STOCKTAKING STUDY ON GREEN ECONOMY THAILAND

2021

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1. Introduction and context

1.1 The purpose and scope of the study

The course of development in Thailand adheres closely to the concept of sustainable development where balancing economic, social and environmental objectives are reflected in the key planning documents such as the Twenty-year National Strategy or the Five-year National Economic and Social Development Plans. Numerous development initiatives, private and public alike, show indications that Thailand has been engaged in solutions in which economic growth is accompanied by environmentally friendly and low carbon initiatives. In electricity production, the implementation of the Feed-in Tariffs helps gear energy production away from fossil and more towards renewables. In light of PM2.5 air pollution and greenhouse gas emission, there has also been a shift from oil refinery’s EURO 3 and 4 standards to the cleaner EURO 5 standard. Gasoline taxes also reflect the fossil fuel proportions hence incentivize the automobile users more towards renewable fuels. In terms of Sustainable Finance, Thailand has established a network among financial regulators, such as the Stock Exchange of Thailand and the Bank of Thailand, to oversee green financing initiatives, e.g., green bonds and sustainability investments in the Thai stock markets. The course of development in Thailand also adheres to the UNDP Sustainable Development Goals (SDGs). The National Committee on Sustainable Development, chaired by the Prime Ministers, has been established to monitor progress in all the seventeen SDGs, and to oversee coordination among agencies to overcome obstacles.

Thailand continues to push green development a step further by integrating work in bioeconomy (B), circular economy (C) and green economy (G) together into a coherent development theme, the BCG business model. The BCG development team recognizes overlaps and complementarities between sustainable development workplans. Thus, the BCG package has been put together to streamline activities, eliminate the overlaps, and enhance coordination to advance green development in a cost-effective manner. Bioeconomy emphasizes investments in biological based investments, such as biodiversity-based agriculture and healthcare. Circular economy looks into enhancing efficiency in waste management. And green economy focuses on environmentally friendly and low carbon initiatives.

In 2021, Thailand is in the process of preparing the 13th National Economic and Social Development Plan (or the 13th Plan) to be launched in 2022. The 13th Plan is a five-year plan that serves as the road map and budgeting guideline for Thailand’s development from 2022 to 2027. The key development theme of the 13th Plan is “High-Value and Sustainable Thailand” that underscores technology- and knowledge-based creative economy and innovation as the driving forces. The five components of the 13th Plan are 1) high-value and environmentally friendly economy, 2) opportunity creation and equality, 3) sustainable livelihood, and 3) key enablers for Thailand’s transformation. Thailand’s transition towards the green economy will be based on the Sufficiency Economy Philosophy that serves as an overarching guide for national development.

Despite the ongoing attempts, further initiatives are required to facilitate Thailand’s green transition over the next five year. This stocktaking report, therefore, presents the existing knowledge on Thailand’s sustainable development with a special reference to BCG initiatives and highlights the current gaps. The report also proposes main policy entry points for strengthening BCG workplans, identifying gaps for further analysis, as well as providing recommendations on how PAGE Thailand can become instrumental in this transition.
1.2 Study methodology

This stocktaking report thus aims to

1) Identify main policy entry points to expedite PAGE supports within existing plans, processes, and actors,
2) Identify new ideas and areas to support the economic transformation of the country at the macro level, and
3) Provide suggestions on PAGE Thailand’s milestones and deliverables, formulation of the annual work plans, and results framework.

2. Overview of macroeconomic policy and green economy transitions

The Thai economy is characterized as being diverse comprising production and exports of goods and services from three major economic sectors: services, manufacturing and agriculture. Being a diverse economy helps cushion Thailand from shocks, but at the same time the high degree of openness also puts Thailand at risks when the economy is exposed to external shocks. While long term economic growth is well-maintained, Thailand needs to execute appropriate macroeconomic measures to help stabilize fluctuations arising from global disturbances. Internally, income inequality in Thailand has been chronic. The stickiness of the trickle-down effect in Thailand arises from the high degrees of market concentration. In addition, the less-developed human resource have kept income trapped among the upper decile segment of the population. In the long run, with a large bulk of population still earns moderate income, Thailand needs to engage in productivity improvement in order to get the economy out of the middle-income trap while at the same time steering production and consumption more towards sustainability.

2.1 Macroeconomic profile

Since the turn of the century in 2000, the agrarian Thai economy slowly switched towards becoming manufacturing as it approaches 2010. Figure 2.1 shows that the percentage of income from manufacturing to GDP rose from 34% in 2000 to 39% in 2010. This transition to a manufacturing-based economy was achieved at the expense of the agriculture share in GDP that decreased from 9% to only 7%. Despite this declining share of agriculture in GDP, agriculture and the rural sector still absorb as much as 40% of the Thai population. Having as large as 40% of the population in agriculture while the sector, in turn, earns only 7% of GDP leaves Thailand with a challenge in inclusive development.

From 2010 to 2019, Thailand went through another transition in which resources began to flow from manufacturing and agriculture to the expanding service sector. The Thai service sector grew from 56% of GDP in 2010 to as high as 63% of GDP in 2019. This increase is met at the expense of the shrinking manufacturing sector that declined from 37% of GDP in 2010 to 31% of GDP in 2019. The agricultural share in GDP also continued to decline slightly from 7% to 6% of GDP during this time period.
Figure 2.1 Sectoral shares of Thailand’s Gross Domestic Product (GDP)

Source: NESDC (2021)
The Thai macroeconomic growth rates fluctuate during 2010’s and 2020’s. As the Thai economy is characterized by a high degree of openness with the value of exports plus imports taking up as much as 78% of GDP, the Thai macroeconomic fluctuations are predominantly determined by fluctuations in global trade and internal supply shocks. The subprime mortgage crisis and trade disputes generated volatility in the Thai economic growth rates. In addition, as tourism is a major foreign income earner, disruptions to international travels such as the spreads of influenza viruses severely affected the Thai economic performance. Domestically, in 2011, Thailand experienced a severe flood which caused the GDP growth to drop to as low as 0.8%. (See Figure 2.2)

**Figure 2.2 Trends in GDP and growth rates**

![Figure 2.2 Trends in GDP and growth rates](source: NESDC (2021))

While the high degree of openness serves as a growth engine for Thailand, it also makes the Thai economy susceptible to external disturbances. This characteristic of the Thai economy puts a pressure on the macroeconomic management as fluctuations in national income will call for fiscal policy readjustments, especially in the government spending. When an external shock occurs, the government has to divert its resources to the affected sectors. And the government budget for green and low carbon initiatives could be jeopardized. Therefore, maintaining a stable economic growth path is key to successful transformation to a green and low carbon society.

Despite short term fluctuations in national income, Thailand has been able to expand on a positive long term economic growth path. Thailand’s long term growth rates during the past 40 years average around 3.5% per year. The key driver for this long term growth is the exporting industries, such as the service, tourism, and manufacturing sectors. (https://www.worldbank.org/en/country/thailand/overview#1)

On employment, Thailand’s labor force totaled around 39 million or about 56 percent of the country’s 69 million population in 2020. The service industry being the largest income generating sector absorbs 19.7 million workers or 50% of the labor force in 2020. On the other hand, the agricultural sector, while generates only 6% of GDP, absorbs as much as 11.7 million workers or 30% of the labor force. The manufacturing sector takes up the remaining 6.3 million workers or about 16% of the labor force. This pattern of employment calls for a consideration in agricultural labor productivity improvement so as to bridge the income gap and move Thailand towards inclusive development.
In terms of unemployment, Thailand has registered a low unemployment rate of around 1% of the labor force as shown in Figure 2.3. Unemployment fluctuations are largely explained by cyclical movements as well as structural frictions in the Thai labor market. Government interventions in the labor market, such as minimum wage laws or social security provisions, help enhance the welfare of those who are able to keep their jobs but can be harmful to new potential employment. These unnecessary government interventions in the labor market can also lead to underemployment and can deter foreign direct investment because the Thai labor force is no longer competitive compared to those in the neighboring countries. Disguised unemployment commonly found in the public sector is another area that needs attention. In all, Thailand needs to introduce a comprehensive human resource development scheme, starting with the education system that delivers a more productive work force. The scheme should also enhance efficiency in the labor markets, provide the necessary social safety nets, and improve work efficiency in the public sector.

**Figure 2.3 Employment by sector and unemployment rates 2001-2020**

![Employment by sector and unemployment rates 2001-2020](image)


**Export-import structure**

Thailand’s structure of exports plays an important role in shaping the Thai economy particularly in light of increasing concerns in the carbon contents of tradable goods and services in the global trade platform. Because export is an important growth engine for the Thai economy, making exported goods conform to international carbon content requirements will benefit Thailand by 1) maintaining the momentum of exports and economic growth, and 2) gearing the Thai economy towards a low carbon one.
Figure 2.4 Export structure in 2000 – 2020

Source: Information and Communication Technology Center with cooperation of the Customs Department (2021)

Figure 2.5 Import structure in 2000 – 2020

Source: Information and Communication Technology Center with cooperation of the Customs Department (2021)
In 2010’s, exports of agro-industrial goods take up more than 70 percent of the Thai total exports. The agro-industrial goods are largely made up of processed agricultural products, such as processed foods and frozen foods. The remaining exports are agricultural products and manufacturing goods.

On the import side, Thailand relies on a variety of imports. In 2020, raw materials and intermediate goods accounted for 40.2 percent of the total imports, capital goods accounted 27.1 percent, fuel accounted for 18.5 percent, and consumer goods account for 10.1 percent.

2.2 Social profile

Income and inequality

With an annual per capita income of US7,189 in 2020, Thailand is positioned as a middle-income country that enjoys the long-term growth rate of 3.5 percent. Despite the continued economic expansion, Thailand envisions to maintain this economic growth and escape the middle-income trap. Figure 2.6 shows how the continued economic expansion during the past decade have alleviated the livelihood of many poor Thais. The number of poor persons has declined from 10.8 million in 2010 to only 4.3 million in 2019 despite the slow increase in population. Percentage wise, this economic improvement is reflected in the decline in the percentage of the poor to the total population from 16.37 in 2010 to only 6.24 in 2019.

Figure 2.6 Poverty

![Figure 2.6 Poverty](source: NESDC (2021))

While the general population of Thailand has escaped from poverty over the past decade, Figure 2.7 shows that the structure of poverty remains unchanged—most of the poor are rural poor. The poverty rate in the rural area has been around twice of that in the urban area. It is important to also note that poverty rates based purely on the national poverty line as shown in Figure 6 may not reflect the real standard of living of the poor because the cost of living in the rural area is also lower than that in the urban area.
As Thailand manages to raise the standard of living of the general population and move many families out of poverty, the country also manages to slowly narrow the income gap at the same time. Although income inequality is still a challenge facing the Thai economic management for the years to come, the income gap has been narrowing during the past decade as shown in Figures 2.8 and 2.9. Figure 2.9 shows that the GINI coefficients that are calculated based on both income and consumption slowly improved between 2010 and 2019. The GINI coefficient of income declined from 0.484 in 2010 to 0.430 in 2019. Similarly, the GINI coefficient of consumption also declined from 0.375 to 0.348 in this time period.

It is needed to be mentioned here that the pattern of income improvement in Thailand has important implications on green growth. First, Thailand needs to maintain the long-term economic growth momentum so as to move the economy out of the middle-income trap. Moving Thailand towards a green economy will require resources both for investment in green infrastructure and also for providing supporting mechanisms for adaptation. In this regard, there is a need for Thailand to continue its macroeconomic prudence by stabilizing its economy as well as improving factor productivity, e.g., in labor and capital. Second, although income inequality shows signs of improvement, the existence of income inequality will have an important bearing on formulation of green measures, carbon taxes in particular. A correct pricing of carbon will inevitably have an impact on lower income energy consumers. Safeguarding low-income families from the hardship of true energy prices is important. In this instance, Thailand needs to craft its energy pricing carefully—correct energy pricing measure is divorced from poverty alleviation measures. Providing affordable energy to the poor, such as, underpriced diesel or subsidized natural gas for cooking will jeopardize the transition to the green economy as well as permitting the wealthy families to benefit from such subsidies unnecessarily.
Figure 2.8 Per capita income by quintile (income)

Source: NESDC (2021)

Figure 2.9 Gini coefficients

Source: NESDC (2021)
**Education**

Thailand has been rather successful in terms of school enrollment; as much as 86-88 percent of children are able to attend primary school during the last decade. The success is made possible owing largely to the compulsory thirteen-year free education legislation. The enrollment rates decline at the secondary school: only 67-69 percent of the children attend the lower secondary school, and only 57-60 percent of the children attend the upper secondary and vocational school. The drop out at the secondary school can be explained partly by the higher forgone income or opportunity costs of attending school and also partly because of the other indirect costs. Although the number of children being able to attend schools is high, Thailand still needs to focus its attention on the quality of education, such as development of analytical skills, creative thinking, and inspiration for diverse career paths. At the tertiary level, attendance increased from 23.1 percent in 2010 to 28.1 percent in 2019. For this level of education, many critiques have proposed that Thailand’s college education should become more oriented towards providing the skills required by the labor market, while others still see university education as opportunities for young men and women to freely explore their academic interests.

