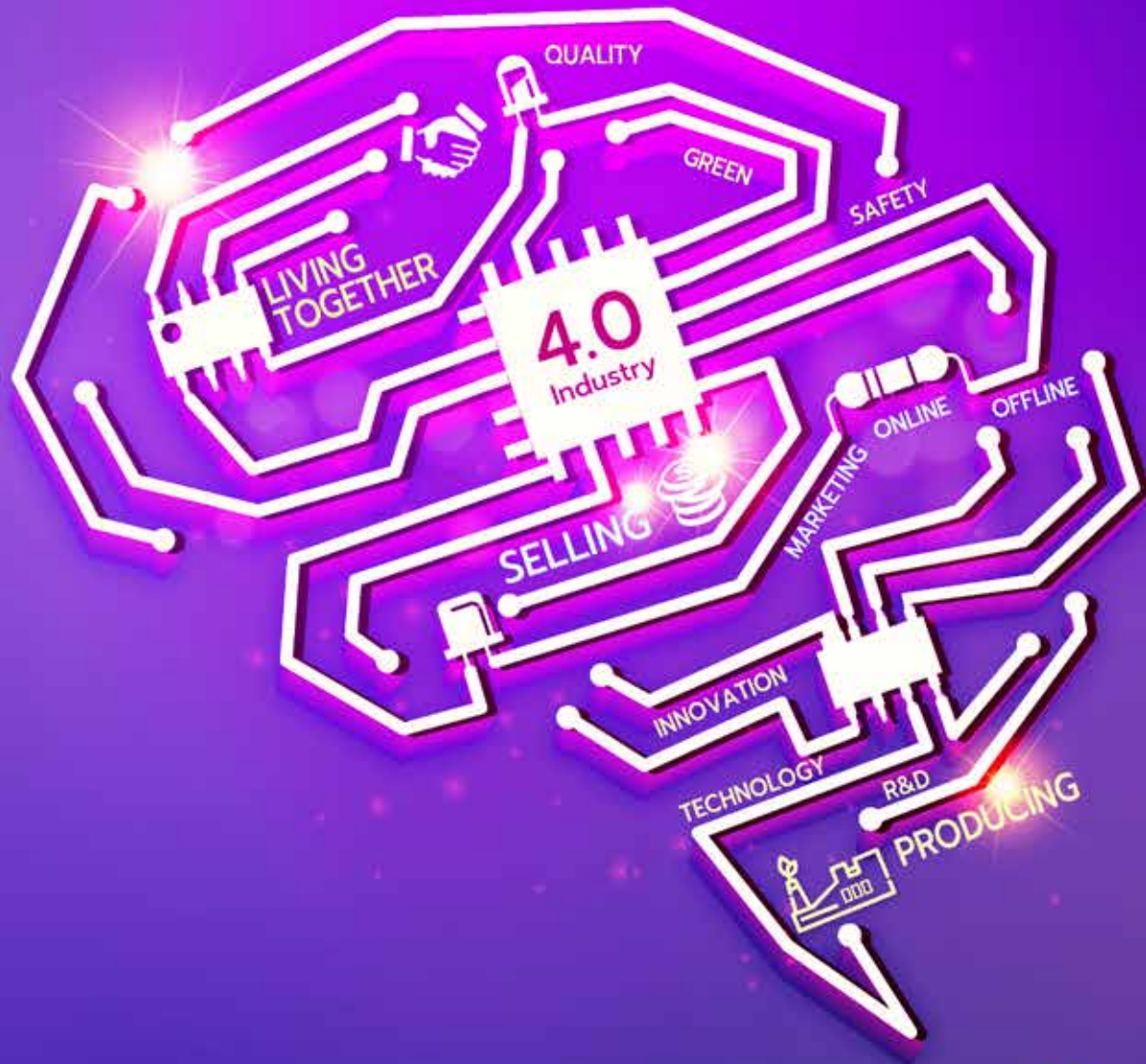




## The Achievement in Implementation of the Government Policy and Industrial Strategy Fiscal Year 2019

ผลการดำเนินงานตามนโยบายรัฐบาลและยุทธศาสตร์ของกระทรวงอุตสาหกรรม ประจำปี พ.ศ. 2562

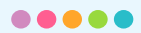


### The Industrial Development Policy for Thailand

Which is Driven by the Newly Significant Policy titled "Markets and innovations leading the Thai industry"



# Message from Minister of Industry



The Ministry of Industry recognises the importance of moving the Thai industry towards “Thailand 4.0” or the Next Revolution 4.0 in accordance with the Thai Industry 4.0 Development policy and strategy under the 20-year National Strategy Framework. The policy aims to advance the Thai industry using green innovation and to connect to the global economy. The policy also aims to promote digital transformation of the industrial sector in order for Thailand to become leading digital economy in ASEAN and continuously provide engines of growth for investment and industrial development. Aside from that, the Ministry has focused on fostering and

strengthening the growth potential of small and medium-sized enterprises (SMEs), community enterprises and new enterprises to ensure that they can compete sustainably in the global market.

The Ministry strives to carry out the government’s missions and policies to achieve concrete results by integrating knowledge with all sectors in order to fulfil the policy goals. In that effort, the Ministry has stepped up its role in supporting and developing SMEs including agricultural industries, SMEs, community enterprises, micro-businesses and startups with the aim of creating value-added and applying agricultural technology and machinery for SMEs,



micro-businesses and agricultural industries. For new industries, the Ministry has linked its core missions to its area-based missions and further developed existing industries through the Industry Transformation Center (ITC), the Creative Industry Village (CIV), the InnoSpace and financial measures.

In addition, the Ministry aims to bring in digital transformation along with creative economy by combining research and development (R&D) and innovation with local creativity, identity, culture and wisdom and to promote marketing before production as well as online marketing channels and e-Commerce by collaborating with relevant agencies to achieve the goals.

In promoting the industrial sector to Factory 4.0, the Ministry maintains its quality of work in overseeing factories and mines to ensure legal compliance and environmentally friendly manufacturing, increase the competitiveness of businesses, and keeps updated with the global and social trends to understand businesses and people in the areas. The Ministry also works to understand the Act, Ministerial Regulations, Declarations and new laws and regulations including the newly introduced Factory Act. On top of that, the Ministry has streamlined its processes regarding license granting and moved quickly to provide businesses with advice on technological application, robot use



and automation to enhance productivity and reduce costs as well as labour. Apart from that, the Ministry has used digital technology and AI in supervising factories and further developed its existing projects to accomplish its goals.

In supporting S-Curve and New S-Curve target industries, the Ministry has a clear policy to support the three target industries, including the automation and robotics industry, electric vehicle industry and bio-industry. Also, it is proposing the policy for Food for the Future industry to the Cabinet. The Ministry has monitored the progress of each target industry, helped drive investment in the areas, promoted the use of robots and automation in the production process, and pushed forward projects for the Food for the Future industry to ensure concrete results.

Moreover, in terms of area-based industrial development including the Eastern Economic Corridor (EEC), the Special economic zone (SEZ) and industry caravan, the Ministry has moved quickly to promote investment in those areas and placed a great emphasis on facilitating investors in license request, supporting information and offering advice to ensure investments following the government's policy.

Another area that the Ministry puts a great emphasis on is the advancement to the digital government through i-Industry, starting with developing its people in terms of knowledge and skills to create an efficient workforce to accomplish its key missions. In addition, its work processes have been transformed into a Digital Government Service using innovation and technology, and most importantly, creating a central database for Big Data to allow for quick access to information and cost reduction. The Ministry also promotes close collaboration with relevant agencies and has visited people and businesses in the areas to raise awareness and create understanding to strengthen a relationship, build trust and promote a good image for the industrial sector to ensure sustainable co-existence with the community.

Given the outbreak of COVID-19, the Ministry of Industry has recognised the problem and has taken part in an effort to prevent the crisis in Thailand by implementing the three following measures including:

- 1) Preventive medical supply - The Ministry has collaborated with various agencies, both the public and private sectors, to manufacture ten million pieces of quality cloth mask that meet the requirements of the Ministry of Industry's notification and are certified by the Thailand



Textile Institute. The masks have been distributed to the public across the country via Thailand Post and will help reduce the risk of infection. Apart from that, the Ministry has asked for cooperation from sanitary mask and alcohol production factories to produce masks and alcohol to meet the demand of the people and has provided 50,000 litres of hand sanitising gel to the general public.

2) Assistance and remedies - The Ministry has introduced measures to support businesses that have been affected by the pandemic including the “Pak-Kayai-Term” (or “Suspend-Expand-Fill” in English) programme for customers of the Small and Medium Enterprise Development Bank of Thailand, the Local Economy Loan programme for community enterprises and customers of the Pracharat SME Development Fund, and a waiver of annual fees for over 60,000 businesses nationwide.

3) Preventive measures - The Ministry has had officers rotate shifts with those working from home, provided different working hours for officers at the head office, issued the Ministry of Industry’s Notification on Co-operation from Industrial Factories to Comply with the Prevention and Control Measures for the COVID-19

outbreak, and set up checkpoints to measure body temperature and provide hand sanitisers for officers and visitors.

Finally, the Ministry of Industry will continue to improve and fulfil its missions as assigned by the government to achieve expected results by creating awareness and cooperation from officers, both at the central and regional agencies, to promote and drive industrial reforms towards Industry 4.0 which will enable industries to compete in the global market steadily, prosperously and sustainably in the future.

*Mr. Suriya Juangroongruangkit*  
*Minister of Industry*

## Message from Permanent Secretary of Industry

Thailand is currently facing the age of rapid technological change which has inevitably affected national development. The government recognises the importance of the coming age of change; therefore, has established policies for national reforms in every dimension including economic, social and environmental aspects with the vision of “Thailand 4.0” to respond to emerging changes and support the country’s sustainable economic growth. To reinforce those policies, the Ministry of Industry has strived to strengthen the industrial sector at all levels.

From 2020 to 2021, the Ministry of Industry strives to promote the industrial development policy for Thailand which is driven by the newly significant policy titled “Market & Innovation leading Thai industry: producing, selling, living together” Able to Produce means applying research and development (R&D) or innovation (research) of various agencies for business operations in the industrial sector and applying technology in the production process. Able to sell means having good markets by emphasising marketing before production and integrating with relevant agencies. The concept also involves creating markets for target industries and encouraging businesses to utilise online channels for e-Commerce, both at the domestic and international levels - such as Lazada, Shopee, Tarad.com, Amazon and Alibaba - as well as offline marketing. Moreover, the concept

includes building a network of co-operation with large businesses (Big Brother) that can mentor local SMEs and community enterprises. Able to living together means having quality goods and services which meet safety standards and are environmentally friendly.

In terms of R&D, the Ministry of Industry has collaborated with public and private agencies such as the Thailand Institute of Scientific and Technological Research (TISTR), the National Research Council of Thailand (NRCT), the National Science and Technology Development Agency (NSTDA), the Thailand Science Park, the Regional Universities Network (RUN) and the Agricultural Research Development Agency (Public Organization) (ARDA). The Ministry has expanded the results from the research and development by organizing the Research Connect three times. The project invited businesses to learn about the research results of various agencies and created 20 matchmakings, which will help add value to industrial products and enhance the country’s economic growth.

In addition, the Ministry of Industry places an emphasis on promoting and supporting the industrial sector in areas such as finance through the Pracharat SMEs Development Fund to provide funding for SMEs, micro-businesses and collaborates with its ally, the Small and Medium Enterprise Development



Bank of Thailand, to launch the “SMEs D<sup>3</sup>” measure to increase funding for SMEs with the loan limit of three million baht at the three-percent interest rate without a guarantee fee for three years. As part of that effort, the Ministry has also introduced the “Tor Term Serm Toon SMEs Sang Thai (Providing Funding for Thai SMEs)” and “Noon SMEs Thai Hai Kao Klai Pai Duay Kan (Supporting Thai SMEs in Moving Forward)” measures. What’s more, the Ministry of Industry has partnered with a network of public and private financial institutions to introduce credit measures that allow the industrial sector to reach their potential, become more efficient and compete in the global market.

In terms of organisational management, the Ministry of Industry focuses on operations to ensure convenience for the public and businesses. The Ministry recognises the importance of personnel, budget and operational efficiency and therefore strives to provide trainings to its people to create good leaders who are highly responsible, determined, dedicated, and ethical

and can manage the organisation well. The Ministry has also implemented the Plan-Do-Check-Act (PDCA) Cycle for planning, examining, driving and evaluating results to allow for effective planning and operations.

On this occasion, I would like to thank all relevant parties and agencies for their hard work and support in all our projects and operations which have allowed us to achieve our goals that are for the benefits of the nation and the Thai people.

A handwritten signature in blue ink, consisting of stylized initials and a surname.

*Mr. Kobchai Sungsitthisawad  
Permanent Secretary of the Ministry of Industry*

Executive of   
The Ministry of Industry



**Mr. Suriya Juangroongruangkit**

*Minister of Industry*



**Mr. Dheerayut Varnitshang**  
Vice Minister for Industry



**Mr. Suchart Trisangrujira**  
Advisor to the Minister,  
Ministry of Industry



**Ms. Suchada Thansap**  
Spokeswoman,  
Ministry of Industry



**Mr. Krichanont Iyapunya**  
Deputy Spokesman,  
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Executive of   
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**Mr.Kobchai Sungsitthisawad**  
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**Mr. Surapol Chamatr**

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**Mr.Nattapon Nattasomboon**  
Inspector General



**Mr.Sura Petpirun**  
Inspector General



**Mr.Somphon Nodthaisong**  
Inspector General



**Mr. Decha Chatutananant**  
Inspector General



**Mr. Banjong Sukreeta**  
Inspector General



**Mr. Niran Yingmahisaranon**  
Deputy Director-General Department of  
Primary Industries and Mines,  
Acting Inspector General



**Mr. Sahawat Sopha**  
Assistant Permanent Secretary,  
Ministry of Industry

# Executive of The Ministry of Industry



**Mr. Prakob Vivitjinda**  
Director General,  
Department of Industrial Works



**Mr. Wisanu Tabtieng**  
Director General,  
Department of Primary Industries and Mines



**Mr. Nattapol Rangsitpol**  
Director General,  
Office of Industrial Economics



**Mr. Wanchai Phanomchai**  
Secretary General,  
Thai Industrial Standards Institute



**Mr. Thongchai Chawalitpichaet**

Director General,  
Office of Industrial Economics



**Mr. Ekapat Wangsuwan**

Secretary General,  
Office of the Cane and Sugar Board



**Ms. Somchint Pilouk**

Governor Industrial Estate  
Authority of Thailand



**Ms. Nartnaree Rathapat**

President,  
Small and Medium Enterprise Development  
Bank of Thailand

# Executive of The Ministry of Industry

## Networking Institution



**Mr. Somwang Boonrakcharoen**

Executive Director,  
Thai-German Institute



**Mr. Phanit Laosirirat**

Executive Director,  
Thailand Productivity Institute



**Mrs. Anong Pajitprapapon**

Executive Director,  
National Food Institute



**Mr. Chanchai Sirikasemlert**

Executive Director,  
Thailand Textile Institute



**Mrs. Punnee Angsusingha**

Executive Director,  
Management System  
Certification Institute (Thailand)



**Mr. Pisit Rangsaritwutikul**

President,  
The Thailand Automotive Institute



**Mr. Narat Rujirat**

Executive Director,  
Electrical and Electronics Institute



**Mr. Viroj Rojwatanachai**

Executive Director,  
Iron and Steel Institute of Thailand



**Mr. Tananon Praichan**

Executive Director,  
Institute for Small and Medium  
Enterprises Development



**Mr. Veera Kwanloetchit**

Executive Director,  
Plastic Institute of Thailand



**Mr. Chakporn Oonjitt**

Executive Director,  
Construction Institute of Thailand

# C ONTENTS

**2**

Message from Minister  
of Industry

**6**

Message from Permanent  
Secretary of Industry

**8**

Executive of the Ministry  
of Industry

**20**

Section 1  
Organization Chart

**22**

Section 2  
Vision, Mission,  
Strategy and Budget

**30**

Section 3  
2019 Economic Outlook  
and 2020 Industry Outlook



**34**

Section 4  
Major Task of the Ministry of  
Industry According to  
the Government Policy

**70**

Section 5  
Achievements According  
to Each Strategy

**72**

Strategy 1  
Enhancing the productivity  
and capability of the industrial  
sector to generate growth  
and strength

**81**

Strategy 2  
Improving the enabling factors  
to create a conducive ecosystem  
for investment and development  
in the industrial sector

**83**

Strategy 3  
Promoting and encouraging  
the industries to be socially  
and environmentally friendly

**123**

Strategy 4  
Developing organizational  
competencies to improve  
service quality





# Organization Chart

**Office of the Minister**

**Industrial  
Economic Cluster**

**Process  
Supervision Cluster**

**Office of Industrial  
Economics**

**Office of the Cane  
and Sugar Board**

**Department of  
Industrial Works**

**Department of  
Primary Industries  
and Mines**

## Networking Institution

- Thai-Germen Institute
- National Food Institute
- Management System Certification Institute (Thailand)
- Electrical and Electronics Institute
- Iron and Steel Institute of Thailand
- Plastic Institute of Thailand
- Thailand Productivity Institute
- Thailand Textile Institute
- Thailand Automotive Institute
- Institute for Small and Medium Enterprises Development
- Construction Institute of Thailand



# Ministry of Industry

Office of the Permanent Secretary Ministry of Industry

Industrial and Entrepreneur Promotion Cluster

Department of Industrial Promotion

Thai Industrial Standards Institute

State Enterprises

Industrial Estate Authority of Thailand

Co-Supervision Agency with the Ministry of Finance

- Small and Medium Enterprise Development Bank of Thailand
- SMEs Venture Capital Fund

Source: Human Resource Administration Division

Date from 6 March 2020



# Vision **Mission** Strategy **Budget**



**Vision :  
Thailand**

**“To be a developed country based on the Sufficiency Economy Philosophy which enjoys stability, prosperity and sustainability”**

**“Stability Prosperity Sustainability”**



**Stability**

The nation enjoys solidarity and is resilient to both internal and external threats and changes, with established social, economic, environmental and political security.



**Prosperity**

The country enjoys constant economic growth and becomes a high-income economy with decreased development disparity. Citizens benefit from development on an equal basis.



**Sustainability**

Development should promote constant growth in terms of people's income and quality of life in an eco-friendly manner without exploitation of natural resources.



**National  
Strategies**  
(2018 - 2037)

- Stability
- Promoting competitiveness
- Developing Human Resource
- Promoting opportunity, equality and equity in the society
- Promoting growth on the environment-friendly quality of life
- Building balance and development of the management system in the public sector



## Fiscal Year 2018

"Thai industries driven by innovation, environmentally friendly production and connecting with the global economy by 2021 AD"



1. Promote and cultivate entrepreneurs' strength and competitiveness in the global market
2. Improve and develop the industrial ecosystem to facilitate the transformation towards Industry 4.0
3. Promote environmentally friendly production in the industrial sector
4. Coordinate and integrate the works of related organizations, both internal and external, to achieve common development goals



"Ministry of Industry's core value is known as A-S-I-A which stands for Accountability, Suggestion, Integrity and Achievement Motivation"

- A** : Accountability
- S** : Suggestion
- I** : Integrity
- A** : Achievement Motivation



# The Ministry of Industry Strategic Plan 2017-2021

## Strategy

1

Enhancing the productivity and capability of the industrial sector to generate growth and strength



## Objectives

To promote and develop industries that match the country's basic potentials, and industries that are beneficial for future economy development. By focusing on research, utilizing research and development, and applying STI to increase productivity and to develop industrial standards throughout value chains, thus enhancing an ability to compete in a higher level. The following strategies are

## Strategies

1. Promote research and development, applying STI and digital technology to develop products and increase industrial efficiency.
2. Develop entrepreneurs and human resources throughout supply chains to become higher skill performers in manufacturing, management, technology and innovation.
3. Promote and develop industries using localized inputs to be higher value added.
4. Develop standards, auditing and certifying of process and products to enhance competitiveness of industrial sectors as well as safety of consumers and people.
5. Strengthen performance of logistics management and industrial supply chain.
6. Develop target industrial clusters to be the hub of ASEAN.

## Strategy

### 2

Improving the enabling factors to create a conducive ecosystem for investment and development in the industrial sector



### Objectives

To support, create opportunity, and reduce obstacles for industrial operation, The following strategies are

### Strategies

1. Revise law, regulations and service processes in order to ease investment and industrial operations.
2. Identify direction of industrial development and develop intelligence system on industrial economics for guiding and warning industrial sectors.
3. Identify appropriate location for industry and revise town planning to suit with industrial development.
4. Support the establishment of design and product testing facilities and increase their capabilities to meet demands.
5. Integrate works with relevant authorities to develop enabling factors for industrial development

## Strategy

3

Promoting and encouraging the industries to be socially and environmentally friendly



### Objectives

To create a good image for industries that emphasize on social and environmental friendly operation, and also to promote sustainable industrial development. The following strategies are

### Strategies

1. Develop mechanisms for industries to strictly abide by the laws.
2. Promote eco industrial town development.
3. Manage industrial waste completely by focusing on the use of industrial waste.
4. Develop potential industrial cluster to be eco industry.
5. Promote industrial sectors to develop products and processes that are socially and environmentally-friendly.
6. Develop surveillance networks on environmental impact management through community participation.

## Strategy

4

Developing organizational competencies to improve service quality



### Objectives

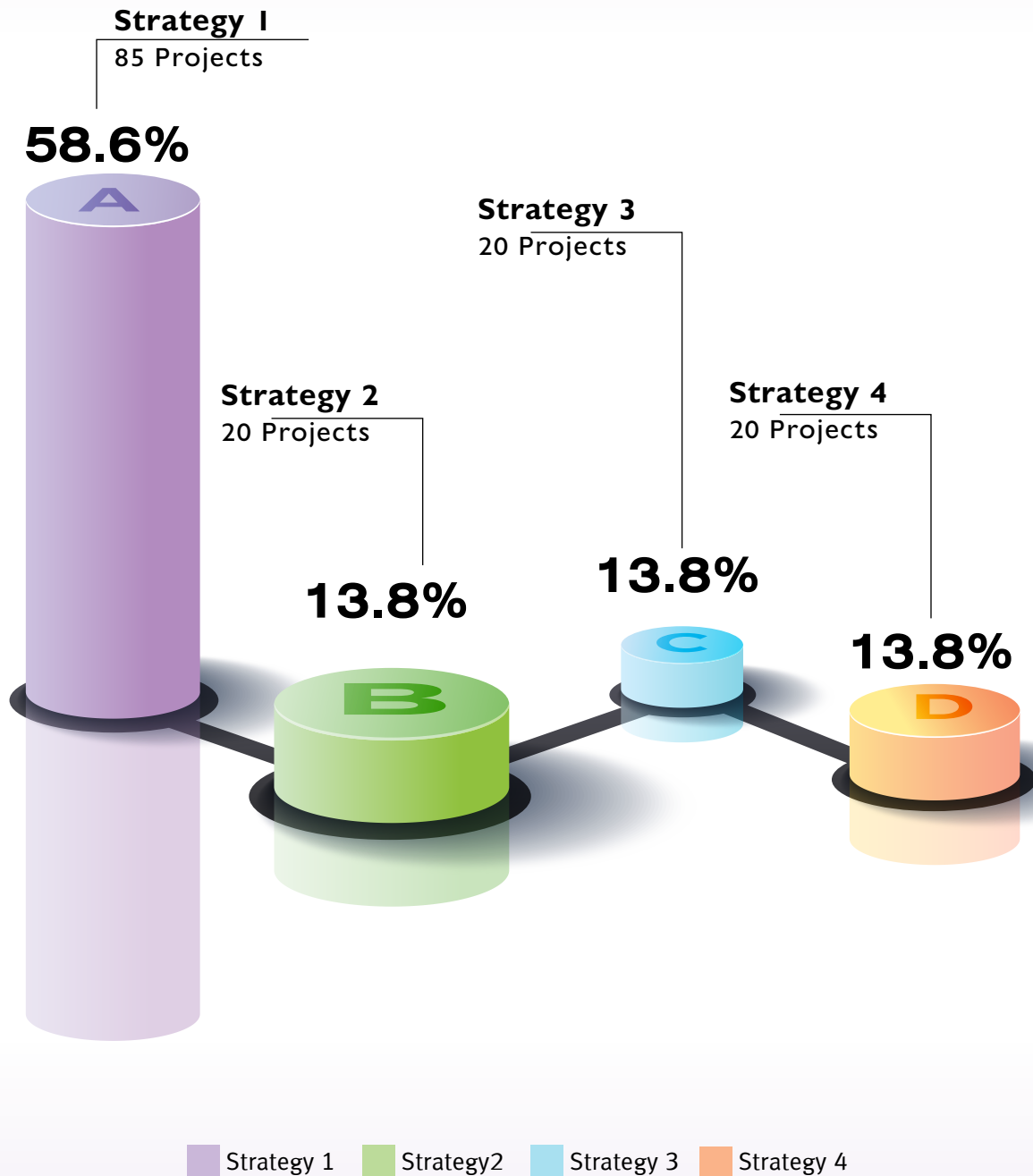
To develop system and personnel for effectively providing services to entrepreneurs and public with good governance, and prepare for future changes. The following strategies are

### Strategies

1. Promote ethics and good governance, prevent corruption and misbehavior in public service practices for benefits of citizen.
2. Improve operational processes, provide appropriate resources and develop tools and information technology that increase service efficiency.
3. Develop the organization's personnel skills and performances.
4. Create a good image of the organization in providing quality services.

