Research and development policy in various areas, and details regarding innovation development in processes, products and/or services, or business models.

The company has set business and product development as one of its strategic growth goals. This includes projects to study the feasibility of business and product development, and innovation in processes. The key components of the model are as follows:

1. **Value Proposition**: Studying the features of products and services along the product line and analyzing to maximize their potential for application in relevant industries.
2. **Customer Segment**: Identifying target customer groups who can use the company's products or newly developed products by studying, evaluating, and analyzing customer behavior, needs, and desired characteristics.
3. **Channels**: Studying and analyzing channels or evaluating ways to deliver products and services to target customers.
4. **Customer Relationships**: Methods to create and maintain relationships with customers.
5. **Revenue Streams**: Studying the factors and resources necessary to develop products and services for market entry.
6. **Key Resources**: Essential resources or processes to support production or promotion towards product development goals, including raw materials and other necessary resources.
7. **Key Activities**: Activities necessary to create and deliver value.
8. **Key Partners**: Partners, shareholders, customers, or networks of organizations or experts who can support business activities.
9. **Cost Structure**: Costs associated with business operations.

Innovation for Products or Services

Innovation involves applying new ideas or processes to improve products, services, raw materials, and processes. The key components are:

1. **Creativity**: Generating new ideas that can be practically applied.
2. **Research and Development (R&D)**: Conducting research and development to create new products or services.
3. **Market and Customer Insights**: Understanding customer needs and behaviors.
4. **Collaboration and Cross-functional Teams**: Working together across different departments and possibly with specialized external experts.
5. **Risk-Taking and Adaptability**: Accepting risks and adapting to situations, with each development project requiring study and analysis to assess potential risks and plan measures to manage impacts.
6. **Technology and Digital Transformation**: Using new technologies to create innovations or applying technology to drive development and progress in business activities.

R&D expenses in the past 3 years

	2023	2024	2025
R&D expenses in the past 3 years (Million Baths) *	722,624(1)	59,810(1)	339,000(2)

(1) investment in assets and equipment, operational expenses for process customization of the biomass project at Huai Pa Wai plant in Y2022-2024.

(2) The expense relates to research and development on using lime as a stabilizing additive to improve soil strength in various infrastructure foundation layers. The purpose of the study is to enhance soil properties prior to construction so that they meet the standards required for infrastructure projects in Thailand. The work is being carried out in collaboration with the Civil Engineering Department of Rajamangala University of Technology Isan.
The total R&D cost is 565,000 THB, to be paid for in three installments. In 2025, the first installment of 339,000 THB was already paid. The remaining payments are 169,500 THB for the second installment and 56,500 THB for the final installment.

Additional explanation about R&D expenses in the past 3 years

The company is developing its business based on the existing product line structure, including expanding and developing related businesses such as engineering design to support necessary engineering and projects that require

continuous improvement and investment. This also includes investing in acquisitions to expand the business base or to acquire assets that can be essential resources for business operations.

For various development projects already undertaken, investments have been made in projects such as renewable energy development, Flex Fuels project development, and research and testing to use biomass materials as fuel for the lime kiln process at the Huai Pa Wai branch. This pilot project aims to reduce greenhouse gas emissions within Scope 1. The research and development of biomass materials is a medium-to-long-term project to address climate change impacts and promote commercial opportunities for developing low-carbon lime products for future markets demanding low-carbon products.

Regarding the scope for structuring data storage for initial progress reports, the investment value of the Biofuel project at the Huai Pa Wai branch between 2022 and 2025 was presented. This investment comprises assets under testing and experimentation: 432,964 baht in 2022, 722,624 baht in 2023, and 59,810 baht in 2024. This investment in assets under construction has been disclosed using the eOne Report data platform developed by the Stock Exchange of Thailand. The company also presented the results of product development projects.

For 2025, there are significant research and development projects that remain in the product development process and were initiated in previous years, continuing development towards innovative products for society. The project maintains its commercial goals and outcomes, particularly the development of lime products for improving soil properties to meet the standards of various infrastructure construction projects in Thailand. The aim is for the developed product to be used as a lime-based binder for soil drying, soil modification, and soil stabilization. This new product targets customers by reducing costs associated with traditional soil improvement methods for various construction projects. The benefits of this product include reduced costs from purchasing new materials, decreased truck traffic on construction sites, increased strength of the subsoil, and faster site readiness for use.