<table>
<thead>
<tr>
<th>Table 2.1 School enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-primary education</td>
</tr>
<tr>
<td>Primary education</td>
</tr>
<tr>
<td>Lower secondary education</td>
</tr>
<tr>
<td>Upper secondary education (+vocational certificate)</td>
</tr>
<tr>
<td>Bachelor’s degree (high vocational certificate)</td>
</tr>
</tbody>
</table>

Source: NESDC (2020)

**Health**

The Thai healthcare system has been at the forefront of national development for several decades. Most Thai children received their vaccines and have a good access to medical services. In 2019, as much as 99.33 percent of the Thai population is under some form of government health care program (See Table 2.2). The universal health care program covers 75.9 percent of the people and provides them with a free access to public health care. Another 17.82 percent of the Thai population is covered under the social security health care program that is designed for the formal workers.
Table 2.2 Health Care Coverage

<table>
<thead>
<tr>
<th>Health care programs</th>
<th>2011</th>
<th>2013</th>
<th>2015</th>
<th>2017</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>No health care coverage</td>
<td>1.65</td>
<td>1.55</td>
<td>1.31</td>
<td>0.81</td>
<td>0.61</td>
</tr>
<tr>
<td>Government social welfare</td>
<td>98.05</td>
<td>98.32</td>
<td>98.52</td>
<td>99.15</td>
<td>99.33</td>
</tr>
<tr>
<td>Universal health care</td>
<td>77.67</td>
<td>74.40</td>
<td>74.20</td>
<td>75.66</td>
<td>75.90</td>
</tr>
<tr>
<td>Social security</td>
<td>11.33</td>
<td>15.37</td>
<td>16.15</td>
<td>17.20</td>
<td>17.82</td>
</tr>
<tr>
<td>Civil servants</td>
<td>8.64</td>
<td>8.57</td>
<td>7.41</td>
<td>7.08</td>
<td>6.60</td>
</tr>
<tr>
<td>State enterprises</td>
<td>-</td>
<td>-</td>
<td>0.75</td>
<td>0.97</td>
<td>0.74</td>
</tr>
<tr>
<td>Independent government</td>
<td>-</td>
<td>-</td>
<td>0.15</td>
<td>0.14</td>
<td>0.10</td>
</tr>
<tr>
<td>Local government</td>
<td>-</td>
<td>-</td>
<td>0.18</td>
<td>0.49</td>
<td>0.51</td>
</tr>
<tr>
<td>Private insurance</td>
<td>4.05</td>
<td>5.27</td>
<td>6.61</td>
<td>7.13</td>
<td>7.33</td>
</tr>
<tr>
<td>Health care by employers</td>
<td>0.45</td>
<td>0.72</td>
<td>0.98</td>
<td>1.70</td>
<td>1.57</td>
</tr>
<tr>
<td>Others</td>
<td>0.47</td>
<td>0.48</td>
<td>0.86</td>
<td>1.01</td>
<td>1.18</td>
</tr>
<tr>
<td>NA</td>
<td>0.30</td>
<td>0.13</td>
<td>0.18</td>
<td>0.04</td>
<td>0.07</td>
</tr>
<tr>
<td>Total</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Source: National Statistical Office (2020)

2.3 Environmental profile

Thailand is rich in natural and biodiversity resources. Climate-wise, Thailand has a tropical climate of Southeast Asia. The geography of Thailand is characterized by mountainous areas in the north and the west which form a large part of the watershed areas. The flat plane of the central region and the northeastern plateau are suitable for cultivations of rice and other crops such as sugar, maize and cassava. The eastern region, on the other hand, is suitable for fruit orchards, such as durians. The southern region of Thailand is bounded with the Gulf of Thailand on the east and the Andaman Sea on the west, making this area rich in marine resources for fisheries. The monsoon pattern of rainfall also makes the south of Thailand suitable for rubber and palm oil plantations.

Forest Area

Thailand recognizes the importance of its forest coverage, particularly in the northern and western regions. Forests perform several key functions, namely, rainwater storage, flood control, climate control and home for biodiversity resources. The forests will be even more important for Thailand because commercial forestry can contribute substantially to income and renewable energy supply. But most importantly, the forests can serve as a carbon sink and will be one of the key solutions in Thailand’s attempt to become carbon neutral.
Figure 2.10 shows changes in forest coverage in Thailand since 1960. For the last 80 years, Thailand has been fighting an uphill battle against deforestation. In the early 1960s, the total forest coverage in Thailand was as high as 53.33 percent of the total land area. Since then, Thailand began to lose its forest areas owing to activities such as forest concession, shifting cultivation, illegal logging, and, more recently, the expansion of maize cultivation to serve as raw materials for the animal feed industry. Currently, the total forest coverage declines to only 31.64 percent of the total land area. Thailand has set the target for forest coverage to be 40 percent of the total land area. This ambitious target implies that the country has committed to reforest 10.3 million acres of land. Although reforestation remains challenging and costly for Thailand, it is the only way that Thailand can become carbon neutral in the least cost manner. Commercial forestry will also generate income not only to the local people but also in many other downstream industries such as furniture and renewable energy.

**Figure 2.10 Forest Area**

Source: Royal Forest Department (2021)

**Air Quality**

Thailand has recently been facing with a severe air pollution problem in the form of PM2.5. The concentration of PM2.5 is high particularly during the winter months when most parts of the country is governed by low pressured air that traps particles and dusts close to the ground (See Figures 2.11 and 2.12). The sources of PM2.5 in Thailand include engine combustion, agricultural burning, and transboundary sources. The Bangkok Metropolitan Area and Chiang Mai province located in the northern region are the areas where people have developed respiratory symptoms associated with the high PM2.5 concentration. Saraburi, in particular, experiences higher concentration of both PM2.5 and PM10 from rock mining for the cement and construction industries.
Figure 2.11 Annual averages of PM2.5

Source: Pollution Control Department (2021)

Figure 2.12 Annual averages of PM10

Source: Pollution Control Department (2021)
**Municipal Solid Waste**

Solid wastes is still a concern among the municipalities in Thailand. Of the total of 25.37 million tons of solid wastes generated each year, only 8.36 tons are properly disposed, and 9.13 tons are recycled. As much as 7.88 tons of solid wastes are still being improperly disposed. Inappropriate disposal of solid wastes leads to issues such as sewer blockages that eventually lead to flooding in cities and debris in the oceans. Municipalities and local governments, together with the energy authority, need to adopt a more effective solution for solid waste management, including waste to energy, recycling, waste sorting, and garbage collection fees.

**Figure 2.13 Municipal solid wastes**

![Graph showing municipal solid waste over years](image)

Source: Pollution Control Department (2021)

**Water Quality**

Water quality in public water ways in Thailand is generally good except in congested waterways in the urban areas. Figure 2.14 shows that most public waterways are in good and fair conditions. The quality of water is considered poor in some congested locations, mostly in cities where households discharge wastewater into the public waterway without proper treatment.
Climate Change

Thailand has been active in climate change dialog and communications with the UNFCCC. During COP26 held in the United Kingdom, the Prime Minister of Thailand submits the statement that, according to the Paris Agreement:

*Thailand aims to peak its greenhouse gas emission in 2030, with the ambition to move towards net-zero greenhouse gas emissions as early as possible within the second half of this century, and towards carbon neutrality by 2065, while looking forward to enhanced international cooperation and support on finance, technology and capacity-building to achieve this ambition.*

Thailand has established the Nationally Determined Contribution (NDC) and the National Adaptation Plan (NAP) to serve as a guidance for its transition towards becoming a low carbon and a resilient society. On mitigation components, Thailand intends to reduce its greenhouse gas (GHG) emission by 20 percent from the projected business-as-usual (BAU) level by 2030. The level of contribution could be increased up to 25 percent, subject to adequate and enhanced access to technology development and transfers of financial resources and capacity building support. In addition, Thailand is now formulating its Long-term Low Greenhouse Gas Emission Development Strategy (LT-LEDS), which will guide Thailand towards a climate-resilient and low greenhouse gas emission development and serve as a basis for enhancing its subsequent NDCs.

Greenhouse gas emission

Thailand greenhouse gas emission rose from around 245 MtCO2e in 2000 to 354 MtCO2e in 2016. This constitutes about 2.5 percent increase in greenhouse gas emission per year. Thailand’s largest contributor is the energy sector; its contribution to the total greenhouse gas emission continued to increase both in absolute amount and in percentage term from 67.2 percent in 2000 to 71.65 percent in 2016 (see Figure 2.15). Methane emission from the agricultural sector is the second largest contributor...
to the greenhouse gas emission. While the total amount of greenhouse gas from agriculture increased from 48.9 MtCO2e in 2000 to 52.1 MtCO2e in 2016, its share in the total emission decreased from 19.9 percent to 14.7 percent. The industrial process and product use (IPPU) and the waste sectors made up the remaining of the greenhouse gas emission.

**Figure 2.15 Greenhouse gas emission by sectors in 2000 and 2016**

Source: Office of Natural Resources and Environmental Policy and Planning (ONEP) (2019)

Figure 2.16 shows Thailand’s greenhouse gas projections for the BAU and the 2-degree targets. To meet the 2-degree target, Thailand needs to reduce greenhouse gas by as much as 52 percent from BAU in the year 2050. Figure 17 shows the sectoral breakdown of the greenhouse gas emission. The total greenhouse gas emission continues to increase with also a higher percentage from the energy sector; Thailand sees reforestation as the prime carbon sink. The projection shows the potential carbon sink of around 100 MtCO2e in 2050.

**Figure 2.16 Mitigation Projection**

Source: Office of Natural Resources and Environmental Policy and Planning (ONEP) (2021)
Adaptation

In climate change actions, adaption has been a concern for many developing countries owing largely to the vulnerability among the low-income population. With a high percentage of population still residing in the rural areas and practicing agriculture, increases in temperatures and sea level rise will impact the livelihood of the population. Climate change poses weather risks for Thailand that will have impacts on agriculture and food security, tourism, as well as health and human settlement.

Based on the damage statistics between 1998 and 2017, the Climate Risk Index (CRI) constructed by the German Watch ranks Thailand tenth among countries that will be severely impacted by climate change. The Thai Meteorological Department also forecasts that the average temperature for Thailand will rise to more than 35 degrees Celsius in the summer months. The total volume of annual rainfall will increase, but the pattern of rainfall will become more irregular. This irregularity will pose adaptation challenges for Thailand, namely, in water management system, resilient infrastructure for both the rural and the urban areas as well as changes in farming practices and way of life.

2.4 Green economy in Thailand

Green economy initiatives in Thailand started in the late 1980’s when natural resource management was incorporated into the 6th and 7th National Economic and Social Development Plans. The adoption of green economy policies and measures at this early stage was on a voluntary basis. Three decades later, the 11th and 12th National Economic and Social Development Plans contained clearer strategic movements toward the green economy. Examples include low-carbon production in the industrial sector, the transition toward clean energy in the energy and transportation sector, promotion of sustainable agriculture, and market development for green products and services, among others.

Currently, at the national level, green economy has been embedded into the National Strategy (2018-2037). One of the national strategies focuses on eco-friendly development, growth, and society by means such as:

1. reducing GHG emission,
2. developing climate change mitigation/adaptation mechanisms,
3. building security and resilience with regards to water resources and energy
4. promoting environmental-friendly agriculture, and
5. increasing the use of renewable resources.

Policy tools and incentives under this strategy include emission taxes, natural resource usage fees, certification and labelling systems for many products, just to name a few.

There are a so a number of sectoral plans that aid the green economy transition. First, the Environmental Quality Management Plan (2017-2021) emphasizes natural resource management and restoration, as well as efficiency enhancement in natural resource utilization. Second, the Sustainable Consumption and Production Roadmap (2017-2036) aims to transform production and consumption into sustainable ones via means such as green procurement, sustainable tourism, and sustainable city management. Third, the Climate Change Master Plan focuses on the reduction of GHG emission and adaptation to climate change. Finally, the Environmental Quality Promotion and Conservation Plan (2017-2025) and a few other plans on energy efficiency and renewable energy contain elements that support green economy. These plans, together, provide guidelines for policy design and implementation. See Box 2.1 for examples of current green economy initiatives in Thailand.

Box 2.1 Examples of the current green economy initiatives in Thailand.

<table>
<thead>
<tr>
<th>Green production</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Measures against illegal, unreported, and unregulated (IUU) fishing</td>
</tr>
<tr>
<td>• Measures against illegal logging</td>
</tr>
<tr>
<td>• Organic farming</td>
</tr>
<tr>
<td>• Production of eco-friendly products and services</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Waste reduction and management</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Promotion campaigns for waste reduction, reuse, and recycling</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emission and pollution control</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reduction of GHG emission</td>
</tr>
<tr>
<td>• Reduction of air and water pollution</td>
</tr>
<tr>
<td>• Green transportation initiatives</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Natural resources and the environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Conservation of natural resources and biodiversity</td>
</tr>
<tr>
<td>• Increases of green spaces in urban areas</td>
</tr>
</tbody>
</table>

Source: analysis by research team

3. Mapping key institutions and organizations

Thailand transition to become a green economy hinges on several factors, among which are the institutional arrangements and the incentive structures that will guide society towards long term sustainability. At the global level, the communications and achievements of UNFCCC together with scientific evidence of IPCC are considered most crucial in driving countries towards sustainability.

3.1 Institutional Mapping

At the national level, Thailand operates under two key documents, they are, the Twenty-year National Strategy or the Five-year National Economic and Social Development Plans. During 2022 and 2027, the course of development in Thailand will be guided under the 13th National Economic and Social Development Plan or the 13th Plan for short. In this regard, the National Economic and Social Development Council (NESDC) will take the leading role in integrating green and sustainable growth into Thailand development road map.

With the regards to climate change in particular, the Office of National Resources and Environmental Policy and Planning (ONEP) is designated to be the UNFCCC focal point on climate change. ONEP is the Thai government authority that prepares Thailand’s Master Plan on Climate Change, the Master Plan on Mitigation and the Master Plan on Adaptation. The Thailand Greenhouse Gas Organization
(TGO) oversees greenhouse gas reduction mechanisms, such as, the voluntary emission reduction mechanism (Thai-VER).

More specifically on greenhouse gas reduction in the energy sector, the Ministry of Energy is responsible for projecting future energy demands and production in Thailand that is described under the Power Development Plan (PDP). With reference to increasing the use of renewable energy, the Department of Alternative Energy Development and Efficiency, under the Ministry of Energy, is responsible for the more detailed preparation of the renewable energy strategies.