# Ratios of Projects

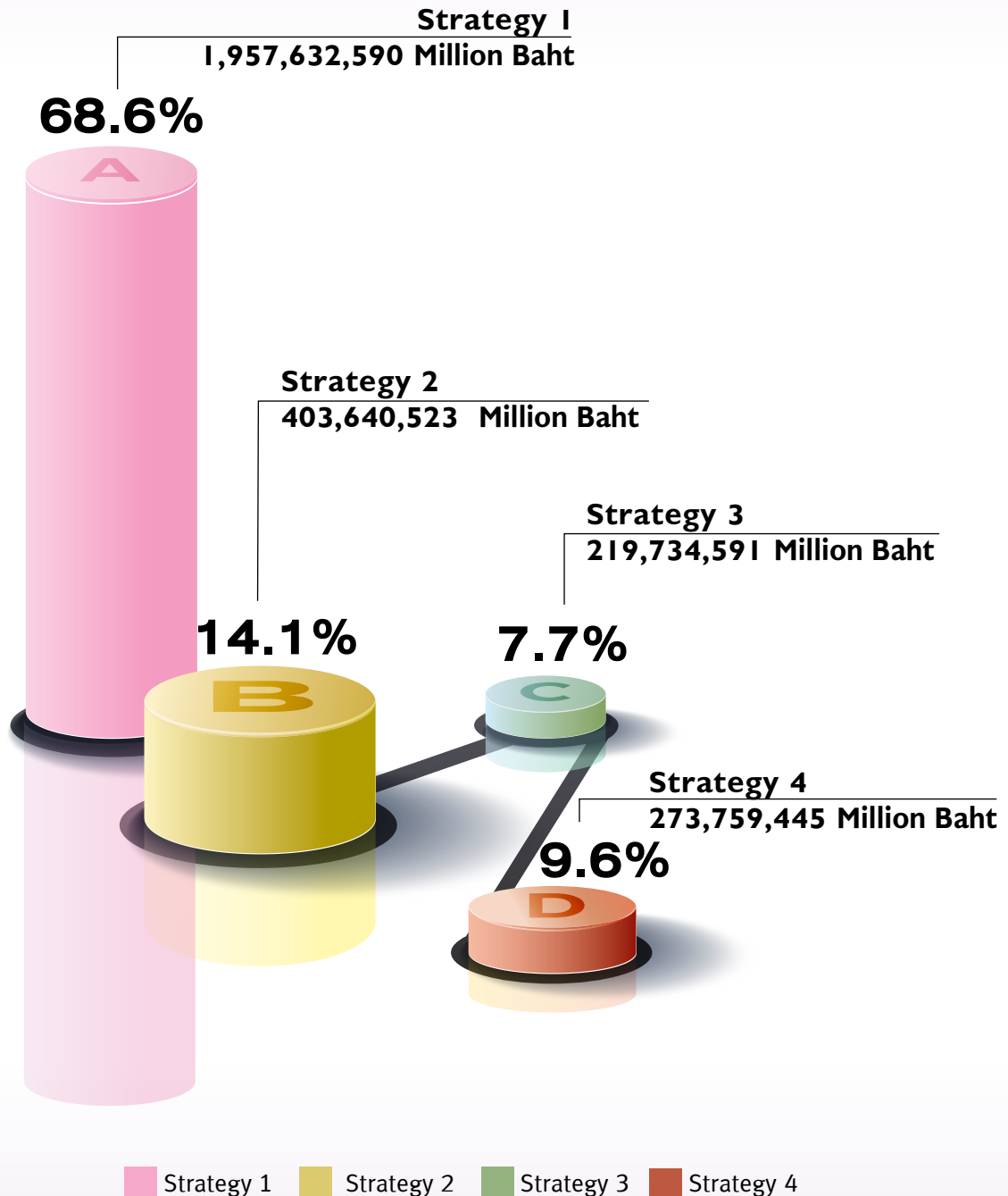
under Ministry of Industry Strategies



In the fiscal year 2019, the Ministry of Industry placed importance enhancing industry capacity to grow strong. As evident from the chart, Strategy 1 has the highest number of projects in support of strategies with Strategies 2, 3 and 4 having fewer projects in descending order.

# Ratios of Budgets for Projects

under the Ministry of Industry



In the fiscal year 2019, the Ministry of Industry focused on enhancing industry capacity. As evident from the chart, Strategy 1 has the highest number of projects in support of strategies with Strategies 2, 4 and 3 having lower budgets in descending order.





Section 3

# 2019 Economic

Outlook and 2020 Industry Outlook



# 2019 Economic Outlook

## and 2020 Industry Outlook



It is expected that the **Thai economy in 2019** will continue to grow at 2.8 percent, a slowdown from the previous year, which grew by 4.1 percent, due to sluggish global demand resulting from trading partners' slowing economies and declining trades caused by the US-China trade war and leading to declining exports. The number of tourists continues to rise compared to the previous year due to the extension of the visa on arrival (VOA) fee waiver. Private consumption and investment is expected to grow continuously due to the economic stimulus schemes in the second half of 2019, especially the "Eat, Shop, Spend (Chim Shop Chai)" Phase 1 and 2 campaign, welfare card for low income earners scheme, compensation for drought-hit farmers scheme, rice farmer income insurance scheme, oil palm farmer income insurance scheme, GHB home loan, home transfer and mortgage fee waiver, and budget spending scheme which help stimulate household spending. The industrial sector in 2019 as can be seen by the manufacturing production index (MPI) shows a downward trend compared to 2018, which grew by 3.65 percent, as a result of sluggish global demand.

The Thai economy in 2020 is expected to continue to grow compared to 2019 due to private and public spending from the fiscal 2020 budget of 3.2 trillion baht and state enterprises' transport infrastructure investment projects. The increased public spending will boost confidence in the business sector and promote domestic private investment. In terms of global demand, exports of goods and services is likely to increase at an accelerating rate compared to the previous year as a result of trading partners' growing economies and global trade recovery. However, the Thai economy in 2020 will face internal and external risks. Trade war is an important risk that can accelerate and affect the country's exports and tourism more than expected. Another important risk is geopolitical conflicts such as Brexit, Hong Kong protests, and Japan and South Korea conflict which might slow the world economy even further and cause volatility in the global financial sector. Internal risks will come from increased financial vulnerability in the household and small business sector. Private consumption shows a slowing trend due to various factors such as rising household debt and financial institutions' prudent lending.



Mr.Thongchai Chawalitpichaet  
Director General Office of Industrial Economics

The industrial sector in 2020 will show a positive trend from the negative trend in 2019 from the trends in key industries such as the auto industry driven by the domestic demand and the launches of new types of vehicle (cars with internal combustion engine and electric vehicles) as well as the demand for new cars of some consumers who bought cars under the First Car campaign (2012-2013) which are 6 to 7 years old. The food industry, which produces staples that accounts for the main household expense, shows a positive sign due to various factors including quality and diverse raw materials, skilled labour, large domestic market, and growing export market since most Thai products meet the quality standards. These factors will allow the industrial sector grow again in 2020.



Section 4



# Major Task of the Ministry of Industry According to the Government Policy





## Target Industry Development



The Office of Industrial Economics (OIE) has been assigned as the main agency to develop the target industries into the country's economic engine; as a result, the OIE has proposed the measures to develop potential industries and the Cabinet approved the three measures with details and key operating results as follows:

### 1. Measure for the Development of Bio Industry in Thailand 2018-2027

The key progresses for turning Thailand into the Bio Hub of ASEAN by 2027 include

(1) Eliminating investment barriers and creating supporting factors such as promoting the launch of the Ministry of Industry's Notification on the Establishment of Factories that use sugarcane as raw materials throughout the Kingdom in 2019, which was approved by the Cabinet on 29 January 2019 and announced in the Government Gazette on 2 May 2019

(2) Accelerating domestic investment with a total private investment of 50,740 million baht from July 2019 to March 2020

(3) Stimulating demand in collaboration with the Ministry of Finance (FPO and Revenue Department) and the Plastic Institute proposed the draft tax measures to promote bio-degradable plastic products, which the Cabinet has approved in principle on 4 June 2019 and is currently under consideration by the Council of State and

(4) Establishing a network in the form of the Center of Bio Excellence (CoBE), the Ministry of Industry has linked biological research and operations with research agencies both at the central and provincial levels such

as Thailand Center of Excellence for Life Sciences (TCELS), National Research Office, National Science and Technology Development Agency, and the Prince of Songkla University. Additionally, the OIE has expanded the measure to regions in order to expand the areas of bioeconomy to encourage businesses to establish a Bio Hub in provincial areas such as Chachoengsao, Lopburi, and Ubon Ratchathani.

## 2. Measure for the Development of Robotics and Automation Industry

Set the goals for 2026 to promote Thailand as the leader in production or automatic robots in ASEAN with a focus on promoting investment in robots and automation systems such as providing tax exemption benefits and knowledge to users and manufacturers of robots and automation. Key operating results are, for example, investment promotion worth over 9,985 million baht, 105 Industry Transformation Centers established, 42 businesses that registered System Integrator (SI) with the Center of Robotics Excellence (CoRE), and 1,250 SI development project participants and prepared users.

## 3. Measure to Support Electric Vehicles in Thailand

Established the vision for the development of the Thai automotive industry, "Thailand is a production base for clean, economical, safe, and electrically powered cars with efficient testing centers that move towards international standards." Key operating results are, for example, nine businesses receiving investment promotion, more than 411,200 vehicles per year of total production capacity, a total investment of 53,795 million baht, providing UN R117 tyre testing services under the Automotive and Tyre Testing Research and Innovation Center project, and determining important production process conditions for Core Technology including

- 1) Batteries
- 2) Towing Motors
- 3) Battery Management System (BMS)
- 4) Drive Controller Unit (DCU).



In addition, the OIE is preparing to propose measures for the development of food processing industry, measures for the development of intelligent electronics industry 2020–2030, and guidelines for the development of Thai industries.

## 4. Bio-Economy Promotion and Development

The Office of the Cane and Sugar Board (OCSB) has promoted and developed bio-economy from the cane and sugar industry, which is a non-food bioeconomy group, by carrying out a project to develop and promote bioeconomy, developing 10 bioeconomy products from cane and sugar, providing trainings for to promote biotechnology and operational production, promoting the project's operating results to 100 people, and providing knowledge and potential enhancement opportunities to personnel, researchers, scientists, and those involved in biotechnology to support the development of bioeconomy production and test analysis for 10 people



Mr. Wanchai Phanomchai  
Secretary General Thai Industrial Standards Institute

## 5. Automotive and Tyre Testing Research and Innovation Center

The Thai Industrial Standards Institute (TISI) has been approved to establish the Automotive and Tyre Testing Research and Innovation Center following the Cabinet's approval on 29 March 2016, with the right to use 1,234.98 rai of the area of the Royal Forest Department, Ministry of Natural Resources and Environment at Lat Krating Forest Park, Lat Krating Subdistrict, Sanam Chai Khet District, Chachoengsao Province. The project is divided into two phases:

Phase 1 Establishing a UN R117 tyre testing unit

Phase 2 Establishing vehicle and automotive parts testing unit



### Operating results

#### **Project Phase 1: UN R117 tyre testing unit**

consisting of a tyre testing facility with UN R117 standard testing equipment for testing tyre noise, wet grip, and rolling resistance.

The construction of tyre rubber testing facility was completed and received APPLUS + IDIADA proving ground certification from Spain. The testing facility follows UN R117 standard and the surface of the noise testing track meets ISO 10844: 2014 standard which is internationally accepted.

The office building construction, testing laboratories, and utility system will be completed in 2020. The testing laboratories are to be completed in November 2019.

The testing services for tyre noise and wet grip have been offered since 15 October 2019 by Thailand Automotive Institute, the contractor to perform tyre testing.

#### **Project Phase 2: Vehicle and automotive parts testing unit consisting of five testing tracks including:**

1. Automotive Performance Testing Track (Long Distance and High Speed)
2. Brake Performance Testing Track
3. Park Brake Testing Track
4. Dynamic Platform Testing Track
5. Skid-Pad Testing Track and 19 Standardized Testing Equipment



Land leveling of the 700 rai area (for the construction of five testing tracks) was completed in April 2019. The design and design details (for the construction of five testing tracks) were completed in February 2019. The entire project is expected to be completed with full service offered in 2023

### Benefits

1. Save testing costs and time for businesses that send products for testing and certification abroad which will require two months of testing and a total cost of approximately 119 million baht per year.
2. Have tracks and equipment to support testing, design, research and development, and innovation of the automotive and auto parts, tyre rubber, processed rubber, and other industries in the country, making the country's industries thriving and sustainable.
3. Boost confidence in investing in the automotive and auto parts industry as there is a testing center in the country.
4. Promote exports and increase competitiveness for businesses as the products are of reliable quality consistent with international standards.
5. Thailand is the leader in the automotive and auto parts industry and tyre rubber industry in ASEAN as there is a test center that is capable to test and certify automotive products and parts and tyre rubber products in accordance with international and other relevant standards.

Prime Minister General Prayut Chan-o-cha visited the area to monitor the progress of the Automotive and Tyre Testing Research and Innovation Center on 20 March 2019.



# Industry 4.0 Promotion and Development

The Department of Industrial Promotion (DIP) has promoted Thai industries to be able to compete in the 4.0 era by conducting projects to develop businesses and personnel in the industrial sector, create opportunities for business success, providing businesses with access to funding, enhance their potential, and increase business capacity to apply innovation and technology for industrial and business development following the Minister of Industry's policy through the following projects:

## 1. “From Local to Global” Agricultural Industry Project”

The Department of Industrial Promotion (DIP) has set the guidelines for agricultural industry promotion. The Department held a meeting to discuss with 18 relevant agencies, both in the public and private sectors, to determine measures to promote agricultural industry, and the meeting agreed to establish a working group to promote agricultural industry to drive the promotion of agricultural industry. The Permanent Secretary of the Ministry of Industry is the chair of the working group and there are a total of 42 representative from the public and private sectors including representatives from the Department of Intellectual Property, the Department of International Trade Promotion, Department of Agriculture, Department of Agricultural Extension, Department of Cooperative Promotion, Office of Agricultural Economics, National Bureau of Agricultural Commodity and Food Standards, The Federation of Thai Industries, The Thai Chamber of Commerce, National Farmers Council, Thai SMEs Confederation, Bank for Agriculture and Agricultural Cooperatives, Right Livelihood Foundation, Thai Beverage Public Company Limited, Thai Union Group Public Company Limited, Pracharath Rak Samakkee Social Enterprise (Thailand) Co.,Ltd.. and networked institutions and agencies in the Ministry to jointly determine policies, guidelines, and directions for agricultural industry promotion and promote collaborations between the public and private sectors.



Mr.Nattapol Rangsitpol  
Director General Department of Industrial Promotion

The Department also conducted a pilot project under the project to enhance the potential of food processing SMEs using innovation and processing technology under the SME Development Fund following the Pracharath initiative for fiscal year 2019 with 70 businesses and a budget of 4.6866 million baht in collaboration with the Food Institute to conduct the project to use the facility and equipment of the ITC - Mie Thailand Innovation Center and under the Agro Genius Academy project in fiscal year 2562 with 200 people and a budget of 2.5 million baht in collaboration with Kasetsart University, Bank for Agriculture and Agricultural Cooperatives, and the Thai Agricultural Quality Promotion Institute to incubate new breed of entrepreneurs in the agricultural industry.

## 2. Creative Industry Village (CIV) Project

The Department of Industrial Promotion (DIP) conducted the creative industrial village project with a focus on creating value for community products and services by using creativity and technology combined with the wisdom of each village and linked with tourism to generate sustainable income for the community. The pilot projects were carried out in 27 villages and expanded to 215 villages in 2019, having developed the capacity of over 800 community leaders, heirs, and businesses and more than 800 products, created community tourist attractions and services for tourists, and created economic value of over 1,500 million baht.



In fiscal year 2020, the **DIP** will focus on creating value for 300 producers and 300 products by encouraging communities to apply creativity and technology in creating community industry development plan linked with tourism in order to create value for products and packaging, strengthening management capacity, and providing new marketing channels to promote community engagement and creative industrial village.

### 3. InnoSpace Project

The Department of Industrial Promotion (DIP) promoted the Thailand Cyberport project by promoting the establishment of Innospace (Thailand) Company Limited, a non-profit organisation, as a national startup platform of for startup creation and development with connection to the country's ecosystem. For the past years, the Department of Industrial Promotion and its allies have moved forward the company's progress to establish clear management in order to carry out activities for concrete results. Initially, the allies have become the main driving force with the Stock Exchange of Thailand mainly developing startups and promoting entrepreneurship, the National Science and Technology Development Agency mainly responsible for angel investors, and Bangkok Bank, Krungthai Bank, and PTT mainly responsible for international cooperation. Over the past years, the Department has met with its allies in investment including public agencies, state enterprises, private organisations, and financial institutions to discuss ways to promote and support startup and investment in InnoSpace (Thailand) as an organisation for enhancing, incubating, and developing startups in Thailand.



Furthermore, the Department has encouraged and sought high value technology and innovation businesses to join the ecosystem to create a network, both in and outside the country, of knowledge, innovation, and technology in the form of open innovation for investment and commercial opportunities and infrastructure and has connected local startups to the globe. Today, 30 businesses, startups, public and private agencies, educational institutions, and financial institutions have signed a cooperation on innovation promotion and development and 13 agencies have signed for alliance on investment to support the development of national platform and startups throughout the life cycle. The initial investment was 515 million baht and in the next phase, the Department of Industrial Promotion will organise “Thailand Cyberport Demo Day 2019” as a pilot project to seek, connect, and create business opportunities for startup and investors both in Thailand and Hong Kong in collaboration with HK Cyberport / HKTDC / HPA.

## 4. Industry Transformation Center (ITC)

The Department of Industrial Promotion (DIP) provided services to SMEs, OTOP producers, startup, community enterprises, farmers, and those interested through 13 Industry Transformation (ITC) Centers, both in the central and regional areas (Regional Industrial Promotion Center) with the objective of process transformation, product transformation, and people transformation. The services entail advisory services, product prototyping, and production process upgrade. In terms of success, more than 5,800 products have been developed, creating an economic value of over 700 million baht.



## 5. Thailand Industrial Design Center (Thai-IDC)

The Department of Industrial Promotion (DIP) has taken steps to help businesses gain acceptance in the fashion industry. It is necessary to promote space for the design and development of products between businesses, designers and those involved and create an environment that is conducive to product design and development or further apply research into development. The Thailand Industrial Design Center (Thai-IDC) is the center for integration of product design and development services with networked agencies throughout the supply chain with an aim to promote and support structural shift from OEM to ODM and ODM to OBM, enhance the ability to design of businesses, creating success factors for design service access, and support the development of industrial design to become a hub in ASEAN hub in order to generate income and take the Thai industry to the global value chain. The operation of the center focuses on personnel development, design, co-working space service, and design knowledge transfer.

In terms of operating results, the Thai-IDC Center was able to develop and transfer design knowledge to 2,362 people to support industrial development, providing product design and development services to 406 products, and offer co-working space for 37 times, resulting in economic value of more than 526 million baht. In the next phase, the Department of Industrial Promotion will build and develop the potential and network of creative industrial designers as well as develop 800 product and packaging design personnel, 200 businesses, and 300 products so that SMEs can apply design knowledge to develop products / packaging to meet relevant standards, creating value and developing products to meet the needs of the market at all levels.

## 6. Connected Industries



The Department of Industrial Promotion (DIP) has promoted enterprises by using intelligent tracking system to increasing productivity by cooperating with Japan to implement the Connected Industries project, initially adopting the “3-Stage Rocket Approach” or “3-Stage Rocket Approach to SMEs 4.0” consisting of three steps

- 1) Visualize Machine with 560 businesses
- 2) Visualize Craftsmanship with 140 businesses and

3) Lean Automation System Integrators or LASI Project with 90 businesses and 800 employees. The project has created a total economic value of more than 1,100 million baht, consisting of the increase in productivity of 219 million baht and the cost reduction of 881 million baht. In fiscal year 2020, the DIP will carry out a project to enhance efficiency/productivity under an integrated plan to advance businesses, community economy, and small and medium-sized enterprises to the international level by promoting the use of digital technology and innovation to increase sales, reduce costs, and boost productivity in the industrial sector with more than 1,600 businesses and 4,000 people joining.

## 7. SME Development Fund Following the Pracharath Way



The Department of Industrial Promotion (DIP) started the SME Development Fund following the Pracharath way to support SMEs in becoming high-value industries in accordance with the national strategy and related strategies. It is also a fund that helps struggling SMEs gain access to funding to develop into potential businesses with access to the normal financial system of private financial institutions, which will make SMEs the main income generator and the economic base of the country. The DIP has conducted the following projects:

1) SME Development Fund Following the Pracharath Way to provide financial access to SMEs in the amount of 18,000 million baht and distributed loans of 14,264.09 million baht to 10,307 businesses,

2) SME Promotion and Development project under the SME Development Fund Following the Pracharath Way of 1,000 million baht with spending of 262.78 million baht to promote and develop businesses through 40 projects. Currently, more than 4,326 businesses and 15,643 people have participated in the project.

## 8. Digital Value Chain

The Department of Industrial Promotion (DIP) has implemented a project that focuses on increasing the competitiveness of SMEs at the global level by encouraging SMEs to apply digital technology in business management for efficiency, promoting e-Commerce marketing, and promoting business matching through various platforms. For the past years, businesses have been promoted to compete at the regional and global levels using the “Marketing leads promotion” approach, which is a management concept that aims to balance production and product demand and to reduce inventory and oversupply. The Department has also promoted SMEs in online channels such as Alibaba and Lazada and encouraged businesses to use social media to build brands and to develop e-Catalogs on websites in order to promote the products.