The company's past innovation and technological efforts for society and the environment include the following:

“Business innovation for society and/or the environment”

Innovation is a process of creating and implementing new ideas, concepts, products, or services that result in a significant improvement or advancement in offering goods or services.

Business innovation aimed at benefiting society and the environment is a key component of sustainability development policy and strategies. These innovations yield economic advantages for businesses while also generating value for society and the environment. The following guidelines outline this approach.

1. Focus on developing business, social, and environmental innovations that enhance value for the company and its stakeholders.
2. Contribute to societal and environmental value creation that can be measured through the innovations implemented, reflecting both business and social/environmental benefits.
3. Share the business and social/environmental innovations created, enabling external stakeholders to understand and implement them.

The Company aims to lead in the production and distribution of lime and calcium carbonate by prioritizing advancement of production technology and innovation, knowledge management, and the creation of new products to foster opportunities for itself and its partners, all while adhering to principles of good governance and sustainability development for society, the environment, and stakeholders. Since launching the EOD Lime Kiln Brand in 2018, the Company has received awards recognizing its innovative capabilities and commitment to innovation. This includes the engineering design sector operated by its subsidiary, Golden Lime Engineering Co., Ltd. In 2024, to enhance investment project models and improve production efficiency, the Company has reallocated personnel from Golden Lime

Engineering Co., Ltd and established a dedicated engineering and investment project unit to further explore and develop technology and innovation for sustainable production processes.

Establishing a framework to promote business and organizational development aims to transform them into sustainable innovation drivers through five key dimensions.

Dimension 1: Strategic Dimension

Focus on clear perspectives in setting goals for innovation including strategies for transferring innovation goals to internal departments to understand the importance and be able to formulate guidelines for innovation development in line with the business goals of organization.

Dimension 2: Structures

Focus on strategies for learning and commitment to building a mutually beneficial business including cooperation in the operation, communication between personnel and decentralization in administration and operation within the organization.

Dimension 3: Support

Focus on supporting innovation development in terms of finance, time, technology as well as creating and distributing knowledge and skills for people in the process of innovation management.

Dimension 4: Climate

Focus on the process of managing and developing human resources in order to support the perspective and understanding of the connections of job characteristics in different departments in the organization by nurturing the development of models for assessing the potential of human resources and creating an atmosphere that is conducive to the development of creativity within the organization.

Dimension 5: Culture

Focus on encouraging employees in the organization to think outside the box and focus on creating new ideas, such as setting challenging goals, dare to accept risks and can accept errors arising from the development of innovation, considered as part of the learning process, accepting comments and feedback from employees and rational arguments along with the preparation process for future changes.

The Company has been promoted and sponsored by Carmeuse and GP Group, a group of major shareholders of the Company by exchanging knowledge with each other including working with affiliates of the Company and various external agencies

The Company has received strong support from its major shareholders, Carmeuse and GP Group, particularly in organizational structure development and knowledge enhancement. Continuous knowledge-sharing and experience exchange take place regularly, including collaboration with affiliated partners and various external organizations.

Driven by the strategic direction and vision of the Carmeuse executive group toward Digital Transformation, both Carmeuse and its global network recognize the importance of advancing digital capabilities. As part of this initiative, an investment budget has been approved to upgrade the Company's information technology infrastructure (IT Infrastructure) in order to strengthen internal communication efficiency and enhance data connectivity across the organization.

The Company is committed to improving communication channels among employees within the Carmeuse network to foster engagement, ensure clear communication of objectives and action plans, and enable systematic progress tracking. These efforts also include encouraging employees to share ideas, exchange knowledge, and contribute their experiences ultimately driving the organization's collective growth and development in alignment with its strategic direction.

Business and product development aimed at generating growth opportunities while addressing the objectives of social and environmental innovation in production.

In pursuit of establishing a diverse customer base and enhancing customer satisfaction, the SUTHA is committed to expanding opportunities and fostering business growth, all while taking into account the economic, social, and environmental implications, as well as the interests of stakeholders.

Key strategies: SUTHA prioritizes the promotion of innovation and the broadening of its existing manufacturing capabilities to offer a diverse range of products that minimize environmental impact. It is dedicated to ensuring sustainable consumption patterns through asset acquisition and product development, while also addressing long-term customer needs and creating competitive advantages in the market through various business approaches and initiatives.