In the business sector, the Thai Chamber of Commerce, the Federation of Thai Industries, and the Joint Standing Committee on Commerce, Industry and Banking have also been very active in engaging private companies in sustainability practices. These private bodies have also been keeping update with climate change developments around the world to ensure the Thai businesses are in line with developments in the global trade requirements and standards.

On public financing, the Ministry of Finance and the Bureau of Budget are key agencies who will prepare adequate public funding to support the green transition. Under the Ministry of Finance are the Department of Excise Tax and the Fiscal policy Office who are instrumental in preparing the tax structure, such as, the carbon tax that will gear Thailand towards becoming low carbon. The Board of Investment (BOI), an independent body, provides tax incentives for investors to engage in green investments, such as, investment in electric vehicles.

On technological advancement in climate change, many innovations are generated by research from the Thai universities and research institutes. These technological advancements both in pure science and social science also rely on public funding currently being operated under Thailand Research Fund (TRF) and Thailand Science Research and Innovation (TSRI). These two funding agencies are pivotal as their resource funding policy will shape the direction of the production of know-how that is the backbone of national development.

Figure 3.1 compiles a list of institutions that play a role in Thailand’s transition towards becoming a green and sustainable economy.
Figure 3.1 Mapping of institutions

3.2 Government Committees

The mapping of key institutions above outlines key agencies whose mandates are closely related to green economy transition. The key institutions were established by law and have specific roles and duties to perform. The roles and duties of the institutions are defined by areas of intention at the time these institutions were established. However, over a long period of time the structure of these institutions can be rearranged to better serve the ongoing development challenges.

In the light of climate change challenges, Thailand does not have a single agency with the complete authority to oversee the all the various issues. Climate change, green economy as well as sustainable development involves coordination among several government, private and civil servant entities in the form of national committees, committees, subcommittees and working groups. The composition of these government committees comprises of a chairperson, committee member and advisor or specialists in the area. These role and duties of government committees is to prepare policy documents where directions and mandates are defined, coordinate work progress among the agencies involved, overcome obstacles and overlapping activities, and provide opportunities for exchanges of view.

Sustainable development, especially the monitoring of the progress of SDGs, is managed under the National Committee On Sustainable Development (CSD) and its sub-committees. As Thailand...
incorporates green economy under the BCG model, work coordination among the concerned agencies is under the mandate of the Bio-Circular-Green (BCG) Policy Board and the National BDG Management Committee and the BCG Model Implementation. Under these body there are several specific subcommittees coverall eleven areas of BCG implementations:

1) Agriculture  
2) Food  
3) Medicines  
4) Medical device  
5) Energy  
6) Materials  
7) Tourism and creative economy  
8) Circular economy  
9) Biodiversity  
10) Law  
11) HR

The climate change issues, in particular, are managed under the National Committee on Climate Change Policy (NCCC) under which are the Subcommittee on Mitigation and the Subcommittee on Adaptation. The workplans on decarbonization is managed under the National Energy Policy Council (NEPC).

4. Review and analysis of strategic national documents and policies

4.1 National documents and policies

The Thai policy framework are prepared in the form of policy documents that are used as a guideline for agencies when developing their specific annual workplans as well as for budget preparation. To ensure the country development follows the main development direction, policy documents need to be coherent where the more specific or sectoral policy documents must be nested under the main theme of national development agenda and policy. To main policy coherence, the Thai policy documents are categorized into three levels of hierarchy: Tier 1, Tier 2 and Tier 3. At the very upper level Tier 1 policy document is the National Strategy 2018-2037. The other policy documents and sectoral policies are thus nested under this National Strategy 2018-2037.

**Tier 1 Policy**

The National Strategy 2018-2037 is the highest level of Thailand national development agenda. It intends to provide a twenty-year long-term vision in guiding national development leading to improved wellbeing of the citizen, sustainability and national security.

The National Strategy 2018-2037: The vision of Thailand twenty year development is “Thailand becomes a developed country with security, prosperity and sustainability in accordance with the Sufficiency Economy Philosophy”. The National Strategy 2018-2037 describes six long term development strategies and under each strategy are specific development agenda.

- Strategy 1: The National Strategy on Security
- Strategy 2: The National Strategy on Competitiveness Enhancement
- Strategy 3: The National Strategy on Developing and Strengthening Human Capital
- Strategy 4: The National Strategy on Social Cohesion and Equity
- Strategy 5: The National Strategy on Eco-Friendly Development and Growth
- Strategy 6: The National Strategy on Public Sector Rebalancing and Development

The BCG model including green economy transition and sustainable development is in line with the twenty-year National Strategy as it ties in with several strategies particularly strategy on eco-friendly development and growth, competitiveness enhancement, strengthening human capital, and social cohesion and equity.
Tier 2 Policy

Under Tier 2 category, there are three Master Plans that provide a more specific guideline on development agenda followed from the key strategies described in the National Strategy 2018-2037.

The Master Plan under the National Strategy (2018 – 2037): There are 23 Master Plans under the National Strategy (2018-2037). At least four Master Plans under the National Strategy (2018-2037) will serve as policy guidelines for Thailand green transition: the Master Plan on Eco-Friendly Development and Growth, the Master Plan on Competitiveness Enhancement, the Master Plan on Human Capital and the Master Plan on Social Cohesion and Equity.

National Reform Plan: The National Reform Plan covers areas that need to be reformed. In connection with BCG, green growth and sustainable development, there are 6 areas of the National Reform Plan that will strengthen Thailand transition into a green economy and sustainability: 1) Public Sector Administration Plan, 2) Legal Reform Plan, 3) Economic Reform Plan, 4) Natural Resources Reform and Environment Plan, 5) Public Health Reform Plan, and 6) Energy Reform Plan.

The 13th National Economic and Social Development Plan: The five-year master plan or the 13th Plan is considered a key policy document that provides a medium-term development direction of Thailand. The 13th Plan will be launched and enforced in 2022. There are 4 main development agenda in the 13th Plan: 1) High Value-Added Economy, 2) High Opportunity Society, 3) Eco-Friendly Living, and Key Enablers for Thailand Transformation.

Tier 3

The sectoral development is described in the Tier 3 category. They are:

Climate Change:
- Climate change Master Plan (2015-2050)
- Thailand’s Nationally Determined Contribution Roadmap on Mitigation (NDC 2021-2030)
- National Adaptation Plan (NAP 2018-2050)

Natural Resources and Environment:
- National Environmental Promotion Plan and Policy (2017-2037)
- Environmental Quality Management Plan (2017-2021)
- Pollution Management Plan (2017-2021)

Sustainable Development:
- Sustainable Development Goals (SDGs) Roadmap Development

BCG Model:
- The 2021-2027 Bio-Circular-Green Economy Strategy

Energy Plan:
- (Draft) National Energy Plan
- Power Development Plan (PDP)
- Alternative Energy Development Plan (AEDP)
- Energy Efficiency Plan (EEP)
- Strategic Plan for Electricity Vehical Promotion
- Gas Plan
- Oil Plan
4.2 Bio-Circular-Green Economy (BCG model)

The Thai government adopted the BCG model as the main driver for economic and social development in Thailand. The BCG model is built upon Thailand’s competitive advantages with the aim to support sustainable growth. The “Bio” component is drawn upon Thailand’s strengths as an agricultural based economy as well as its great bio and cultural diversity. The “Circular” component aims to reduce waste and pollution through processes such as reuse and recycle. The “Green” component emphasizes on environmentally friendly initiatives so as to make our growth sustainable into the future.

Box 4.1 provides an overview of the current BCG Strategic Plan. The main target sectors of this plan include agriculture and food, medicine and healthcare, energy and materials, and tourism. At the current stage, the main strategic plan along with sectoral action plans have just been approved by the BCG Policy Board. Future initiatives to drive the BCG agenda will be led by a quadruple helix framework comprising the government, the private sector, universities and research institutions, and international organizations.

With regards to industrialization, not all parts of the industrial sector are the main targets of the BCG Strategic Plan. The plan, however, covers all key current industries as well as the industries that the government sees as becoming important in the future. For example, the plan emphasizes on Thailand’s current key sectors—agriculture, food, and tourism. It also puts some weights on the medical and healthcare sectors—the sectors that are gaining traction as Thailand transitions into the aged society. The sectors not directly targeted by the BCG Strategic Plan might also be urged to green-transform as the economy as a whole is becoming more green.

Whether or not the BCG agenda will be effective depends on how we overcome the current and upcoming hurdles such as the rigid and obsolete legal framework as well as the lack of human capital in certain areas. To these fronts, working teams and action plans on these specific hurdles have been established. All of these efforts make the BCG agenda a comprehensive driver of Thailand’s sustainable development and transition to the green economy.

**Box 4.1 The Overview of the BCG Strategic Plan**

**Strategic Areas**

<table>
<thead>
<tr>
<th>Strengthen and maintain our resource stocks and diversity, both bio and cultural, by balancing utilization and conservation</th>
<th>Build ecosystems at the local, provincial, regional, and national levels by 1) targeting and matching area-specific demands and supplies, and 2) cultivating new ideas and innovations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foster BCG-friendly industrialization to boost sustainable competitiveness by focusing on four key sectors: agriculture &amp; food, medicine and healthcare, energy and materials, and tourism sectors</td>
<td>Promote resilience to global changes</td>
</tr>
</tbody>
</table>

**Thirteen Measures to Drive the BCG-led Growth**

1. Build databases and data warehouses on diversities and intellectual capital
2. Increase the stocks of natural resources through reforestation and carbon markets
3. Develop BCG economic corridors for all regions
4. Increase efficiency and value-added in the agricultural sector
5. Improve quality of and standards for street and local food
6. Use innovations to add values to bio-based products such as bioplastic and functional food to create a new bio-based economy
7. Create markets for new products and innovations
8. Foster sustainable and green tourism
9. Promote the use of green innovations, green finance, and the circular economy model to support sustainable production
10. Invest in basic infrastructures, from R&D to production and certification, to improve the quality of BCG products and services
11. Support BCG-driven startups and SMEs
12. Build human capital to support the BCG economy at every level, from the local communities to researchers and entrepreneurs
13. Establish international ties to attract experts and investors as well as to foster R&D and trade

Source: NSTDA (2021)

### 4.3 SDGs nationalization process

The concept of green economy is tightly connected with the global agenda on Sustainable Development Goals (SDGs). This study will focus on Thailand’s status on 13 indicators from the four SDGs most related to green economy as outlined in Table 4.1

#### Table 4.1 Key SDGs and Indicators Considered in Thailand's Stocktaking Study

<table>
<thead>
<tr>
<th>SDG 8 Decent work and economic growth</th>
<th>SDG 9 Industry, innovation, and infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services</td>
<td>9.2 Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry’s share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries</td>
</tr>
<tr>
<td>8.4 Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-year framework of programmes on sustainable consumption and production, with developed countries taking the lead</td>
<td>9.3 Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets</td>
</tr>
<tr>
<td>8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value</td>
<td>9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities</td>
</tr>
<tr>
<td>SDG 12 Responsible consumption and production</td>
<td>SDG 13 Climate actions</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>12.2 By 2030, achieve the sustainable management and efficient use of natural resources</td>
<td>13.2 Integrate climate change measures into national policies, strategies and planning</td>
</tr>
<tr>
<td>12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment</td>
<td>13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning</td>
</tr>
<tr>
<td>12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse</td>
<td></td>
</tr>
<tr>
<td>12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities</td>
<td></td>
</tr>
<tr>
<td>12c Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities</td>
<td></td>
</tr>
</tbody>
</table>

Source: Definitions of indicators from The United Nations

**Goals and plans**

Thailand has incorporated SDGs into its National Strategy. All of the SDGs considered in this chapter contribute toward the national goal on promoting environmentally-friendly growth. In addition, the national goal on improving social equality is part of the SDG 8 on decent work and economic growth. The SDG 9 on industry, innovation, and infrastructure will help boost Thailand’s competitiveness, also one of the national goals. The SDGs, therefore, are tightly embedded into the country’s national strategies. In addition to the National Strategy, the SDGs have also been incorporated into the National Economic and Social Development Plans (NESCPs). Specifically, the SDGs are well aligned with the 12th NESCP’s fourth strategy on environmental friendly growth for sustainable development. See Table 4.2 for detail.

**Policies and incentives**

Following from the national-level plans are the area-specific roadmaps for many of the SDGs, for example, the Sustainable Consumption and Production (SCP) Roadmap for SDG 12 and the Nationally Determined Contribution (NDC) Roadmap for SDG 13. Even though Thailand might lack specific plans on certain SDGs, many elements of those SDGs are usually incorporated into ministry-level plans. For instance, decent work in SDG 8 is a significant part of the vision in the Department of Labor Protection and Welfare’s strategic plan (Ministry of Labor, 2019). Details of the related plans for the key SDGs are provided in Table 4.2.

Policies to drive the SDGs in Thailand are usually led by individual government agencies with some cross-agency attempts. Box 4.2 provides examples of current policies and initiatives.
Box 4.2 Examples of key players, policies, and incentives by SDG indicators

**SDG 8: Decent work and economic growth**

- **8.3 Formalizations of SMEs**: NSTDA and depa are among the key players in fostering entrepreneurship and innovation within the SME sector.
  - NSTDA has various programs and initiatives to support the entrepreneurial ecosystem—from research and development to technology translation and startup incubation. NSTDA also acts as a focal point for the BCG agenda in Thailand.
  - depa aims to bring digitalization and technologies to the underprivileged groups. Their main target groups include farmers and SMEs. The boosted productivity and efficiency through depa’s initiatives could help drive growth and bring these traditional informal groups to the formal economy.

- **8.4 Material resource efficiency**: The SCP Roadmap contains various components that promote sustainable consumption and production. Some examples include recycling, organic farming, sustainable tourism.