The Department also supports the use of Big-Data such as T-Goodtech, J-Goodtech business matching database and provides information on trends or market changes to allow businesses to develop



Mr. Jullapong Thaveesri  
Deputy Permanent Secretary of Industry

various as well as create a marketing coach. In the next phase, in fiscal year 2020, the Department of Industrial Promotion will develop the potential of SMEs using digital system with a focus on creating knowledge on how to advance SMEs to the global level using e-Commerce marketing, platform development, and business matching through T-Goodtech and dead stock management for 350 SMEs and 1,000 people.

## 9. Credit promotion programme to increase the efficiency of integrated sugarcane production

The Office of the Cane and Sugar Board (OCSB) ran a credit promotion programme to increase the efficiency of sugarcane production to encourage sugarcane farmers to use agricultural machinery for sugarcane cultivation and sugarcane harvesters to reduce labour shortage and sugarcane burning as well as to develop water source and water management in sugarcane fields. The Cabinet, at the meeting on 11 June 2019, has approved the extension of the credit promotion programme to increase the efficiency of sugarcane production for fiscal year 2019-2021 with the annual credit limit of 2,000 million baht for three years, totaling 6,000 million baht. Individual borrowers get an MRR interest rate (currently, MRR = 7 percent per year). The borrower pays the MRR-5 rate (2 percent per year). The government compensates for three percent per annum and the BAAC compensates for two percent per year. Farmer/institution borrowers get an MLR (currently, MLR = 5 percent per annum). Borrowers pay at the MLR-3 rate (2 percent per year). Government compensates for two percent per year and the BAAC is responsible for one percent per year. In fiscal year 2019, 302 people and businesses received credit in the amount of 1,919,677,190 baht which was divided into



- 1) water and equipment development - 18 people and businesses amounting 4,535,000 baht,
- 2) sugarcane harvesters/sugarcane tractors - 242 businesses (254 vehicles) amounting 1,848,990,690 baht, and
- 3) tractor/sugarcane trucks - 42 businesses amounting 66,151,500 baht with the total of 302 businesses and the total amount of 1,919,677,190 baht.



## 10. SMEs Standard up TISI.S

**The Thai Industrial Standards Institute (TISI)** has developed the S-Industrial Standards (TIS-S) in accordance with the “SMEs Standard Up” project to develop small and medium-sized enterprises (SMEs) to meet standards that are suitable for the target enterprises and establish a specific standard system for SMEs of which there is no standard to comply with in order to certify product capacity as well as product and service quality in line with the development of potential industries for Industry 4.0.

In fiscal year 2019, TISI has set the standards for TIS-S certification and provided training to SMEs. The operations can be divided into three areas as follows:

### 1. Standard setting

The TISI has set the TIS-S standard and announced the implementation of 38 standards (78 TIS-S standards for fiscal year 2018–2019) which can be divided into the following sectors:

- |                    |             |                    |              |
|--------------------|-------------|--------------------|--------------|
| 1) Textile items   | 5 standards | 2) Household items | 28 standards |
| 3) Cosmetics items | 1 standard  | 4) Service items   | 4 standards  |

### 2. Certification

The TISI had certified the TIS-S standard for 19 SMEs which can be divided into the following sectors:

- |                    |              |
|--------------------|--------------|
| 1) Household items | 2 standards  |
| 2) Cosmetics items | 1 standards  |
| 3) Services items  | 16 standards |

### 3. Training

The TISI has provided personnel development to SMEs in order to promote knowledge and understanding about the criteria and the TIS-S certification process which can be used to develop business capacity and obtain TIS-S certification. The TISI has organised a training workshop on the TIS-S standard and certification process at The Twin Towers Hotel, Bangkok for 116 participants in two classes as follows:

- 1) Class 1, Training Date 26 June 2019, 71 participants
- 2) Class 2, Training Date 24 July 2019, 45 participants

From the operating results in fiscal year 2019 in the three areas, the trainings have helped develop and support small and medium-sized enterprises (SMEs) in setting up a standard system that can guarantee product capacity as well as product and service quality that meets the needs of target markets in line with the development of potential industries for Industry 4.0





## Promoting Production 4.0



Mr. Prakob Vivitjinda  
Director General Department of Industrial Works

### 1. Industrial waste management

The Department of Industrial Works (DIW) has carried out industrial waste management projects with details as follows:

#### Industrial Waste Management for Fiscal Year 2018–2019

Item	Target 2019	Operating results (accumulated)	
		2018	2019 (As of 30 Sep 2019)
1. The amount of hazardous industrial waste managed correctly	1.56 million tonnes/year	2,498	1,327
2. The amount of industrial waste entering the system	24 tonnes/year	45.783	17.25
3. The number of industrial factory having correct industrial waste management	9,000 factories/year	9,414	9,270

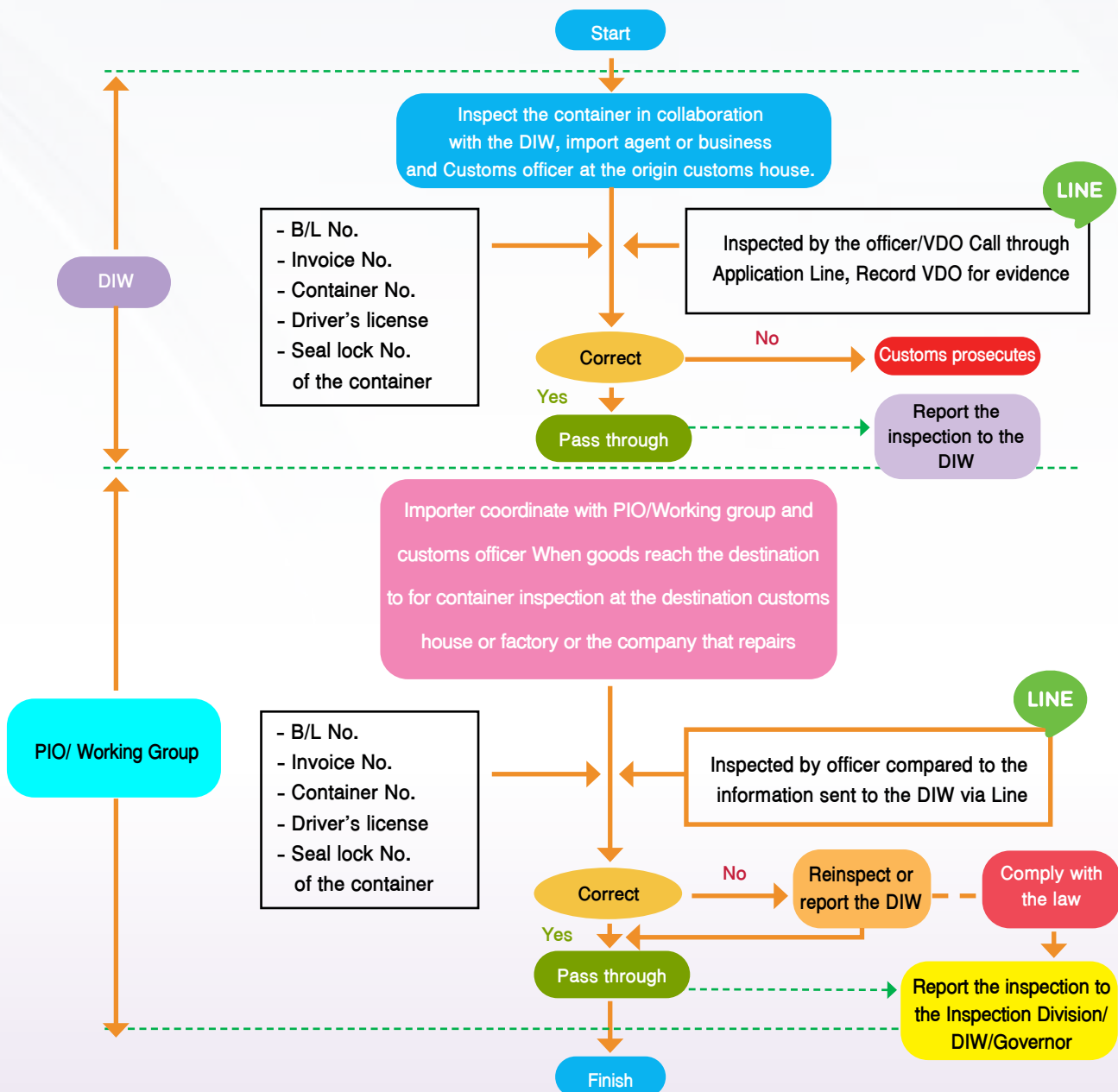
# Summary of E-Waste and Used-E Management

## Legal measures

Prosecuted offenders (suspended license and prosecuted offenses against importation without permission), issued the Ministry of Industry's Notification to determine the type and source of raw materials to be used in the factory, prohibited the import of E-waste as raw material in the factory according to Section 32 (2) of the Factory Act B.E.2535 (1992), improved the conditions involving the imports of electrical appliances and electronic devices into the Kingdom by limiting the type of electrical appliances allowed to be imported with specific business reasons and long useful life

## Regulatory and monitoring measures

Established an electronic monitoring system for E-waste and Used-E by coordinating with provincial industry offices and the Industrail Estate Authority of Thailand (IEAT) to jointly release products.



## Plastic scrap import management

The Cabinet's resolution on 3 July 2018 acknowledged the management measure for electronic waste and plastic scrap imported from foreign countries by limiting import quantity as necessary and sufficient for the used plastic recycling industry and reducing the quantity within two years to ensure correct management without effect on businesses that comply with the law.

The Subcommittee for Integrated and Systematic Management of Electronic Waste and Plastic Scrap Imported from Foreign Countries set quotas for scrap imported from foreign countries by gradually reducing import in two years as follows: Year 1- set the import quota of no more than 70,000 tonnes (PET 50,000 tonnes and others 20,000 tonnes) and the domestic plastic use of at least 30 percent; Year 2-sets the import quota of no more than 40,000 tonnes and the domestic plastic use of at least 60 percent; and Year 3- Prohibit import of plastic scrap from foreign countries and use all domestic plastics.

In terms of the management of plastic scrap imports, the DIW has restricted the issuance of plastic scrap import licenses since June 2018, established an electronic system to inspect the import of plastic scrap, and sent the draft regulation for plastic scrap imports to the Ministry of Commerce to amend the Ministry of Commerce's Regulation (In process). The provincial industry offices inspected plastic scrap at the destination factory and strictly supervised businesses.

### Import quotas as of 16 October 2019

Year	Production capacity (tonne/year)	Quota (tonne/year)	Imports amount (tonne/year)	Remaining quota (tonne)	Unused quota (tonne)
2018	564,989	742,240	291,738.84	-	450,501.16
2019	564,989	471,265	205,552.89	116,875.54	148,836.56
2020	564,989	225,040	-	225,040.00	-

## Corrective measures

1. Provided staff to support the plastic scrap entry together with the Customs Department from June 2018 to the present

2. Appointed a special task force to support the customs clearance procedures of plastic scrap imports on 13 December 2018 with the authority to develop the system for inspection records of plastic scrap imports, support the customs clearance procedures of plastic scrap imports in accordance with the requirements, and report the results of the inspection of plastic scrap imports.

3. Developed an electronic system to monitor the import of plastic scrap by allowing importers to notify imports through an electronic system. The special task force inspects containers in collaboration with the Customs Department and takes pictures to confirm the products on the automatic notification system to notify the industry officers to inspect the containers at the destination factory in order to verify accuracy and completeness, facilitating businesses which import plastic scrap legally to be used as raw materials

4. Notified the rules and guidelines for importing plastic scrap and stipulated the conditions on import licenses on 28 December 2018 as well as invited businesses to attend a meeting to explain the guidelines for imports of goods (plastic scrap) on 18 January 2019 to ensure that businesses understand and comply with the law.

5. Established the criteria for imports of goods. Different types of plastic scraps must be separated, not mixed together and can go through the production process without cleaning. Plastic scrap must not be dirty or contaminated with organic matter that causes unpleasant color or smell or with residual such as scrap bricks, stones, soil, sand, or metal that prevents it from being directly usable and requires the scrap to go through sorting or cleaning process before use.



Mr. Panuwat Triyangkulsri  
Deputy Permanent Secretary of the Ministry of Industry



## Spatial Industry Development

### 1. Map Ta Phut Industrial Port Development Phase 3

The government has assigned **the Industrial Estate Authority of Thailand (IEAT)** to carry out the Map Ta Phut Industrial Port Development Phase 3 project, an important project under the Eastern Economic Corridor (EEC) project. The IEAT has signed a Public-Private Partnership (PPP) to develop gas and liquid cargo ports to increase the capacity of loading and unloading of natural gas and liquid goods at Map Ta Phut Industrial Port located in the Map Ta Phut Industrial Estate, Map Ta Phut subdistrict, Mueang Rayong district, Rayong Province, covering an area of approximately 1,000 rai consisting of 550 rai of reclaimed area behind the port for operations and 450 rai of area for construction sediment storage pond with the total port length of 2,200 meters. The total investment of the project is approximately 55,400 million baht consisting of (1) infrastructure investment of approximately 12,900 million baht, (2) gas port investment of approximately 35,000 million baht, (3) liquid goods port investment of approximately 4,300 million baht, and (4) investment in related businesses of approximately 3,200 million baht. The project will bring positive impact to Thailand's industrial economy, both in terms of the economy and society, with spatial and local development through employment and also support the country's energy security.

The Eastern Economic Corridor (EEC) Policy Committee has approved the results of private partner selection and negotiation and drafted the Joint Venture Agreement that has been reviewed by the Office of the Attorney General on 24 June 2019 with the Cabinet's resolution to acknowledge the Committee's resolution on 24 September 2019. On 1 October 2019, the Cabinet approved the Map Ta Phut Industrial Estate Expansion Project under the Map Ta Phut Port Development Project in which the IEAT has signed the Public-Private Partnership contract with Gulf MTP LNG Terminal Company Limited. The seaport is expected to be open for service in 2025.



Ms.Somchint Pilouk  
Governor Industrial Estate Authority of Thailand



On 1 October 2019, Mr Somkid Jatusripitak Deputy Prime Minister, Mr Suriya Jungrungrangkit, Minister of Industry, Mr Kobchai Sungstittisawat, Permanent Secretary of the Ministry of Industry, Miss Somjin Piluek, IEAT Governor, and executives of the IEAT and Gulf MTP LNG Terminal Company Limited. joined the signing ceremony of the Public-Private Partnership contract for the Map Ta Phut Seaport Development Phase 3 Project (Part 1) between the IEAT and Gulf MTP LGN Terminal Co.,Ltd.. at Chuhawan Meeting Room, Ministry of Industry. It was the first contract out of the five contracts under the government's EEC megaproject.

## 2. EEC Smart Park Industrial Estate Development Project

The Industrial Estate Authority of Thailand (IEAT) has carried out the EEC Industrial Estate Development Project: Smart Park Industrial Estate Project located in Huai Pong subdistrict, Muang Rayong district, Rayong province in the north zone of Map Ta Phut Industrial Estate to support Thailand 4.0 policy and follow the Eastern Economic Corridor (EEC) development plan in accordance with the Cabinet's resolution on 28 June 2016. The project aims to be the main driving force of the country's economy and support for the development of high-tech, innovative, and environmentally friendly industries (New S-Curve) including digital industry, robotics industry, healthcare industry, aviation industry, and logistics industry group. The project covers approximately 1,383.76 rai of land which is divided into 621.55 rai of industrial area, 150.54 rai of commercial area, 373.35 rai of utility and reservoir area, and 238.32 rai of green area.

The IEAT has presented the Environmental Impact Assessment Report (EIA) to the National Environment Board (NEB) on 2 August 2019. The Board approved the EIA report following the expert committee (EC)'s opinion on 15 August 2019. The IEAT is currently preparing the proposal for the Cabinet's consideration and approval of the investment project and the construction is expected to begin in 2020.



### 3. Special Economic Zone (SEZ) Development Project

The government has a policy to increase the country's competitiveness when entering the ASEAN Economic Community, reduce inequality, and promote the country's development and security. **The Industrial Estate Authority of Thailand (IEAT)** as the agency responsible for the development and management of industrial estates which are the main drivers of the country's economy has been assigned to develop industrial estates in the potential area in the Special Economic Zone (SEZ) to support industrial investment and created continuous economic activities in the economic area as follows:

1. Industrial estate development project in Sa Kaeo Special Economic Zone in Pa Rai subdistrict, Aranyaprathet district, Sa Kaeo Province with a land size of 660.56 rai
2. Industrial estate development project in Songkhla Special Economic Zone in Samnak Kham subdistrict, Sa Dao district, Songkhla Province with a land size of 927.93 rai
3. Industrial estate development project in Tak Special Economic Zone in Ta Sai Luad subdistrict, Mae Sot district, Tak Province with a land size of 670.50 rai
4. Industrial estate development project in Narathiwat Special Economic Zone in Laharn subdistrict, Yee Ngor district, Narathiwat Province with a land size of 1,730 rai

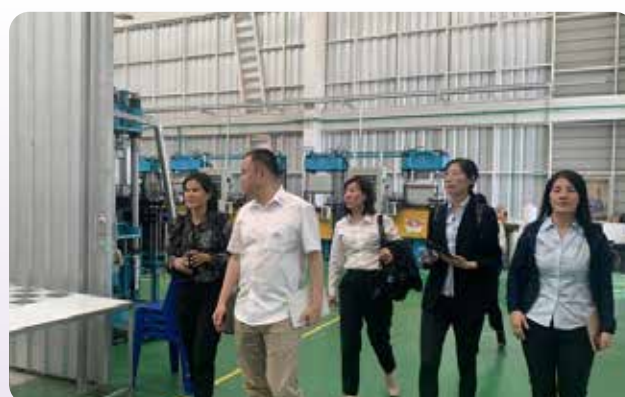
The 2019 operating results of the Special Economic Zone (SEZ) Development Project are as follows:

Operating Results			
Industrial estate development project in Sa Kaeo Special Economic Zone	Industrial estate development project in Songkhla Special Economic Zone	Industrial estate development project in Tak Special Economic Zone	Industrial estate development project in Narathiwat Special Economic Zone
Completed construction of Sa Kaeo Industrial Estate, with 3 businesses already using the area, 1 reserving the land lease, and 2 reserving standard factory.	Under construction with the Phase 1 construction started on 17 April 2019 with an area of 627.43 rai and 12.53 percent of the construction is expected to be completed by 2019.	The IEAT submitted the EIA report to the NEB on 5 July 2019 and the NEB approved the report on 15 August 2019. It expects to present the proposal to the Cabinet for approval of Tak Industrial Estate Development Project by December 2019.	SBPAC is in the process of requesting the budget to purchase 1,730 rai of land to develop Narathiwat Special Economic Zone of which 600 rai of area will be used for industrial estate development.



**2020-2022 Action Plan of the Special Economic Zone (SEZ) Development Project  
are as follows:**

Fiscal Year	Action Plan			
	Industrial estate development project in Sa Kaeo Special Economic Zone	Industrial estate development project in Songkhla Special Economic Zone	Industrial estate development project in Tak Special Economic Zone	Industrial estate development project in Narathiwat Special Economic Zone
<b>2020</b>	Public relations and marketing to attract investors to Sa Kaeo Industrial Estate	Complete Phase 1 construction and start operations, and begin Phase 2 construction	Propose to the Cabinet for approval of the project investment.	<ul style="list-style-type: none"> <li>- Purchase land and develop a land use plan</li> <li>- Study and prepare the Environmental Impact Assessment (EIA) report</li> <li>- Study and survey the area of Narathiwat Industrial Estate Development Project</li> <li>- Conduct a feasibility study of the project</li> </ul>
<b>2021</b>		Carry out Phase 2 construction	Construct the project	<ul style="list-style-type: none"> <li>- Present the EIA report to the relevant agencies for consideration and approval</li> <li>- Study and design the construction details of Narathiwat Industrial Estate Development Project</li> <li>- Create a plan to request investment budgets</li> </ul>
<b>2023</b>		Complete Phase 2 construction		Present the proposal to the Cabinet for approval of Narathiwat Industrial Estate Development Project





## 4. Rubber City Industrial Estate Project

The Industrial Estate Authority of Thailand (IEAT) is responsible for the development of Rubber City Industrial Estate located in Chalung subdistrict, Hat Yai district, Songkhla Province within the Southern Industrial Estate. The operations can be summarized as follows:

1. Developed the Rubber City Industrial Estate Project
2. Clustered rubber industry connecting SMEs with large industries to expand the supply chain and provide integrated services under the sustainable development and balanced economy, society, and environment framework
3. Developed the rubber industry from raw material exporters into producers and users.
4. Promote demand for natural rubber and drive up the price of raw rubber.

The Rubber City Industrial Estate Development Project aims to develop the area within the Southern Industrial Estate by setting up the Rubber City Investment Service Center, build public utility system and facilities, allocate areas, and increase service capacity to support the entry of SMEs in the midstream and downstream rubber industry. In 2019, the IEAT completed the construction of the Rubber City Industrial Estate. Currently, there are five businesses utilizing the area and two businesses interested in leasing the area.



On Friday, 11 October 2019, Miss Somjin Piluek, IEAT Governor welcomed Mr.Suriya Jungrungrangkit and his team for a visit at the Rubber City in Hat Yai district, Songkhla Province

## 5. Promoting primary industries and mines to green industry standard

The Department of Primary Industries and Mines (DPIM) promotes mines and primary industries to meet green mining standard, an industry that is committed to operating environmentally friendly businesses, sustainable development, and social and environmental responsibility both inside and outside the organisation throughout the supply chain. The standard includes six criteria which are:

- 1) responsibility to the environment and society,
- 2) reducing, preventing, and mitigating environmental impacts,
- 3) taking care of the safety and health of workers and neighboring communities,
- 4) having green space and clean scenery,
- 5) transparency and verifiable, and
- 6) efficient use of mineral resources.

To promote and encourage the industrial sector to improve and upgrade operations to the highest standards. The DPIM, an agency under the Ministry of Industry and the main agency for managing and monitoring mines and primary industries including mines, mineral processing plants, metallurgical plants, stone crushing and quarry plants, and rock salt production factories, recognises the importance of driving mines and primary industries towards green industry in accordance with the Ministry of Industry's policy in order to promote balanced and sustainable development in the economy, society and environment.

The Department also proactively and continuously carries out the main activities under the project to promote primary industries and mines to green mining and green industry standard in order to upgrade the standard of businesses and promote environmentally friendly business conduct. The operations in fiscal year 2019 were as follows:

1) Public relations and inviting businesses to join the project

Sent staff to businesses that complied with the environmental standard and had good community engagement guaranteed by relevant agencies to offer advice and invite businesses to fulfil the green mining standard. In 2019, there were 43 businesses that requested the green mining standard certification and 219 award-winning businesses that continued to comply with the green mining standard.

2) Inspection, selection, and consideration of businesses in accordance with the green mining standard

Sent staff to provide advice and help businesses in initial preparation. After that, businesses will present operational information in accordance with the green mining standard to the Sub-Committee on the Selection of Green Mines which consists of various departments including the Pollution Control Department, Office of Natural Resources and Environmental Policy and Planning, Department of Forestry, Mining Industry Council, Quarry Association, and experts from educational institutions that are teaching mining. The agency also evaluated businesses in the areas that participated in the project and presented the results to the Green Mining Committee for consideration and selection of businesses that meet the evaluation criteria and green mining award. In 2019, there were 41 businesses that passed the criteria and received the green mining awards and 119 businesses that continued to comply with the green mining standard.



