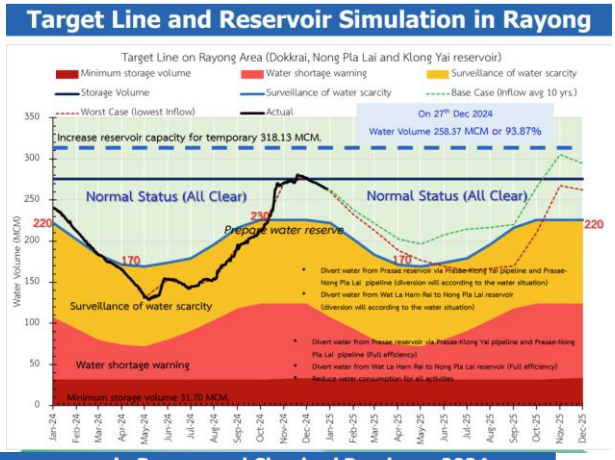




Source: B.Grimm Power / Royal Irrigation Department / East Water/ Industrial Estate Authority of Thailand/ East Water/ Amata Water

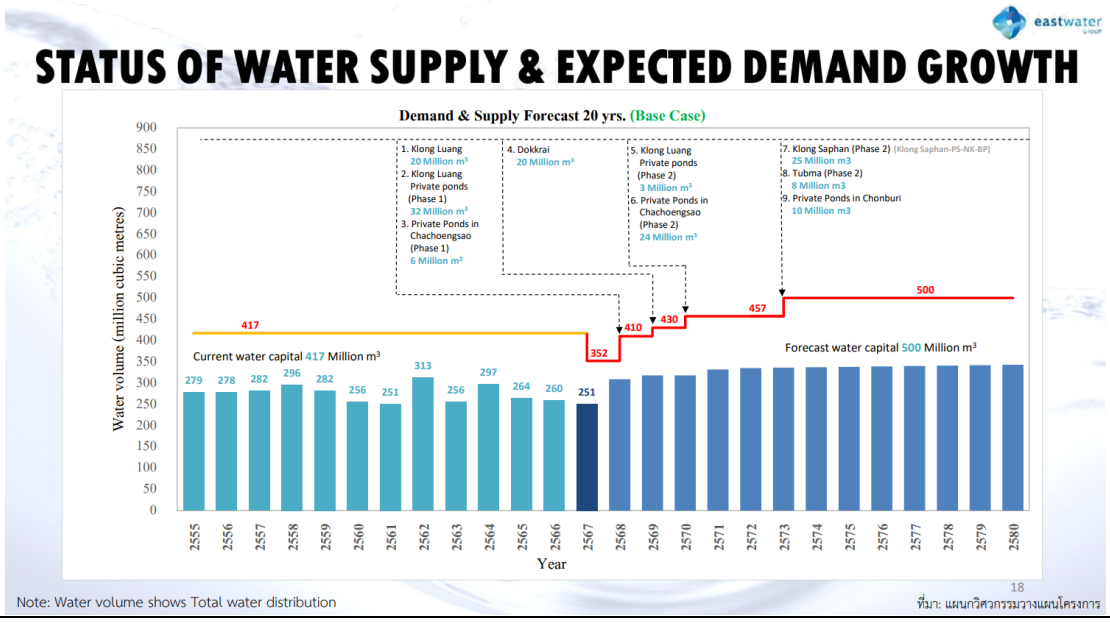
Figure 4: Sample of future estimation tools





Summary of water shortage prevention and mitigation measures in Rayong and Chonburi Provinces 2024

Measure	Planned Water Volume (MCM) 2024												
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
1. Primary measures														
1.1Water diversion via pumping from Prasae Reservoir	*Plan MOU PS - KY*	2.19	4.00	8.50	8.50	8.50	*5.00*	*5.00*	*5.00*	*5.00*	*5.00*	*5.00*	*7.50*	69.19
	Plan PS- NPL	3.30	2.22	3.50	4.11	3.28	0.78	0.83	0.40	0.39	1.36	6.09	6.14	32.41
PS. Divert water to irrigation area during Jan to Mar 2024	PS-KY (Diver for irrigation)	7.46 (4.87)	6.23 (2.45)	7.72	7.02	6.07	5.70	5.99	5.73	6.05	7.01	5.32	26 Dec 4.77	*75.07 (7.32)*
	Actual PS-NPL	3.29	2.22	3.50	4.11	3.28	3.25	2.73	2.48	0.68	3.02	4.40	26 Dec 4.55	*37.51*
1.2 Divert Water from Bangpakong River + Private Pond	*Plan Private pond*	1.50	1.25	1.25	1.25	1.25	1.25	1.25						10.58
	Plan Bangpakong River							0.08	7.05	8.97	9.30	9.12		34.51
	Actual PrivatePond	1.60	0.40	1.31	0.71	0.72	1.48	0.92						*7.14*
	Actual Bangpakong River								7.21	8.35	8.38	14 Nov 3.53		*27.55*
1.3 Klong Saphan reverse pumping station	*Plan*						4.00	4.00	2.00	2.00				*12.00*
	Actual					2.05	0.06	1.93	0.00	0.88				4.92
1.4 Divert Water from Klong Pantong - Klong Pra Ong Chaiyanuchit	*Plan*						4.00	14.00	14.00	14.00	14.00	10.00		*70.00*
	Actual						8.60	13.95	15.05	14.43	15.19	30 Nov 13.08	-	*80.3*



Source: East Water/ Industrial Estate Authority of Thailand/ East Water/ Amata Water

- **Potential Regulatory Changes:**

Staying ahead of potential regulatory changes ensures that our operations remain compliant and sustainable. B.Grimm Power actively monitors potential regulatory changes related to water usage at local, regional, and national levels. For example, we closely follow key regulations such as the Water Resource Act (Thailand), 2018 and the progress of its subordinate legislation, as well as trends in water tariff adjustments that could affect operational costs and long-term water management strategies.