- **8.5 Full employment & decent work**: The Department of Labor Protection and Welfare targets to support and protect vulnerable groups including informal workers, elderlies, people with disabilities, and child labor. For example, the Informal Labor Protection Division provides training programs and educates informal workers about their rights.

**SDG 9: Industry, innovation, and infrastructure**

- **9.2 Sustainable/inclusive industrialization and 9.4 Sustainable & clean industries**: The main government initiative for green industrialization and the green transformation of the industrial sector is the Green Industry Program led by the Department of Industrial Work. This program provides incentives and a framework guiding factories and plants through green transformation steps.

- **9.4 Sustainable & clean industries**: Future policies under consideration include low-interest loans for green transformation, tax deductions for green expenses, and carbon credits and markets.

- **9.3 SMEs’ access to finance**: While there are some financial products targeting at SMEs, this sector is still identified as one of the vulnerable groups with limited access to financing.

**SDG 12: Responsible consumption and production**

- **12c Fossil-fuel subsidies**: Fossil-fuel subsidies have already been phasing out. For instance, gasoline subsidies are now only in place for E20 and E85. A complete elimination of gasoline and diesel subsidies is expected by 2023.

- **12.2 Sustainable use of natural resources**: Sustainable use of natural resources are among the key elements of various policies such as the BCG plan and the DIW’s Green Industry.

- **12.4 & 12.5 Waste management and reduction**: Thailand has several ongoing programs and campaigns, both public and private, on waste reduction and recycling. Waste management is also an important part of the BCG plan and sectoral-level programs such as Green Industry. See Section 6.3 for details.

- **12.7 Public procurement**: Green public procurement has been identified as a crucial future step toward building actual demands for green products and services and a sustainable green transition. The public procurement process involves several parties and a complicated structural framework making it difficult to inflict significant changes.

**SDG 13: Climate actions**

- **13.2 Climate change policies**: Climate change has been integrated in to various plans and policies from the national level down to the organization level. See Table 2 for examples.

- **13.3 Climate change awareness**: Climate changed is incorporated into school curricular at every level. Government agencies also offer a wide range of training programs to build public awareness and educate stakeholders about climate change. Examples include a training program on carbon credit calculation by the Royal Forest Department and training programs on natural disasters by the Department of Disaster Prevention and Mitigation.

Sources: Interviews with various organizations
Progress

As shown in the last row of Table 4.2, Thailand needs to accelerate its progress to achieve many of the SDG indicators considered in this study, according to a recent report from UNRCO (Lekprichakul, 2021). Some exceptions are indicator 12c in which we can maintain our progress and indicators 12.2, 12.4, and 13.2 where we must reverse the current trends. The report also lists a significant number of indicators for which the progress cannot be measured. These findings point toward the needs to 1) accelerate the progress toward many SDG indicators, and 2) build better monitoring mechanisms.
Table 4.2 SDGs for the Green Economy: Thailand’s Goals, Plans, Policies and Incentives, and Progress

<table>
<thead>
<tr>
<th>SDG 8: Decent work &amp; economic growth</th>
<th>SDG 9: Industry, innovation &amp; infrastructure</th>
<th>SDG 12: SCP</th>
<th>SDG 13: Climate actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Goals</td>
<td>To promote environmentally-friendly growth</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>To improve social equality</td>
<td></td>
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<tr>
<td></td>
<td>To boost national competitiveness</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>National Reform Program: Economy, natural resources &amp; environment, energy</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>National Economic and Social Development Plan (12th): Strategy 4 on environmental friendly growth for sustainable development</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>National Economic and Social Development Plan (13th): Milestone 10 on circular economy and low carbon society, Milestone 11 on risk management, mitigation, and adaptation to climate change and natural disasters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Policies &amp; Incentives</td>
<td>Master Plan on Labor Development</td>
<td>Ministry of Industry’s Strategic Plan</td>
<td>SCP Roadmap</td>
</tr>
<tr>
<td></td>
<td>• depa’s initiatives to support farmers and SMEs</td>
<td>• Department of Industrial Work’s Green Industry Program (see Section 6.1)</td>
<td>• Phasing out of fossil-fuel subsidies by the Fuel Fund</td>
</tr>
<tr>
<td></td>
<td>• Department of Skill Development’s training programs on green technologies (see Section 6.2)</td>
<td>• Department of Industrial Work’s Green Industry Program (see Section 6.1)</td>
<td>• Various waste management initiatives (see Section 6.3)</td>
</tr>
<tr>
<td></td>
<td>• Phasing out of fossil-fuel subsidies by the Fuel Fund</td>
<td>• Various waste management initiatives (see Section 6.3)</td>
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<tr>
<td></td>
<td>• Various waste management initiatives (see Section 6.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Progress</td>
<td>8.3 Formalizations of SMEs</td>
<td>9.2 Sustainable/inclusive industrialization</td>
<td>12c Fossil-fuel subsidies</td>
</tr>
<tr>
<td></td>
<td>8.5 Full employment &amp; decent work</td>
<td>9.4 Sustainable &amp; clean industries</td>
<td>12.2 Sustainable use of natural resources</td>
</tr>
<tr>
<td></td>
<td>8.4 Material resource efficiency</td>
<td>9.3 Small-scale industries access to finance</td>
<td>12.4 Managing chemicals &amp; waste</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12.5 Reduction in waste generation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12.7 Public procurement practice</td>
</tr>
</tbody>
</table>

Progress: □ Maintain progress to achieve target, ■ Accelerate progress to achieve target, ■ Reverse trend to achieve target, □ Cannot be measured
Source: Progress from Lekprichakul (2021).
4.4 Nationally Determined Contributions (NDC)

On October 26, 2020, Thailand submitted its revised Nationally Determined Contributions (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC). In this revision, Thailand committed to reduce its GHG emission even further—a 25% reduction from its 2005 business as usual (BAU) level by 2075 instead of the previous 20% commitment. To drive initiatives toward this NDC goal, the country set out three major strategic plans as follows.

1. The NDC Roadmap on Mitigation (2021-2030) specifies agency-level NDC goals and key measures for government agencies in the energy, transportation, industrial, and waste management sectors.
2. The NDC Sectoral Action Plans lay out NDC goals for specific measures (see Box 4.3 for detail).
3. The NDC Supportive Action Plan identifies and provides guidelines on NDC policy gaps and support systems.

Prior to 2020, Thailand’s initiatives on NDC had been guided by the Nationally Appropriate Mitigation Action Plan (NAMA) which aimed to reduce the country’s GHG emission by 7-20% relative to the BAU. Thailand was able to hit this target, for example, by achieving a 14.09% reduction in 2017. After the NAMA, the NDC initiatives have been driven by the NDC Roadmap on Mitigation along with the two action plans as described above.

The NDC Roadmap for Mitigation focuses on three main sectors: energy and transportation, waste management, and industrial processes and products. Its goal is to reduce GHG emission by 115.6 tons of carbon dioxide equivalent (tCO_2e) within 2030. Over 95% of the reduction will be coming from the energy and transportation sector. Details on several measures in these three sectors are outlined in the NDC Sectoral Action Plans and are illustrated in Box 4.3.

**Box 4.3 Summary of measures in the NDC Sectoral Action Plans**

<table>
<thead>
<tr>
<th>Energy and transportation sectors (9 measures)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Efficiency enhancement in electricity generation and in electricity consumption in households, commercial and government buildings, the manufacturing sector, and the transportation sector.</td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Waste management (4 measures)**

- Waste management through means such as reduction, reuse, and recycling
- Waste water management/treatment and biogas generation from waste water

**Industrial processes and products (2 measures)**

- Clinker substitutes and eco-friendly coolants

Source: ONEP (2020)
The NDC Roadmap for Mitigation outlines several challenges in achieving the 115.6 tCO₂e goal and suggests that international finance mechanisms may help accelerating the progress toward the goal. For example, technology transfers along with funding can help facilitate the adoption of clean and renewable energy.

The next step in Thailand’s NDC initiatives is the Long-Term Low-Emission Development Strategy (LEDS), which is currently under a drafting process. In the most current draft, the LEDS specifies the following NDC goals for Thailand:

- The peak of Thailand GHG emission will be within 2030,
- Thailand is to be carbon neutral within 2065, and
- Net zero emission is to be achieved as soon as possible within the second half of the 21st century.

In order to achieve these goals, Thailand will have to immediately revamp its infrastructure in the energy and transportation sector. The country will have to adopt advanced technologies to reduce its emissions as well as to capture and store carbon. In addition, incentives and carbon trading mechanisms should be improved to make abatement more flexible and economically viable. Through these technologies and other attempts to cut down on emissions, Thailand would also benefit from abatement spillovers such as reduced air pollutants (nitrogen oxides, and carbon monoxide), reduced electricity and energy consumption, and green job creation.

**Carbon markets in Thailand**

Carbon markets is one of the key drivers for economically-sound and sustainable abatement of GHG. Carbon trading and markets in Thailand are under the supervision of Thailand Greenhouse Gas Management Organization (TGO), an autonomous government unit under the Ministry of Natural Resources and Environment. Currently, Thailand does not have a mandatory carbon trading requirement; participation in carbon trading is on a voluntary basis. The three trading mechanisms include

1. Thailand Voluntary Emission Reduction Project (T-VER),
2. Thailand Voluntary Emission Trading Scheme (Thailand-V-ETS), and
3. The international carbon market under the Clean Development Mechanism (CDM).

T-VER focuses on voluntary carbon trading among micro- and small-scale projects. Trading on T-VER has already started with an increasing trading volume over the last couple of years. Details on T-VER are provided in Box 4.4

Thailand’s participation in the trade of certified emission reductions (CERs) within CDM has been limited and declining in recent years due partly to low carbon prices in this platform. To support the international carbon trading in the future, the TGO introduced Thailand-V-ETS, which emphasizes the development of an emission trading scheme (ETS) that meets international standards. The scheme consists of a measurement, reporting, and verification (MRV) system. Thailand-V-ETS is still in its development phase with a total of 55 factories in its pilot program since its inception.
Box 4.4 Thailand Voluntary Emission Reduction Project (T-VER) and its future

Thailand Voluntary Emission Reduction Project (T-VER) is a voluntary-based carbon trading platform focusing on micro- and small-scale projects in the following areas:

- Enhancement of energy efficiency,
- Development of renewable energy,
- Waste management,
- Transportation management,
- Reforestation, and forest conservation, and
- Agriculture.

Engagement in T-VER requires two steps prior to trading: 1) project registration, and 2) T-VER carbon credit certification. Trading is over the counter (OTC). Transactions can occur in either the primary market or secondary markets, with most them in the primary market. Currently, the platform is quite small with a low trading volume, but the volume has grown significantly in the past few years as shown in Table 4.3 Carbon credits earned under T-VER are usually used for reporting and advertising purposes.

### Table 4.3 Trading volumes and prices in T-VER

<table>
<thead>
<tr>
<th>Year</th>
<th>Trading amount (tCO₂e)</th>
<th>Trading value (thousands of baht)</th>
<th>Average price (baht/ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>2,758.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>5,641.00</td>
<td>846.00</td>
<td>149.97</td>
</tr>
<tr>
<td>2017</td>
<td>33,468.00</td>
<td>1,006.00</td>
<td>30.06</td>
</tr>
<tr>
<td>2018</td>
<td>144,697.00</td>
<td>3,090.52</td>
<td>21.37</td>
</tr>
<tr>
<td>2019</td>
<td>131,028.00</td>
<td>3,246.98</td>
<td>24.78</td>
</tr>
<tr>
<td>2020</td>
<td>169,806.00</td>
<td>4,375.69</td>
<td>25.77</td>
</tr>
<tr>
<td>2021</td>
<td>206,621.00</td>
<td>4,659.72</td>
<td>22.55</td>
</tr>
</tbody>
</table>

Attempts have been made to increase transactions and liquidity in T-VER. As one way to boost the demand for T-VER carbon credits, TGO established Thailand Carbon Neutral Network (TCNN). The network aims promote collaborations among the government, the private sector, and local communities in driving carbon neutral and net zero emission initiatives. The TCNN, as a result, could potentially increase the domestic carbon trading volume and liquidity within the T-VER platform. In addition, TGO and the Federation of Thai Industries are working together in developing Thailand Carbon Credit Exchange Platform based on blockchain technologies. The new platform would help lowering transaction costs, both monetary and non-monetary, and encourage more trading of T-VER credits in the future.

Source: TGO (2021)
5. Review of macroeconomic policies and identification of gaps

5.1 Macroeconomic policy changes to incorporate COVID-19 realities

Being an opened economy that relied heavily on export income and earning from international tourism, the Thai economy was severely impacted by the COVID-19 incidence that began in the early 2020. The Thai economy registered a negative 6.1 percent decline in GDP growth rate in 2020. Aside from engaging in several containment measures, such as, shutdowns, curfews or travel restrictions, the Thai government streamlined much effort in providing the needed health care facilities for the infected persons together with launching comprehensive vaccination nation-wide.

Given the size of the impact of COVID-19 public budget needs to be reallocated away from what was originally intended to increase public health care spending and fiscal stimulation measures. In connection with the green transaction, the Ministry of Natural Resources and Environment underwent a 20-30 percent budget cut in 2020. This shows how external shocks and disturbances that impact the macroeconomics can halt the momentum of green transition.

Government stimulating measures to boost the economy in 2020 include several forms of matching-payment schemes, such as, half and half scheme, direct cash payment into e-wallet, shopping rebate, travel together, soft loan to small and medium scale entrepreneur, tourism promotion, university tuition fee reduction, or tax rebate scheme.