Mr. Wisanu Tabtieng  
Director General Department of Primary Industries and Mines

## 6. Monitoring of environmental quality in business operational sites

Environmental Impact Assessment Report is a condition attached to a concession certificate and is considered an important measure in preventing and mitigating environmental impacts with which businesses must strictly comply in order to keep potential environmental impacts at an acceptable level. It is, therefore, necessary to evaluate and monitor environmental quality in order to track the current environmental conditions in the mining area and to prevent and mitigate the environmental impact resulting from mining in timely manner. The agency has conduct assessments of businesses to ensure compliance with the standard and efficient environmental conservation.



In fiscal year 2019, **the Department of Primary Industries and Mines (DPIM)** conducted assessments of the implementation of environmental impact prevention measures and measured the amount of dust by measuring opacity in the area where stone crushing and quarry plants are operated, as well as the amount of dust in the atmosphere, the noise level, and vibration in the surrounding communities. The Department also provided advices and recommendations on environmental management to 582 businesses in 46 provinces. The environmental quality assessments and monitoring of the mining and primary industries have resulted in businesses having effective environmental impact prevention and mitigation for operations and the environment in the surrounding communities being in good conditions, leading to environmentally friendly business operations that are accepted by the community and reflect harmonious co-living.

## 7. Strengthening the network of parties in social and environmental care

The Department of Primary Industries and Mines (DPIM) recognises the importance of participation from all sectors involved in mining in caring for society and the environment. Therefore, it has transferred environmental quality monitoring to local administrative organisations and established people network for environmental impact monitoring in their communities as well as transferred knowledge on environmental quality assessment and monitoring to local administrative organisations and such networks so that local agencies and people can monitor mining operations in their own communities and mines can live happily with the communities

Between 2007 and 2018, the DPIM has transferred environmental quality assessment and monitoring to 388 sub-district administrative organisations and built 490 networks which cover most of the mining areas. However, even though the people network has been established in nearly all mining areas, the DPIM has continuously promoted the work of the people network since personnel in local administrative organisations continue to change or rotate and newcomers do not have the knowledge or members of the people network migrate or cancel the reporting of the network. Additionally, the Department has urged the work of the agencies that are related to the work of the local administrative organisation and the people network such as primary and mining industries, provincial industry offices, and businesses to ensure knowledge and efficient operations. In fiscal year 2019, the DPIM in collaboration with the National Institute of Development Administration (NIDA) carried out the following tasks:





1. Provided training to encourage the work of the people network to promote participation in environmental care among the mining industry for 175 people from 17 networks
2. Provided training and encouraged the work of local administrative organisations (LGO) and primary industries and mines on the topic “Learn to Increase Operational Capacity” for 159 people
3. Provided training to businesses on the topic “Learning from Experience: Managing with Corporate Social and Environmental Responsibility” (Big Brother to Little Brother) for 102 businesses
4. Organised a seminar for executives, local administrative organisation officials, and primary and mining industries on the topic “Technology for Environmental Monitoring and Warning” and “The Benefits that Local Administrative Organisations Receive from Mining” and the LAO: Mining Environmental Mindfulness Award Ceremony with 152 participants in the seminar.

The project’s operations have allowed local administrative organisations and people network to have knowledge, understanding, and develop capabilities for those involved in social and environmental care and to apply the knowledge gained to assess impact from mining operation, which helps government agencies to solve problems effectively. Moreover, businesses that have joined the “Big Brother to Little Brother” training programme were able to apply the knowledge gained to their operations, allowing for continuous improvement of the society and the environment around the businesses.



# Regulatory Revision and Service Enhancement

## 1. Amendments of Law under Supervision – Two Amendments to Factory Act B.E.2535 (1992), Factory Act (Version 2), B.E. 2562 : Effective on 27 October 2019

The Department of Industrial Works (DIW) focused on summarising the main ideas, raising, increasing convenience, and maintaining oversight as follows :

- 1) Supervised the factory with 50 horsepower with at least 50 employees,
- 2) Exceptions for factories that do not seek permission in five areas,
- 3) Required a private inspector and self-certification,
- 4) Cancelled the Ror.Ngor.4 license renewal, made factory expansion and Ror.Ngor.4 license transfer more convenient,
- 5) Discontinued business and ordered corrections,
- 6) Amendment of penalties,
- 7) Determined the new fee. The urgent task is to issue 19 new laws and the DIW has already proposed nine draft ministerial regulations: three with the Cabinet's approval and the rest in progress.

In terms of amendment to the definition of “factory”, the Department controls factories with at least 50 horsepower or 50 workers, which makes factories under 50 horsepower not within the scope of the law on factories. But there are other laws governing them including the law on public health, law on environmental quality promotion and conservation, law on building control, law on city planning, and law on labour control. The Ministry of Industry has issued a letter to various regulatory agencies that supervise those laws including the Ministry of Interior, Ministry of Public Health, Ministry of Natural Resources and Environment, and the Ministry of Labor to inform the amendments to the Factory Act and asked the agencies to update their laws to be able to control factories that are not under the supervision of the Factory Act.



Mr.Kobchai Sungsitthesawad  
Permanent Secretary of Industry

Number of Factories according to the draft Factory Type  
Estimates when dividing the factories using the agreed method

Information according to the Factory Act before adjustment

Factory type	Number of factories
1	42,212
2	18,318
3	74,572
<b>Total</b>	<b>135,102</b>

Information according to the Factory Act before adjustment

Number of factories		Number of factories	Not within the scope of factories under the new Act	Remaining number	Factory Type		
					Type 1	Type 2	Type 3
Group 1	7 orders	70	40	30	30		
Group 2	2 orders	45	31	14		14	
Group 3	129 orders	37,686	11,091	26,595			26,595
Group 4	173 orders	97,301	60,662	36,639		3,968	32,671
<b>Total</b>	<b>311 orders</b>	<b>135,102</b>	<b>71,824</b>	<b>63,278</b>	<b>30</b>	<b>3,982</b>	<b>59,266</b>

**Remark:** *Group 1 Factory is considered Group 1 Factory regardless of their size as previously.  
Group 2 Factory is considered Group 2 Factory regardless of their size as previously.  
Group 3 Factory is considered Group 3 Factory regardless of their size as previously.  
Group 4 Factory is considered Group 2 or Group 3 Factory according to the number of workers and horsepower.*

*Group 4 Factory:*

- Group 2 Factory: no more than 75 horsepower machinery and no more than 75 workers
- Group 3 Factory: no more than 75 horsepower machinery or at least 75 workers

\*\* Data as of 25/10/2019

In terms of cancellation of the factory license renewal, the officials still have the power to inspect and exercise the power to order or prosecute if the factory causes nuisance or does not comply with the law. Since the amendment under the Factory Act (No. 2) B.E. 2562 (2019) does not amend the supervision power, factories are still required to self-declare about the businesses that are licensed and that they have fully complied with the law on factories as well as the sub-legislations. The certification require a third party inspector to certify the practice of that factory.

#### **Factory Act (No. 3) B.E. 2562 (2019)** with effective date on 1 May 2019

The essence of the law stipulates the transfer of the tasks related to small and medium-sized factories to sub-district administrative organizations which can supervise local administrative organisations and that annual fees fall to local administrative organisations only for the transferred factories

The task transfer follows the law on decentralisation to local administrative organisations, and the Ministry of Industry has proceeded since 2009. The Ministry of Industry has organised trainings for local administrative organizations that have received the tasks by providing knowledge on the supervision of Class 1 and Class 2 factories and making a clear operational manual as a guideline for the operation of the officials of the local government organisations. Currently, the process is ongoing.

Annual fee status issues Ministry of Industry Has a letter notifying the authorities in the Bureau of the Permanent Secretary Governor of Bangkok Pattaya City Mayor From May 1, 2019, annual fees and additional payments fall to the local government organization that has received the mission transfer

**Hazardous Substances Act (No.4) B.E. 2562 (2019)** Facilitating, maintaining supervision, and determining clear procedures.

Significant amendments include

- 1) Improving the composition and authority of the “Hazardous Substance Committee” with the Minister of Industry as the person determining the criteria for the appointment of the senior expert committee,
- 2) Separating a pass-through from imports for proper control and supervision,
- 3) Reducing the requirements for return of hazardous materials or dispatch of hazardous materials,
- 4) Exemption of the requirements for the use of hazardous substances for study, analysis, research and development,
- 5) Advertising and adding clear definitions and control regulations,
- 6) Increasing the authority for the department to order importers or passers-through who violate the law to send hazardous materials outside the country urgently if there should not be any domestic operation or management,
- 7) Initially compensating to provide compensation to injured persons or agencies that provide assistance without having to wait for proof of liability, and
- 8) Civil liability and penalties. The urgent task is to issue sub-legislations including two Ministerial Regulations, five Ministry Notifications, and five Notifications.

All three chemicals including paraquat, chlorpyrifos, and glyphosate are chemicals used in pest control which is monitored as hazardous substances under the Hazardous Substance Act B.E. 2535 (1992). The main agency responsible for the authorisation and supervision of production, imports and exports, or possession of those substances is the Department of Agriculture, Ministry of Agriculture and Cooperatives. Therefore, anyone wishing to

produce or import all the three hazardous substances must first register and obtain a license from the Department of Agriculture before they can proceed. The committee has considered all the information and made decisions based on the principles of risk management. The committee sees that the main problem does not come from the substance but from management, strict enforcement and oversight as well as users' lack of knowledge and understanding and easy access to the substances. The risk of food consumption is not at a dangerous level and there are limitations of substances or substitutions. Banning the use may have advantageous for prevention, but banning without proper management may lead to illegal smuggling and ineffective outcomes. The Hazardous Substance Committee, therefore, recognises that it is necessary to continue the restricted use with close monitoring which will ultimately lead to the consideration of the appropriateness of the ban.

The measure is required to be reviewed within two years starting from 14 February 2019. However, if the results of the monitoring and evaluation by the committee found that the Ministry of Agriculture and Cooperatives cannot reduce or solve the problem or that there is the development of effective weeding without chemical use or there is a substitute, the committee will propose to immediately change the status of the substance to Type 4 Hazardous Substance without having to wait for two years. In this regard, the Ministry of Agriculture and Cooperatives has sent the issue for consideration of the Hazardous Substance Committee to raise the three chemicals from Type 3 Hazardous Substance to Type 4 Hazardous Substance. The committee scheduled a meeting on 22 October 2019 and the meeting results can be summarised as follows:

The Hazardous Substance Committee has voted to ban the use of the three chemicals including paraquat (Vote: 21-5), chlorpyrifos (Vote: 22-4), and glyphosate (Vote: 19-7) effective on 1 December 2019.

The committee considered the information together with the results of the Ministry of Agriculture as well as the methods of weed management and alternative substances and saw that the management can prevent problems in practice if the three hazardous substances are banned. The representatives from the Ministry of Public Health presented information on the hazards and monitoring of agricultural residue and the parts where they agree or disagree with the ban. The Hazardous Substance Committee voted openly with the resolution to ban the use of the three chemicals including paraquat, chlorpyrifos, and glyphosate with 26 participants: "Paraquat" to be banned on 1 December 2019 with 20 votes, to be banned on 1 December 2021 with one vote, and to be restricted with five votes, "Chlorpyrifos" to be banned with 22 votes and restricted with four votes, "Glyphosate" to be banned with 19 votes and restricted with seven votes

After the committee have approved the Ministry of Agriculture and Cooperatives's proposal to raise the three agricultural substances from Type 3 Hazardous Substance to Type 4 Hazardous Substance with effect from 1 December 2019, the Department of Agriculture has been assigned to draft the Ministerial Regulations on the List of Hazardous Substances, organise a public hearing, and propose to the Hazardous Substance Committee for consideration and opinion in the next meeting.

In this regard, the Department of Agriculture was asked to consider the duration and appropriate management of remaining hazardous substances after the Notification comes into effect by considering the impact on related parties such as farmers or distributors.

**Machinery Registration Act (No. 3) B.E.2558 (2015)** increasing access to funding sources, facilitating, and requiring private inspectors

The essence of the Act was adding provisions relating to requiring the private sector to be the machinery inspector who registers the ownership on behalf of the government official, increasing penalties, and adjusting fees to better reflect the economic conditions. One Ministerial Regulation and three Departmental Notifications are underway.

## 2. Revision of the Cane and Sugar Act B.E.2527 (1984)

The Office of the Cane and Sugar Board (OCSB) has revised the Cane and Sugar Act and related laws and regulations to cover the use of a cane to produce ethanol and other products such as ethanol, bio-plastic, a bio-chemical with an aim of increasing the value of cane and sugar in accordance with the trade agreements with the World Trade Organization (WTO), ASEAN Free Trade Area (AFTA), and international standards. The revision is currently under consideration by the Council of State which can be summarized as follows:

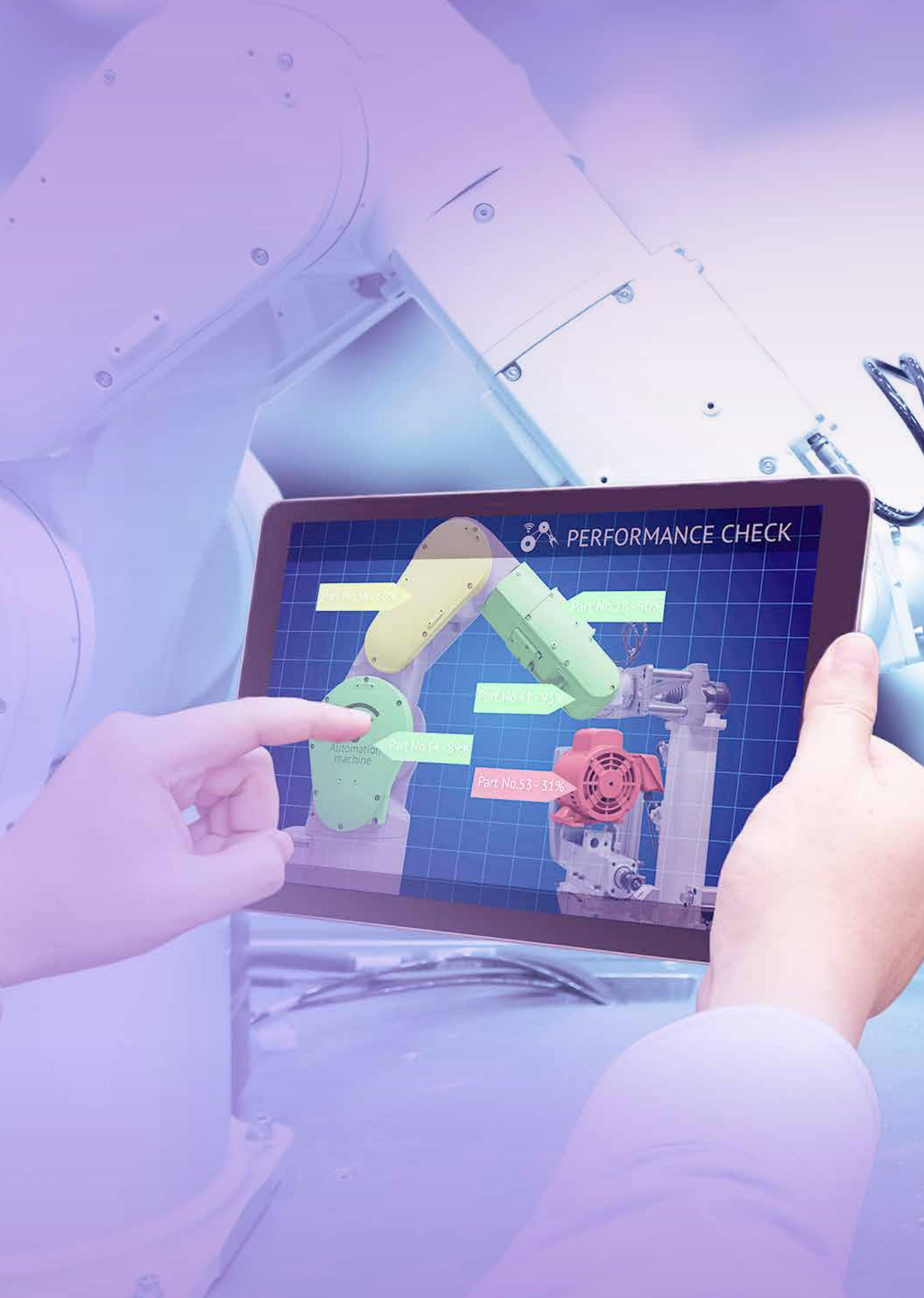
⊙ Proposing an amendment to align with the 2018–2027 Thai bio-industry development measures by changing the definition of sugar to allow the sales of sugarcane juice which is used to produce other products (revised Article 4)

⊙ Addressing problems and obstacles in the meetings of various committees by addressing the problem that the meeting can convene with only half of the remaining committees without the attendance of representatives from factories or sugarcane farmers and revising the duty in the case of the Chairman's absence (revised Article 14, Section 16, Section 20, Section 24, Section 32, and Section 41)

- Resolved that issues that are conflicted with the WTO
- Terminated domestic sugar pricing (Article 17 (18))
- Modifying the fund component by canceling the loan with the approval of the Cabinet and government subsidies (Article 27)
- Amended the permission of sugar imports with the approval of the Cane and Sugar Board (Article 47)
- Amended the sugarcane pricing of no less than 80% and no more than 95% of the revenue forecast and terminating payments to factories when the final sugarcane price is lower than the primary sugarcane price by requiring the difference to be included in next year's calculation (Section 49 and Section 56)



Mr.Ekapat Wangsuwan  
Secretary General Office of the Cane and Sugar Board



# PERFORMANCE CHECK

Part No. 10 - 95%

Part No. 20 - 90%

Part No. 30 - 95%

Part No. 40 - 89%

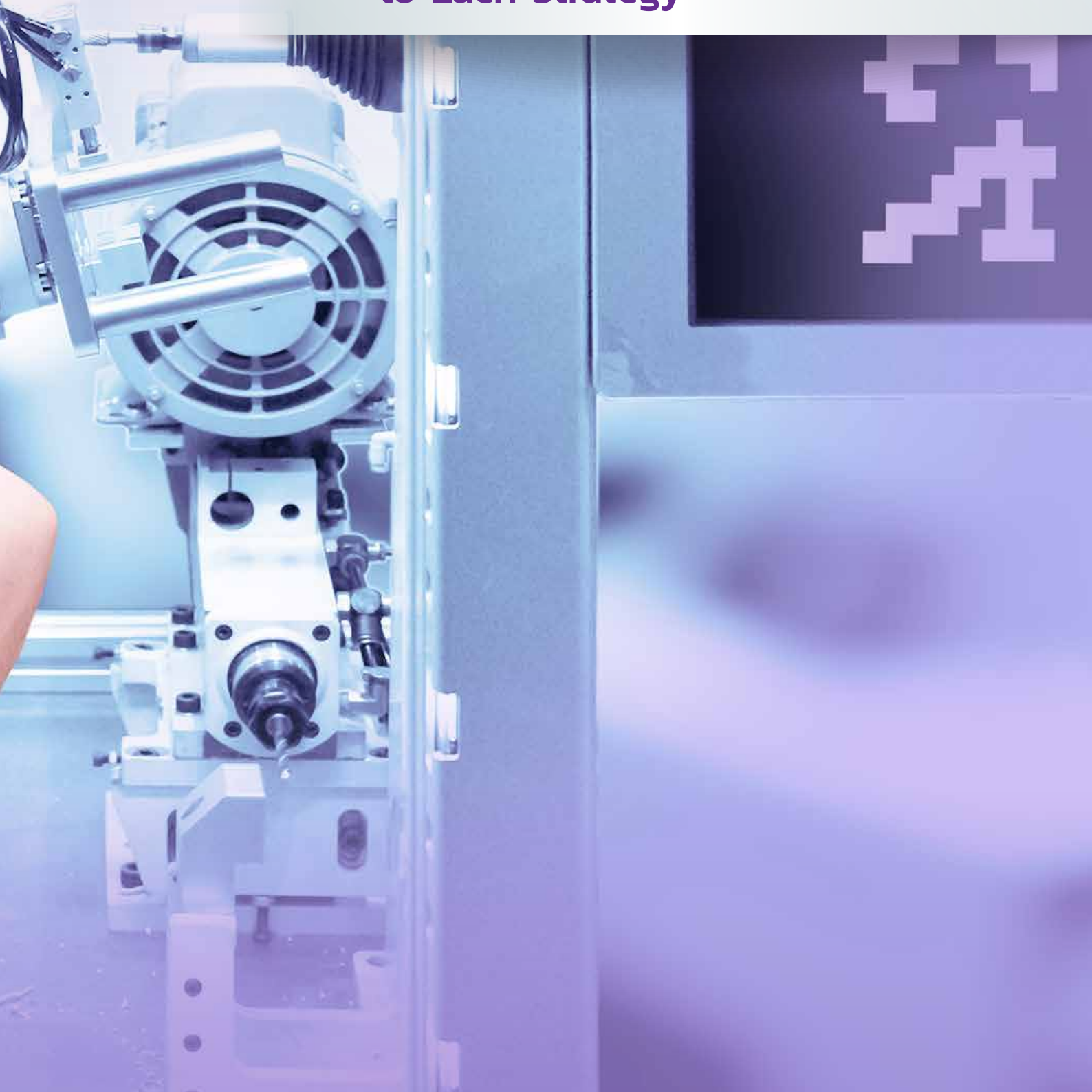
Part No. 50 - 31%

Automation machine

Section 5



# Achievement According to Each Strategy





## First Strategy

Enhancing the productivity and capability of the industrial sector to generate growth and strength

### 1. The Office of Industrial Economics and the productivity enhancement of the industrial sector

Today, market competition has become increasingly intense due to technological changes and diverse and complex consumer demand. According to the International Institute for Management Development (IMD)'s world competitiveness ranking in 2018, Thailand ranked 25<sup>th</sup> of the 63 countries evaluated. Even though that was a jump from the 31<sup>st</sup> place in the previous year, it still ranked 53<sup>rd</sup> in the previous year and the industrial productivity shows a downward trend. Therefore, the industrial sector needs to adapt to the changes by applying technology in the production processes and improving the skills of labour to respond to technological advancement in order to increase the productivity of the industrial sector and enhance the country's competitiveness.

In fiscal year 2019, **the Office of Industrial Economics (OIE)** in collaboration with the Networking Institute of the Ministry of Industry has promoted the enhancement of the efficiency and productivity of the industrial sector by conducting the Industry 4.0 Enhancement project by boosting efficiency, productivity, and innovation under the three main programmes including:

1. Productivity Enhancement of the industrial sector through technology, innovation, and modern management by offering advice to businesses regarding productivity improvement of assembly line through technology, innovation, and management which will help to increase productivity, minimise loss, reduce production cost, and increase sales. There are 105 businesses that have participated in the programme.

2. Productivity Enhancement of Human Resources by ensuring all-round skills that can respond to the changes in the industrial sector both today and in the future through the collaboration with private and educational organisations in designing and organising training courses that meet the needs of the industrial sector and are in line with high-efficiency operations and through labour trainings and creating instructors who can communicate the knowledge. There are 3,043 people have participated in the programme.

3. Potential Enhancement of Surrounding Factors to promote productivity enhancement for sustainable growth by creating the framework for advancing the organisation to Industry 4.0 and developing information systems such as Lean expert registration evaluation, network system for technology developers and businesses that participate in the technology enhancement programme, self-assessment of business potential, and e-learning

The programmes have increased manufacturing productivity by 24.22<sup>1</sup> percent and labour productivity by 9.42 percent.

<sup>1</sup>Productivity in the process level of the businesses who participate project

## The Next Step of the Office of Industrial Economics in Enhancing the Competitiveness of the Industrial Sector

In the fiscal year 2020, the operations still focus on bringing in technology, innovation, and productivity improvement tools to improve manufacturing productivity with an emphasis on transforming production to Industry 4.0, producing high-value products, and increasing value of waste. The Office continues to enhance labour productivity to prepare and improve the skills of labour to meet industry demand, technological changes, and efficiency. The operations will boost the competitiveness of businesses and labour in the industrial sector and advance the country to stability and sustainability.