1. **Business development** involves evaluating market opportunities and creating products based on the initial production process or exploring investments in new projects to reach untapped markets, including new customers, businesses, or industries that have not previously utilized the company's offerings. Key projects that have been initiated include:

   - **Substitute product for the steel sector**: the development of dolime products.
   - **Lime product for the lightweight brick sector**: AAC grade lime products.
   - **Soil Stabilizer** : enhancing soil strength for business development. Currently, it is in the exploratory phase, assessing opportunities, potential business channels, collaborative efforts, product formulation, and properties, which will require medium to long-term development.

2. **Product development** emphasizes leveraging technology and innovation to enhance the efficiency of existing production processes or investing in new projects. This involves applying knowledge and expertise in engineering, design, and capital allocation to create new products that meet specific targets. The newly developed and distributed products include:
   - **Dolime**
   - **Milled lime** (Hard Burnt) for the lightweight brick sector or AAC

   Executing these initiatives will enable SUTHA to broaden its customer base, enhance customer satisfaction, and foster sustainable business growth opportunities.

GRI:203-1

3.Process Improvement through Technology and Innovation

Each year, the Company allocates funds to enhance and refine its production processes, emphasizing the development of new products and improving production efficiency to meet customer requirements. This approach ensures that products are utilized effectively and sustainably, leveraging technology and innovation for process advancement, as outlined below:

1. Cutting-Edge Technology:

   - The integration of modern machinery and equipment in production to boost efficiency and minimize errors.

   <u>Key projects execution and investment :</u>

   - The Dolime investment for the installation of a briquetting system at Phra Phutthabath, aimed at producing dolime products that are crushed and compacted into blocks for clients in the steel manufacturing sector.
   - The high-efficiency lime production investment for lightweight brick customers through the acquisition of Cava assets and machinery, leveraging expertise from the Carmeuse group, an indirect major shareholder.
   - Upgrade the dust collection system from a web scrubber to a bag filter at the Chong Sarika branch. This upgrade not only enhances the efficiency of the dust collection system but also reduces maintenance time

and water consumption, aligning with the Company's water management initiatives. Some machinery is imported, with model development and equipment oversight managed by engineers from the GLE Engineering and Capex department.

- Selection of Technologies to Promote Socially and Environmentally Friendly Product Use

The Company actively promotes and selects technologies that are socially and environmentally friendly. Information on these technologies is shared with our customer base as potential solutions that can be adopted within their production processes. The recommended technologies aim to enhance operational efficiency, reduce environmental impacts, and improve workplace safety. One of the key technologies introduced is Lime Injection for the steel industry.

For the Steel Industry

The selected technology is the Fluxes Injection System, an advanced method for injecting lime and fluxes into steelmaking furnaces. This system is designed to optimize slag chemistry and plays a critical role in:

- Controlling slag basicity,
- Reducing melting point, and
- Absorbing impurities such as phosphorus and sulfur.

The technology was introduced as a solution to challenges associated with traditional flux charging methods. It includes the Pneumatic Injection System and LIMEJET technology, both of which significantly improve process performance compared with conventional systems. Key advantages include:

- Increased productivity and reduced melting time,
- Reduced dust generation and environmental impact,
- Lower production costs and reduced waste disposal requirements,
- Extended refractory lining life in the furnace,
- Improved energy efficiency and steel quality, and
- Enhanced workplace safety and overall working conditions.

2. **An automation system for overseeing and regulating the production process**

For guaranteeing that products adhere to predetermined standards. This methodology aids in sustaining consistency within the process, reducing time and errors, and offering resources for data visualization and analysis derived from the control system. These systems are capable of assessing the production status, detecting anomalies, and pinpointing any variables that do not fulfill requirements, whether related to the company's operations or those of its clients.

- Developing a software solution to oversee devices within the Pneumatic Transportation system specifically designed for clients in the Thai Foods sector.
- Designing a software solution to oversee kiln operations and handle statistical data related to the work process (Kiln Software Upgrade and HMI).
- Developing a software system to regulate the EOD kiln process in line with the kiln sales initiative for Indonesia.
- Upgrading the existing kiln system software to allow for customization of the control system based on modified or additional equipment.

3. **Innovation Development:**
   - Conducting Research and Development (R&D) to design high-quality new products that align with market needs.
   - Enhancing production formulas and processes to improve efficiency and lower production costs.