5.2 Gaps in macroeconomic scenarios and modeling

Thai economic and social planning is largely based on sectoral planning, such as, agriculture, industry, services, tourism or energy planning. However, it is often found that each sectoral plan has its specific targets and objectives but lack sufficient linkages with the other plans. For instance, the irrigation plan may aim to increase the irrigation area via development of new reservoirs and irrigation systems but did not sufficiently illustrate how this expansion will impact the conservation areas as part of the conservation area will have to be used as water storage. The increase in industrial output and income as described may not sufficiently describe how this expansion will impact carbon emission or the level of PM2.5 or the volume of wastewater to be discharged.

It is therefore essential that Thailand is able to develop a resource constraint optimization algorithm that is designed for policy analysis. This type of modeling will enable the policy makers to recognize the opportunity cost of economic advancements in some sectors that can only be realized if there are sacrifices in the other sectors of the economy. More related to the green economic transition is the recognition that some economic sectors may need to undergo a slower growth in order for the country to move towards sustainability.

At the local level, Thailand has also been engaged in several local area specific development initiatives, such as, investment in power plants, road and highspeed train construction projects, irrigation system projects or airport construction projects. These large-scale investment at the local demands for a comprehensive analytical model that can investigate into the benefits and costs of alternative options, the benefit and costs for different groups of stakeholders should an option be adopted or how such investment projects can be best financed. Such analytical model is still absent in the Thai policy formulation process and currently policy analysis is carried out piece by piece. Such analytical model needs to also integrate future risks to test if the intended investment or plan can withstand future uncertainties.

5.3 SDG Integration and nationalization

Thailand’s progress on selected SDGs, as discussed in section 4.3, reflects the needs for acceleration in a number of indicators related to SCP and climate change. In addition, better monitoring mechanisms are required as the progress in many indicators cannot be measured.
Thailand’s policy strength lies within its incorporation of green economy and SDGs into its national-level goals, strategies, and plans (see Sections 4.1-4.2). At the planning level, green economy objectives are well-aligned with SDGs targets and indicators. The challenge, however, lies within how these strategies and plans would be implemented. For example, the BCG plan incorporates many SDGs into its strategies. Implementing this plan could be a challenging for a couple of reasons. First, the plan requires cooperation from various parties, from the government to the private sector and the civil society. In addition, some components of the BCG plan involve new technologies which require high-skilled labor and supporting infrastructure. Therefore, capacity building is crucial for the BCG plan implementation to be inclusive.

5.4 Highlight key macro-economic policy indicators that are not aligned with a green economy transition to identify policy gaps.

[work in progress]

1. Expansion of agricultural output can lead to an increase methane emission.
2. Expansion of irrigated area can lead to an expansion in dam construction and reduction of forest conservation area.
3. Expansion of automobile production can lead to an increase in automobile emission of CO2.
6. Review of sectoral policies and initiatives and analysis of their effectiveness

6.1 Green industry and circular economy

Current Policy Landscape

Thailand has incorporated the circular economy as one of its focuses in the BCG model. Details on this model are discussed at length in section 4.2. There are also various green industry initiatives in Thailand, many of those are in line with the circular economy concept. Table 6.2 maps the current policy landscape in Thailand to UNIDO’s five policy themes for supporting the green industry.

Table 6.1 Five policy themes to support the green industry in Thailand

<table>
<thead>
<tr>
<th>Theme</th>
<th>Current policy landscape in Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Integrated policy framework</td>
<td>Some vertical and horizontal integration and collaboration; Government policy guidelines and budget allocation follow the top-down approach. Some programs involve various government units as well as cooperation from non-government parties. For example, consultation with the Federation of Thai Industries (FTI) was needed when establishing the green industry standards and in government programs such as the DIW’s Green Industry and Eco Industrial Towns.</td>
</tr>
<tr>
<td></td>
<td><strong>Policy tools and monitoring systems already in place:</strong> There exist indicators and monitoring mechanisms on green industry transformation led by DIW. DIW is working to update their protocols to better facilitate this transformation as well as better accommodate some factories that might have struggle during the COVID-19 pandemic.</td>
</tr>
<tr>
<td>2. Enabling environment</td>
<td>Financial institutions: Sustainable finance initiatives have started. The Working Group on Sustainable Finance (WG-SF) has been established to lay out plans and policies supporting sustainable financing agenda in Thailand. Demand and market opportunities: There are some niche markets for green products and services. Green procurement, both in the private and public sector, should be encouraged to sustainably build demands and markets for these products and services. Phasing out of distorting subsidies: Fossil fuel subsidies have been phasing out. International cooperation and trade: Thailand has been working with various international organizations and NGOs on numerous green initiatives such as training programs. To promote international trade of green products, Thailand should make its national standards/certificates accepted by the global market.</td>
</tr>
<tr>
<td>3. Industry-led initiatives</td>
<td>Initiatives at multinational and large enterprises: There are a number of pilot programs by large corporates according to the Committee on Trade and Industries’ White Paper on Circular Economy. Government’s role: The Thai Government has started some initiatives that support the industry-led initiatives, for example, training programs on green skills and the Green Industry program by the DIW.</td>
</tr>
<tr>
<td>4. Harnessing technologies</td>
<td>Absorption and diffusion of new technologies: BOI incentives have been granted for green technologies to encourage technology diffusion. The DIW also works to transfer green technologies to firms and factories.</td>
</tr>
</tbody>
</table>
**R&D initiatives and supports**: Domestic R&D in BCG economy is one of the core policy focuses in the BCG plan. Research grants have been initiated in several areas related to the BCG economy.

### 5. Mixes of policy instruments

- **Market-based**: The DIW is in the process of initiating and developing market-based policies such as fee exemptions for advanced-levels green factories.

- **Voluntary-based**: The green industry program by DIW is voluntary-based with some information-based rewards, i.e., certification and labelling.

- **Information-based**: Green Industry certification and labelling by DIW.

Source: Policy themes from UNIDO’s report on green industry. Current policy stage in Thailand is summarized from various documents and the interviews with the relevant parties.

**Box 6.1 The Green Industry Program**

The DIW’s Green Industry Program is a voluntary-based certification program that guides factories throughs five steps of greening as follows:

- Level 1: Green Commitment
- Level 2: Green Activity
- Level 3: Green System
- Level 4: Green Culture
- Level 5: Green Network

Factories passing each level will receive a certification for that level. Higher level certification comes with added benefits such as a special waste treatment scheme and eligibility for Thailand Trust Mark.

Over 40,000 factories have participated in the Program since its inception. The DIW could accommodate around 2,000-3,000 factories each year with the goal of having at least 60% of its factories on this Program 2022.

Source: Green Industry (n.d.) and the interview with the DIW

**Gaps and Opportunities**

The current green industry policies in Thailand have already stretched across all key policy themes and areas. However, many of the policies are still in the beginning phases; efforts should be made in extending and strengthening those policies. The following policy gaps and opportunities have been identified in the interviews with representatives from the DIW and FTI.

1. **Market-based incentives for greening the industries**: Market-based incentives should be expanded to include carbon taxes, cap and trade schemes, and BOI incentives for green investment.

2. **Technologies**: Many processes within greening the industries, such as production efficiency improvement and waste management, rely heavily on various types of technologies. Thailand has adopted some new technologies in recent years, but it still needs many others. R&D and technology transfers in related areas should be encouraged. Technology-driven initiatives could also be a source of inequality, so significant capacity building is required to ensure that the green transition is inclusive.

3. **Capacity building in green skills**: Capacity building in green skills is required to support new technologies and the greening initiatives. Section 6.2 illustrates that green skill training currently exists in a relatively small scale. This effort should be expanded to cover a broader range of skills and a wider group of workers. In addition, Thailand still needs to build a highly-
skilled taskforce if it were to develop and adopt new technologies required for the green transition.

4. **Awareness building**: Awareness on climate change and environmental issues should be built in order to drive real demands for green products and services as well as to promote inherent demands for industry greening. Awareness building initiatives should be embedded into the education system from early childhood to life-long learning.

5. **Funding and budgets**: The government budget for the Green Industry program is limited and has been decreasing in the last couple of years. In addition, SMEs usually have limited access to credits and financial products; the sector is one of the most vulnerable groups in the transition to the IGE. Future sustainable finance initiatives should therefore tackle these aspects.

### 6.2 Green Jobs

Thailand has started embracing green jobs and green employment into its labor policies and initiatives, both by the public and private sectors. The Ministry of Labor is the key driver behind many public programs that aim to promote green jobs and support Thailand’s just transition toward the green economy. Within the private sector, many large companies have shifted toward green business/industry/production and hence have started recruiting people to work on these new ventures.

**Potential areas for green job promotion**

While there are many potential areas for green job promotion around the world, the ILO\(^1\) highlighted four key arenas for Thailand:

1. **Improvement of environmental health and resilience to climate change** Thailand was considered a medium risk country in the World Risk Index score based on its susceptibility to natural hazards and coping capacity. On the environment and ecosystem health fronts, Thailand does relatively well relative to its peers in Asia-Pacific, but it could still improve in certain areas.

2. **Sustainable production and organic farming** A significant proportion of employment in Thailand has been in the agriculture, forestry and fishing sector. Therefore, sustainable production and organic farming could be another focus area of green job promotion in Thailand.

3. **Municipal waste management** Municipal solid waste generation in Thailand was expected to increase, but only a small percentage of the waste was recycled. Therefore, improving the municipal waste management system, including collection, disposal, recycling, and composting, could support Thailand’s transition to the green economy and provide green job opportunities.

4. **Renewable energy** Thailand’s share of renewable energy in total energy consumption has been fluctuating in the 2010’s. As the country aims to increase the share of renewable energy, more job opportunities will arise in this area.

Of the four key arenas underlined by the ILO, sustainable production & organic farming and renewable energy seem to be the areas with significant drives from the government according to our interviews with various government agencies. For example, NSTDA emphasized the importance of agriculture as one of the backbones to drive the BCG agenda in Thailand. The Department of Skill Development also offers training programs related to smart farming and solar photovoltaic technologies.

Municipal waste management is an area in which both the public and private sectors take part in. Upcycling and recycling products have gained significant tractions in recent years. There are also smaller-scale composting initiatives driven by the private sectors.

All in all, Thailand’s ventures into these key areas for green job promotion could create green job opportunities now and in the future. The just transition into the green economy will also require skill

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\(^1\) Thailand Employment and Environmental Sustainability Fact Sheets 2017
development for our workers, markets for green jobs, as well as social safety nets for workers that might have fallen behind. The next subsection will outline Thailand’s labor policies on these fronts.

**Current policy landscape**

In its recent report, the ILO evaluates green jobs policy readiness in ASEAN. Thailand is regarded as having significant policy elements in place in three areas, some elements in three areas, and limited or no elements in two areas as shown in Table 9 (ILO, 2021). Most of these policy areas are under the supervision of the Ministry of Labor.

**Table 6.2 Thailand’s green labor policy readiness and progress**

<table>
<thead>
<tr>
<th>Policy</th>
<th>Readiness Level</th>
<th>Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green agenda</td>
<td>Significant</td>
<td>The BCG concept has been incorporated into national strategies and various area-specific plans. See Section 4.2 for detail.</td>
</tr>
<tr>
<td>Industrial &amp; sector policies</td>
<td>Significant</td>
<td>Thailand’s labor protection laws include many elements that could help protect vulnerable groups during the transition toward the green economy. Examples include unemployment benefits and compensation schemes for other income losses.</td>
</tr>
<tr>
<td>Social protection</td>
<td>Significant</td>
<td>Large enterprises and multi-national companies have started to incorporate green transformation and sustainable growth into their plans and operations.</td>
</tr>
<tr>
<td>Enterprise policies</td>
<td>Some</td>
<td>There exist about 20 BCG-related skill training programs under the Department of Skill Development.</td>
</tr>
<tr>
<td>Cross-cutting issues – labor</td>
<td>Some</td>
<td>The current legal framework and labor-related infrastructure provide basic supports for these cross-cutting issues, but they are not specific to the IGE.</td>
</tr>
<tr>
<td>Green skill development</td>
<td>Limited</td>
<td>No formal markets for green labor. One program under the Department of Employment supports informal workers in improving their work efficiency and increasing their value-added through green processes.</td>
</tr>
<tr>
<td>OSH for climate change</td>
<td>Limited</td>
<td>Most of the current OSH initiatives focus on reducing work-related accidents. One program related to BCG aims to increase awareness on safe chemical usage in the agriculture sector.</td>
</tr>
</tbody>
</table>

Source ILO (2021)

**Social protection**

Social protection and social safety nets will be a key support system for workers in Thailand as the country undergoes the green economy transition and climate change. The key policy tools for social protection in Thailand include various elements of the social security system as well as the government-provided healthcare schemes.

Within the social security system, workers may receive compensation for income losses due to unemployment, accidents, disabilities, and deaths, among others. These compensations will serve as a social safety net should the insured workers lose their jobs in the transitioning process or experience
losses from natural disasters as a result of climate change. Nonetheless, the social security system covers only a small percentage of the Thai population. The population outside of the system are usually more vulnerable to changes, for example, informal workers who have less job security.

The public healthcare schemes have a better coverage than the social security system at around 98% of the population. However, these schemes only provide basic healthcare coverage and will not suffice in supporting workers through significant career transitions. These findings, therefore, suggest the needs to extend the coverage of career-related social protection measures.

**Skill development and capacity building**

The Department of Skill Development under the Ministry of Labor is the focal point for government-led skill development initiatives. The Department currently integrates elements of the green economy, such as waste reduction, into all of its training programs. More importantly, 20 out of the over one thousand training programs focus on green skills such as solar cell maintenance and smart farming.