## **2. Sufficiency Economy Standard for Practical Implementation in Industrial Sector (TIS 9999)**

**Thai Industrial Standards Institute (TISI)** released the Regulation on TIS 9999 Volume 1-2013 Guidance on Sufficiency Economy for Industries to bring His Majesty the Late King Bhumibol Adulyadej's Sufficiency Economy Philosophy to practice in order for the industrial sector and parties involved in the supply chain to understand the philosophy and move towards the same vision. Organisations can set their own guidelines to ensure desired results, which are balanced development of the economy, society and environment, sustainable growth, happiness, readiness for internal and external environmental changes, uncertainties of the society, economy, environment, politics, and regulations. The guidance has been proposed to be an international standard (ISO).

### Operating results in fiscal year 2019

1. Organised a seminar to create a network and put the TIS 9999 Sufficiency Economy Guidance into practice in businesses, private organisations, and public agencies involved in the industrial sector development to implement the Sufficiency Economy Industrial Standards in Lam Pang and Krabi with 147 participants.

2. Enhanced the potential of industrial businesses to achieve the Sufficiency Economy Industrial Standards in three sessions with five participating organisations and 104 participants.

3. Reviewed the effectiveness and success of evaluation and certification of 11 organisations or 198 participants in total.

4. Organised a meeting to provide an opportunity for self-certifiers to share their experience with 48 participants.

5. Organised and promoted the TIS 9999 Guidance on Sufficiency Economy for Industries based on His Majesty the Late King Bhumibol Adulyadej's Sufficiency Economy Philosophy as an international standard (ISO) from 8 to 13 September 2019 at Pullman Bangkok King Power Hotel with support from 26 countries in order to follow the ISO procedures.

### 3. Thai Community Product Standard (TCPS) Programme



The Thai Industrial Standard Institute (TISI) organised the Thai Community Product Standard (TCPS) programme to enhance the quality of products to acquire the community product standard certification which will increase consumer confidence in the product, ensure sustainable production within the community, and promote the products and distribution channels for the community at the domestic and international level. The operating results in the fiscal year 2019 are as follows:

- 1) Established the Thai Community Product Standard (TCPS) in 62 areas
- 2) Certified community product quality with 9,944 certificates issued
- 3) Monitored product quality maintenance of 1,139 products
- 4) Oversaw the capacity of the provincial certifying agencies in 76 provinces
- 5) Enhanced the potential of community producers by providing knowledge of product quality improvement and promoting the prosperity and sustainability of the community economy in Ayudhaya, Kanchanaburi, Krabi, Sukhothai, Songkhla, Udonthani and Rayong with 1,773 participants
- 6) Organised a workshop to enhance the capacity of community food and beverage producers to enable them to receive product quality certification in Songkhla and Rayong with 196 participants
- 7) Enhanced the potential of TCPS entrepreneurs in preparation for digital community economy in Kanchanaburi Chiang Rai, Buriram, Krabi and Udonthani with 529 participants
- 8) Organised a seminar for personnel to enhance the efficiency in certifying community product quality with 247 participants
- 9) Organised an integrated academic seminar to examine and approve the criteria in the draft standard concerning 64 issues with 132 participants

The results of the survey on community entrepreneurs who received community product standard certification found that the community entrepreneurs were able to increase their sales by 51.8 percent.

## 4. Research, development, and management of sugar cane breed

The Office of the Cane and Sugar Board (OCSB) established Thailand Sugarcane Breeding Centre in Kanchanaburi as the centre for sugarcane breed improvement which conducts R&D and connects the infrastructure system to improve sugarcane breed in the system and further develop the infrastructure system for the sugarcane breed improvement locally and advance the centre into Southeast Asia's hub of sugarcane breeding, develops and supports the use of information system to improve and select sugarcane breed to reduce the time and procedures, improve the database system for Thai sugarcane breed improvement, develop personnel for sugarcane breed improvement and selection, and improve sugarcane breed by mixing breeds to grow young sugarcane plants using modern techniques and methods, establish the International Sugarcane Germplasm Bank, set up laboratories for DNA finger print of six sugarcane breeds to develop techniques for good and new pure breed production using advanced techniques as well as improve and develop good sugarcane breed into new pure breed which is suitable for planting in any area and provide knowledge to sugarcane farmers and promote sugarcane sellers. These initiatives are set out in a plan to be completed in 2022 to benefit sugarcane farmers and reduce the time and procedures for new sugarcane breed development from 10-12 years to 6-8 years.



Mr.Surapol Chamatr  
Deputy Permanent Secretary of Industry

## 5. Support, develop, and enhance the efficiency of cane and sugar production

The Office of the Cane and Sugar Board (OCSB) supported machinery use in sugarcane plantation to reduce costs and increase production efficiency. In 2019, the Office carried out a project to enhance the sugarcane production through smart farming in the pilot areas of 30 sugarcane farmers in Nakhon Sawan, totaling 8,426 rai to support farmers in efficiently planting sugarcane in a large area. The project also promoted innovation and modern technology in farm management by encouraging planting in a large area, developing attribute data system, developing diagnostic and analytical system for farm management using attribute data, developing an information system for sugarcane farm management that uses augmented reality, and improving the efficiency of water management to ensure sugarcane planting is suitable for each area.

The Department of Industrial Promotion (DIP) is the main agency in promoting and developing small and medium enterprises, community enterprises, entrepreneurs, industrial sector personnel, and industrial service providers through capacity building and advancing and connecting services to improve productivity through innovation, technology, and cultural capital. The Department also provides digital services to prepare for Industry 4.0 and enhances supporting factors that facilitate business. The Department provides support to SMEs and community enterprises through the Industry transformation Center and offers advices through the SME Support & Rescue Center: SSRC which is the main agent that helps businesses receive support from relevant organisations to ensure the country's economic growth and the industrial sector's competitiveness through mechanisms as follows:

**1. Marketing for promotion** is a management idea to create a balance between production and market demand and to reduce inventory and oversupply in the agricultural sector. The DIP focuses on “Doing Less for More Quality”, changing the belief of production and profit maximisation. The idea highlights personnel development and platform creation including promoting online distribution channels, encouraging the use of social media to create brand for business, developing e-Catalog on websites to promote products, and promoting the use of Big Data such as business matching data and information on current trends in the market in order to help businesses develop products that are diverse and meet market demand as well as create professional marketing coaches.

**2. Innovation for promotion** is the enhancement of the efficiency of SMEs in product development through research and innovation to meet market demand and increase product value. Key activities include promoting the collaboration between the National Science and Technology Development Agency (NSTDA) and Thailand Institute of Scientific and Technological Research (TISTR) in bringing research into product development and providing financial support to promote potential industrial innovation in each area including food for the future, processed agricultural products, tourism products, and healthy food.

DIP received funding for operations with the production goals of six action plans, 18 projects, and 31 activities and the business development goals of 2,850 businesses, 17,555 people, 2,227 participants, 34 groups, 2,047 products, and one system. The operating results as of 30 September 2019 show the achievement of 2,918 businesses, 19,181 people, 2,269 participants, 35 groups, 2,091 products, and one system which can be divided for each plan as follows:

## 6. Integrated plan to promote entrepreneurs, community economy, and SMEs at the global level

### 1.1 SME promotion in the 4.0 era involves the following three aspects:

1) Promoting entrepreneurship and early-stage business development to create people who are ready to establish and expand business by increasing the skills of entrepreneurs in the early stage to allow them to be creative and adopt technology and innovation for strong business growth with 50 participating businesses and 1,300 people and with 51 participating businesses and 1,429 people accomplished.

2) Supporting regular SMEs in potential improvement, providing business turnaround assistance to SMEs including value creation for creative industry, and promoting the design and product development center that connects organisations related to design services and product development by ensuring the growth and value creation of creative industry to increase the competitiveness of small and medium enterprises in the creative, fashion and lifestyle, and packaging and printing industries in order for efficient and high-value product and service design with 270 businesses, 500 people, and 270 products and with 303 businesses, 535 people, and 303 products accomplished. Advancing SMEs to Industry 4.0 is enhancing the competitiveness of small and medium enterprises and developing entrepreneurs and personnel in industries such as processed agricultural products, processed food, rubber, and ceramic industries through production process and standard improvements, value creation, and industrial personnel and entrepreneur preparation by providing knowledge, technological skills, and expertise with 776 businesses and 401 businesses participating. Industrial cluster and connectivity is about promoting coordination in the form of cluster and productivity and innovation to enhance business competitiveness and create a shared vision for greater competitive potential with 14 groups accomplished.

3) Encouraging strong SMEs to be able to compete at the global level by enhancing the potential of entrepreneurs to Smart SMEs and advancing them to become Global SMEs by improving the potential of SMEs to compete at the global level and efficiently enhance their organisation. Improving SMEs using advanced technology and innovation and raising the potential and Halal certification standard of 200 businesses and 4,650 people as well as taking the products to the global stage by developing products that meet market demand and respond to consumer behavior in the global markets with 72 businesses and with 200 businesses, 4,688 people, and 72 businesses.

**1.2 Community enterprise promotion and development includes developing** community products to meet market demand, promoting the application of Thai society's knowledge, culture, and local wisdom in the industrial production and service processes with high value and that meet consumer needs in the tourism market in order to create marketing and income opportunities for communities to improve product design, development, and packaging to exhibit each region's identity and meet market demand with 1,300 businesses and products with 1,300 businesses and 1,335 products accomplished. Community entrepreneur promotion and development is about improving business potential of entrepreneurs, community producers, community enterprises, and OTOP in terms of production, management, product quality standard, environmental conservation, information technology adoption, and cluster networking with 1,240 businesses and with 1,440 accomplished.

**1.3 Business factor improvement includes** the operation of the SME Support & Rescue Center: SSRC which provides information services and basic advices to support and assist struggling SMEs and improve factors that support `SMEs by creating mechanisms to continuously drive business growth, promoting co-working space, connecting funding sources with entrepreneurs and new businesses, and creating and developing a network of entrepreneurs and new startups with 315 businesses and with 9,097 people and 326 businesses accomplished. Service development and business factor promotion is about developing quality industrial service providers and distributing services to target small and medium enterprises with 300 businesses and 11 groups with 308 businesses and 11 groups accomplished.

## 7. Integrated plan to develop potential industries

**2.1 Industrial potential development** : Operating the Industry Transformation Center by creating awareness of industrial transform, improving places of business, and incubating prototype product development in collaboration with organisations within the Ministry of Industry's network that have the knowledge and engineering expertise and private organisations for knowledge transfer. The Industry Transformation Center is the center for connecting various services of networked organisations and experts to improve interested entrepreneurs and personnel with at least 300 businesses joining. The clustering and networking of potential industries focuses on promoting the collaboration in clustering to enhance the potential of industries to prepare for industries for the future or using modern technology to create higher value of products, strengthen the value chains, build the foundation for industries for the future, and share prosperity with regional areas with eight groups and with 309 people and eight groups accomplished.

**2.2 Productivity enhancement** : supporting businesses in meeting the standards of potential industries and providing businesses with technological skills and innovation in order to make products with higher value, improve the potential industries' efficiency, innovation, and technology following the government's policy by promoting the auto industry and automation, electronic intelligence industry, and healthcare industry with 445 businesses. Providing knowledge and production and technology skills for personnel in the industrial sector to prepare for modern production with 890 people with 458 businesses and 980 people accomplished.

## 8. Integrated plan to improve the area at the regional level and promote enterprises to strengthen the area at the regional level

**3.1 Northern region** : increasing value of industrial products through innovative technologies and creative design for tourism and services in the northern region with 100 businesses and products and enhancing the competitiveness of SMEs through innovative technologies and standards of processed food and agricultural industries with 50 businesses and people and with 103 businesses and products and 50 businesses and people accomplished.



Mrs. Warawan Chitaroon  
Deputy Permanent Secretary of Industry

**3.2 Northeastern region** : increasing the potential of the processed agricultural industry to enable the industry to compete at the global level, promoting the change of agricultural production to new products that match the conditions of each region, improving the production process for greater efficiency and to meet related standards, and developing and connecting industries with 60 businesses and 188 products as well as advancing cultural tourism by creating high-value tourism products that meet market demand based on provincial identity with 60 people and products and with 60 businesses and 188 products and 60 people and 62 products accomplished.

**3.3 Eastern region** : improving places of business of the auto part and the industries for greater productivity and preparation for Industry 4.0 with 270 businesses and two groups and with 280 businesses and two groups accomplished.

**3.4 Southern region** : improving places of business of the processed agricultural industry which includes rubber and oil palm for greater efficiency in production process and competitiveness of regional enterprises with 75 businesses and three products and with 75 businesses and three products accomplished.

**3.5 Southern borders** : providing trainings and improving skills for people in the three southern border provinces, promoting the expansion of household businesses in the areas, and promoting understanding between the public, private, and people sectors in the areas with 95 people and with 95 people accomplished.

## 9. Integrated plan for transportation and logistics system

Enhancing the capacity of logistics management, raising the standards of logistics and supply chain management in the industrial sector to reduce logistics costs of businesses, strengthening the connectivity and collaboration of supply chain, promoting the application of logistics and supply chain management system, and promoting the use of information technology system in inventory management with 315 businesses and 440 people of the businesses with 324 businesses and 440 people accomplished.

## 10. Integrated plan for the development of digital economy and society

Central database development for the information integration is about developing the database system of the Department of Industrial Promotion to integrate data and connect the data with the Big Data system of the Ministry of Industry with one system and with one system accomplished.

## 11. Initial plan to strengthen the country's competitiveness

Improving the potential and quality of One Tambon One Product (OTOP) products by increasing the business potential of OTOP producers, community producers, community industries, production process, management, product quality standards, and product development to meet market demand, improving the skills used in communication technology to create social media marketing channels, and enhancing the competitive potential using modern technology and innovation with 100 businesses and products and with 101 businesses and products accomplished.



Mr.Nattapon Nattasomboon  
Inspector General



## Second Strategy

Improving the enabling factors to create a conducive ecosystem for investment and development in the industrial sector

### 1. Area Development for Potential Industry Project to Meet Investment Demand

Today, operations of new industries are challenging and have become increasingly complex due to resistance for industrial factory construction which inevitably affects investors' confidence and investment environment as well as corporate image. As a result, it is necessary to increase the confidence of investors and the society by studying, developing, and evaluating the potential of areas suitable for industrial factory construction based on the balance between various aspects including infrastructure, utilities, economy, society, and environment as well as the development plan for system connecting nearby industrial areas and potential for connection with other regions in order for industrial factories to operate business and live harmoniously with the communities and society. One of the measures or instruments used is industrial zoning which is an area study for industrial factory construction that is suitable for the economy, society, and environment with management and co-living condition details specified without social and environmental impact. The operations must be based on the sustainable development and community and stakeholder engagement principles.

As a result, **the Department of Industrial Works (DIW)** started the Area Development for Potential Industry Project in the fiscal year 2019 with three target areas including Pichit province, Chaiyaphum province, and Buriram province to prepare the areas for the expansion of various industries based on the country's strategies and area potential to meet the government's policy with the objective of determining the areas and creating industrial area development plan that links to economic area development, transportation network, and infrastructure that affect the industrial, trade, and investment sectors in order to promote and develop industrial areas in target provinces as well as creating a database of industrial area in target provinces. The results of the analysis and potential assessment of the areas can be summarised as follows:

**Pichit province** : transforming the economic foundation from agriculture to bio-agricultural industry to increase the value of agricultural products and provide suitable areas for moderate industrial development. The target areas are in Vajirabaramee, Sak Lek, and Tab Klo districts

**Chaiyaphum province**: strengthening the economy by developing the agricultural industry, keeping products in the cold storage for the bio agricultural industry, developing into the electronic industry for the future, and providing suitable areas for moderate industrial

**Buriram province**: developing safe agricultural products and promoting cattle farming, water-saving planting for the agricultural and initial rubber industries as the basis. In the future, various products will be developed such as rubber products, medical equipment, sport equipment, and animal feed production to meet regional policy. Most areas are suitable for moderate industrial development. The potential areas are in Prakonchai, Sa Tuek, and Lamplaimas districts. The industrial area development plan to meet investment demand includes

- 1) Strategic plan for target industrial area development focusing on area development to prepare the industries for related utility systems and laws and
- 2) Strategic plan to develop industrial factors with a focus on developing entrepreneurs, farmers, labour, communities, and others.

**โครงการพัฒนาพื้นที่อุตสาหกรรมอย่างมีศักยภาพเพื่อรองรับการลงทุน ประจำปีงบประมาณ 2562**

อุตสาหกรรม มีความมุ่งมั่นให้เกิดการพัฒนาอย่างยั่งยืนในภาคอุตสาหกรรม และเกิดความเชื่อมโยงกันอย่างเป็นระบบทั้งด้านและเชิงแวดล้อม โดยการเติบโต การขยายโรงงานอุตสาหกรรมในอนาคต จะต้องอยู่ในบริเวณพื้นที่ที่เหมาะสม เพื่อป้องกันข้อจำกัด และสิ่งแวดล้อม

นาพื้นที่อุตสาหกรรมอย่างมีศักยภาพเพื่อรองรับการลงทุน ปี 2562 มีเป้าหมายที่จะศึกษา วิเคราะห์หาพื้นที่ที่เหมาะสมต่อการอุตสาหกรรมในจังหวัดที่จัด โดยความร่วมมือและการมีส่วนร่วมของทุกภาคส่วน เพื่อการพัฒนาที่ยั่งยืนต่อไปในอนาคต

**ผู้ประกอบการที่สนใจขอรับคำปรึกษา**  
 1. กรุงเทพฯ 2. เชียงใหม่ 3. นครราชสีมา 4. นครศรีธรรมราช 5. นนทบุรี 6. ภูเก็ต 7. พิษณุโลก 8. เพชรบูรณ์ 9. ระยอง 10. ร้อยเอ็ด 11. อุบลราชธานี 12. อุตรดิตถ์ 13. ยะลา 14. หนองคาย 15. หนองบัวลำภู 16. หนองบัวลำภู 17. หนองบัวลำภู 18. หนองบัวลำภู 19. หนองบัวลำภู 20. หนองบัวลำภู

**พื้นที่ที่เข้าร่วมโครงการ**  
 - กรุงเทพฯ  
 - เชียงใหม่  
 - นครราชสีมา  
 - นครศรีธรรมราช  
 - นนทบุรี  
 - ภูเก็ต  
 - พิษณุโลก  
 - เพชรบูรณ์  
 - ระยอง  
 - ร้อยเอ็ด  
 - อุบลราชธานี  
 - อุตรดิตถ์  
 - ยะลา  
 - หนองคาย  
 - หนองบัวลำภู  
 - หนองบัวลำภู  
 - หนองบัวลำภู  
 - หนองบัวลำภู  
 - หนองบัวลำภู

**ข้อมูลเพิ่มเติมได้ที่**  
 กองส่งเสริมของทุน จะเติบโตในห่วงโซ่มูลค่าของภาคอุตสาหกรรม  
 1. กรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์  
 2. กรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์  
 3. กรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์  
 4. กรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์  
 5. กรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์  
 6. กรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์  
 7. กรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์  
 8. กรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์  
 9. กรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์  
 10. กรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์  
 11. กรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์  
 12. กรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์  
 13. กรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์  
 14. กรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์  
 15. กรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์  
 16. กรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์  
 17. กรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์  
 18. กรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์  
 19. กรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์  
 20. กรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์

## 2. Increasing Machinery Registration of Small and Medium Enterprises Programme

The Department of Industrial Works (DIW) started the Increasing Machinery Registration of Small and Medium Enterprises Programme to support SMEs in upgrading machinery to increase production efficiency and reduce energy and environmental costs or applying innovation to improve productivity which can be used in credit approval of financial institutions or funding approval of other organisations in the future.

In addition, SMEs received knowledge and understood how to increase the efficiency of machinery which is part of the programme to support SMEs following the government’s policy with the objective of providing knowledge and in-depth advices regarding machinery improvement for increased productivity, increasing access to funding, reducing energy and environmental costs, using renewable energy, and applying innovation in SMEs for greater competitiveness.

The results of the operations, there were 146 SMEs participating in the programme with 107 qualified participants and 2,131 machineries analysed for efficiency, 614,557,344 baht investment in machinery upgrade, 226,027,002 baht/year return on investment in machinery upgrade, 18,320,737 baht/year return from machinery upgrade, and payback period of 2.72 years.



## Third Strategy

Promoting and encouraging the industries to be socially and environmentally friendly

### 1. Business Promotion and Development into Green Industry



The Ministry of Industry promotes industrial development in Thailand to achieve Eco Industry and Green Industry, which focuses on the development of urban areas based on resource potential and the physical structure to increase productivity and commercial competitiveness, reduce environmental impact, and promote occupational health safety and social responsibility concurrently, creating a balance among economic, environmental, and social developments which allows industries to live happily and sustainably with the community.

In fiscal year 2019, **the Department of Industrial Works (DIW)** organised a project to promote and develop green industry by raising awareness of personnel at all levels through knowledge and understanding about sustainable development, promoting knowledge, concepts, and experiences of successful organisations to provide a concrete example and guidelines for fair business through various media, creating and developing experts, assessors, providing assistance to businesses to enable them to develop sustainable green industry, promoting and developing officers and government officials of the Ministry of Industry in implementing green industry guidelines, and raising awareness and participation of all sectors for sustainable green industry development.

The results of the operations, support, and development of 2,921 businesses into the green industry. Factories made investments to increase production efficiency and pollution prevention of 13,053,376.68 baht, saved 36,467,023.59 baht per year, saved resources such as electricity by 1,202,759.64 kWh per year, water consumption by 37,040.39 cubic meters per year, and greenhouse gas by 768,654.33 kilograms Co<sub>2</sub>eq per year. 31 factories were able to increase production efficiency by applying environmental management system for practical, systematic results, reducing environmental impact of CO<sub>2</sub> by 20,800 tons per year and production costs by 118,189,048 million baht per year.

#### Summary of the number of green industry certificates (data as of 30 September 2019)

Level	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
1	316	1,172	4,407	5,637	4,328	2,926	594	699	558	20,637
2	227	705	1,733	764	986	1,292	704	1,271	1,153	8,835
3	507	603	882	659	730	1,056	909	058	1,071	7,375
4	-	30	20	1	42	53	139	93	115	493
5	-	-	-	5	8	17	6	12	24	72
<b>Total</b>	<b>1,050</b>	<b>2,510</b>	<b>7,042</b>	<b>7,042</b>	<b>6,094</b>	<b>5,344</b>	<b>2,352</b>	<b>3,033</b>	<b>2,921</b>	<b>37,412</b>

## 2. Project to provide in-depth advices for businesses to become green industry in the second area of the northern region

In fiscal year 2019, the Ministry of Industry created a plan to upgrade top green industry businesses to a higher level, especially to Level 2 Green Industry which requires advices from consultants and experts. Most small and medium-sized enterprises (SMEs) face limitations in terms of human resources and knowledge required for advancing to a higher level of green industry. The target groups are in Kamphaeng Phet, Chiang Mai, Chiang Rai, Tak, Nakhon Sawan, Nan, Phayao, Phichit, Phitsanulok, Phetchabun, Phrae, Mae Hong Son, Lampang, Lamphun, Sukhothai, Uttaradit and Uthai Thani.