We employ two main channels to stay updated on regulatory changes and coordinate with authorities:

1. Internal Monitoring and Coordination: B.Grimm Power actively tracks new regulations and coordinates with all relevant departments. Our dedicated team closely monitors potential regulations, drafts of new regulations, and contracts with water suppliers. This team:
    - Participates in public hearings
    - Coordinates with relevant parties
    - Provides feedback and recommendations to authorities
2. Industry Association Engagement: We maintain close relationships with relevant associations (e.g., The Association of Private Power Producers, Thai Industrial Estate & Strategic Partner Association). These associations:
    - Coordinate closely with government and relevant authorities on potential future regulatory changes
    - Provide early signals of potential regulation changes, allowing us to analyse and prepare in advance
    - Effectively communicate industry feedback and recommendations to authorities

These channels enable B.Grimm Power to stay informed, prepare for changes, and provide input on regulations affecting our operations.

- **Scenario Analysis:**

B.Grimm Power continually assess water use and identifies risks associated with water through risk management including water supply and water quality risks. We have involved the stakeholders and incorporated municipal, community, and industrial estates into our survey. We have collaborated extensively with water providers and regulatory authorities to improve water supply stability and security while reducing the risk of regulatory changes. Engagement with all stakeholders from upstream to downstream helps B.Grimm Power to track potential water availability issues.

Water issues are included in a scenario analysis to conduct our Business Continuity Plan (BCP) and Business Continuity Management (BCM) to establish guidelines for dealing with severe impacts causing disruption of operation. If a water scarcity issue occurs, B.Grimm Power commits to working with all stakeholders to minimise the impact. The strategy was executed in stages to meet extreme scenarios depending on how long the situation changed by reducing water consumption via process improvement, adjustment or even force majeure, finding alternative sources and providing drinking water to communities.

- **Impacts on Local Stakeholders:**

Understanding and mitigating the impacts of our water usage on local communities and ecosystems is a core component of our sustainability strategy. We engage with local communities, government agencies, and NGOs to assess the social and environmental impacts of our water usage. Feedback from these stakeholders is integral to our decision-making processes. Therefore, we have carried out Environmental Impact Assessment (EIA) and public hearings in compliance with the laws. This compliance is regularly monitored and reported to follow guidelines and requirements. In organising public hearings, we have made available information concerning power plant project implementation, generation and distribution processes of electrical power involved as well as information on community relations activities which are geared towards promotion and improving the quality of life of people in the surrounding communities. Such activities facilitate an exchange of opinions, creating a mutual understanding and taking on board suggestions for further development of power plant projects to be consistent with the context of the community and society.

Figure 5: Type of Assessment

Type of Power	Type of Assessment	Percentage of Power
Co-generation	Environmental Impact Assessment: EIA	100
Wind	Initial Environmental Examination: IEE	100
Solar	Code of Practice: CoP	100

Source: B.Grimm Power

In addition, we have made financial contributions to the community development fund to improve the quality of life and environment in the neighborhood. Such contribution is used for the purposes of career development, education, arts and culture, promotion of music and sports, public health and environment and mitigating impacts that may be caused by B.Grimm Power's operation, etc. We have mandated the department responsible for the community relations activities

and public relations to coordinate and create a good relationship between the power plants and the surrounding community right from the projects' beginning to construction and in the post-commercial startup to ensure that the community can maximise their potential in a sustainable way. In addition, we have put in place a system for receiving complaints about community relations at each local community where the power plants are operating. Various channels for receiving complaints are established, including suggestion boxes, notices from government agencies, verbal and telephone notifications, and community leaders. When a complaint is made, responsible units address the problem and monitor progress and inform the Management unit for corrective and preventive actions to prevent a repeat and inform complainants of the results for their endorsement.

Figure 6: Current performance on Business Impacts of Water Related Incidents

Incidents	Currency	FY 2021	FY 2022	FY 2023	FY 2024
Total actual and opportunity costs (e.g. forgone income) from water-related incidents	THB - Baht	0	0	0	0

Source: B.Grimm Power

Product Use Phase/ Downstream Risks

While B.Grimm Power's primary operations focus on electricity generation, we also recognise that water-related risks extend beyond our direct activities. One critical area is the product use phase, where our industrial clients depend on water to operate their own manufacturing processes. A disruption in water availability could impair their operations, which in turn could affect our electricity demand, revenues, and broader value chain stability.

We conduct scenario analyses to evaluate how customer sectors might be disrupted by water shortages (e.g., operational shutdowns or regulatory restrictions) and assess the potential impacts on B.Grimm Power under these scenarios. Based on WRI Aqueduct and CDP references, sectors with medium to medium-high water risk in the product use phase—such as automobile, tire, and home appliances—are closely monitored.