**Table 6.3 The Department of Skill Development’s Training Programs Related to Green Economy**

<table>
<thead>
<tr>
<th>Training program</th>
<th>Number of Participants in 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Usage and Maintenance NGV Fuel Automobile</td>
<td>20</td>
</tr>
<tr>
<td>2 The Clean Air in Homes and Small Commercial</td>
<td>24</td>
</tr>
<tr>
<td>3 Maintenance of Air Conditioning in Homes and Small Commercial</td>
<td>282</td>
</tr>
<tr>
<td>4 Solar Equipment Maintenance</td>
<td>809</td>
</tr>
<tr>
<td>5 Green Tiling with Cement Adhesive and Sealant</td>
<td>20</td>
</tr>
<tr>
<td>6 Electrical Energy Conservation for Industrial</td>
<td>20</td>
</tr>
<tr>
<td>7 Installation and Inspection of NGV Fuel for Car</td>
<td>76</td>
</tr>
<tr>
<td>8 Installation of NGV Fuel Systems for Automobile</td>
<td>20</td>
</tr>
<tr>
<td>9 Installation R32 Refrigerant Split-Type Air Condition</td>
<td>20</td>
</tr>
<tr>
<td>10 Safe Use of Flammable Natural Refrigerants</td>
<td>120</td>
</tr>
<tr>
<td>11 Growing Hydroponic Vegetables that are Non-toxic</td>
<td>114</td>
</tr>
<tr>
<td>12 Design and Installation IoT Control System for Planting</td>
<td>20</td>
</tr>
<tr>
<td>13 Application of Internet of Thing for Agriculture</td>
<td>111</td>
</tr>
<tr>
<td>14 Design and Use of Solar Incubators for Processing of Agricultural Product</td>
<td>40</td>
</tr>
<tr>
<td>15 Application of Solar Cell System for Agriculture</td>
<td>338</td>
</tr>
</tbody>
</table>

---

2 Only 16.4 million out of the 66.2 million population were under the social security system at the end of 2020. (Figures from the Social Security Office and the National Statistical Office)

3 Figure from the National Health Security Office’s UCInfo platform.
Through a gender lens, many of the current training programs and some of the potential areas for green job promotion in Thailand fall within the traditionally male-dominant industries. Specifically, all of the green training programs in Table 6.3 are for mechanics, with an exception of a few programs related to agriculture. Energy, one of the potential areas for green jobs, is also male dominant. The other two potential areas, waste management and environmental health, could be considered male-heavy. This raises a question of whether we should identify potential areas and jobs for women. Alternatively, should we encourage women to participate in these traditionally male-dominant industries? And how?

Policy areas with significant gaps

According to ILO (2021), the two policy areas in which Thailand has limited or no policy elements are the green labor market and occupational safety and health (OSH) issues related to climate change. Based on our interview with the Ministry of Labor, the Department of Employment has an ongoing program to help build awareness on green production. A smooth transition toward the green economy would require more direct and established labor market mechanisms and infrastructure.

On the OSH front, the current attempts mostly deal with minimizing work-related accidents. In accordance with the green economy transition and climate change, the future OSH initiatives should also cover occupational hazards due to industrial transition, increases in temperatures, and extreme weather events, just to name a few.

Ability to implement policy and progress monitoring

The Ministry of Labor has some infrastructure for implementing and monitoring new policies to support the transition to the IGE. For instance, an extensive network of training centers under the Department of Skill Development can help conduct upskilling and reskilling training throughout the country. Another example is the social security system, which already contains several social protection measures. Yet, its coverage should be expanded to the vulnerable groups to ensure that the transition to the green economy is just. Finally, the Office of Permanent Secretary for Labor has already been tasked with monitoring Thailand’s progress toward SDGs; the Office could also monitor the IGE transition progress.

COVID-19 and green jobs in Thailand

The policy focus at the Ministry of Labor has been shifted to COVID-19 mitigation since the start of the pandemic in 2020. This might have caused some delays on green job initiatives. However, COVID-19 also puts our social safety nets to test. Several lessons have been learned, and our safety nets are now better equipped to deal with large scale labor market shocks. This, in a way, helps prepare us for future shocks such as those due to climate change.
6.3 Waste management

Thailand has been facing the issue of solid waste management as the total volume of total solid still exceeds the total volume of proper solid waste management. While the effort of private recycling and garbage collecting by the poor is able to recycle a large amount of solid wastes, a large volume of solid wastes is currently managed by open-pit dump sites and the remaining are left unmanaged. Improper disposal of solid waste at areas near the coastal areas is also the major cause of ocean debris in Thailand.

Although municipalities and local governments have adopted an economic instrument to manage waste management, that is, the solid waste management fee, this system needs to be strengthened. Currently, the solid waste management imposes at a fixed garbage management fee which does not provide incentives for the household or business to minimize the volume of solid waste being disposed. It is, thus, desirable that the garbage management fee be determined by the number of garbage bags or garbage bin each household disposes. This new development will incentivize households and business units to minimize on the amount of solid waste created.

The use of solid wastes for electrification is an area that can help reduce the volume of unmanaged solid waste. Currently, there is a limitation on the how much electricity generated from solid waste can be sold to the authority. Obtaining the electricity purchase agreement with the power authority is the bottleneck that has prevented many entrepreneurs form engaging fully in the production of electricity generated from renewable energy.

6.4 Energy

Thailand has made a significant progress in introducing renewable energy into the energy system. The target of renewable energy has also increased overtime indicating that Thailand has embarked on the journey to decarbonize the energy sector. New initiatives are seen in the policy shift from EURO 3 and 4 refinery standard to the cleaner EURO 5 standard, increase in the use of gasohol and biodiesel, energy efficiency and energy conservation initiatives. The more recent policy on the production of electric vehicle will introduce a dramatic shift in energy production and consumption in Thailand where the demand for gasoline will be shifted more towards electricity. A bold effort declared by the Ministry of Energy is Thailand will not be investing new coal fired power plants. However, there are obstacles and bottlenecks that need to be addressed in this transition.

Power Generation

Over the past decade saw an increase in the use of renewable energy in electrification. The main sources of renewable energy in the Thai power generation include solar PV, biomass, biogas, solid waste, wind and hydropower. Increasing renewable energy will not only help move Thailand towards decarbonization but will also have positive impacts on the welfare of the economy. Increasing use of biomass will help increase income as agricultural wastes and by-products will generate additional income to the farmers.

Thailand has recently switched from the use of Adder-Cost to Feed-in Tariff as the mechanism in promoting the production of electricity from renewable energy sources by the private sectors. This tariff structure of the Feed-in Tariff mechanism is the attempt to provide just sufficient income to the electricity business to cover the cost of electricity generation. As each type of renewable energy incurs different costs, the tariff structure of the Feed-in Tariff offers to buy electricity from different renewable energy sources at different price. As electricity generation is regulated, any private companies who are interested in joining the Feed-in Tariff mechanism must request for the permission to “sell” electricity or the purchase agreement from the electricity authority. Obtaining the purchase agreement has been a key bottleneck in Thailand’s renewable energy development owing partly to the limitation of the grid system as well as the higher cost of electricity.

Thailand is in a period where the role of the authority needs to be revised where public energy agencies should adopt the role of becoming a regulator rather than the producer of energy. In this respect, there is a need for the Thai electricity to focus on providing adequate electricity grid system that can support...
the private sector interest in producing electricity from renewable energy sources. A movement towards liberalization and free market competition in electricity generation from renewable energy will also enable Thailand to reap the full benefit of the technological innovation and the lower cost in renewable energy.

6.5 Natural Resource Management

Forests and Biodiversity Resources

Forest ecology is important for Thailand for several reasons, such as, serving as water regulator that controls flooding in the raining seasons and provide a continued supply of water during the dry seasons, an important habitat for biodiversity resources, carbon sink, or climate control. The management of the forest areas is under the jurisdiction of two major government agencies: the Department of Forestry and the Department of National Parks, Wildlife and Plant Conservation. Section 2 shows how Thailand is still unable to increase the forest coverage to meet the target of having 40 percent of the total land area in Thailand as forest cover. Two issues facing the forest authority are the legality of human settlement in the forest areas and how best to introduce reforestation in place of commercial agriculture that has encroached a large part of forest reserves in the northern provinces of Thailand.

Human settlement in the forest reserves has been an uphill battle for the Thai authority. Several containment arrangements have been implemented but there are several communities residing in the forest reserve areas that are still in dispute and need resettlement arrangement.

In the northern provinces, a large area of the Thai forests has been occupied by illegal corn plantation to serve as inputs for the animal feed business. Such illegal corn plantation in highlands is managed under a well-organized network where seed, fertilizer, pesticides and sale arrangement are well institutionalized by the private sector. There is thus an urgent need for the Thai authority to adopt an effective solution to curb such forest encroachment and replace corn fields on highlands with a more sustainable reforestation program.

Mineral Resources

Mineral resource development was once a key economic sector for Thailand that has generated significant income for the country. Owing to the environmental problems generally occurred along with mining, the role of the mining sector to the Thai economy has subsided. Only a few key mining industries are remaining in Thailand, that is, the rock mining to serve the cement and construction business. There are, however, still some small-scale mines that are scattered in some parts of Thailand.

Thailand has passed a new Mining Act in 2017 that contains several measures designed for a more effective mining management especially to control the environmental impacts from mining. A new development includes the enforcement of the mining zones where new mines will only be permitted if they are located in the located in the mining zones that are to be declared by the government.

Water Resources

Water resource management has always been important for Thailand as a large part of the country is still dominated by agriculture. In providing adequate supply of water, the Thai government has invested heavily on irrigation dams as well as irrigation systems. While the past expansion of the irrigation system has benefited the farmers, especially those in the central plain, the issue of efficiency in water utilization, water conservation or water distribution has been a concern. Furthermore, a continued investment in water storage such as medium-scale or large-scale dams will also have an impact on forest reserve and wildlife as they are located in the restricted forest areas.

The newly enacted Water Resource Act BE 2558 contains a provision that water resource is longer free and the authority can impose a water fee as a way to increase efficiency in water utilization and generate revenue to be used for maintaining the irrigation systems. With the newly launched Eastern Economic Corridor (EEC) initiative as a new economic zone covering eastern areas in the eastern provinces, such
as, Chonburi province, Rayong province and Chacheongsao province, the issues of diverting water resources from agriculture to serve the water demand of the industries, the efficiency in water utilization as well as water justice will be important for Thailand.

6.6 Others

Digitalization is one of the main drive forces behind industrialization and economic growth in the 21st century. Digitalization, therefore, has been incorporated into many parts of the government’s strategies, plans, and policies. In the IGE transition/BCG model contexts, digitalization helps improve efficiency in production processes and consumption. For example, digitalization could help decrease material consumption and reduce waste. Digitalization, thereby, inevitably becomes a crucial part of the green transition.

Many of the government’s digitalization initiatives in Thailand are led by the Digital Economy Promotion Agency (depa). Depa currently focuses on 1) human capital development, 2) the digital economy, and 3) social improvement. While the green economy is not one of depa’s focus areas, many programs at depa are related to the green economy and the IGE transition (see Table 6.4 for details). In addition, the agency’s policy targeting could help fill in the current gaps in Thailand’s IGE transition. In particular, the agency targets SMEs and farmers, two of the most vulnerable groups within Thailand’s current IGE transition plans and policies. By targeting these two groups, the agency also helps tackle inequalities and the limited access to funding and technologies faced by these underprivileged groups.

Table 6.4 DEPA’s initiatives related to the IGE transition and SDGs

<table>
<thead>
<tr>
<th>Initiatives</th>
<th>The IGE transition and SDGs prospects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manpower development (focusing on digital skills)</td>
<td>The concepts of reskilling, upskilling, and building new skills are crucial to SDG 8 (decent work and economic development). depa’s manpower development framework, e.g., its online learning platform and scholarship programs, can also be applied to labor development in the IGE transition context.</td>
</tr>
<tr>
<td>Reskill the current workforce</td>
<td></td>
</tr>
<tr>
<td>Upskill the future workforce</td>
<td></td>
</tr>
<tr>
<td>Build new skills for the general public</td>
<td></td>
</tr>
</tbody>
</table>

Digital Transformation & Digital Startups

depa has been investing in and supporting various digital startups in Thailand. Sectors that are related to the IGE transition and SDGs include

- Agtech
- Other startups that help enhance efficiency

Agricultural technologies can help decrease the use of chemicals, reduce costs, and increase productivity and income. For example, an adoption of smart greenhouses in Phayao reduces production loss by about 10%.

Digital platforms improve resource allocations and help reduce consumption and waste. For example, an online medical platform such as OOCA allows doctors to meet with patients online. Both parties can avoid trips to the hospital. Another example is Haup, an online car sharing platform, which could help reduce the demand for personal cars.

Digital Ecosystem & Infrastructure

Smart cities

The environmental aspects of smart cities will play an important role in achieving the SDGs and transitioning to the green economy. For example, the Smart Port program at Laem Chabang aims to address
air pollution and road traffic problems in the area. Other examples include improved urban planning, smart mobility, and climate change mitigating mechanisms.

Source: DEPA (2021)

[TOR 4.ii.G] Digitalization in the IGE transition context: How digitalization can help the country to achieve SDGs and tackle unparalleled challenges that it is facing (INT: DEPA 2.1, 2.2, 2.3) and (INT OTP 11.1)—such as climate change, an unhealthy environment, and increasing inequalities (e.g., access to healthcare, environment quality, innovation, and digital agriculture).

7. Sustainable Finance

7.1 Public Green Finance

In the last couple of years, the Thai government has allocated 108-121 billion baht per annum to environmental-friendly growth (see figure 7.1). Within this part of the budget in 2021, significant portions have been dedicated to water resource management (56.5%) and creation of growth on the environmental-friendly quality of life (22.6%), as shown in Table 7.1. Table 7.2 exhibits expenditures on programs and policies that are related to the BCG model and sustainable growth in 2020. The expenditure on renewable energy at the Department of Alternative Energy Development and Efficiency dwarfed the expenditures on other projects by many times. While this large expenditure is in line with the large share of GHG emission from the energy sector, some other initiatives, e.g., those related climate change, might also require substantial investment.