According to the results of 91 factories which received knowledge transfer and in-depth consultation consisting of 71 factories that wish to upgrade to Level 2 Green Industry, six factories that wish to upgrade to Level 3 Green Industry, 14 factories that wish to upgrade to Level 4 Green Industry, all applied for green industry certification (or 100 percent of factories) with 71 factories applying for Level 2 Green Industry, six factories applying for Level 3 Green Industry, and 14 factories applying for Level 4 Green Industry. The operating results can be summarized for each level as follows:

The results of the plan in 71 factories can be summarized as follows: water usage reduced by 25,347 cubic meters per year, waste reduced by 306,329 kilograms per year, energy consumption reduced by 1,409,707

kilowatt-hours per year, waste water generation reduced by 19,059 cubic meters per year or 17,540,578 baht per year, and greenhouse gas or carbon dioxide emissions reduced by a total of 4,099,484 kilograms of carbon dioxide equivalent per year. It can also be estimated that the plan reduced costs by 17,540,578 baht per year and increased income by 2,530,823 baht per year.

### 3. Project to provide in-depth advices for businesses to become green industry in the fourth area of the northeastern region

The industrial sector is important to the country's economic growth, prosperity, and employment; however, it is facing challenges not only from competition but only from having to gain acceptance from the society and community by complying with the law, being careful with its operations, and evaluating the effects that may occur. Therefore, “Green Industry” guideline can ensure the continuity of the industrial sector today and in the future.

The Green Industry Promotion and Development Project was initiated by the Department of Industrial Works (DIW) in 2011. Until now, 26,000 businesses have received green industry certification which are divided into

- Level 1 Green Industry (Green Commitment)
- Level 2 Green Industry (Green Activities)
- Level 3 Green Industry (Green System)
- Level 4 Green Industry (Green Culture)
- Level 5 Green Industry (Green Network)

In fiscal year 2019, the DIW created a plan to upgrade top green industry businesses to a higher level, especially to Level 2 Green Industry which requires advices from consultants and experts. Most small and medium-sized enterprises (SMEs) face limitations in terms of human resources and knowledge required for advancing to a higher level of green industry.

The project aims to provide businesses with in-depth knowledge in environmental production management to promote ways to utilise resources for maximum benefits by creating a balance between economic progress and ecosystem protection and developing capabilities and raising awareness of employees and entrepreneurs about environmental conservation in order to improve the quality of life of employees and create a good image for the factory. Additionally, the project encourages entrepreneurs to adopt environmental management for practical application and compliance with the laws and regulations, eliminating conflicts that may arise from the surrounding communities and upgrading businesses to a higher level of green industry. The target groups are in Krabi, Chanthaburi, Chachoengsao, Chonburi, Chumphon, Trang, Trat, Nakhon Nayok, Nakhon Si Thammarat, Narathiwat, Prachinburi, Pattani, Phang Nga, Phatthalung, Phuket, Yala, Ranong, Rayong, Songkhla, Satun, Sa Kaeo and Surat Thani.

The results of the operations, from 101 factories participating in the Green Industry project (Level 2 and above), all applied for green industry certification (or 100 percent) with 92 factories applying for Level 2 Green Industry, seven factories applying for Level 4 Green Industry, and 2 factories applying for Level 5 Green Industry. The operating results for each level can be summarized as follows:

92 factories had operating results that were in line with the Level 2 Green Industry requirements. Environment policy establishment, environmental plan creation, and plan effectiveness has led to a reduction in water usage of 535,828.40 cubic meters per year, a reduction in waste of 1,170,774.44 kilograms per year, a reduction in electricity consumption of 6,617,156.99 kilowatt-hour per year, a reduction in fuel consumption of 16,831,472.08 kilograms per year and a reduction in greenhouse gas emissions or carbon dioxide of 8,039,451.88 kilograms of carbon dioxide equivalent per year. It was also estimated that the project's plan has reduced costs by 283,722,030.21 baht per year and increased income by 2,722,426.20 baht.

Seven factories that applied for Level 4 Green Industry certification and two factories that applied for Level 5 Green Industry or nine factories in total created an environmental plan and were able to save water up to 19,563.9 cubic meters per year, reduce waste 978,000 by kilograms per year, reduce electricity consumption by 2,663,118.31 kilowatt-hour per year, reduce fuel consumption by 241,760 kilograms per year, and reduce greenhouse gas emissions or carbon dioxide by 5,314,035.86 kilograms of carbon dioxide equivalent per year in total. It was also estimated that the project's plan has reduced costs by 10,801,571.58 baht per year.

## 4. Clean technology transfer project for industrial field

The Department of Industrial Works (DIW) has a policy to promote clean technology in industrial fields (productivity enhancement and pollution prevention) in order to increase production efficiency and environmental protection through clean technology (CT). Clean technology is the concept of economical and efficient use of raw materials, resources, and energy and waste minimisation. Systematic data collection and evaluation together with continuous practices allow factories to learn about the root causes and preventive and corrective measures for problems, increase production efficiency, and reduce costs as well as environmental problems.

Electronic component and plastic industry is an important industry that drives the Thai economy through domestic sales and exports to international markets. The industry is, therefore, the basic industry that generates income for the country tens of billions of baht annually. The industries use electric raw materials, fuel, water, and many other resources. Since the products manufactured are high-value and consumers demand quality products, businesses need to adapt to meet consumer needs, increasing the chance of waste dumping waste and pollution. As a result, this sector needs to adopt management methods or guidelines for clean technology application with technical feasibility and economic value to increase resource efficiency and reduce waste in order to improve production processes and products that are environmentally friendly as well as to increase the competitiveness of industrial fields to generate sustainable income for the country.

In fiscal year 2019, the Department of Industrial Works stipulated the application of clean technology in the electronic component and plastic industry which corresponds to the 10 S-Curve industries with the objective of promoting the practical and continuous use of clean technology in the electronic component and plastic industry and establishing clean technology guidelines for the electronic component and plastic industry to guide the implementation of clean technology (CT).

The results of the operations, 22 factories from the electronic component and plastic industry that applied CT option were able to reduce costs by 36,467,023.59 baht and greenhouse gas emissions by 768,654.33 kilograms of CO<sub>2</sub>eq per year.

## 5. Project to study the potential of water saving in industrial plants



After Thailand's mass flood in 2011, the government has implemented water management from upstream to downstream in Thailand. Until the drought crisis in 2015 and 2016, the drought severely affected the country's water management when the amount of water in the main dams became scarce, causing the government to discuss and determine supportive measures for all sectors that use water. **The Department of Industrial Works (DIW)** has cooperated with relevant government agencies in procuring raw water for industrial use and provided advice to factories on efficient water use as well as sought raw water reserves. Due to water shortage, the industries that use a lot of water and are located in the drought-hit areas were required to slow or stop production at certain times, resulting in a significantly negative impact on the country's economy at the grassroots and national levels.

Currently, the government has established the Office of National Water Resources (ONWR) to integrate information for the formulation of water resources management policy. The DIW had to carry out a project to study water consumption reduction in industrial plants with the objective of promoting water-saving technology in industrial plants including water circulation and reuse of wastewater using the 3Rs (Reduce / Reuse / Recycle) principle developing industrial personnel to have the knowledge and understanding of efficient water use which will reduce the amount of raw water, water use in industrial plants, cost of procuring raw water, wastewater produced, and cost of wastewater treatment, resulting in a harmonious and sustainable co-living of the factories and the people in the community.



The results of the operations, the 17 participating factories were able to reduce the amount of water used by 5.27 to 40.57 percent. All factories were able to reduce the amount of water used by 21.38 percent on average or 2,253,520 cubic meters per year, which represents a total saving of 29,000,519 baht per year and a greenhouse gas emission reduction of 986,031 kilograms of carbon dioxide equivalent per year.

## 6. Project to increase the production capacity of industrial plants using environmental management system in major river basins

The Department of Industrial Works (DIW) conducted a project to increase the production capacity of industrial plants using environmental management system in major river basins with a focus on production and service improvement, socially and environmentally friendly business operations, and connected business groups and networks through efficient management of shared resources and increased competitiveness, leading to ISO 14001 environmental management standards that allows for an equilibrium of the economic, environmental, and social aspects that will bring about sustainable development in the future.

The project aims to promote a more sustainable development approach in industrial plants based on the principles of creating economic prosperity through efficient resource utilization which increases the efficiency of machinery and equipment, reduces pollution at source, and prevent and reduce environmental impact by creating a balance between economic progress and ecological preservation. Industrial plants, especially ones along major river basins, are encouraged to implement environmental management system, comply with the law and regulations, and eliminate potential conflicts with the surrounding communities. Factories and employees are also encouraged to participate in environmental protection, improve the quality of life of employees, and create a good image for the factory, moving towards green industry factory and ISO 14001 certification to help reduce greenhouse gas or carbon dioxide emissions

The results of the operations 31 factories that participated in the project and received clean technology transfer for environmental management system were successful in applying the environmental management system to reduce pollution at source and able to increase production efficiency by applying the eco-efficiency concept to reduce production costs by 118,189,048 million baht and greenhouse gas emissions by approximately 20,800 tons carbon dioxide equivalent per year.

## 7. Project to promote social responsibility and sustainable community in industrial factories (CSR Beginner and CSR-DIW)

The government announced the policy to restructure the industrial sector by promoting and developing eco-industrial cities to reduce environmental impact and promote industrial safety, allowing the industrial sector to sustainably live with the community and society. The Ministry of Industry has implemented industrial development based on the concept of eco-industrial city.



**The Department of Industrial Works (DIW)** has set the guidelines for industrial operations to gain public trust and reinforce a good image in order for the economy, environment, and society in Thailand, which is an important industrial production base, to develop and grow sustainably with the objective of promoting social responsibility and cooperation between industries and community to create social symbiosis and promote sustainable development in the area driven by strengthening and supporting small and medium-sized community enterprises to compete in the market which supports the government policies to create small social enterprises to achieve the government's SME 4.0 policy.



**The results of the operations**, the CSR-DIW verifications, 42 out of 46 factories or 91.30 percent passed the criteria. For the CSR Beginner group, 310 out of 358 factories or 81.57 percent passed the criteria. The DIW organised seminars to showcase the operating results and give awards and certificates to 358 industrial factories that passed the CSR-DIW standard and 310 factories that passed the CSR Beginner standard at the Miracle Grand Convention Hotel with 1,640 participants from the public and private sectors.

**Table summarising the number of industrial factories that received the awards and certificates from 2008 to 2019**

Order	Awards and certificates	Number of industrial factories that received the awards and certificates												
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
1	CSR-DIW for Beginner Award	-	-	-	-	403	722	-	-	-	65	-	310	1,500
2	CSR-DIW Award	28	80	96	117	112	120	112	130	58	62	41	43	999
3	CSR-DIW Continuous Award	-	-	-	139	181	257	272	340	290	310	-	-	1,789
4	CSR-DIW Network Award	-	-	-	12 groups, 30 factories	7 groups, 17 factories	-	-	-	-	-	-	-	19 groups, 47 factories
5	CSR-DIW in Supply Chain Award	-	-	-	11	15	-	-	-	-	-	-	-	*26
6	CSR-DIW Advance Award Level 4	-	-	-	-	-	53	-	-	-	-	-	-	53
7	CSR-DIW Advance Award Level 5	-	-	-	-	-	7	-	-	-	-	-	-	7
8	CSR-DIW Project Award	-	-	-	-	-	-	-	6	-	-	-	-	6
9	Pre CSR-DIW (receive only certificates)	-	-	-	-	-	-	-	-	120	-	-	-	120
<b>Total</b>		<b>28</b>	<b>80</b>	<b>96</b>	<b>297</b>	<b>728</b>	<b>1,159</b>	<b>384</b>	<b>476</b>	<b>468</b>	<b>437</b>	<b>41</b>	<b>353</b>	<b>4,547</b>

On Monday, 23 September 2019 at 9.30AM, Mr.Konpatwee Muangnoi, Deputy Director-General of the Department of Industrial Works, joined the “ECO INNOVATION FORUM 2019” with the honour of Vice Minister of Industry Mr.Dheerayut Varnitshang, the event’s chairman, and Advisor to the Minister of Industry Mr.Suchart Trisangrujira, welcomed by Miss Somchint Pilouk, the Industrial Estate Authority of Thailand Governor, and Mr.Somchai Wangwattanapanich, Vice President of the Federation of Thai Industries at the Ballroom, Miracle Grand Hotel, Bangkok.

“ECO INNOVATION FORUM 2019” was organised under the concept of Circular Economy: Way to Smart and Sustainable Eco Industrial Town with the objective of promoting the development of eco-industrial cities under the principles of a circular economy, which focuses on efficient resource use that meets the growth of the world population.

## 8. Project to create a database for resource sharing (RECP) and industrial plant upgrade in the area of eco-industrial cities in 15 provinces

The Department of Industrial Works (DIW) has created a master plan and an action plan for provincial eco-industrial development in 15 provinces as a framework for implementation, both in terms of management and project operations in the short, medium, and long terms as well as indicators for eco-industrial urban development. The Department pushed the plan into action to achieve the targets as stipulated by the indicators. The Ministry of Industry is the main agency in the operation and has set a time frame from fiscal year 2016 to fiscal year 2021.

In fiscal year 2016-2019, the DIW has upgraded factories in the target areas in 15 provinces and created a material flow chart that was used as a database to analyse the options for further plant development. However, there is still a lack of factories to be upgraded to complete Level 2 Eco-Industrial Urban Development Indicator (in the industrial sector).

Therefore, to enable the eco-industrial city (in the industrial sector) development to pass the Level 2 eco-industrial city criteria, there need to be factories that meet the environmental and safety standards following the indicators for Level 2 eco-industrial development and there need to be factories that meet the Level 3 eco-industrial city criteria. Currently, there are 6,033 factories in 15 provinces and 1,627 factories have been upgraded.

1) Project to create a database for resource sharing (RECP) and industrial plant upgrade in the eco-industrial cities in seven target provinces: Ayutthaya, Saraburi, Nakhon Ratchasima, Khon Kaen, Ratchaburi, Surat Thani and Songkhla

The results of the operations, there are industrial plants that have been upgraded and improved following the eco-industrial city indicators in seven target provinces as follows:

- Level 2 and 3 - 205 factories
- Verification - 19 factories

2) Project to create a database for resource sharing (RECP) and industrial plant upgrade in the eco-industrial cities in seven target provinces: Rayong, Samut Sakhon, Samut Prakan, Chachoengsao, Prachinburi, Chonburi, Nakhon Pathom, and Pathum Thani.

The results of the operations, there are industrial plants that have been upgraded and improved following the eco-industrial city indicators in eight target provinces as follows:

- Level 2 and 3 - 205 factories
- Verification - 19 factories

## 9. Project for the verification and evaluation of eco-industrial cities and development of eco-industrial networks in 15 provinces

The Ministry of Industry's Notification regarding the Determination of Eco-industrial Urban Area and the measure to support the factory operation in eco-industrial urban areas in 2018 included 15 provinces and 18 areas and set the targets for eco-industrial city development that require 15 provinces and 18 target areas to achieve Level 3 eco-industrial city assessment in 2021. In 2019, eight provinces (Rayong, Chachoengsao, Chonburi, Samut Prakan, Samut Sakhon, Prachinburi, Nakhon Pathom, and Pathum Thani) must pass Level 2 criteria based on the indicators and seven provinces (Ratchaburi, Ayutthaya, Saraburi, Nakhon Ratchasima, Khon Kaen, Songkhla, and Surat Thani) must pass Level 1 criteria based on the indicators.

As a result, in 2019, **the Department of Industrial Works (DIW)** conducted a project for the verification and evaluation of eco-industrial cities and development of eco-industrial networks in 15 provinces and 18 areas. The objective was to provide knowledge about verification, evaluation, and indicators to people interested in eco-industrial city development to develop the capacity of evaluators in verifying eco-industrial city development, to create acceptable standards, and to strengthen the relationships and promote experience sharing within the Eco Industrial Network Working Group in order to create a digital system to facilitate the working group or related parties in collecting data from the areas which would be sent to the Eco Center and central agency. The center is the source of knowledge on eco-industrial city development, tracks activities and results of eco-industrial development level of the target areas in order to verify eco-industrial city development in the target areas of 15 provinces based on the five indicators in 20 dimension.



## The results of the verification and evaluation of eco-industrial city development level

Order	Eco-industrial city development level	Eco-industrial city area
1	Level 4 Symbiosis	<p>Two areas, one province including:</p> <ol style="list-style-type: none"> <li>1) Taphong Subdistrict, Ban Lang Subdistrict, and Choeng Noen Subdistrict, and Mueang Rayong District, Rayong Province</li> <li>2) Map Ta Phut pollution control areas in Rayong Province consist of Map Ta Phut Subdistrict, Noen Phra Subdistrict, Huai Pong Subdistrict, Thapma Subdistrict, Mueang District, Map Kha Subdistrict, Nikhom Phatthana District, Ban Chang Subdistrict, and Ban Chang District, Rayong Province</li> </ol>
2	Level 2 Enhancement	<p>16 areas, 14 provinces including:</p> <ol style="list-style-type: none"> <li>1) Sadao Subdistrict, Prik Subdistrict, Phang La Subdistrict, Samnak Taew Subdistrict, Samnak Kham Subdistrict, Padang Besar Subdistrict, Sadao Subdistrict, Ban Phru Subdistrict, and Phatong Subdistrict, Hat Yai District, Songkhla Province</li> <li>2) Wang Dal Subdistrict, Non Si Subdistrict, Na Khaem Subdistrict, and Kabin Subdistrict, Kabin Buri District, Prachinburi Province</li> <li>3) Bang Pu Subdistrict Municipality, Samut Prakan Province</li> <li>4) Plaeng Yao Subdistrict and Hua SaMr.ong Subdistrict, Plaeng Yao District, Chachoengsao Province</li> <li>5) Tha Rong Chang Subdistrict and Tha Sathon subdistrict, Surat Thani Province</li> <li>6) Sikhio Subdistrict, Lat Bua Khao Subdistrict, Mittraphap Subdistrict, Kut Noi Subdistrict, and Nong Ya Khao Subdistrict, Sikhio District, Nakhon Ratchasima Province</li> <li>7) Chalung Subdistrict, Hat Yai District, Songkhla Province</li> <li>8) Nakhon Luang District, Ayutthaya Province</li> <li>9) Om Yai Town Planning Areas consisting of Bang Krathuk Subdistrict, Krathum Lom Subdistrict, Rai Khing Subdistrict, Tha Talat Subdistrict, Yai Cha Subdistrict, Tha Kham Subdistrict, Om Yai Subdistrict, and Ban Mai Subdistrict, Sam Phran District, Nakhon Pathom Province</li> <li>10) Bangkadi Subdistrict, Mueang District, Pathum Thani Province</li> <li>11) Na Phra Lan Subdistrict, Chaloem Phrakiat District, and Khao Wong Subdistrict, Phra Phutthabat District, Saraburi Province</li> <li>12) Laem Chabang Municipality and Chao Phraya Surasak Municipality, Si Racha District, Chonburi Province</li> <li>13) Khu Bang Luang Subdistrict, Lat Lum Kaeo Subdistrict, Khu Khwang Subdistrict, Rahang Subdistrict, and Na Mai Subdistrict, Lat Lum Kaeo District, Pathum Thani Province</li> <li>14) Nam Phong Subdistrict Municipality, Lam Nam Phong Subdistrict Municipality, Muang Wan Subdistrict Municipality, and Kut Nam Sai Subdistrict Municipality, Nam Phong District, Khon Kaen Province</li> <li>15) Ban Pong Municipality, Tha Pha Municipality, Boek Phrai Subdistrict Municipality, and Pakrat District, Ban Pong District, Ratchaburi Province</li> <li>16) Om Noi Municipality, Samut Sakhon Province</li> </ol>

Evaluation results of eco-industrial city level in 15 provinces and 18 areas in fiscal year 2019

Province/Area*	Level 1 Engagement	Level 2 Enhancement	Level 3 Resource efficiency	Level 4 Symbiosis	Level 5 Happiness
<b>Rayong</b> - Pollution control area - Choeng Noen Subdistrict, Taphong Subdistrict, and Ban Lang Subdistrict,	✓	✓	✓	✓	
<b>Samut Prakan</b>	✓	✓			
<b>Samut Sakhon</b>	✓	✓			
<b>Chachoengsao</b>	✓	✓			
<b>Prachinburi</b>	✓	✓			
<b>Chonburi</b>	✓	✓			
<b>Pathum Thani</b> - Bangkadi Subdistrict - Lat Lum Kaeo Subdistrict	✓	✓			
<b>Nakhon Pathom</b>	✓	✓			
<b>Ratchaburi</b>	✓	✓			
<b>Ayutthaya</b>	✓	✓			
<b>Saraburi</b>	✓	✓			
<b>Nakhon Ratchasima</b>	✓	✓			
<b>Khon Kaen</b>	✓	✓			
<b>Songkhla</b> - Sadao District and Hat Yai District - Chalung Subdistrict,	✓	✓			
<b>Surat Thani</b>	✓	✓			

## 10. Project to increase the efficiency of sorting and recycling plants of electrical and electronic waste



On 17 March 2015, the Cabinet approved the strategy for integrated electrical and electronic waste management. The objective was to promote correct and systematic management of electrical and electronic waste and continuously reduce hazardous waste from electrical and electronic products at source. Moreover, the strategy promotes the establishment of sorting and recycling plants that have processes suitable for each type of product in the country.

**The Department of Industrial Works (DIW)** recognised the importance of the issue and therefore conducted an in-depth project to increase the efficiency of sorting and recycling plants of electrical and electronic waste with the objective of raising the operational standard of sorting and recycling plants of electrical and electronic waste, prepare the plants to support the integrated strategy for electrical and electronic waste management, enforce the law related to electrical and electronic waste management, promote knowledge and awareness of correct and eco-friendly approach to electrical and electronic waste management.

**The results of the operations:** out of the 21 factories that participated in the project and passed the evaluation criteria, four factories received “Excellence” awards, three factories received “Good” awards, five factories received “Honorable Mention” awards, and nine factories received “Participation” awards. The award ceremony was held at Amari Watergate Bangkok.

## 11. Project to assist and monitor factories that lack industrial waste management

The Ministry of Industry prepared a five-year industrial waste management plan (2015-2019) to encourage factories which produce industrial waste to implement effective management in line with the law and the National Council for Peace and Order (NCPO)'s Solid and Hazardous Waste Management Road Map by assigning the Ministry of Industry to implement waste management measures, strictly monitor factories which produce hazardous waste and factories that handle hazardous waste, and take legal actions against illegal waste disposal.

**The Department of Industrial Works (DIW)** established a centre for help and monitoring with the objective of providing advice to Category 3 factory operators under the Factory Act B.E.2535 (1992), especially SMEs that have not yet implemented industrial waste management required by the law and factories that need to renew factory license (Ror.Ngor.4). The centre has been operating since 2016 to increase the potential for systematic and correct industrial waste management. Activities at the centre include having industrial waste experts staff provide advice and assistance to factories in 76 provinces nationwide, including Bangkok. Staff who have been trained and/or officers supervising industrial waste management who have passed the test and registered with the DIW provide advices and recommendations to factories that have to renew factory license or factories that wish to adopt correct industrial waste management system.

**The results of the operations:** as of 17 September 2019, 9,132 factories have adopted correct industrial waste management system (Sor.Gor.1/Sor.Gor.2) in the industrial waste management system as required by law or 101.47 percent of the target 9,000 factories.

## 12. Project to promote the use of waste

**The Department of Industrial Works (DIW)** carried out a project to promote the use of industrial waste and reduce landfill waste following the policy of efficient resource use and environmental impact minimization from fiscal year 2009 to 2010 by studying industrial waste utilisation and implementing a pilot project to enhance the potential of industrial waste utilisation.