4. **Information Technology (IT):**
   - Implementing Data Management Systems to gather and analyze production data, thereby boosting process efficiency.
   - Adopting Enterprise Resource Planning (ERP) software for effective resource and production management.
   - Deploying advanced work management software with AI capabilities, database management, cloud file sharing, and robust security systems for effective work and information management.
5. **Employee Skills and Knowledge Enhancement:**
   - Providing training to enhance employees' skills in utilizing new technologies and innovations for improved efficiency.

- Encouraging continuous learning and self-improvement among employees to help them adapt to and implement new technologies in their roles.
- Introducing online training technologies and innovations to deliver knowledge and assessments, ensuring preparedness against cyber threats in both internal and external communications.

The integration of technology and innovation into the production process serves as a viable strategy to enhance efficiency and ensure the continuous delivery of products that align with customer specifications. This approach not only fosters a competitive edge in the marketplace but also acts as a catalyst for improving operational efficiency and effectiveness within the organization, ultimately aiming to establish it as an innovative entity.

Examples of initiatives aimed at fostering innovation within the organization include:

- COST SAVING PROGRAM
- Dolime product development tailored for steel industry clients, focusing on sustainable production and distribution
- Innovation promotion project for the smart application of lime in the steel and chemical sectors
- Customization development for the Two Vertical Shaft Kiln 150TPD lime kiln, specifically designed for the lightweight brick industry
- The Visualization System Development Project aims to develop and improve software systems for various kilns, enabling control of lime kilns through programs and equipment in a PLC system. This includes connecting and controlling machinery and equipment within the system, as well as displaying and storing related data.

Key Development Project: Soil Stabilization Initiative

SUTHA is dedicated to advancing key development projects that generate balanced value for the Company and its stakeholders across economic, social, and environmental dimensions. Among its strategic initiatives, the **Soil Stabilization Project** aims to address prevalent soil challenges in construction and infrastructure development throughout Thailand through the application of lime.

Based on comprehensive studies and research, SUTHA has identified several critical soil-related issues impacting national infrastructure:

1. Low Stability of Clay Soils

Numerous regions, especially in Central and parts of Southern Thailand, are characterized by clay soils with limited stability and inadequate bearing capacity. High rainfall and groundwater levels exacerbate the high moisture content of these clays. Without prior soil improvement, these conditions frequently result in **excessive ground settlement**, causing significant structural damage to buildings and infrastructure.

2. Saline Soils

High-chloride or high-sulfate soils are widespread in the Northeastern region and coastal areas. These saline soils accelerate corrosion in structural elements, often observed as rust on foundations and buildings. Standard mitigation strategies include utilizing chloride- or sulfate-resistant construction materials and conducting soil improvement before commencing construction.

3. Imminent Shortage of Construction Materials

Thailand faces an increasing scarcity of high-quality natural construction materials. Several regions have already reported shortages of materials compliant with engineering standards, necessitating adjustments in construction practices and revisions to technical specifications to reflect current resource limitations.

Benefits of Soil Stabilization Business Development

SUTHA has evaluated the advantages of developing lime and hybrid lime products for soil stabilization to support a wide range of infrastructure projects. The primary benefits include:

Enhanced Engineering Properties of Soil

Improves soil bearing capacity and stability pre-construction, leading to more robust and durable infrastructure foundations.

Cost Efficiency in Sourcing Natural Materials

By promoting the use of existing on-site materials—often considered below specification—the lime stabilization method reduces dependence on sourcing new natural materials.

Reduced Carbon Emissions

Minimizing the transportation of new materials directly decreases greenhouse gas emissions.

Increased Construction Site Safety

Limiting soil transport and reducing reliance on external sources lowers heavy vehicle operations, thereby improving overall site safety.

Greater Durability and Sustainability

Soil stabilized with lime or hybrid lime demonstrates improved long-term performance, contributing to resilient and sustainable infrastructure systems.

Relevant Research

Historical and ongoing studies highlight the limited scope of research on lime and hybrid lime soil stabilization within Thailand. To address this, SUTHA has established a formal partnership with the **Civil Engineering Department of Rajamangala University of Technology Isan** to jointly develop lime-based soil stabilization products.

The project is currently in the **final research conclusion phase**, and results are anticipated to guide future product development and commercial implementation.

Photo Source: https://www.carmeuse.com/eu-en/products/civil-engineering/viacalco