While the gross amount of the environmental-related budget has been stable over the years, its share in the total budget has been small (3-4%) and declining, prior even to the COVID-19 pandemic (see figure 7.1). And this declining trend continues after the pandemic hit. The scarce and declining budget was also reflected in several interviews with many government agencies working in areas related to the environment and SDGs. This suggests the need to reallocate these resources back to environmental and sustainability causes after the pandemic recovery. Furthermore, other sources of funding, such as from sustainable finance initiatives, should also be considered as the pandemic and the recovery could be prolonged.

Another reason for the need of sustainable finance initiatives is the current large gap in investment required for sustainable development. Specifically, Thailand needs to double its investment to reach the SDGs (United Nations Thailand, 2021). While domestic public finance accounts for about half of all funding in Thailand (United Nations Thailand, 2021), the proportion of government budget dedicated to environmental causes is rather small as discussed earlier. Therefore, Thailand must also seek investment from other sources via the sustainable finance initiatives.
Figure 7.1 Thailand’s government budget breakdown (2017-2021)

![Figure 7.1 Thailand’s government budget breakdown (2017-2021)](image)

Source: Data from Budget Bureau (2021)

Table 7.1 Breakdown of the 2021 environmental government budget

<table>
<thead>
<tr>
<th>Programs</th>
<th>Budget (Bt bn)</th>
<th>% of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated program on management of water resources</td>
<td>65.5</td>
<td>56.5</td>
</tr>
<tr>
<td>Programs on public sector personnel</td>
<td>18.8</td>
<td>16.2</td>
</tr>
<tr>
<td>Fundamental program on creation of growth on the environmental-friendly quality of life</td>
<td>13.4</td>
<td>11.5</td>
</tr>
<tr>
<td>Strategic program on supporting creation of growth on the environmental-friendly quality of life</td>
<td>12.9</td>
<td>11.1</td>
</tr>
<tr>
<td>Strategic program on creation of sustainable growth with regard to conservation, rehabilitation and destruction prevention of natural resources</td>
<td>3.6</td>
<td>3.1</td>
</tr>
<tr>
<td>Strategic program on coping with repercussions from climate change</td>
<td>1.1</td>
<td>0.9</td>
</tr>
<tr>
<td>Strategic program on dealing with pollution and the environment</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Strategic program on creation of sustainable growth of marine economic society</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Strategic program on elevating paradigms to stipulate the future of the country’s natural resources</td>
<td>0.01</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>116</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Budget Bureau (2021)
Table 7.2 Expenditures in projects related to BCG and sustainable development in 2020

<table>
<thead>
<tr>
<th>Units/Projects</th>
<th>Expenditures (Bt Mil)</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Science and Technology Development Agency</td>
<td></td>
</tr>
<tr>
<td>• Promoting Bio Economy as a new source of regional income</td>
<td>10</td>
</tr>
<tr>
<td>• Smart Farmer</td>
<td>48</td>
</tr>
<tr>
<td>Department of Agriculture</td>
<td></td>
</tr>
<tr>
<td>• Development of smart farming technologies</td>
<td>8.2</td>
</tr>
<tr>
<td>Office of Natural Resources and Environmental Policy and Planning</td>
<td></td>
</tr>
<tr>
<td>• Operations related to climate change</td>
<td>12.7</td>
</tr>
<tr>
<td>• Efficiency enhancement in the management of watershed areas, biodiversity, and SCP</td>
<td>17.9</td>
</tr>
<tr>
<td>Energy Policy and Planning Office</td>
<td></td>
</tr>
<tr>
<td>• R&amp;D in renewable energy</td>
<td>6.2</td>
</tr>
<tr>
<td>• Pilot study for smart grid</td>
<td>6.7</td>
</tr>
<tr>
<td>Department of Industrial Works</td>
<td></td>
</tr>
<tr>
<td>• Green Industry Program</td>
<td>24.8</td>
</tr>
<tr>
<td>• Eco Industrial Town</td>
<td>21.2</td>
</tr>
<tr>
<td>Department of Alternative Energy Development and Efficiency</td>
<td></td>
</tr>
<tr>
<td>• Development and efficiency enhancement initiatives in renewable energy</td>
<td>357</td>
</tr>
<tr>
<td>• Development and efficiency enhancement initiatives in energy conservation</td>
<td>59</td>
</tr>
</tbody>
</table>

Source: Budget Bureau (2020)

7.2 Sustainable Finance

Sustainable finance is defined as “an approach that explicitly acknowledges the relevance of environmental, social, economic, and governance factors, and requires stakeholders, including regulators and market participants to incorporate such sustainability factors into their financing, investing and insuring analysis, risk management, and decision-making process, as well as within their fiduciary responsibilities, resulting in greater long-term investments in sustainable economic activities.” (WG-SF, 2021)

The transition toward the green economy will require substantial investment. Due to the relatively small government budget allocated to environmental causes, sustainable finance would be one of the key enablers for Thailand’s IGE transition.

Goals, policies, and stakeholders

The Working Group on Sustainable Finance (WG-SF) has been formed to facilitate the development of sustainable finance initiatives in Thailand. The WG-SF consists of all key financial regulators/policy making units: Fiscal Policy Office, the Bank of Thailand, the Securities and Exchange Commission, the Office of Insurance Commission, and the Stock Exchange of Thailand.

The WG-SF recently set out the Sustainable Finance Initiatives for Thailand with a goal of achieving a commercially viable and sustainable financial sector by 2025 (WG-SF, 2021). The sustainable financial sector would help

1. finance the real economy’s transition toward sustainable growth and development, and
2. manage financial risks due to environmental causes; namely, climate change, resource depletion, and environmental degradation; as well as social and governance causes.

The Initiatives’ five key strategic initiatives (KSIs) are outlined in Table 7.3.
Table 7.3 KSIs in the Sustainable Finance Initiatives

<table>
<thead>
<tr>
<th>KSIs</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical taxonomy: national sustainable finance taxonomy</td>
<td>To promote inflows of investment and provide information for better decision makings</td>
</tr>
<tr>
<td>Improving the data environment: quality, depth, immediacy, and price of sustainable finance data</td>
<td>To enable development of new products and markets as well as cater a wider range of investor</td>
</tr>
<tr>
<td>Implementing effective incentives: fiscal and prudential policies plus non-financial approaches</td>
<td>To incentivize financial flows into sustainable development initiatives</td>
</tr>
<tr>
<td>Creating demand-led products and services: true underlying demands for sustainable finance products and services</td>
<td>To build a flourishing sustainable finance sector in the long term</td>
</tr>
<tr>
<td>Building human capital: skills, competence, values, and behaviors of relevant stakeholders</td>
<td>To incentivize financial flows into sustainable development initiatives</td>
</tr>
</tbody>
</table>

Source: WG-SF (2021)

In addition to the WG-FS working as a spearhead, the sustainable finance initiatives would also involve several other parties—public, private, domestic, and international. For example, at the international level, the Network for Greening the Financial System (NGFS) consists of 83 central banks and financial supervisors working together in climate risk management and the green transition of the financial sector, among others (NGFS, 2021). The Bank of Thailand has already joined the NGFS. UNDP and the Integrated National Financing Framework have also ventured into various projects on financing the SDGs.

Within Thailand, the sustainable finance initiatives would involve stakeholders such as investors, project owners, financial intermediaries, and financial regulators. Some of these stakeholders have already started their own sustainable finance initiatives. For example, a number of large corporates have issued green bonds (ThaiBMA, 2021), and the Stock Exchange of Thailand (SET) has also started several programs that involve many listed companies in environmental, social, and governance (ESG) and sustainable investing (SET, 2019). Examples of current sustainable finance projects and initiatives are provided in Table 7.4.
### Table 7.4 Examples of sustainable finance initiatives and projects in Thailand

<table>
<thead>
<tr>
<th>Initiatives/Projects</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green bonds</td>
<td>There are 37 bonds currently classified as green, social, sustainability bonds and sustainability-linked bonds by the Thai Bond Market Association (ThaiBMA). These bonds were issued in 2019-2021 mostly by large corporates in the energy and transportation sectors.</td>
</tr>
<tr>
<td>Green loans and financial products</td>
<td>Commercial banks start to consider ESG factors when making loans and offering financial products. Some green loans and financial products are already available. For example, around 10% of Siam Commercial Bank’s portfolio is on green projects and businesses, and Bangkok Bank offered over 95 billion baht in financial products to renewable energy projects in 2020.</td>
</tr>
<tr>
<td>Thailand Sustainability Investment (THSI)</td>
<td>THSI is a list of stocks in the SET that have been evaluated and passed certain ESG criteria. The THSI currently contains 147 listed companies with a total market capitalization of 12.96 trillion baht (about 60% of the stock market size).</td>
</tr>
</tbody>
</table>
| SET’s training programs related to sustainability and SDGs | SET has organized various training programs on sustainability and SDGs for both listed companies and the general public. Some examples include programs on:  
  - Sustainability reporting,  
  - Task force on climate-related financial disclosures (TCFD) in finance, and  
  - Corporate sustainability strategy. |

Sources: ThaiBMA (2021), Siam Commercial Bank (2021), Bangkok Bank (2021), Krungthai Bank (2021), SET (2019), SET Sustainable Market Development (2021a,b)

### Key barriers, gaps, opportunities, and options

While the key strategic areas have already been identified, policy implementation still needs to be fleshed out. Work plans and timeline for the KSIs should be established. Attention and extensive monitoring would also be required. More importantly, the implementation would require collaboration among government agencies, the private sector, international partners, financial sector regulators, members of the WG-FS, development finance institutions, and NGOs (WG-SF, 2021). In addition, these initiatives would also involve several players in the financial markets—from individual investors to listed companies and issuers of financial products.

The key focus of the sustainable finance initiatives, at least in the beginning phase, should be the various parts of the domestic financial markets because of two reasons. First, domestic sources of funds made up around 80 per cent of all funds in Thailand (United Nations Thailand, 2021).Seconds, there are still large gaps in access to sustainable financial products. Some large corporates have already ventured into green and sustainable finance, but the awareness must be built for the wider public. Domestic investors, including the public sector, and project owners should develop awareness about sustainability in order to drive real demands and supplies of sustainability financial products. In addition, the current sustainable finance initiatives should be expanded to cover SMEs and individual investors. SMEs and the other underserved groups already face financial constraints and have limited access to credits. These groups are also less experienced and less knowledgeable about credits and financial products. Policy
makers would have to consider these aspects when developing the taxonomy, incentives, and capacity building initiatives.

Thailand’s effort in transforming its financial sector into a sustainable one is still in an early phase. The country would benefit from lessons learned at other similar countries, but the current examples, e.g., in WG-SF (2021), are mostly from developed countries with strong financial markets. Customized recommendations and guidelines from international organizations would also be helpful in accelerating our progress toward a commercially viable and sustainable financial sector.

### Financing for a Green Economy transition

- Review relevant policies and goals, national and international institutions working in the fields, existing initiatives. Identify key barriers, gaps, opportunities, and options to mobilizing public and private financing for a green economy transition and for the development of green businesses in Thailand (institutional, capacity-related, economic, etc.) and ways in which PAGE could provide effective support.

### 8. Mapping of existing green economy initiatives and identification of policy gaps for PAGE interventions

As shown in the previous sections, Thailand has established plans and started its journey toward the IGE transition. Table 8.1 provides a summary of policies, areas for possible policy intervention, the investment needs, and challenges and opportunity for the key economic sectors.
Table 8.1 provides areas for possible policy intervention, the investment needs and challenges and opportunity for the key economic sectors.