Waste is utilised in various ways including using sludge from the wastewater treatment system and process waste from the food factory to make fuel briquettes, mixing production waste and wastewater sludge with synthetic gypsum waste to produce fertilizer from 2011 to 2015 and from 2017 to 2018. Increasing waste utilisation potential reduces illegal waste dumping and waste disposal costs while increases the value of waste and trade opportunity and promotes eco-friendly business and sustainable industrial development with the objective of promoting waste recycling and reducing waste that must be disposed of in order to promote understanding of the industrial sector in the industrial waste management methods based on the 3Rs principle so that industrial plants have a more sustainable development approach, utilise resources more efficiently, and reduce pollution at source and environmental impact.



**The results of the operations:** out of 50 factories reviewed, 44 factories passed the assessment criteria with a score of 80 or more and six factories failed. The Department organised a seminar to promote the project's results and hold an award ceremony for the project to promote the use of waste with 50 factories receiving the award at the Taewakumrungruk Room, 2<sup>nd</sup> Floor, The Royal Thai Army Club, Bangkok. The awards were divided into three categories which consisted of

- 1) Good Waste Management Based on 3Rs Award (3Rs Awards) with 44 factories receiving the award,
- 2) Zero-Waste Achievement Awards with 17 factories receiving the award, and
- 3) 3 Rs\* Awards which were given to two factories in terms of creativity, economic return, and efficient waste reduction, one factory in terms of creativity, 13 factories in terms of economic return, and four factories in terms of efficient waste reduction. Additionally, 6 factories receive participation certificates.

### **13. Project to improve and upgrade industrial waste handling factories**

**The Department of Industrial Works (DIW)** has a policy to promote and support the establishment of waste and scrap disposal service providers across the country to supply services to factories that produce industrial waste. However, there is still an issue regarding the service standards of waste handling factories in which there have been public complaints on the services provided. As a result, industrial waste producers are not trusting the services of the waste handling factories and lack proper information for selecting the right service provider. It is therefore important that the Department of Industrial Works (DIW) promote and develop management and service standards which are consistent with the law and academic principles for waste handling factories in order to raise the service quality and confidence of industrial waste producers in choosing the service provider.

With this issue in mind, the **DIW** conducted a project to improve and upgrade industrial waste handling factories with the objective of improving the service and operation of waste and unused material management that focuses on environmental protection and safety to ensure that waste handling services follow the academic principles, publishing information about waste handling service providers that conform to the law and academic principles, and providing knowledge on environmental management assessment to the Ministry of Industry's personnel.

**The results of the operations:** 85 factories have participated in the project and received waste management standard evaluation. Those factories have received industrial waste factory standard awards including one factory receiving the Gold Plus awards, 34 factories receiving the Gold Medal awards, 13 factories receiving the Silver Medal awards, nine factories receiving the Bronze awards, five factories receiving the Honorable Mention awards, and 24 factories receiving certificates.

## 14. Project to improve and develop industrial waste management information system

Since 2006, the **Department of Industrial Works (DIW)** has developed an online system for requesting a permission to take waste or unused materials outside the factory to provide convenience, save time and travel costs, and reduce resource use of factories and public agencies in compliance with the law on industrial waste management, resulting in increased compliance of factories and more reporting of the amount of industrial waste in the system.



The DIW started a project to improve and develop industrial waste management information system with the objective of developing a system to support the increasing number of industrial waste management tasks, improve service efficiency, facilitate industrial waste monitoring and supervision of the Department of Industrial Works' staff, and facilitate factories' requests and reports.

**The results of the operations:** the Department has improved the electronic systems for accepting requests of waste handling factories to take waste or unused materials outside the factory (Sor.Gor.10/ Sor.Gor.12) both for waste handling factories and the Industrial Waste Management Division's officers, developed the electronic system to consider the certification of waste handling factories to take waste or unused materials outside the factory (Sor.Gor.1/Sor.Gor.13), developed the tracking and publication system for certification results and mass balance reporting system (Sor.Gor.14), and extended the e-Manifest system to track the transportation of hazardous waste nationwide.

## 15. Project to set the standard for hazardous substances storage to upgrade hazardous substances storage site

The Department of Industrial Works (DIW) is responsible for supervising and monitoring the production, import, export, use, and possession of hazardous substances. There are nearly 500 types of substance that are considered hazardous substances based on the Hazardous Substances Act B.E. 2535 (1992) and are under the DIW's responsibility. Moreover, there are more than 2,000 hazardous substances factories that need to ensure the safety of their storage following the legal standards. There are 1,633 cases of factories that need to have specific personnel responsible for the safety of hazardous substances storage. Highly flammable substances storage is the most required storage followed by hazardous substances storage area of 300 square meters or more. Therefore, if there are controls of building, container, storage, and management, these will prevent harm that may occur to people, animals, plants, property or the environment according to the spirit of the law. Each hazardous substances storage has different management systems, measures, and safety standards which create problems for control and oversight.



As a result, the establishment of standard for hazardous substances storage must have storage information to be able to install safety systems and promote the standard of the sites for storage, production, use, and possession of hazardous substances. The standard can also be used as a guideline to inspect factories. This project was challenging and involved complication in setting the criteria, creating manuals, grouping hazardous substances storage, showing the information of hazardous substances storage site and details of hazardous substances stored using Google Map's global positioning system (GPS).

The project aimed to study the guideline on hazardous substance management of factories that are required to have personnel specifically responsible for the safety of hazardous substances storage. The Department used the DIW's Manual for Chemical and Hazardous Substances Storage to create a proper survey used to inspect hazardous substances storage sites and provide advices on hazardous substances storage which is required to have personnel specifically responsible for the safety of hazardous substances storage. Hazardous substances storage sites are classified into two levels: Higher than the criteria and Meet the criteria. The classification is the input for the overall evaluation and statistical analysis to conclude the number of storage sites in each level. The Department created a manual for hazardous substances storage site inspection, organised trainings on hazardous substances storage, safety reporting for specialised personnel, and created e-Learning media to offer advices to "Meet the Criteria" factories in upgrading their hazardous substances storage sites.

**The results of the operations:** 100 factories that were required to have personnel specifically responsible for the safety of hazardous substance storage were inspected and received advices on hazardous substance storage. Personnel at the storage sites were knowledgeable and understood the classification of hazardous substances storage with the success rate of 85 percent. E-Learning materials about classification following the Department of Industrial Works' Notification on the Manual on Chemical and Hazardous Substance Storage B.E. 2550 (2007). For TRGS 510 classification, five factories were classified as "Higher than the Criteria" hazardous substances storage sites whereas 95 factories were classified as "Meet the Criteria" hazardous substances storage sites. Factories showed the information of their hazardous substance storage sites and details of the hazardous substances stored using Google Map's global positioning system (GPS).

## **16. Project to promote and improve fire and chemical safety in the industrial sector**

Is a project that applies information technology to create the safety assessment system with an aim of increasing the ability of personnel to self-assess the safety in the industrial sector with knowledge that can be transmitted digitally. The project's key success was the creation of the "Self-assessment Safety Application System" (Safety Application) or "S-Checklist" application which is used to assess factory safety on everyday devices and allows for greater convenience in safety assessment of factories.

S-Checklist has been developed to assess occupational health and safety in five modules including management, chemical work safety, fire prevention, electrical and energy hazard prevention, chemical process safety management, and dust explosion prevention. If the inspection results show inconsistencies or defects, the system can suggest corrective actions for safety management plan that is suitable for the nature of the business and industrial risk. Furthermore, the system has a database for knowledge on occupational health and safety which is kept in various documents such as manuals, laws, and recommendations that factory personnel can download through this application.

Factory executives can learn about the effectiveness of safety management from the summary of the inspection results in terms of safety level. The system processes the results using the average percentage score divided into four levels: Excellent, Good, Medium, and Need Improvement. Moreover, the system summarised inconsistencies and systematic correction to provide information for executives' decisions on resource allocation for systematic management planning which is line with the strategic direction of the organisation, promote safe business operations of the industrial sector, minimise loss, promote continuous improvement, promote sustainable business, and enhance competitiveness in the global markets.

**The results of the operations:** the Department has information systems for safety and chemical self- assessment via mobile and web-based application. 418 factories learnt to use information technology system for assessment and learnt about industrial safety management. 60 officers of the Ministry of Industry received trainings on how to use information technology system for assessment and industrial safety management. 31 factories self-assessed on fire and chemical prevention using the mobile and web-based application.

## 17. Project to promote and improve safety for Industry 4.0

The Thai manufacturing sector has high energy consumption. Boiler is one of the energy sources that produces steam, which is widely used as the source of power for industrial production in all industries. If used without care, boilers can bring about undesirable consequences such as accidents, excessive loss of energy from steam production, and negative environmental impact. Therefore, close control is required to prevent undesirable outcomes.

**The Department of Industrial Works (DIW)** realises that using modern computer simulation technology and Industry 4.0 technology, such as Internet of Things (IoT) and Smart Safety and Monitoring for safety, energy consumption reduction, and environmental impact reduction will help prevent accidents from boiler use and maintenance by allowing factories to quickly recognise and solve problems as well as to know the amount of energy use and loss in various conditions, reducing energy loss, and pollution released. This represents technology application that clearly benefits boiler use. Therefore, it is necessary to encourage factories to recognise the methods and direct and indirect consequences from efficient application of technology in boiler use in terms of safety, energy conservation, and environmental impact.

The project to promote and improve safety for Industry 4.0 aims to provide businesses, government personnel, and relevant agencies with knowledge, capacity, and understanding in information technology for

the safety of boiler, chemicals, and industrial gas as well as to provide access to government digital services to support the registration of factory safety personnel and safety information reporting through electronic systems in order to ensure that factories conduct safe operations related to the safety of the use of boilers, chemicals, and industrial gas.

**The results of the operations:** 22 target factories that use boilers received an evaluation on safety, energy consumption, and environment as well as advices on the application of Industry 4.0 technology in boiler use. 124 factory personnel who used boilers gained knowledge and understanding in the application of Industry 4.0 technology in boiler use and were able to further apply the knowledge. At least 813 factory employees, boiler inspection engineers, and the Ministry of Industry's officers acquired knowledge and understanding about information technology for the safety of boilers, chemicals, and industrial gas. There were 10 models of computer simulation.

## 18. Project to promote workplace safety

**The Department of Industrial Works (DIW)** is prepared to strengthen and upgrade the safety of the bioeconomy to a new S-curve industry or an industry that involves microbes, especially genetically modified microbes. The project to promote workplace safety aims to promote and improve the safety of the working conditions and study international agreements and gather knowledge and information on biosafety of activity related to microbes and genetically modified microbes for biological factories or factories that carry out activities related to microbes and/or genetically modified microbes in order to allow factories and relevant personnel to conform to international biosafety regulations and support the development of Thailand's biological economy in achieving the strategic industrial development goals aimed at increased global competitiveness

**The results of the operations:** 32 factories were inspected and gathered information on biosafety and received experts' advices. 500 manuals on biosafety for operation related to microbes and genetically modified microbes were published. Inspection forms for biosafety for factories were created. 300 manuals on biosafety for permission consideration and oversight of biosafety factories or factories with activity related to microbes and/or genetically modified microbes were published. Inspection forms for biosafety for personnel and the Ministry of Industry's officers were created. At least 331 personnel, the Ministry of Industry's officers, factories, and relevant parties gained knowledge and understanding about the safety of the operations related to microbes and genetically modified microbes.

## 19. Project to increase energy efficiency in the industrial sector

**The Department of Industrial Works (DIW)**, the regulatory agency for the industrial sector in terms of production, environment, safety, and hazardous substances, realises that there are numerous ice pack factories, ice cube factories, and cold storage in the industrial sector and that they should be encouraged to adopt technology to increase energy efficiency of machines or cooling systems in order to reduce production costs and promote efficient energy consumption. Moreover, operational staff who are responsible for the machines and

equipment of ice pack factories, ice cube factories and cold storage factories will play an important role in raising energy efficiency and safety; therefore, it is important to provide knowledge, understanding and skills for responsible personnel or workers of the machines and equipment in order to increase the efficiency of the cooling system.

As a result, **the DIW** started a project to increase energy efficiency by increasing energy efficiency of the cooling system, to enhance the skills of personnel and workers responsible for the cooling system to conserve energy, and to promote the safety and sustainable environmental conservation.

The project aims to provide knowledge and promote understanding of those in charge of the cooling systems that use ammonia as refrigerant or relevant parties about energy efficiency, safety, and environmental conservation to enhance the skills of those in charge of the cooling systems that use ammonia as a refrigerant or relevant parties in surveying, measuring, and finding energy-saving measures for the cooling system and to increase energy efficiency of the cooling systems that use ammonia as refrigerant.



**The results of the operations:** 100 ice pack factories, ice cube factories and ammonia-refrigerant cold storage factories participated in the project and reduced energy consumption in cooling systems by 2,649.57 toe or 31,467,860.60 kWh per project per year or 116,940,962.10 baht.

**The DIW** organised “The Success of Factory 4.0” seminars and exhibitions to showcase the project to promote and improve fire and chemical safety in the industrial sector, project to promote and improve safety for Industry 4.0, project to promote work safety, and project to increase energy efficiency in the industrial sector on Monday, 2 September 2019. Mr Teerayut Vanichchang, Vice Minister of Industry presided over the opening ceremony and Mr Thongchai Chavalitphichet, Director-General of the Department of Industrial Works, gave the welcoming speech with senior executives of the Ministry of Industry, government officials, businesses, and relevant officers attending the event at the Miracle Grand Convention Hotel, Bangkok.

The event aimed to showcase the success of the implementation of the policy given by Mr.Suriya Juangroongruangkit, Minister of Industry, to the DIW aimed to accelerate the application of digital technology in industrial plant oversight and safety innovation in conjunction with environmental conservation and energy security to prepare Thai industries for Thailand 4.0. The seminar and exhibition event consisted of three parts:

1) “The Success of Factory 4.0” exhibition consisted of safety application system for self-assessment of industrial safety through “S-Checklist” which can be used on both Android and iOS operating systems and for safety assessments in terms of work conditions, chemical use, fire prevention, electrical hazard prevention, and dust explosion prevention.

2) Exhibitions of digital technology and innovation to support Industry 4.0. More than 30 private sector agencies were interested and joined the event. The exhibition zones were divided for Smart Boiler, Networked Tracking and Control System for Digital Boiler Operation, Digital Technology in Ammonia-Refrigerant Cooling Systems, and Biosafety Technology.

3) Seminars on four interesting topics including

1. Safety Application System for Evaluating Factory Safety
2. Energy Efficiency Enhancement in Ammonia-Cooling System Industry
3. The Future of Thai Industry and Biological Safety and
4. Computer Simulation Application and Technology 4.0



## 20. Creating civic participation and underground mining

The Department of Primary Industries and Mines (DPIM) has carried out to further investment in the mining and primary industrial raw materials project by advising investors and the public on technical engineering, social, economic, and environmental knowledge to ensure the most effective and proper use of minerals. Potash minerals and Rock salt (KCl) are found in many areas in the northeastern region of Thailand and the total reserves of potash minerals, both Sylvite (KCl) and Carnallite ( $KClMgCl_2 \cdot 6H_2O$ ), are expected to amount to 407,000 million tons divided into 7,000 million tonnes of Sylvite and 400,000 million tonnes of Carnalite. Potash is mainly used as raw material in the fertilizer industry. If potash and rock salt can be utilized, it will prevent Thailand from the trade deficit from potash imports of nearly 1,000,000 tonnes per year, worth about 15,000 million baht per year.



Additionally, mineral salt (Halite: NaCl) is found and expected to amount to approximately 18 trillion tonnes in reserve. Rock salt can be used as a primary raw material in various industries such as the chemical industry, plastic industry, glass industry, and paper industry. At present, Thailand uses about 2 million tons of rock salt minerals per year, worth more than 2,000 million baht per year. For the past years, mining licenses have been granted to two businesses which are ASEAN Potash Chaiphum Public Company Limited in Bamnet Narong District, Chaiphum Province and Thai Khali Company Limited in Dan Khun Thot District, Nakhon Ratchasima province. Additionally, exclusive mineral exploration licenses have been granted to five businesses including one in Sakon Nakhon Province and four in Nakhon Ratchasima Province.

Currently, **the DPIM** has promoted public engagement with underground mining as follows:

- 1) Responded to the complaints regarding underground exploration and mining project of potash mineral and rock salt.
- 2) Organised the meeting between stakeholders in the Potash Mining Project of Thai Khali Co., Ltd. to determine the person who has the right to inspect underground mining.
- 3) Investigate the licensing to open underground mines in collaboration with the Underground Mining Participatory Investigation Working Group, Concession Certificate 28831/16137 of Thai Khali Company Limited.
- 4) Monitoring the progress of the underground mining project, potash and rock salt of ASEAN Potash Chaiyaphum Public Company Limited and Thai Cali Company Limited.
- 5) Coordinating and meeting with government agencies in Nakhon Ratchasima to prepare for the arrangement of a preliminary consultation meeting with stakeholders in the underground mining project of International Petroleum Group Company Limited.
- 6) Promoted public relations for the exploration and underground mining of potash mineral and rock salt.



## 21. Promotion and development of waste as substitute resources to support the development of Eco Industrial Town and promoting the development of Thai Industry 4.0

The Department of Primary Industries and Mines (DPIM) emphasizes the deficiency of mineral resources in the future, along with the conservation of natural resources and the environment. The Department also focuses on the recycling of waste or waste from households and industries (Secondary Raw Materials) by separating minerals and metals for recycling, also known as “Urban Mining.” Over the past years, Thailand has continued the projects to promote and develop recycling technology or waste reuse as a substitute resource in order to reduce the consumption of new resources, waste, and environmental pollution in the community and to promote Eco Industrial Town development as well as zero waste society and circular economy and prepare Thailand for Thai Industry 4.0, which focuses on driving the industry through innovation, encouraging civic engagement, and environmentally friendly development. Key operations in fiscal year 2019 were as follows:



1) Promoted and encouraged the use and application of recyclable technology in Eco Industrial Town in suburban areas (Samut Prakan, Samut Sakhon, and Pathum Thani) and the EEC areas (Rayong, Chonburi, and Prachinburi) by studying, experimenting, developing, and transferring environmentally friendly prototype recycling technology to businesses, both in theories and practice so that they can reuse industrial and household waste in target Eco Industrial Town as circular commercial resources. The goal was to improve eight types of waste recycling technologies. The project succeeded in developing the prototype for environmentally friendly recycling technologies for waste in the target areas. At the same time, the Department also transferred the recycling technology prototype, both in theory and practice, to businesses to encourage the reuse of waste and create circular commercial resources as follows:

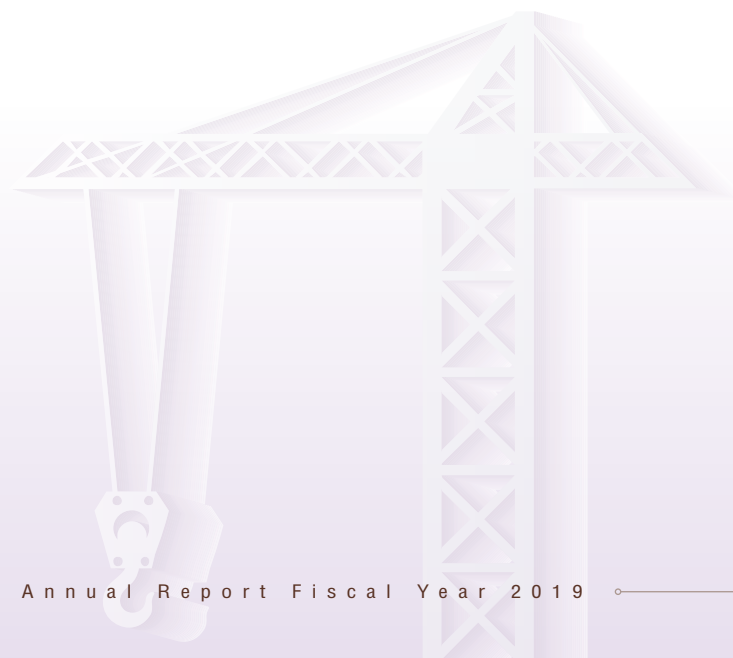
- Used sludge from the high-power magnet polishing process and high-magnetic scrap that contain Neodymium, Nd. to produce neodymium oxide to be used as the starting material in the production of high-power magnets
- Used degraded or expired solar panels to produce pure silver process
- Used sludge from wastewater treatment system containing copper and nickel to produce pure copper and high-concentration nickel powder
- Used active catalysts containing nickel to produce ferro-nickel and nickel
- Using aluminum slag powder as the substitute raw material in autoclaved aerated concrete production
- Used plastic packaging scrap containing aluminum to produce wax and aluminum sheet scrap
- Used rinse water in electroless nickel plating to produce nickel
- Used zinc powder recycling technology from the hot-dip galvanizing zinc industry to produce Zinc sulfate (ZnSO<sub>4</sub>)

2) Promoted the use of recycling technology to develop and apply substitute raw materials in the mechanical parts industry by developing and expanding existing technologies of Department of Primary Industries and Mines (DPIM) and relevant agencies in order to develop substitute raw material for the mechanical parts industry, especially one type of raw material that is imported from abroad as an example for businesses to apply. The Department also transferred technology to businesses and is developing the prototype product that uses substitute raw material in the production of mechanical parts.

3) Developed a recycling technology research and development center that is efficient and complete as those of developed countries by installing machinery and equipment for particle separation process which are essential machinery and equipment used for waste preparation by granulating, sizing, and sorting waste, especially electronic wastes, so that it will be separated before going into the next step of the recycling process to concretely promote waste as substitute resources in the industrial sector and provide recycling technology trainings for at least 200 businesses annually. Currently, the Department is installing machinery and equipment for particle separation process which are essential machinery and equipment of pilot scale factories used for waste preparation by granulating, sizing, and sorting electronic waste, especially electronic circuit scrap for the first time in Thailand. The project is expected to be completed in June 2020.



4) Collaborated with other government agencies to drive the national strategy for economic strength and sustainable competitiveness, and environmentally friendly growth for sustainable development, following the 12<sup>th</sup> National Economic and Social Development Plan, especially on the development of environmentally friendly innovation and technologies issues, used materials circular systems, promotion of the use of environmentally friendly and renewable materials, sustainable waste and pollution management by encouraging the private sector to adopt the concept of circular economy in resource management. However, the project is still in the process of drafting the criteria for assessment and efficiency measurement of businesses based on the circular economy concept to be used in evaluating mines and primary industries in order to improve the operations of those businesses in accordance with the circular economy concept, leading to operational enhancement and upgrade in those businesses which will be the base for resource circulation and prepare for the country's circular economy. Nevertheless, the circular economy concept has just received attention, both at domestic and international, during the past few years. Therefore, there is no clear criteria and many agencies are still in the drafting process such as ISO, WBCSD.



## 22. Promoting the mining industry to meet international standards for social responsibility

The Department of Primary Industries and Mines (DPIM) is the agency that supervises primary mining industry groups and sets a strategy to promote social responsibility of the mining industry. Therefore, the DPIM has conducted the project for the mining industry to promote international standards on social responsibility with the objective of enabling the mining industry business to operate continuously and live sustainably with society and the environment, creating acceptance of the mining industry, and promoting an understanding of the need to use mining resources among the society including citizens, local administrative agencies and the public sector, which will result in sustainable mining and production in the mining industry in the long term.

The CSR-DPIM project has been in operation since 2010. Currently, 109 businesses have passed the assessment according to the DPIM standard. Also, 84 network members continue to carry out CSR-DPIM network activities. DPIM is trying to increase the target to expand the project results by having more members pass the assessment following the DPIM standard and increasing the number of network members continuously. In 2019, the DPIM, in collaboration with the ISO Certification Institute (MASCI), performed the following tasks:



Verification in the joint operating area of the CSR-DPIM Network Project

- 1) Advertised the project (Kick off) by organizing a seminar to distribute knowledge about social responsibility standards (CSR-DPIM) to businesses and interested parties and organised an award ceremony for mining businesses that passed the Social Responsibility Criteria 2018 with 305 participants in total.