<table>
<thead>
<tr>
<th>Key sectors</th>
<th>Policies</th>
<th>Investment needs</th>
<th>Challenges and opportunities</th>
</tr>
</thead>
</table>
| Industry    | • The Green Industry Program that supports the industrial sector’s green transition.  
• Eco industrial towns to encourage clustering of green production  
• Production processes that meet international/national environmental standards such as ISO Green Label  
• Promotion of the bio economy concept with focuses on agro-industry, food, pharmacy and medicine, bio fuels, bio plastics, and biorefinery  
• Promotion of the Circular concept that supports sectors such as plastic, rubber, automobile, construction materials, steel and other metals, solar power, EVs, and batteries  
• Capacity building for green skills  
• Reduced GHG emission from industrial processes | • To build awareness on sustainable production among all sizes of firms  
• For labor development related to green technologies  
• To foster the transition toward new businesses and production processes that meet environmental standards, for instance, energy generation from waste and green market development  
• To support research and development  
• To ensure that the ongoing programs are inclusive and continued into the future | • SMEs could be lagged behind due to the lack of financial resources. To support them, the Ministry of Industry and SME Bank establish a fund that provides green loans for small enterprises  
• Large corporates have invested in R&D for environmentally friendly products. They could be another key driver behind the green transition in Thailand.  
• The engagement in green programs from communities and the people are still limited.  
• There exist some legal limitations on recycling of industrial waste.  
• Emission law enforcement should be strengthened. |
<table>
<thead>
<tr>
<th>Key sectors</th>
<th>Policies</th>
<th>Investment needs</th>
<th>Challenges and opportunities</th>
</tr>
</thead>
</table>
| Energy      | • Promotion of renewable energy (RE) according to the National Energy Plan which targets the share of RE in total energy consumption to be 50% by 2050  
• Advancement in energy storage technologies and smart grids to support the use of RE  
• Liberalization of electricity generation to allow prosumers to sell their RE to the grid  
• Development and adoption of bio fuels and bio materials according to the BCG plan  
• Promotion of energy conservation such as financial incentives for energy efficient buildings from the Energy Conservation and Promotion Fund  
• Green urbanization toward green cities  
• Supports for community-level electricity generation/1-MW power plants  
• Reduction of GHG emission in the energy sector incentivized by fuel excise taxes, carbon trading (T-VER program), other financial incentives for green products, etc.  
• Promotion of green labelling | • In R&D for energy storage and other clean energy technologies  
• In a well-connected modern grid infrastructure that supports RE  
• In human development in new skills required for clean energy | • The current grid infrastructure might not be able to accommodate a large share of RE  
• There exist legal/administrative limitations in the liberalization of electricity generation  
• Carbon trading mechanisms should be extended to cover larger projects. T-VER currently accepts only micro- and small-scale projects.  
• The progress toward green public/private procurement should be accelerated  
• The funds provided by powerplants to the surrounded communities are still limited. The funds should also be directed toward mitigating the environmental effects of the power plants. |
<table>
<thead>
<tr>
<th>Key sectors</th>
<th>Policies</th>
<th>Investment needs</th>
<th>Challenges and opportunities</th>
</tr>
</thead>
</table>
| Natural Resources | • Plans to manage, restore, and conserve natural resources  
• Restoration and conservation of biodiversity  
• Water resource management to ensure a sufficient supply of water | • To maintain a continuous progress in the conservation and replenishment of natural resources  
• In R&D and pilot projects related natural resources and biodiversity such as vaccine development  
• In human resource development in new skills | • The BCG model focuses on local/regional demands and supplies and hence encourages the use and conservation of local natural resources.  
• Awareness on sustainable consumption and production should be built in a wider scale  
• Laws on the access to bio-resources should be updated.  
• Bio-resource accounting should be made at the local level to create a complete database on biodiversity. |
| Transportation | • Improvements in public transportation coverage and connections between different platforms  
• Promotion of EV adoption with a targeted share of 30% of all vehicles  
• Incentives for bio fuels  
• Upgrade local fuel and vehicle standards to Euro 4 and 5  
• Reduced GHG emission in the transportation sector | • To extend and better-connect the basic transportation infrastructure  
• In R&D for EVs and their infrastructure such as charging stations | • Working from home during the COVID-19 pandemic could be a paradigm shift toward less commuting and emission.  
• The public should be encouraged to increase their use of public transportation/  
• EV adoption should be encouraged, for example, through tax and financial incentives. At the same time, there should be enough investment in EV infrastructures. |
<table>
<thead>
<tr>
<th>Key sectors</th>
<th>Policies</th>
<th>Investment needs</th>
<th>Challenges and opportunities</th>
</tr>
</thead>
</table>
| Agriculture and food | • Promotion of sustainable/safe agriculture  
• Promotion of agricultural practices that meet standards such as an organic accreditation program by the International Federation of Organic Agriculture Movements (IFOAM) and Good Agricultural Practices (GAP)  
• Crop and animal breeding for climate change adaptation  
• Organic farming technologies | • In agricultural technologies  
• In R&D and production of microbial pesticides and breeds that are robust to climate change  
• In human resource development in digital technologies such as smart farming and drones | • The demand for environmentally-friendly agricultural products is concentrated in the well-educated, high-income groups. The awareness about these products should be extended to other groups as well as to a wider group of farmers.  
• Economies of scale in sustainable/safe agriculture could bring the prices of these products down, making them more affordable to a wider group of customers. One way to create the economies of scale is to build clusters of farms that share technologies and know-hows. This would also make it easier for the farmers to get organic certifications that prohibit commingling with nonorganic substances. |
| Waste reduction and management | • Municipal waste management that focuses on original sources, including waste sorting, reusing, and recycling  
• Supports for R&D related to recycling  
• Supports for new technologies in wastewater management such as biogas generation from wastewater  
• Promotion of waste to energy policies | • In R&D for recycling technologies  
• In human resource development and awareness building  
• In waste management infrastructure  
• To support extended producer responsibility (EPR) | • There are some legal limitations in recycling in the industrial sector that might require revisions.  
• A mechanism for electronic waste purchase (from consumers) should be developed. |
### Key sectors

<table>
<thead>
<tr>
<th>Policies</th>
<th>Investment needs</th>
<th>Challenges and opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>• R&amp;D supports in the focus areas of the BCG model such as agriculture, food, medicine, and tourism</td>
<td>• In R&amp;D in new and digital technologies</td>
<td>• A substantial investment in human resources is required, both for R&amp;D and for training the labor force.</td>
</tr>
<tr>
<td>• Supports for public adoption of new technologies through depa</td>
<td>• In human resource development to support digital transformation and new technologies</td>
<td>• Urban planning should take into account environmental aspects such as transportation and waste management.</td>
</tr>
<tr>
<td>• Development of smart cities</td>
<td>• In digital infrastructures such as affordable accesses to devices and the high-speed internet</td>
<td>• Better data collection and management are required in various domains, e.g., city data, overall government data, and energy consumption.</td>
</tr>
</tbody>
</table>

Source: analysis by research team

### 9. Conclusions and recommendations

#### 9.1 Summary of the main findings / key messages found in the previous sections

[work in progress]

#### 9.2 Recommendations on priority areas at macro and sectoral level to support

There are several entry points for policy intervention that are essential for Thailand transition towards becoming a green and sustainable economy. Following provides priority areas where government policies and measures need readjustments.

**Energy**

Thailand has developed a system of taxes and surcharges on gasoline products that cannot be characterized as “carbon tax system”. Gasoline products are currently subject to an excise tax, value added tax, surcharge for the energy conservation fund, surcharge for the energy price stabilization fund, and a fee to be allocated to local governments. These taxes, surcharges and fee need to be realigned and harmonized into a single carbon tax on energy. Other types of energy, such as, lignite and natural gas that contain a high degree of carbon content are not subject to proper taxation. There is a need for key government agencies, such as, the Ministry of Finance and the Ministry of Energy to collaborate on restructuring the energy taxes to better reflect their full cost.

On electricity production, Thailand is currently adopting the Feed-in Tariff as a mechanism in promoting the use of renewable energy in the production of electricity. The Feed-in Tariff is set in such a way that the more costly renewable energy will receive a purchasing price higher than that of the cheaper renewable energy. In the future, the structure of Feed-in Tariff price differences need to be narrowed so as renewable energy prices are much more equal. When electricity produced from renewable energy are sold at similar prices, the marginal cost of producing renewable energy from different sauces can be thence be equated. A more equal marginal cost of producing electricity from
renewability simply signifies efficiency in electricity production. However, there is a need to introduce some differences in the cost of electricity produced from renewable energy in order to reflect their environmental impacts.

**Forestry**

Forests serve several functions. In the environmental profile section above shows that forest coverage in Thailand is about 10 million acres short of the target. Increasing the forest areas to meet the target will benefit Thailand in many ways, namely, providing a better ecological balance and water regulation, diversify the economy, providing income and jobs, better climate control, and more importantly, providing carbon sink.

Increase the forest area of 10 million acres will not be an easy task especially if Thailand has to rely on the government effort in regenerating the forests. Commercial forestry is a promising solution for Thailand as it will attract resources from the private sector to be invested for reforestation. Currently, there is growing interest from the private business to engage in commercial forest but the current Thai forest laws and regulations are still the obstacles.

The Thai government need to reconsider its position and views on how forest areas can be best managed. The past 60 years show that the public sector did not have sufficient resources to protect the forest, let alone replanting them. Now it is time to reconsider the role of the private sector in commercial forestry and shifting the role of the public sector more towards becoming a regulator in forest management/

**Transportation**

The two major sources of carbon emission in Thailand are energy and transportation. To curb carbon emission, and also other related pollution, such as, PM2.5 Thailand needs to focus on increasing efficiency in the transportation sector. This includes preparation in terms of land use planning and city planning leading to a more compact city concept, reducing the use of private fossil fuel vehicles, and more of public transportation, encouraging the use of renewable energy and electric vehicles, and so on.

**Agriculture**

While agriculture has been a key economic sector and provides income to many rural families, the Thai agricultural sector needs attention in order to maintain its international competitiveness as well as reducing greenhouse gas emission (methane from rice paddy and livestock). Past government agricultural policies have not proven very successful as these policies are not directly targeted at improving farm productivity but rather as a means to ease hardship of the poor farming families.

In this regard, the Thai government needs to rethink its agricultural policy and divorce agricultural policy from poverty alleviation policy. To effectively address poverty issues, there is a need to target government assistance on family basis as each poor family most like to confront different types of obstacles. Therefore, government effort in poverty reduction needs to be family base where education, reskill and upskill, health care, housing and ownership as well as supplementary income are packaged specifically to suit each family need.

As for agriculture, the government policy should then be directed towards improved farm productivity and efficiency in resource utilization. A proper water pricing is needed in order to promote efficiency in water utilization and water conservation. Energy pricing should be introduced in order to divert the farmers from extensive use of subsidized diesel to the use of renewable energy. Farm subsidies need to be reduced in order to reduce inefficiency and wasteful public spending but instead encourage the farmers to engage in a more profitable line of agri-businesses, such as, fruits.

Last but not least, reducing methane emission from agriculture should be a part of the Thai climate change policy. However, instead of adopting the polluter-pays principle like the case of carbon emission from energy utilization, reducing methane from the farms can be carried out via the beneficiary-pays
principle so as to lessen the burden on the farming families. Policy instruments under the beneficiary-pays principle may include, for instance, soft loan for new technology adoption, changing farm products, reskill and upskill packages, or relocation assistantship.

**Sustainable Finance**

- Demand-led financial products and services,
- financial access for SMEs and the underserved groups

[work in progress]

**Research and Development**

Carbon sink, environmentally friendly production and consumption, clean technology, renewable energy, smart grid, efficiency in water utilization, smart farming

[work in progress]

**Manpower Development**

Clean technology and renewable energy, education and university

[work in progress]

**Land Use Planning**

[work in progress]

**9.3 Recommendations on priority areas for green economy learning**

This stocktaking report reveals keys issues that are characteristics of the course of development in Thailand. More importantly, the stocktaking also draws on the successes and failures of policy formulation that have hindered work progress. The issues discussed in this section will provide useful fundamental for further preparation of policy measures that will gear Thailand towards become a green and sustainable economy.

**Maintaining macroeconomic prudence.**

Maintaining macroeconomic disciplines to stabilize the economy from external and internal disturbance as well as promoting long-term growth is a fundamental in shaping the economy towards becoming green and sustainable. Fluctuation in macroeconomics will lead on to cyclical unemployment and a possible reallocation of public budget away from green transition to remedy economic hardship resulted from fluctuations. This instability in the macroeconomics will slow down the momentum and prolong transition process of becoming a green and sustainable economy.

**Improvement in Factor Productivity**

A continued improvement in factor productivity as a means to move Thailand out of the middle-income trap needs to be emphasize. Enhancing long term improvement in per capita income is key to shifting Thailand out of the middle-income country will enable the Thai population to engage in green production and consumption. This improvement in factor productivity will also aid poverty reduction that is a root cause of policy distortions, such as, subsidized energy. Improvement in factor productivity involves greater emphasis on the education system, re-skill and up-skill programs, lifelong education. Productivity improvement also needs to be introduced to the financial sector so as to better allocate financial resources to their best use.
One Policy One Objective

Streamline a policy measure to achieve specific objectives. A common policy failure in Thailand that has significantly dampened the impacts of economic transition towards a green and sustainable is policies are designed to achieve several objectives at the same time. The case of excise tax on energy is a good example. The current energy tax in Thailand is designed to 1) incentivize energy users towards renewable energy, 2) provide energy at affordable prices to the low-income families, and 3) raise revenue for the government. This nature of policy formulation has made public finance unnecessarily expensive as it will not enable Thailand to effectively engage in decarbonization nor can it alleviate poverty. Similar lessons are also seen in other sectors of the economy, such as, agricultural policies are designed to strengthen the agricultural sector while at the same time help reduce poverty. Land use planning policy also aims to improve land productivity while at the same time make land accessible to the poor families.

In these instances, it is imperative that Thailand designs each policy instrument to achieve one single objective. For instance, energy pricing should aim at providing price signals to divert society away from the use of fossil based energy and more towards renewable energy. While poverty reduction measures should be carried out via a separate set of policies that are more targeted at the poor families. Subsidizing energy will also lead to leakages in public funds as many non-poor families will generally benefit from the subsidies as well.

Liberalizing Markets

During the past decade the world saw a remarkable technological improvement in renewable energy. The coat of power supply produced by renewable energy, such as, solar PV have declined and became just as competitive as their fossil counterpart. Also the scale of operation of may renewable technology has decreased in size. These technological innovations suggest that power generation needs to be large and monopolized by state enterprises. In this instance, there is a need to redefine the role of the government in the energy sector. Liberalizing the energy market and introducing competition in the production of renewable energy will not only ensure decarbonization, energy stability but will also help achieve inclusiveness where income is distributed to small entrepreneurs scattered throughout the country as well.

Revision of Laws and Regulations

From interviews with several agencies it is learned that many green initiatives cannot be successfully deployed owing largely to the legal restrictions. Many agencies may aim to engage in green purchases even for a small increase in cost. However, such attempts may not be made possible owing to procurement regulations that require bidding and price comparison. Several laws and regulations need to be revised to enable public agencies to engage in green procurement. Revision on laws and regulations will complement the liberalization of markets discussed above. The case of reforestation is a case in point. Currently, there are business initiatives to invest resources in commercial forestry. Such initiatives will enhance Thailand carbon sink potential, improve ecosystem, provide a better climate control and provide jobs and income. Such initiatives have not been made possible owing large to the forest laws that require timber business and transactions to be under regulations.

Information Disclosure

Information disclosure encompasses disclosure of information related to the production of goods and services or eco-labeling and footprint, disclosure of carbon emission by the entrepreneurs, requirement of information from the degree of sustainability of the companies in the stock exchange. Information disclosure will enable members of society to engage in the promotion, consumption and expansion of green and sustainable businesses without a much need for government intervention.
9.4 Key stakeholders and types of collaboration with PAGE necessary to support the transition to GE (national and international actors)

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