Launch seminar (Kick off) and award ceremony CSR-DPIM Network Activity

2) Prepared advertising documents for the project, selected businesses to participate in the project, and assessed the implementation of the CSR-DPIM standards with seven companies participating in the programme and six businesses that passed the assessment.

3) Organised CSR-DPIM Network activities in the form of Group Training to review the knowledge and understanding about the operation process and share knowledge on social responsibility experience (Show & Share) with 122 participants. On top of this, 62 network businesses have delivered sustainability reports in the form of a self-assessment report following the CSR-DPIM reporting frameworks. Out of those businesses, 12 businesses met the standard and receive excellent standard level (with 100 points in total). 47 passed the standards (not 100 points). Three businesses did not pass the standard and three businesses received the social responsibility award.



## 23. Development of a database for mining surveying using remote sensing

The Department of Primary Industries and Mines (DPIM) has a primary mission on supervising the mining industry and primary industry operations that comply with the law and safety standard and reduce environmental impact. But there are still limitations in mining process inspection, which prevents the inspection and supervision to be carried out thoroughly and efficiently as it should be in terms of the requirements specified in the license, correct and full royalty payment, and illegal smuggling.

From those problems, the DPIM has implemented remote sensing technology in the inspection and supervision of mining operation by using remote sensing technology to gather real-time data which can help improve efficiency and save time as well as the operation cost comparing with the ground surveying work using the total processing surveying camera (Total Station) or satellite receiver (GPS). Besides, remote sensing technology can also reduce accessibility difficulties and reduce the risk of accidents when surveying in hazardous areas such as steep cliff areas. Also, in some situations, it may be necessary to use real-time or current data to assist decisions making process and solve problems in particular cases quickly, especially surveying and tracking the progress of mining operations or changing in mining areas, inspecting illegal mining, and helping increase efficiency in various processes.

In 2019, the DPIM created the data on surveying concession certificates by surveying 100 concessions using satellites and conducted topographic surveying with UAV using as a geographic information database and topographic database for volumetric inspections of 70 concessions. Moreover, the DPIM provided practical and theoretical trainings to transfer the knowledge on new UAV technology to personnel in charge of monitoring tasks.



Training on the use of UAV technology

Aerial photographic map of data surveyed using UAV on 5 August 2019

## 24. Creating a life cycle database of industrial raw materials that are products of mining and metals.

Since 2018, the Department of Primary Industries and Mines (DPIM) has conducted the project to create a life cycle database of industrial raw materials by applying the Life Cycle Assessment (LCA) principles and methods, which are essential tools for environmental and sustainable development according to international certified (ISO 14041-14043), in mining production which produces important raw materials the industrial sector. Initially, the Department has chosen industrial rocks, which are the most important mineral in the country as they account for the highest production capacity and utilization. Their production is roughly 200 million metric tonnes per year or 80 percent compared to the total production of all kinds of minerals in the country, which are produced at approximately 250 million metric tonnes per year. The target minerals are four types of industrial rocks for construction, which are limestone, granite, basalt, and sandstone. The operation data is collected from all over the country, and then evaluated in terms of the product life cycle using the Sima Pro model, which helps to evaluate the production efficiency of construction stone both in terms of resource and energy use as well as environmental impact. Additionally, the Department was able to assess the environmental impact at each step compared to the construction stone production, which will identify the gaps that should be addressed in terms of environmental standards or environmental management systems at each sub-production process, leading to the reduction of the overall impact of the whole industrial production process.

In 2019, the DPIM continued the project by collecting data on the production of three additional minerals including Gypsum, Dolomite, and Anhydrite from mining businesses around the country as well as additional data on industrial mineral rocks for the limestone construction industry to acquire complete information. After that, the data will be used to assess environmental impact according to the principles of product life cycle assessment using the Sima Pro model in the next step.



**The results of the operations:** after the creation of the life cycle database of industrial raw materials which are product of minerals and metal, the Department has selected five mining companies and stone mills in the industrial limestone rock for construction with data and details of operations which were used to analyse the energy usage of both from diesel fuel and electric power by evaluating the energy efficiency of each step in the construction stone production compared with the one metric tonne of construction stone produced, as summarized in Table 1.

**Table 1: Energy efficiency of each composition step in stone construction on the case study**

Construction stone production	Land preparation and soil peeling (Diesel oil: l / t)	Quarrying (Diesel oil: l / t)	Grinding or crushing stone (electric power: kwh / t)
Case study 1	0.0047	0.3556	2.0150
Case study 2	0.0060	0.2424	1.3594
Case study 3	0.0006	0.6391	1.2299
Case study 4	0.0156	1.4417	2.1126
Case study 5	0.0027	0.3077	1.4123
Average	0.0059	0.5973	1.6258

The crucial environmental impact from construction stone production is particulate matter, consisting of total suspended particle (TSP), and particles with diameter of less than 10 microns (PM10). The evaluation of the amount of particle released in each step of the construction stone production compared to one metric tonne of construction stone produced in the five case studies can be summarised as in Table 2.

**Table 2: The amount of particles emission in each stage of the stone construction production compared to one metric tonne of construction stone production in the case studies**

Construction stone production	Land preparation and soil peeling		Quarrying		Grinding or crushing stone	
	TSP (kg/t)	PM10 (kg/t)	TSP (kg/t)	PM10 (kg/t)	TSP (kg/t)	PM10 (kg/t)
<b>Case study 1</b>	0.0025	0.0011	0.0548	0.0155	0.5640	0.1700
<b>Case study 2</b>	0.0032	0.0012	0.0553	0.0158	1.6560	0.3260
<b>Case study 3</b>	0.0020	0.0010	0.0197	0.0062	0.3848	0.2776
<b>Case study 4</b>	0.0021	0.0010	0.0458	0.0154	0.5297	0.1654
<b>Case study 5</b>	0.0030	0.0016	0.0486	0.0150	0.9740	0.4255
<b>Average</b>	0.0026	0.0012	0.0448	0.0136	0.8217	0.2729

From the environmental impact assessment of construction industrial stone production, it was found that dust impact is a significant problem. The quantitative impact assessment of dust release revealed that the process of grinding and crushing rocks is the most impactful step, which has an average TSP release rate of 0.8217 kilograms and an average PM10 of 0.2729 kilograms, compared to one tonne of construction stone. The mining process came second with the average TSP emission rate of about 0.0448 kilograms, and the average PM10 of 0.0136 kilograms, compared to one tonne of construction stone. Finally, the process with the least dust release rate is the land preparation and soil peeling, which has an average TSP release rate of 0.0026 kilograms and an average PM10 of 0.0012 kilograms, compared to one tonne of construction stone.

From the assessment of the life cycle of construction limestone production all the five case studies, the data on both TSP and PM10 can be used to prepare, manage and determine suitable environmental measures, which will help reduce complaints on dust that can affect the area around the mines. Besides, the dust release rate for both TSP and PM10, as well as the energy consumption ratio, compared with one metric tonne of construction stone, can be used as a life cycle database for industrial raw materials of mineral products in the country.

## 25. Promotion and rehabilitation of mining areas for improvement and beneficial use

The Department of Primary Industries and Mines (DPIM) aims to create a guideline for the development and rehabilitation of mining areas that have decayed and cliff areas, which are difficult to access by businesses to utilize, transform, or adjust to suit their concession areas before the expiration of the concession certificate. In 2019, the Department developed two areas as follows:

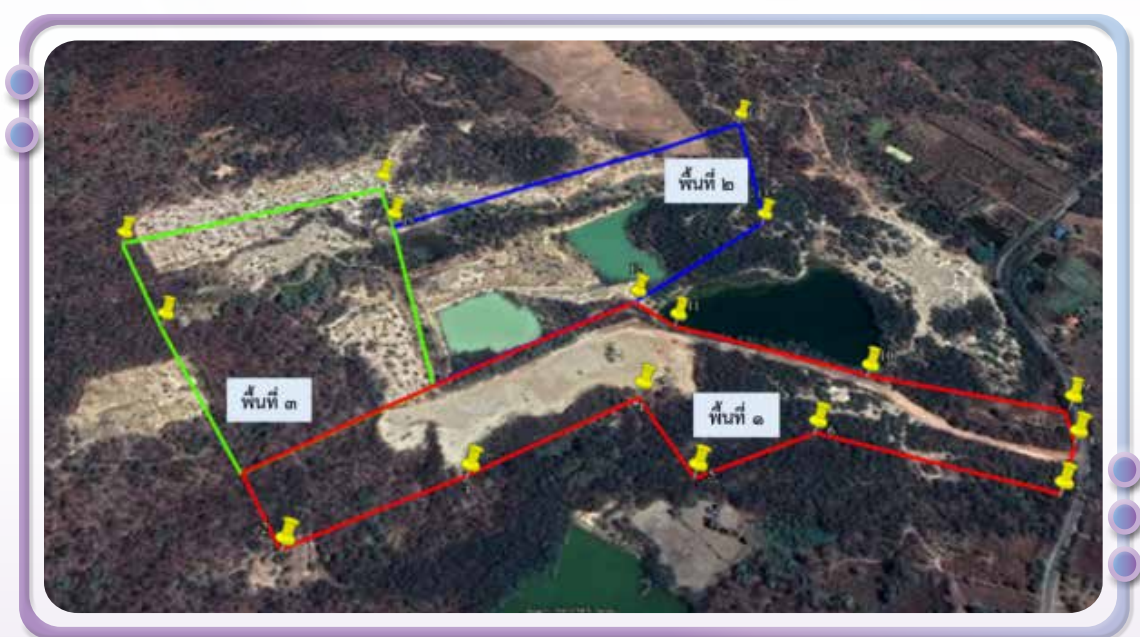
### 1) Hua Suea subdistrict, Mae Tha district, Lampang Province

1.1) In the Mae Chang National Forest Reserve area, on the left side of the entrance with area of 10 rai

1.2) In the Mae Chang National Forest Reserve on the right side of the entrance with area of three rai

The operating results of the area rehabilitation and development to benefit people in the nearby area can be summarised as follows:

The DPIM in collaboration with the Forest Resources Management Office 3 (Lampang), Department of Forestry, and Hua Suea Subdistrict Administrative Organisation have been conducting a reforestation and land restoration project in previously mined areas, especially for Ballclay white soil minerals in nine plots of land in an area of 150 rai located in the left side of the Mae Chang National Forest Reserve. The physical characteristics of the area are mostly laterite mixed with clay with some parts of creeks resulting from soil subsidence which are natural waterway with trees in some areas, but the areas have never been used. The DPIM has surveyed the community's opinions in order to create the environmental rehabilitation plan to meet the needs of the community. From survey, it was found that the community would like to use the area to create more green space for the community with a plan to create a community forest. After that, the DMIP started land leveling of the first area in a size of 10 rai located on the left side of the area's entrance.



Areas for project operation



For the second area in a size of three rai on the right side of the entrance, the Department used heavy machinery to adjust the area to align with the surrounding area and then took a pile of soil debris in the project area to cover up about 30 centimeters to make the area suitable for planting trees. The tree planting around the community area is a combined plantation of 6,260 trees, consisting of Sangnu bamboo, Khaow tree, Cassia, Tamarind tree, Mahogany, Gold leaf, Samo Phisak tree, Moringa tree, Wa tree, Makhom, Inthanin, Rosewood, and Raintree to be a green space for natural ecological restoration and 6,000 carp were released in the mine.



## 26. Solving the lead contamination problem in Khli Ti Creek, Thong Pa Phum district, Kanchanaburi Province

In the past, the government had granted concession certificates for lead-zinc mining for over 90 years. Kanchanaburi is the potential area for lead-zinc deposits in Thailand both in Thong Pha Phum district and Si Sawat district. To promote the country's economic development, the government allowed the production of lead-zinc minerals in Thong Pha Phum district, Kanchanaburi, of four mines including Song Tho Mine, Bor Yai Mine, Bor Ngam Mine, and Bor Noi Mine.

The problem of lead contamination in Khli Ti Creek was caused by the leakage of lead ore from the sludge pond of the Khli Ti ore dressing plant of Takua Concentrate (Thailand) Co., Ltd., a holder of Bor Ngam Mine concession located on the edge of Khli Ti Creek, Chalae subdistrict, Thong Pha Phum district, Kanchanaburi in 1998. The problem resulted in lead contamination in the environment such as water, sediment, and aquatic animals which exceeded the standard. The people in the area were not able to use Khli Ti Creek. This incident led to a litigation at the central administrative court and a verdict was issued to order government agencies to revitalize the conditions of the creek.



Bor Ngam Mine, ore dressing plant, and sediment pond  
at the time of mining in 1998

After the problem of lead contamination in Khli Ti Creek, government agencies such as the Department of Primary Industries and Mines (DPIM) (previously Department of Mineral Resources), the Department of Pollution Control, and related government agencies in a form of a working group have carried out corrective measures by investigating the case, punishing the mine, banning operations, and ordering the improvements of ore sediment ponds and the dredging of Khli Ti Creek.

The initial solution for the Khli Ti lead contamination problem was to conduct sediment dredging in Khli Ti Creek and bring to the landfill that is allocated to both sides of the creek. Subsequently, the working group viewed that the sludge did not reduce lead contamination but rather spread and blow sediment farther away. Therefore, the working group decided to stop the dredging and construct a permanent rock dumping dam to slow down the speed of water in Khli ti Creek and trap sediment in front of the dam to prevent it from spreading, letting Khli Ti Creek naturally recover.

In addition, to prevent the problem from occurring in the future, there was a joint meeting of the Minister and Deputy Minister of four ministries consisting of the Ministry of Agriculture and Cooperatives, Ministry of Public Health, Ministry of Science and Technology, Ministry of Natural Resources and the Ministry of Industry to order the Khli Ti ore dressing plant to cease operations, cancel its permit and permit renewal, order the plant to dismantle machinery and equipment and relocate workers as soon as possible, and require all raw minerals to be removed from the area with proper and careful operations. The Department of Pollution Control was assigned to monitor water and sediment quality continuously four times a year, and report the results to the villagers every time.



Monitoring of the progress of old ore dressing plants and contaminated areas

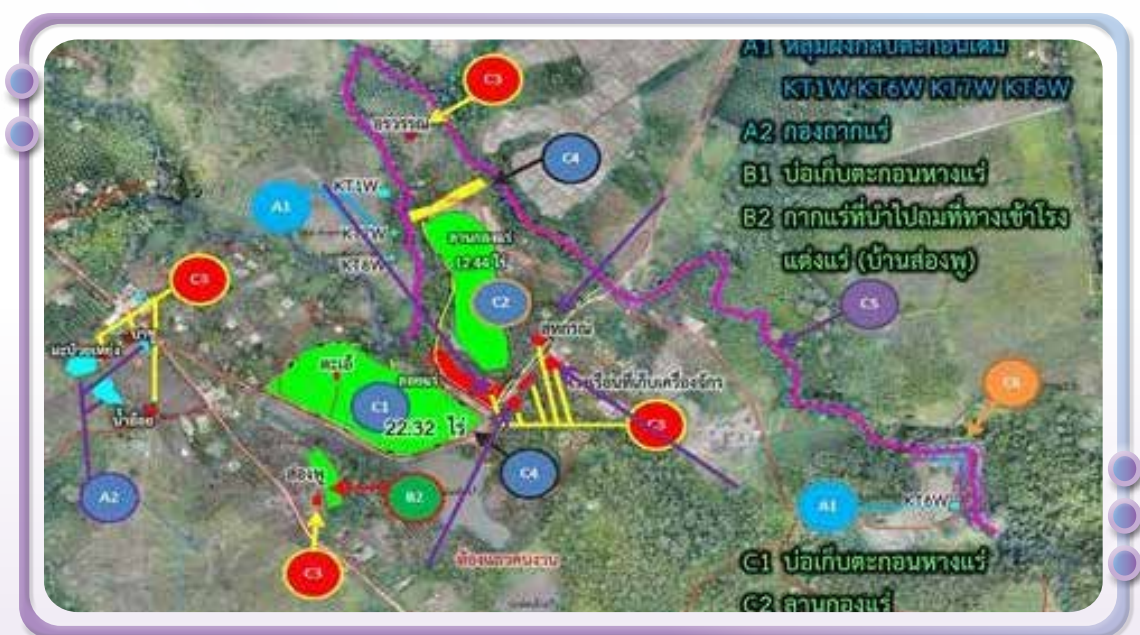
Given the problem, even though government agencies had solved the problems immediately and continuously since 1998, the villagers still viewed the government's solutions too slow, particularly those of the Department of Pollution Control. Therefore, the villagers filed a lawsuit against the Department of Pollution Control for delayed rehabilitation of Khli Ti Creek which had caused the villagers in the lower community and neighboring communities to incur opportunity costs from the utilisation of Khli Ti Creek due to the lead contamination. The litigation started in 2005 with request of compensation and restoration of Khli Ti Creek. Subsequently, the Supreme Administrative Court issued a judgment on 10 January 2013, requiring the Department of Pollution Control to prepare and execute the rehabilitation plan, examine, and analyse water samples, soil, plants, and aquatic animals in Khli Ti Creek in every season until the lead contamination in water, soil, vegetables and aquatic animals in Khli Ti Creek does not exceed the standard for at least one year, and to compensate the villagers who prosecuted the case

In addition, the villagers have filed a lawsuit against Takua Concentrate (Thailand) Co.,Ltd., the root cause of the Khli Ti Creek lead contamination which had made it impossible to use the water in the creek and caused the accumulation of lead in the body that harms the health of the community and aquatic animals. The court later required the company to compensate the villagers for over 100 million baht in total

Currently, the Department of Pollution Control has been resolving the issue by hiring an environmental and hazardous substance management research center, Khon Kaen University to conduct the project to rehabilitate Khli Ti Creek after the lead contamination. The research study has led to rehabilitation action plan to solve the problem as follows:

- (1) Safe landfill construction
- (2) Sludge and water sediment suction from the trap weir to be sent to the landfill
- (3) Rehabilitation of the area around the old ore processing plant and contaminated area due to ore dressing activities
- (4) Constructing additional sediment trap weir
- (5) Establishing a geographic information system
- (6) Publicizing the project and providing report to the public and people in the area by selecting and hiring Better World Green Public Company Limited as the operator.

To promote a sustainable solution for lead contamination for Khli Ti Creek, the Department of Pollution Control has, therefore, worked collaboratively with stakeholders including villagers from the South Khli Ti Village and North Khli Ti Village, academia, and relevant government agencies including the Department of Primary Industries and Mines (DPIM), Department of Water Resources, Department of Disease Control, and the Department of National Parks, Wildlife and Plant Conservation. The DPIM was involved from preparing budget requests, monitoring the rehabilitation process, collecting water samples and sediment for studies, and monitoring the situation of lead contamination as well as studying the area that was previously mined to evaluate the potential health hazards of the community and regularly attend meetings to update the progress to all stakeholders and people in the area.



Rehabilitation of the area around the old ore processing plant and contaminated areas from mineral processing activities.

**Table 1: Summary of the progress of the Khli Ti Creek rehabilitation project (Data as of September 2019)**

Khli Ti Creek Rehabilitation Process		Progress
1	Safe landfill construction	Completed
2	Sludge and water sediment suction from the trap weir to be sent to the landfill	In progress (The design has been completed. In the process of preparation for the sediment system test)
3.	Rehabilitation of the area around the old ore processing plant and contaminated area due to ore dressing activities	Completed
4	Constructing additional sediment trap weir	In progress (The design has been completed. In the process of construction preparation.)
5.	Establishing a geographic information system	In progress (progress since the start of the project and continue until the end of the project)
6.	Publicizing the project and providing report to the public and people in the area by selecting and hiring Better World Green Public Company Limited as the operator.	In progress (progress since the start of the project and continue until the end of the project)



Constructing additional safe landfill with water storage and observation ponds



## Fourth Strategy

Developing organizational competencies to improve service quality

The Ministry of Industry is an important agency in driving the country's economic growth following the Thailand 4.0 policy and 20-Year National Strategy; therefore, it plays a vital role in promoting Thailand's industrial sector for strong and sustainable growth in line with the government's policy. The Ministry's personnel are committed to working for the people and public benefit, working professionally with knowledge, skills, and good attitudes, being creative through innovation and adaptability to new challenges, and improving services and operations. In the fiscal year 2019, the Human Resource Management Division under the Permanent Secretary Office of the Ministry of Industry trained 1,067 officers through the following programmes:

### 1. Knowledge and Public Service Programme



Activity to promote knowledge and public responsibility in understanding the duties and responsibilities for the public by encouraging personnel to participate in the 904 volunteer course under the royal volunteer spirit programme, the regular course, Class 3/2019 to ensure personnel have a good attitude towards the institution, sacrifice, ideology, unity, and teamwork. After the programme, participants can become instructors to further the cause. Nine officers of the Ministry of Industry completed the course and became special instructors for other officers from nine agencies under the Ministry of Industry and other public agencies and state enterprises.

## 2. Leader Development for Higher Position Programme



Developing the Ministry of Industry's officers and staff in the networked institutions under the Ministry's supervision to prepare for higher management positions and the Ministry's important missions by achieving the Ministry's policy and strategic goals, creating leaders with management skills who are ready to become new public leaders following the good governance principle. The programmes are carried out every year and include management programmes for leaders at three levels: basic-/middle-/high-level manager programmes and head of provincial industry office preparation programmes with 175 managers trained in the fiscal year 2019

## 3. Capacity Building of Personnel at Provincial Industrial Offices



The Permanent Secretary Office of the Ministry of Industry has provincial industry offices in every province across the country providing services to entrepreneurs and people in the areas. As a result, personnel at the provincial industry offices must have the competencies, skills, and knowledge required for their duties including management skills, skills to put policies and plans to practice, business promotion, permit granting for industrial factories and mines which covers environmental and safety monitoring, concession granting for mines and revitalising mines, and supervising businesses in complying with related laws and regulation.

#### 4. Capacity Building of Leaders and Operational Skills to Respond to Change Programme



This is a programme to provide knowledge and develop leadership for greater responsibilities including skill development programmes that are vital to goal achievement including Inspector-General of the Ministry Programme, Good Governance for Managers Programme, English Language Programme, Digital Technology Programme, and Laws and Regulations Related to Work Programme. Officers should continue to increase their expertise and skills to respond to change and received trainings at external agencies including, the Office of the Civil Servant Commission, King Prajadhipok's Institute, Ministry of Interior, Damrong Rajanupab Institute, Ministry of Foreign Affairs, Comptroller General's Department, Ministry of Digital Economy and Society, and Digital Government Development Agency (Public organization).

## 5. New Civil Servant Development Programme

Training for the Ministry of Industry's new civil servants in order to create good civil servants, increase their competencies, promote morality, ethics, and teamwork, create a network between government agencies, learn to follow His Majesty's footsteps, and participate in study visits at the royal projects as well as other volunteer activities.



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## Data Supporting and Contributions by

- The Office of Industrial Economics
- Office of the Cane and Sugar Board
- Department of Industrial Works
- Department of Primary Industries and Mines
- Department of Industrial Promotion
- Thai Industrial Standards Institute
- Industrial Estate Authority of Thailand
- Thai-German Institute
- Thailand Productivity Institute
- National Food Institute
- Thailand Textile Institute
- Management System Certification Institute (Thailand)
- Thailand Automotive Institute
- Electrical and Electronics Institute
- Iron and Steel Institute of Thailand
- Institute for Small and Medium Enterprise Development
- Plastic Institute of Thailand
- Construction Institute of Thailand
- Small and Medium Enterprise Development Bank of Thailand

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